RECORD OF SOCIETY OF ACTUARIES
1995 VOL. 21 NO. 4B

UPDATE ON THE REDESIGN OF EDUCATION & EXAMINATION (E&E)

Moderator: CECIL D. BYKERK
Panelists: JEFFREY A. BECKLEY
ROBERT L. BROWN
Recorder: MARTA L. HOLMBERG*

The SOA Board of Governors in January 1995 approved proposals calling for the redesign of the basic education system to meet the goal of preparing actuaries for traditional, nontraditional and expanded professional roles they are expected to assume in the business environment in the future. Initial work on the design of that system is under way.

During the spring and summer, the Board Task Force on Education and officers of the SOA presented information on the principles guiding the redesign and invited/elicited reaction and ideas from SOA members, candidates and employers.

This session will be used to report on the status of the redesign, as well as the reaction and ideas received from interested audiences. Attendees will be invited to contribute their ideas about how the redesign can be used to meet the educational goals.

MR. CECIL A. BYKERK: I've been Chairperson of the Board Task Force on Education since it was set up about a year-and-a-half ago. Hopefully, the session won't be your first exposure to this topic, but more a continuing dialogue. I'd like to introduce the panelists. We have Rob Brown, who has served on the Board Task Force on Education since its inception. We have Marta Holmberg, the Society staff person who supports the education and examination (E&E) area and has played a key role in this process. We also have Jeff Beckley, who until a few months ago was planning to spend his next year running the E&E system as the General Chairperson of the E&E Steering Committee. We convinced him that he should head up the Design Team. Jeff graciously accepted and has relinquished the upcoming chair of the other committee. Jeff is also a member of the Board Task Force on Education. I would like to recognize other persons here today who have been important to this effort. Godfrey Perrott has also been on the Board Task Force since its inception and has played a critical role. Jeff Allen of the SOA staff also has been heavily involved in this effort. I also want to recognize Bruce Jones of the Design Team. We appreciate all of the volunteer effort that goes into this, and it has taken a fair amount of time. As all of you are aware, the volunteer effort is an extremely important part of what this organization is all about. Recognizing that we need to make a significant change in our education system, we need as many people involved as possible.

As for the presentations, I'll cover the introductory part, then turn it over to Rob to go through some of the principles underlying the design. Jeff will take us through

---

*Dr. Holmberg, not a member of the sponsoring organizations, is Education Executive of the Society of Actuaries in Schaumburg, IL.

the design we've developed so far and I'll wrap it up at the end. We will cover the principles and objectives for the redesign, a status report, our plans, results from the survey, and how the input is being used. Most of you received the report that was sent out in August. It went out to all members of the SOA, the CAS Board, and other interested parties. You'll hear what we've gotten back from those surveys, and Jeff will cover the current course description and design.

When we started this, we asked ourselves, What is the goal? What are we trying to get to? What is an actuary? We considered a number of definitions of what an actuary is, and didn't like any of them. We finally came up with one and, of course, we could debate it for the rest of this session, but it's what we're using as our definition: the actuary is the professional who assesses and manages financial aspects of risk and uncertainty. We think it's a good working definition. Working from this definition, we tried to define the distinctive competencies of the actuary that should be enhanced and encouraged by the education process. The distinctive competencies we identified are unstructured problem solving, flexibility, adaptability to change, expertise in modeling techniques, global thinking, using stochastic and dynamic approaches, expanded application of contingencies, imaginative responses and business value added. Those are a list of core competencies that we feel actuaries of the future will need to have.

We also produced another list that parallels the desired competencies, a list that describes what we're doing today and what the core competencies of the actuary are today. From the parallel lists we tried to track how we need to move to reach the desired goals. From there we will be better able to look at how our system is designed, what we need to enhance, what we need to change, what we need to keep, and so on. The key is that the actuary must be able to demonstrate value added to move successfully into new roles and new markets. There's been discussion about whether actuaries are just receiving a Master's in Business Administration (MBA) and losing their uniqueness. But it is critical that if we're going to maintain the status of the FSA, we must move forward into other areas besides life insurance and pensions. We need to demonstrate to the world that we add value. If we don't do that, then we're not going to be very successful at moving into new roles. I would also say, we won't be very successful at retaining the roles that we play.

The focus for the education redesign is the development of essential mathematical capabilities, with broader business applications, thereby enhancing the core competencies. We can summarize this by saying we're trying to figure out where we're going—we've defined the term *actuary*, we're looking at the core competencies, and we recognize that we need to add value.

MR. ROBERT L. BROWN: Remember that the foundation of our thinking was that we wanted the actuary to be seen as the professional who assesses and manages the financial aspects of risk and uncertainty. We concluded that we do not have that unique perception today. People outside of our traditional employers do not turn to us when they need somebody to assess and manage financial aspects of risk and uncertainty. So, we started work to determine what knowledge and capabilities should exist in the actuary to become that unique professional who will be called upon and can, therefore, add value. This is the other key phrase then, value added.

First, on the knowledge side. The required knowledge should include math and logic; the business content of, and context for, economic security programs; investments and financial vehicles; and asset/liability management. In terms of capabilities, we think the capabilities should include model construction, assumption setting, data testing, sensitivity testing, followed by analysis, communication, and results management. This is all modeling, when you step back from it. These are the essential elements of modeling, and modeling may be the essential element of the uniqueness that we bring to the process that will enable us to add value.

Having decided that these should be the required knowledge and capabilities, we started to lay down some principles for the redesign of our E&E system. First, we felt that we should only examine those subjects that cover essential elements of an actuary's education. It was decided that we could not increase the load on the E&E system, nor the size of the syllabus. We could not add to the length of time to fellowship, nor could we add to volunteer hours that go into making this system work. The system could break if we added any more weight. We also believed it essential to provide a business context with a level of rigor consistent with that of the current mathematical education. Let me tell you quite clearly, we are not changing the way that actuaries qualify, or the type of people that we want to attract. We do not want to walk away from mathematical rigor and attract only people in business programs—that is not the case at all. What we want to do, all the way through the syllabus, is to tell you the actuarial context in which you are working and that context is a business context. We want to include all types of contingencies, not just life contingencies. I guess it would be my goal, someday, to be able to say that we have stopped being hyphenated actuaries. This would be one small step in that direction. We want to include models from outside the insurance and pension fields, not just to be nontraditional actuaries, but to become that single and unique professional who is called upon to analyze and manage uncertainties and risk.

As the next step in the principal setting, we divided the education process into different parts. First is what we called preliminary education. These are elements of the education process that are necessary, but that strictly speaking, are not uniquely actuarial and also elements that are generally available in any good program at a university or college. You can think of examples such as calculus and probability, numerical methods and operations research perhaps. The next segment we defined and labeled was basic education. This would be clearly essential actuarial material, encompassing significant math rigor, but within a business context. These would be knowledge-based skills that all actuaries would need. Certainly, we would put contingencies, risk theory, and modeling in basic education.

Advanced education would include knowledge, capabilities, and skill sets needed by actuaries in a particular practice area. Notice, however, that even though we may be talking about a particular practice area, we're talking about material that is relatively stable over time and not primarily country-specific, because our fourth category is professional development. Here's where we get into compliance and legislation-driven material that is primarily country-specific and time-specific. It's the type of material that with the passage of legislation, could become obsolete overnight and would be specific to the U.S. in 1995 or Taiwan in 1996. That knowledge then would be categorized as professional development. Another principle espoused was that we would obtain each category of education from the best available source. This would include universities for some of the preliminary material, the CAS for material that is, strictly speaking, property

and casualty in nature and might include programs that are available, such as for a certified financial analyst (CFA) designation, that might fit somewhere along the way. We don't try to be all things and provide all the resources. If somebody is doing a good job, let's piggyback on them. Let's use those existing resources.

Let's change gears and talk about some of the feedback that we have received. Everyone was sent the report of the Board Task Force on Education and asked to respond. We have received more than 400 written responses, including some discussion on Actuaries Online. I think any objective person, having reviewed the responses, would say that they have, in general, been extremely positive. The support that we have seen has been strong for the principles and the direction outlined in the report. Statistically, because actuaries have to have something to measure, we've come up with a number of less than 5% who clearly state opposition. There were of course many responses that indicated a concern about the details of the redesign. As the details become available, we'll start to get down to some of the more nitty-gritty comments. There was agreement about the importance of the trends and factors cited. Respondents thought we had captured the essence of the issues. There was particular mention of the importance of communication skills, business acumen, critical and creative thinking and a broader range of problem-solving skills. Further, there was mention of the importance of modeling and management skills and the knowledge of investments.

In terms of some particular concerns and issues raised, we have had more than one person say that we need to continue to test and examine what we have labeled as being preliminary (that is, we don't want you to stop testing calculus and probability). Some of these were from candidates, some from employers, some had the tone of initiation into a fraternity. Jeff will tell you how we have responded, but I want to tell you that none of the suggestions have been ignored. There were many other concerns expressed: Are we going to continue to attract good candidates with diverse backgrounds? We are now calling the early exams attractor/selector exams. Who are they going to attract? Will they be high quality candidates? Will we be able to guarantee that the value of fellowship will be retained, while at the same time, somehow shortening the travel time to fellowship?

That was a goal that a number of people espoused and, within our committee, it's one that we've continued to worry about: being able to shorten the travel time. We have had, and I think for some of us it may have been a bit surprising, a strong level of support for a smaller number of larger exams. We have heard that the flexible education system (FES) did not find support among employers and even among some members and candidates.

Of course, everybody says to maintain the standards and keep the value of fellowship. They say not to do anything to depreciate or dilute it. There were questions about where we will put the Associateship level in the education continuum. Jeff will have an early response, but all of these things are still open for discussion. What about equity in the transition period? It's a little early to talk about the details of transition, but Jeff's team is now starting to consider it, and we have stated that there will be an equitable transition. There were questions about professional development programs because many of these will require attendance, especially for international students. What about the cost? If they are just attendance programs, what about the rigor? We don't have all of the detailed answers yet, but we have listened carefully to the responses and we are responding.

MR. JEFFREY A. BECKLEY: The Design Team, to this point, has concentrated on the basic and advanced areas. The Board Task Force on Education developed four categories: preliminary, basic, advanced, and professional development. The basic and advanced areas are where the SOA will be involved in explicitly providing and testing the subjects. Recently, we have begun to look at the areas of professional development and transition. Since we have just begun the discussions, I have nothing that is sufficiently developed to present at this time.

The basic level, as the design is currently envisioned, would include six courses. There would be no electives, it would all be required courses. The first course is management and quantitative assessment of risk. The second course is introductory finance, economics, and interest theory. The third course is labeled actuarial contingencies. The fourth course covers methods of actuarial modeling. The fifth course covers the application of basic actuarial principles and the sixth course covers investments and asset management.

The advanced level would have two courses: the first course, Course 7, would be on applied modeling and it is envisioned that this would be an intensive seminar. The advanced courses, Courses 7 and 8, are anticipated to be practice-area-specific. There would be an intensive seminar that would address different practice areas, but everybody would take one intensive seminar in their desired practice area. The final course, Course 8, would be advanced actuarial practice. This, once again, would be practice area-specific.

The practice areas covered are not finalized at this point. There's a good chance that there will be separate finance and investment courses. There's a chance that the retirement systems courses will be specific to the U.S. and Canada. For the rest of the practice areas, it's not envisioned that there will be separate U.S. and Canadian courses, although there may be a small amount of nation-specific material. If you remember, one of the principles underlying the Task Force's report was that regulation-driven and compliance-driven material, should be part of professional development, where feasible. Now I will run through the general content of each course within the design.

Course 1 covers management and quantitative assessment of risk. It would probably concentrate on three areas: identification of risks and how risk affects businesses and professionals; mechanisms for handling risk; and the fundamental tools for quantitatively assessing risk. In attempting to determine what the first course should be, we kept certain objectives in mind. Those objectives were largely spelled out by the Board Task Force.

We thought the course should give students some insight into what an actuary does. Course 100, as it's currently structured, would make an actuarial student think that you spend your time doing calculus or linear algebra, in other words, that it's highly mathematically driven. It's not until you get through the first two exams in the current structure that you get into anything other than pure math. Not until you get to the core level, do you get away from the mathematically driven courses. Course 1 in the new system would still be highly mathematically driven and I'll comment on that shortly. The mathematics that would appear would be in the context of risk management and we believe that context gives the student some additional insight as to what an actuary does.

The second objective was that the course should require the student to demonstrate a certain level of mathematical skills.

The third objective was that the course should attract, or select, candidates with appropriate skills. We can argue, as we have in the past, whether any exam can do that. The phrase we came up with was that the course should do a reasonable job of attracting/ selecting the right candidates and I defined "reasonable" to be better than the current Course 100. We believe as a Task Force, and also as a design team, that this course achieves that objective. We also felt, both from the student's standpoint and from the employer's standpoint, that the first course should give the student and employer some indication of the future success of that student, both within the actuarial exams and upon completion of the exams, and particularly the former.

If we go back to Course 1, the third area addresses quantitative assessment of risk. We envisioned well over 50% of the exam will focus on the assessment of risk and that this assessment of risk will be based upon using calculus and probability and elementary statistics to quantify that risk. This is somewhat contrary to the Task Force's principle that we not test elementary or preliminary subjects. We received a strong indication that the membership was not comfortable with completely eliminating the testing of preliminary mathematical subjects.

A second reason for including the information is that we hope to move forward with jointly sponsoring exams with the CAS, and that makes it important to test this material for the near term.

The third reason stems from the Board Task Force's report in which the basic principles are discussed, then the attractor exam is discussed. To some extent, there's a conflict between attracting the appropriate students while they're still in college and yet not testing preliminary subjects. So, we thought that it'd be very tough on students to start them with Contingencies as their first exam. We felt that the first exam, or the first two exams, need to be set up so that a student with a reasonable amount of self-study, which we would define as minimal, could take the exams based on courses that are readily available at most colleges and universities.

For those three reasons, we envision the first exam containing a fair number of calculus, probability, and statistics questions, all within a risk management context. We're trying to accomplish a number of objectives within one course, and we feel this exam does a good job of meeting the objectives.

Moving forward, course two is labeled introductory finance, economics and interest theory. I should point out that we should change the order of this title because the "introductory" only applies to finance; the interest theory and economics covered are not considered introductory, at least not by our standards (although an economist probably would consider the economics introductory). We would include both microeconomics and macroeconomics within that course. We would envision that a student who is taking a finance course, macroeconomics and microeconomics courses, or perhaps an in-depth economics series that covered both, as well as interest theory, could take this exam. We envision that the economics and the finance courses would be available at most colleges and universities, and the interest theory course would certainly be available at colleges

and universities offering an actuarial science major or minor, and at most schools that have preactuarial programs.

Course 3 would cover actuarial contingencies. We would envision this as covering the theoretical basis of the actuarial models for contingencies and applications of those models to insurance and financial risks. We envision this course as covering both individual and collective risk models. It would cover life contingencies and other contingencies.

Course 4 would be methods of actuarial modeling. This would introduce modeling: what models are and how they are used. It would explain data selection, data analysis, analysis of results, and reporting the results and management of the results. The methods would include regression, forecasting, survival analysis, credibility theory, analysis of loss, and frequency distributions and simulation techniques. We would envision that the first two exams and this fourth exam would be the prime candidates for joint sponsorship with the CAS.

Course 5 would cover plan and product design; applications of design to the coverages for contingencies; risk classification principles and techniques; principles and practices applied to pricing, rate making, or funding; marketing, distribution, and administration; and valuation of liabilities, or funding in the case of pension plans. It's envisioned that this would be an overview course that would emphasize common principles between different practice areas and would provide an integrated approach. It would not address issues, say for life insurance, then address them for health insurance, and then address them for financial retirement programs. Rather it would look at all the programs at once and address the different areas and look for the commonalities, the principles that are appropriate, that are applicable to all of our areas of practice.

Course 6 would cover investments and asset management, including investment vehicles and the financial markets, application of asset/liability matching tools, derivatives, and portfolio management. This course would be the last of the basic courses.

Course 7 would be the beginning of the advanced courses. A candidate would need to have completed all of the first six courses before Course 7. Course 7, as I mentioned earlier, would be an intensive seminar on applied modeling. The details on this are not nearly as well developed, at this point, by the design team. We have been concentrating on the first six courses and feel fairly comfortable with those at this point. We have discussed Courses 7 and 8, and I will share with you where we are in their development. With regard to Courses 7 and 8, they would be practice-area specific. With Course 7, there may be a good portion of the seminar that would be common to everybody, along with a portion that would be practice area-specific. We're still formulating our thoughts on this. We would like to look at the applied modeling as practical applications and considerations in modeling, selecting the model, analyzing the data going into the model, evaluating the output that we get from the model and then communication of results, which we think is a critical portion of any modeling process and a critical skill that this intensive seminar would allow us to enhance and draw upon.

Course 8 would be entirely practice area-specific. I will cover Course 8 to illustrate our thinking. This course is on finance and investments, and until a few days ago, we were

looking at this as being one practice area. We're now probably looking at splitting that into two areas. But let me give you an idea of what a Course 8 on finance and investments might have covered: management of capital for financial institutions, advance portfolio management applications, derivatives, financial management issues for financial institutions and perhaps principles of taxation. Taxation would not mean do a core dump on what the U.S. tax code or what the Canadian tax code is.

One final comment before I hand this back to Cecil is that Rob said we are not decreasing the mathematical rigor of the exams and that may not be 100% clear from what we have presented here. But, I think that if you look, for example, at course four, the methods of actuarial modeling course, and you think that course is not mathematically rigorous, I think you'd be surprised at how mathematically rigorous it is. Also, many of the evolving areas in the investment and finance areas are quite rigorous mathematically. I went to an earlier session led by Hans Gerber which demonstrated how the standard actuarial approach to contingency theory can be applied to option pricing. It was extremely intensive mathematically and while that material isn't on the current syllabus, the Black-Sholes formula and its application is. There's some very rigorous math that's involved with some of the investment courses. So, we may not be testing probability and calculus to the degree that we currently are testing it, but to consider this design not to be mathematically rigorous would be a big mistake, because I sincerely believe that it is.

MR. BYKERK: Now I'd like to review how we responded to the membership, what we have yet to do, and then talk about what the next steps in the process are. All of us talked about what the membership said, based on the report released in August. The first course, testing preliminary math, is the area where we have responded the most in the design. This concern actually came out at the Board Meeting, before we went out to the membership with our report. If you go back through the history of the Society to the 1930s and look at the various syllabi we have had, you'll see we had four exams on calculus, three on analytic geometry, two on trigonometry, and so forth. It is obvious we have changed over the years. I think the design that we've come up with will initially have the ability to test, in a very rigorous manner, specifically some of the types of problems in Courses 100 and 110. Perhaps they will be worded and structured differently. I believe that we've set up a system we can gradually change if we want to do that, so that we can look at other things and not spend so much time on testing general math. But, right now, the membership is very concerned that we're going to make a 90 degree turn, or perhaps more than a 90 degree turn, if we don't continue testing at this level.

Attract good candidates with diverse backgrounds. Again, that's something we've heard throughout the discourse from the membership, from the Board, and so on. The design allows two possibilities. The first course would attract very similar candidates as we do today. But Course 2, we think, may be an attractor to a different set of candidates, candidates who have business focus, but who have a very strong foundation in mathematics. So, we think that we might be able to actually have two attractor/selectors, and that's very positive to us.

Shorten the travel time. The concern with travel time was expressed in conjunction with support for having fewer but longer exams. We didn't specify a goal to create fewer but longer exams, but the initial design ended up that way. The first time we presented this, a month or two ago, we seemed to tap pent-up feelings people weren't expressing. The Board certainly expressed it when we went to it with this design. Travel time is

lengthening. The average number of credits that students are writing is decreasing and has been since we implemented FES. There are some very positive things about FES. I believe this new structure will take care of the reasons for implementing FES. This is supposed to be enduring, core material, and if that's the case, we shouldn't be having to change it very often. I will also add, because we are aware of the downside of going with longer exams, that it affects people who have been able to use the new system to accommodate lifestyle choices or life demands. We realize and understand that and have to work our way through it. It's a balancing process.

Assign appropriate level of ASA. We started out with a working principle that the level required for the ASA wouldn't change from where it is today. I will tell you that some people think we should do away with the ASA. There are issues concerning whether to have the ASA signify mastering the basic and advanced courses and then have country-specific FSAs. There are all sorts of different approaches, but we think the working approach is that after exam six, after completing the basic courses, that's when you get your ASA designation. There have also been suggestions that we move the fellowship admissions course (FAC) down to the Associateship level, and make it a professionalism course required for membership. All this is subject to review.

Things we feel we need to address more before we have a sense that we've fully considered them include the need to maintain standards. That's going to be something we need to be aware of all the way through the process. This is not to say that we lowered the standards, but the concern should be one of the guideposts as we design this system, as we put the syllabus together, and so on.

Maintain the value of the FSA. That's something we will continue to think about, continue to observe, and continue to get feedback from people. Besides the various meetings, we've gone around and talked at local clubs. There's also the membership input that we've gotten back from our report. In addition, the Board Task Force members took a slate of CEOs, board chairpersons who are actuaries, and some nonactuaries, and we called these people and talked to them about the proposed system. I talked to several people and received very positive responses. Those individuals are some of the key people we're going to have to go back to and say, "Here's what we have done. Do you think this maintains or even enhances the value of the FSA for you?"

Provide equity to candidates affected. This point is obviously important; that's been touched on in earlier remarks. We will continue to address that as we work through the transition. The cost and rigor of professional development will be other issues we will consider as we work on professional development.

Other steps in the process. Right now we are putting together a review group. This review group will be a loosely knit set of people, at least 100–150. We will mail them the design and other information and ask for feedback. We're trying to get a balanced group of people representing various perspectives. We have asked the Board for recommendations and asked all the Sections for representatives. We've gone to various constituents, and we'll try to put together a very balanced list and err on the side of having a larger group rather than a smaller one.

Establish preliminary subjects. Since some of the preliminary subjects won't be tested directly, we won't be putting out a syllabus for them. We will develop a syllabus for the

basic and the advanced courses, but we feel that for the preliminary subjects, it is more a matter of saying you should have covered these subjects before you start the process.

Define and establish guidelines and parameters for the professional development. We've already mentioned that there's much work yet to be done on professional development.

Work with the CAS on potential joint exams. We're beginning to work on that right now. We have liaison members from the CAS on both the design team and the Board Task Force on Education. I'm a liaison member to the CAS counterpart to our Board Task Force. The CAS is getting started a little later then we did, but we believe we're very close to establishing some committees across the two organizations, and perhaps we will establish similar arrangements with other organizations that jointly sponsor our courses.

Establish principles for transition rules. We've been there, done that, but we will go through it again. We want to make sure that the rules are truly equitable and sensible.

Set priorities as to which parts of the system come first. I guess that sort of segues into our timetable. So, I will answer the likely first question someone would have asked, which is, When do you see this going into effect, and how should I structure my exam taking in order to accommodate it? We don't know for sure. We're still actively designing the system. My guess is, the earliest we could say this will be implemented is, maybe at best, late 1997, more likely 1998, or somewhere in that time frame. It depends how quickly it all comes together. When we look at the transition rules, what kind of transition will we need to have? There's been discussion about having a dual system for a time. Marta starts shaking when we talk about running parallel systems for a year or two years; that makes us all very nervous. We think if we do the transition rules right, we won't have to run both systems in tandem. The other part of the question is, people are beginning to alter their exam taking based on what they think might happen. Actuaries are supposed to do projections well, but I don't think it's a good thing to start projecting this outcome, assuming that you can outguess any of us. Our recommendation is, because we will have a very equitable and fair transition, don't alter anything you're doing today based on the fact that we're doing something with the system. Go ahead, take your exams as you otherwise would. For those of you who are FSAs, if you have students that you counsel, please advise them not to alter their exam-taking approach just to fit this thing. We aren't close enough to the finish to know how it's all going to work.

MR. MICHAEL P. HEALY: I'd like to ask two questions. You talked about preliminary, basic, advanced, and professional development. Is professional development additional course work that you didn't outline here? The second question was to give some insight into the thinking behind the intensive seminar. The problem I have with seminars, in general, is that you bring people into some area for a week or so, and I think there's probably a reluctance to not pass people. I wondered if you could maybe elaborate on why you think a seminar makes more sense than more traditional testing methods.

MR. BYKERK: I might just say a couple words about your first question, then I'll turn it over to the other people. The reason we haven't said much about professional development today, is that we have just now gotten professional development to a point where it makes sense to discuss a working design. The idea here is that professional development would cover subjects that are country specific, temporal in nature, that tend to evolve

quickly, and so on. These subjects are the same types of things that all Fellows who are staying current in their job do, as continuing education, on a regular basis. The delivery vehicles might be seminars. They might be meetings like you've been attending the last few days. They might be tapes; they could even be formal courses. We haven't yet defined all the delivery vehicles. We feel it should come from a core of programs. You wouldn't just take *x* credits or the *z* courses needed to satisfy the professional development requirement to become a Fellow. You would take those courses and then continue professional development programs to enhance your skills and stay current. But, one of the issues that comes up is, Will professional development be tested? and Will we have the same kind of rigorous exam process? There may be some parts of professional development that are tested. There's the issue of where the EA1 and EA2 exams will end up. Will the EA exams be part of course eight or will they be professional development? There may be delivery vehicles that are in fact tested. But, right now, we think that is not the approach that we will be taking. I'll turn it over to whoever might want to address either that question or the second one on the intensive seminar issue.

MR. BECKLEY: There are a number of reasons the design team supports the use of an intensive seminar. I should point out that we do think we'll need to make alternatives available to foreign students, but, by and large, the intensive seminar would be a required course. We believe that there's significant educational value to be gained by the intensive seminar format, as opposed to the self-study exam format. We believe that for the applied modeling subject, an intensive seminar is the best educational vehicle, not a self-study course. It is anticipated that there would be an objective evaluation of the students at the end of the intensive seminar. Not all students would pass.

On the other hand, we also don't believe that we need to maintain a 40–50% pass rate on the intensive seminar to make that objective evaluation sufficiently rigorous. A low pass rate would result if people don't demonstrate that they've learned the basic and fundamental material that we think they should learn through the intensive seminar. But, basically, we think that there's much educational value to the intensive seminar and that it's the best vehicle for delivering the applied modeling material. There are several side benefits to the seminar. There would be a definite emphasis on communication skills—interaction among students during the week. We think that the people teaching the intensive seminars would include both college professors and business faculty (the business faculty being people who are working in the field). Their involvement would add considerable value to the educational process.

FROM THE FLOOR: I probably fall into the general category of people who approve of the direction, but have a few concerns. There are several things that I'm excited about in the new program and then a couple of suggestions that I hope will be constructive. First of all, I'm glad to see the change to fewer and longer exams. I think the process has become very Byzantine in the last few years with all the specialty tracks. It seems every six months there's a need to sit down and map out the whole plan again. That shouldn't be the case, so I think that's a good change. I hope that you'll consider offering each of the exams every six months, especially at the basic level, as you move to large exams. You've already mentioned you have a concern with people being able to plan the rest of their lives around these. When you have to study for a big exam, it's helpful to have the chance to do it every six months. I think that would make it easier for people.

I was a little surprised by the reluctance that I heard earlier from some of the folks on the Board Task Force to test the preliminary topics and, in particular, probability and statistics. I'm glad that you've gone back and added some more material, because I think that's advantageous, not only from the employers' point of view, in identifying good candidates, but also from the candidate's point of view. Probability and statistics are crucial to understanding contingencies and mathematical modeling and every other subject on the syllabus. I guess I question the assumption of whether everyone gets that background in an undergraduate education. I came from a liberal arts school which has a superior mathematics program, but it's geared very much toward what they call pure mathematics; it points you into graduate school and analysis, topology, and analytic geometry, and that sort of thing. I don't think it's fair to assume that all of your future actuaries have the opportunity to get that kind of exposure. So, I encourage you to keep testing the statistics. Finally, I just wanted to make one suggestion and that is, don't try to accomplish every part of an actuary's education through the exams. I see the process of becoming an actuary almost as going through medical school and doing your residency simultaneously, because you are working while you're taking the exams, and experience is a big piece of the education. Don't lose sight of that, and don't necessarily feel that every aspect of the education has to come from the exam syllabus.

MR. BYKERK: I might add to the last part of your comments. The basic premise of the approach we are taking here is that we will not attempt to cover every single thing. In fact, although you may not agree with it, on the front side that's exactly what we were thinking about; we are not experts in calculus. We should be able to do calculus well, but there's nothing unique there about being an actuary. So, we thought there were better vehicles for the delivery of calculus and those types of subjects. I would maintain we don't educate now on calculus or probability and statistics—we examine. We shouldn't be telling you what you should be studying for in your particular niche of the world. You're the best one to know that. That's the concept here, shrinking this thing down to what is the very basic, hard-core part of what it means to be an actuary. I appreciate your comments.

MS. LINDA M. MCCULLUM: I have a question that follows along the lines of examining versus educating. You talked about the skills that you want actuaries to have. One of the skills that you pointed out was unstructured problem solving. I'm wondering, from all the panelists, what are your thoughts in terms of how you teach somebody something like that? If you can, are we planning on it? Then, also, how do you evaluate that skill?

MR. BYKERK: I'll turn it over to our professional educator here, first.

MR. BROWN: That was one of the strongest reasons that I saw, on a personal level, for the use of the intensive seminar. You can get into some good unstructured problem-solving, when you get together with others in a classroom. It's very difficult to examine when there is no clear, correct answer. However, having said that, we are already attempting to do more of that type of questioning and will continue in that direction. Let me give you an example. Instead of somebody studying social security and writing an exam on the benefit for a 37-year-old widow with a handicapped child, attending college and age 19, we might say, What are the alternatives for the funding of social security in the year 2030? There's no uniquely correct answer to that question and that's the type of unstructured situation in which we'd like to see ourselves. On a personal level, I believe

it's much easier to do those types of things in a seminar setting than it is to put somebody in a room, having read some material, and have him/her take a three-hour exam. That would be one of my strongest defenses for the seminar.

MR. BECKLEY: I also think with the concentration on basic principles, it's easier to ask questions that are unstructured and that rely on those basic principles. It may be tougher to grade those questions, but it certainly is easier to ask those questions than it is when the material you are studying concentrates on details of a particular country-specific social security program, for example, or country-specific laws and compliance-specific material. If the material you study covers basic principles and we ask you to apply those principles to a given problem, you should be able to do that, whether it's a problem that you've seen before or not. It's going to be hard to grade, but we have been doing some of that within the Fellowship courses already.

MR. BYKERK: One other comment about unstructured problem solving. We do feel that that's an area where we need to provide some education or gear our education in that direction. In listing the core competencies for actuaries, we recognize that some of those core competencies are not explicitly addressed in the exam structure. But, in trying to educate future actuaries in what we think is important for being an actuary (that is, identifying those core competencies), as the supervisor of a student, you want to sit down with the student and say, here are the things you should be working on. You'll get some of these things through the exams. Other things you're going to have to work on yourself.

FROM THE FLOOR: A few years ago when future exam methods (FEM) was proposed, there was talk about granting credit for university courses. I was wondering whether for this system you might consider requiring a particular number of credit hours in calculus or probability and statistics, to sit for the exams.

MR. BYKERK: We've addressed that in one respect. There's an issue that has arisen about whether or not we should have a requirement that you have a bachelor's degree or higher, but, at this point, we've felt that the issue is outside the scope of our effort here. Surprisingly, it's very controversial. But, in any case, we have tried to stay away from that very thing. We will gather and put together a list of preliminary courses or preliminary subjects, and we will say to individuals, you need to have knowledge in these areas, you need to be able to do these kinds of things, and so forth. From a personal point of view, I want to stay far away from anything that says you have to have so many hours of college credit because we'll just open up a Pandora's box. We had a very divisive thing eight years ago and I don't want to relive that. I guess my view is, you list the preliminary subjects and skills, and then you put it to the individuals that they're responsible for making sure that they know those things. Those areas are not uniquely actuarial areas.

FROM THE FLOOR: I have one comment and two questions, all unrelated. The comment is about the intensive seminars. I just recently earned my ASA. I took the intensive seminar on Applied Statistical Methods. I feel as if I bought ten credits. The seminar was very good and I learned a great deal of information. At the end of the seminar, I was ready to be tested on everything that had been taught to me during the week. I don't believe today I could do any of those things. When you take an intensive seminar, you're trained intensively and all the material sticks in your head, for the short term. Maybe a month later would be a more appropriate time to test that material.

Somewhat related is the issue of cost. My first question is, How much is it going to cost people? It is prohibitively expensive for actuaries to go through the process, as it currently exists, if they're not sponsored by a company. I know that in many cases, in the consulting field, you're not sponsored by your company. You have to buy your own computer in many companies. You certainly have to pay your own professional designation fees, buy the materials, and so on.

I was just adding up things today. It now costs $290 for dues. This seminar costs $650, lodging $875, food I factored in at about $100, my current exam fee is $420, and exam materials about $700. That's $3,025 for this six months. Intensive seminars, of course, will have the plane fare and the registration fees. I think cost is something that needs to be addressed and I was wondering how you will control costs.

My second question is: I'm not as worried about the integrity of the FSA designation after the process gets changed because the designation, I believe, will be enhanced by at least the principles of this new function. What I'm more worried about is current FSAs, who have a designation that will be completely different from the designation that the new FSAs will have. How do you communicate to the rest of the world, especially when we're trying to get people into nontraditional areas, that an FSA earned in 1960 is the same as an FSA earned in 1999?

MR. BYKERK: I'll give my two cents worth on all three of those, then I'll turn it over to Rob. With respect to a core dump on the intensive seminar, it's probably a valid point. I can tell you that when I took the Fellowship exams back in the early 1970s, after I forgot the mnemonic to tell me which items to list on some particular question, or I came upon a real live work problem that required me to remember those items, I couldn't remember them either. It's a bit facetious, but I think we've had that kind of thing forever, that last cramming of material. It's true with the actuarial exams. It's true with college courses. The people that do the all nighters and then go and do well on the exam, two days later they can't spout that back. But, it's a valid point and it's something we'll have to address with the intensive seminars. We've talked about having the individuals do a fair amount of work beforehand, such as, maybe submitting something before they come to the intensive seminar, to show that they're prepared.

With respect to cost, there are several issues. The obvious one is the cost of taking the exams under this system. But, what are the financial implications to the SOA? Right now, the education system helps support the overhead of the SOA office, as it should. We have to examine exactly what's going to happen. If we chop some exams here and chop some exams there, what's left? What about the last question of the value of the FSA? Well, my feeling is that there will be no asterisks. There will be no distinction because I personally feel that we can give future actuaries a leg up in trying to move into the 21st century, to develop these new processes, and so on. I think that current FSAs, if they want to be active in the field, have to learn all this on their own. With the formation of the professional development courses, you will find that current FSAs will use those vehicles to reeducate themselves. We may even have people go back and write courses, just to brush up on things. I think it would be wrong to have any kind of designation that indicates that these are different FSAs.

MR. BROWN: I believe a number of my answers to your questions will relate to the idea of a free market. The cost factor will be answered by the free market. If we have a

number of students that need to take intensive seminars, the seminars will be offered in a number of places. Also, with modern technology, I think we can put the early part of the program on CD ROM and make it available to somebody with a home computer that costs less than $2,000. Now this is just me speaking, but if we're going to change the FAC to a professional admission course, so that it would come along with the ASA, and then course seven is an intensive seminar, there might be some logic for enabling people who have to travel any significant distance, to combine the two. That should be relatively easy. We'll do things and the free market will do things to make sure that costs are kept under control.

Your final question on what's a 1960 Fellow worth? I'm a 1976 Fellow and of course one definition of an actuary is an actuary can prove that the exams he or she wrote were tougher than any other set of exams, before or after. The toughest set of exams ever written by any actuaries was for the cohort between 1968–76. But, I would mention, I've written both property and casualty exams and SOA Exams. Property and casualty exams are remarkably different from the Society exams, and the free market has never had any problem figuring out what a property and casualty actuary is worth, or worried about the fact that the exams are different for a property and casualty actuary and a Fellow of the SOA. Anybody that earned their Fellowship in 1960 and has kept current will have value added and will find a good place in the market. A good property and casualty actuary who stays current will find that he/she has value added and will find a place in the market, and so will you and so will I.

MR. BECKLEY: I actually was talking to Marta about this idea of having the FAC at the same time as the intensive seminar, but talk about pressure to pass! At the end of a certain number of days, they would put a list up on the board and if your name isn't on the list (as passing) you'd go home.

MR. MATTHEW S. EASLEY: First, I'd like to say I agree strongly with the focus on testing enduring material. I think one of the big irritants in taking the exam, as I recall, is studying material that was about 20 years out-of-date, from the *Group Insurance Handbook*. It was probably one of the bigger wastes of time. That book was very good in some respects, but there was a great deal of material in it that seemed inadequate. Also, the rate of change of regulation. Obviously people who are in a particular practice area need to know that. But, I don't see that as having any part of deciding whether somebody is a competent actuary. If an FSA left the country for ten years and came back, he or she would have no idea of the current regulations, but I wouldn't think he or she would be any less an FSA for having lost touch with those specifics.

The design of risk systems is one thing that I think was sort of implied, but I didn't see it specifically labeled as one of the core competencies. If I missed it I apologize, but that would be one that I would include as very important to me. Our ability to understand the nuances, the design and the structuring of risk systems is as essential to what we are as a profession as the application of contingencies. I think it would be good to make that more explicit.

I also want to consider Courses 100 and 110. One thing these exams do is attract math majors, who have been a very central part of who we are. The proposed courses, I think, will attract some very different people. Even with the changes, they still look like they will attract people with economics, finance, and business interests, which is fine, in one

sense, but not distinctive. I think one of our distinctive characteristics is our technical quantitative skill, and I think we need to attract the best math people, who also have an interest in business, as opposed to the best business people, who also have an interest in math. I think that's a very important distinction that we need to make in this process.

The other thing I would comment on about Courses 100 and 110, whatever they will be under the new arrangement, if they survive, are both cheap and objective. They're cheap because of the material. It doesn't require a great deal of effort on our part to design those exams, or to give them, compared to the other exams. You don't need a committee designing questions. We use a standardized testing service, ACT, so we're not talking about much effort. There's not a volunteer committee that spends lots and lots of time. It's fairly inexpensive and I think it would be a mistake for us to abdicate our roles in assuring that there's a minimum level of mathematical competency in people coming in.

I have one question in that context: I notice in Course 2, there's a large number of undergraduate material on economics that I believe would be just as available as calculus on the typical college campus. I'm not sure why we're giving preference to economics over mathematics, in terms of testing freshmen and sophomore level class material, but it seems like we're putting greater emphasis on economics than we are on mathematics.

MR. BYKERK: Regarding the cost of the ACT exams, they are money losers for us.

MR. EASLEY: On the larger size of the courses, it used to be a problem before FES that people would pick their own exam out of the material. I think it's important that the group deal with that issue. People could study two out of three topics, know them cold, and skip the one they didn't like. I think that was a bad thing and FES may not have been the best way to fix it, but I think it's something that should be kept in mind.

MR. BECKLEY: We had minimum standards on some exams and minimum internal standards to address that issue.

MR. EASLEY: On the advanced courses, I would consider requiring people to sit for two areas (Course 8), rather than one. A person that sits for one area thinks he/she knows the whole world. Once they've taken the second area, they've been disabused of that idea. Regarding the idea of flexibility, I think, again, if you're going to collapse it down to core principles, then ask people to cover two areas. Going back to the idea of the seminar, if the seminar is going to be an involvement, and perhaps not a test in the sense that we're most used to, perhaps that wouldn't be unacceptable. On the seminar, I would suggest that maybe some preparatory material and a pretest for attending would be one way to get some more rigor into the process. I think that would allow people to participate more effectively, than if you simply just allow anybody to show up by paying a fee. I think Georgia State has used pretests for some of its courses over time.

It's not an original idea, but it might have application here. An example of material that I think is worth dropping are EA exams. They are licensing exams, and I don't know that there's any real loss in dropping them from the FSA syllabus and leaving them to be picked up outside the exam system by people who want to practice in that particular area. I am an EA, so I am commenting on my own area.

MR. BYKERK: There are other people that would disagree with you very strongly about that. I'm not sure where I'm at on it. There are other individuals on the Board who don't want to drive the pension actuaries away from the SOA. There's some sense that if we disregard the EA exams the pension actuaries will believe that we are not concerned about them and go their separate ways.

MR. EASLEY: Last, I'll comment on the professional development piece. I would suggest that maybe some of that could be considered post-FSA, as maybe an enhanced continuing education requirement, after Fellowship, perhaps during the first three to five years after achieving the FSA, rather than trying to imbed that in the pre-FSA period. I think that might be more effective and it also, maybe, would make those courses more attractive and available to the other FSAs, to get their involvement.

MR. BECKLEY: I'd just say that several of the comments that Matt made are comments that we have heard, some very recently. They are not reflected in our design.

MR. STEVEN C. SCHNEIDER: I'd like some comments or clarification on what seems to me as somewhat inconsistent treatment of the basic math material and economics material. I know there's been a great deal of talk about whether or not to include the material from Courses 100 and 110. Frankly, I can see both sides of that issue and it's not an easy decision. However, we seem to be universally zealous in adopting economics and finance material on the exams when there are probably at least as many universities and places where you can get that knowledge, besides through actuarial exams. Maybe that's what I need clarification on. Do we think we can do it better than the universities in certain ways, or are we going to, in fact, use universities to train people that way?

MR. BYKERK: That's a good point.

MR. BECKLEY: Fair comment. Why are we testing economics? Isn't that a preliminary subject? Sometimes you can't see the forest for the trees. It's an issue that I think the design team needs to look at. That's a very fair comment and certainly one that we have heard earlier this weekend.

MR. BYKERK: I'd like to add a couple of comments. I think this whole attractor/selector issue is a complex one. On the one hand, we're saying we do not want to have in our core material those things that someone else can do better. We also can't just start out with contingencies and expect to attract people into the profession. Courses 1 and 2, as currently designed, are where our thinking is. A good student in math could write Course 1 at the end of his or her second year of college, if he or she takes the time to cover a 30–50-page study note on management of risk. The other course, Course 2, it is thought, could be taken at the end of, maybe, the third year of college. Are we educating in the case of Courses 1 and 2? I would say only a modest amount, but we're testing. When we get on to Course 3, with contingencies and so on, then we are taking on the education and examination part of it. Then when we get to professional development, we're educating, but not examining, probably. I think we have to have a piece of the puzzle that doesn't quite fit the full criteria that we set out because otherwise, we're not going to get anybody entering the profession. By the same token, we have not just turned the whole thing over to the universities and said, submit a transcript with x hours of economics, and so forth, and we'll let you through. We are going to examine it. I think there is a bit of an inconsistency, but I think there's a compelling reason for it.

MR. BROWN: You will see the impact of your comments today. I would suggest, right off the top, that the amount of material, or the level of importance, in economics will be reflected the next time you see an iteration. But, let me assure you that there is a great deal of math. Course 1 is more than 50% mathematical. In Course 2, all of the finance and interest theory is math. The interest theory today would probably be Stephen G. Kellison's book *Theory of Interest,* if we had to pick one today, or Samuel A. Broverman's *Mathematics of Investment and Credit.* Course 3, contingencies, is all math. Course 4, methods for actuarial modeling, except for the communication of results, is all math. I don't know whether we're going to attract mathematicians as well as we might today, but there's no way that you're going to be a fully qualified actuary and not know your math. I'll guarantee that.