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2005 Education System Redesign

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Summary: In 2003, the SOA's Board of Governors approved a redesign of the education and examination system. Since that time, considerable progress has been made with regard to implementation. This presentation gives the attendees a review of the proposal, progress made to date and implications for actuarial education and training programs.

MS. MARY ROSALYN HARDY: I have two roles in this session. I'm the moderator and I'm speaking. As moderator, I'd like to welcome you all to this session. There are issues around the 2005 redesign that appear to be quite controversial, and so we're hoping for a lively discussion. We're planning to leave a good length of time for questions for debate at the end.

Warren Luckner has been involved in the redesign and is going to give you a description of what's happening from that viewpoint. Then I will speak. I haven't been involved at all in the redesign, and I want to throw up some issues from the viewpoint of somebody who's looking at this from the outside, as an academic and someone who has a certain amount of sympathy with students (but not entirely), and also from the point of view of someone who has been involved in education systems elsewhere. Then we'll have some discussion.

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the faculty of the University of Nebraska and the Lincoln actuarial science program for nine years. He left Nebraska for the opportunity to serve on the staff of the Society of Actuaries. As a member of the SOA staff, he served in various education and research capacities for 14 years. Subsequently, he served as associate professor of mathematics and director of actuarial studies at Benedictine University in Lisle, Ill. He returned as director of the actuarial science program at Nebraska last fall.

MR. WARREN R. LUCKNER: Mary Hardy answered the question of why I'm here and who I am. I'd like to get a sense of why you're here and who you are. First of all, is there anybody here who is involved in an actuarial science program as an instructor or teacher? Okay. Is there anybody here who is responsible for an actuarial student program at his or her company? There seem to be a good number of people. That is an issue. We'll talk a little about that. Is there anybody here who anticipates participating in this system to achieve his or her Fellowship? There are a few more. That's good, although we have a couple of more years until it gets fully implemented, so maybe you won't have to participate in it. Maybe you will get the value out of participating in it.

Neil Parmenter in his remarks yesterday morning mentioned that the Society of Actuaries is embarking upon an image campaign. One way to look at the goal of any change in the educational and qualification process is to look at how it changes the image of the actuary from someone who is obviously suffering the agony of defeat to someone who is obviously experiencing the thrill of victory. On a more serious note, one way to characterize the motivation for any change in our education and membership qualification process is that the goal is to improve the education of those who would attain the professional credentials, and, ultimately, the quality of service that they provide to their employer, to society in general and to the profession.

As you're all aware, the structure of our educational qualification process involves three components: preliminary education (PE), associate education and Fellowship education. The new redesign is being implemented in phases consistent with that structure. The PE part of it is ready (or close to being ready) to be rolled out in 2005. We still have some exams to prepare and things to do, but we're well along the implementation plan for that. The Fundamentals of Actuarial Practice (FAP) Course, which is a new, innovative approach to finishing the associateship qualification process, will be rolled out in 2006. The Fellowship education component will be rolled out in 2007.

The goals of the redesign reflect a fundamental challenge that we have whenever we do education and membership qualification. The first two objectives are to provide a syllabus that is more relevant to actuarial practice and to prepare actuaries for the future. They represent the balance between trying to provide education that is relevant to current practice and education that is relevant to enhancing current practice with new theory, an education that will help future

practice. There's a little tension there. There are some difficulties in identifying what's appropriate to include because of current practice and what's appropriate to include in order to improve future practice.

The third objective is to reduce "travel time" to completing the process. That objective is a practical one that has been an ongoing issue. There has been a long-standing concern that we in the actuarial profession are losing students, who have the skills that we want to have in the profession, to other areas, primarily because of the long-term process we have for qualification and attaining professional designations compared to other similar areas that can provide the same types of rewards and work that we do. Those goals motivated the redesign. One way to look at it is that the redesign is trying to meet those goals.

We went through many steps in the redesign, beginning in January 2002. We also had communication with membership at various points about the redesign. In March 2004 there was a Webcast. Since that time, the things that are most active are the joint Casualty Actuarial Society (CAS) and SOA implementation teams for the PE, and the ongoing FAP and FSA component design teams. Hopefully you're all aware that we have this e-mail address, eq2005@soa.org, to which you can submit questions. There are a number of questions that have answers on the SOA Web site.

One of the first questions is, why change so soon? Everybody is concerned about regular changes since we just implemented something in 2000. I think there are two reasons. One, from the standpoint of understanding that we're in a changing environment and that we always want to be sensitive to new approaches in education and new content that may be best to include in the syllabus, we do have the responsibility to always try to be up-to-date in our process. That's not to say we should be changing every year, but one of the criticisms that we had for the 2000 change is that we didn't plan it far enough ahead. We tried to plan ahead with the 2005 change, and then there's some criticism about changing too quickly. We have problems on either side. It's important to understand that as a profession in an environment that's regularly changing, we ought to be anticipating that we wouldn't have a static education and qualification process. Having said that, the other important reason is that there were some flaws that were identified in the 2000 system, most notably the fact that the professional development component did not achieve the goals that we had hoped it would achieve in terms of nation-specific content. There was a lot of criticism on the part of employers that we had eliminated nation-specific content. We didn't eliminate it. We had hoped that the nation-specific content would have been taken care of with the professional development component, but it wasn't reaching that goal. Maybe we decided too quickly that it was a flaw, but the professional development component is still in place. Actually, I think the people who are in the process will have an opportunity for the next couple of years to complete the professional development component.

Also, there was some member research that indicated that changes were needed,

particularly with respect to the relevance of the content to actuarial work. Some of the theoretical content was good from a theoretical standpoint, but maybe didn't complete the picture by illustrating how it applies to actuarial tasks. We hope to have done some of that in the PE changes to include actuarial illustrations.

Some will disagree, but the changes are not as big as we maybe assumed. One significant controversy is: Where did financial economics (FE) go? Where did the Course 6 content go? Those of us in the design process, and others who have been more heavily involved than I, would state that it has been dispersed. We recognize that. We believe and hope that it's covered ultimately through all this dispersion, but maybe not in the way that it should be covered; we're still considering that question. It's been dispersed in the sense that some of it has gone to the math of finance exam; some of it is being considered for the FAP course; and some of it will be on some Fellowship examinations. The theory and development is not as concentrated in one place as it was in the Course 6 exam. That potentially is a significant problem, as illustrated by the fact that many of the sessions we have had at this meeting use concepts from FE. We still want to make sure that students are educated in modern FE.

What are the key changes? We'll go into more detail later, but the idea is that we will be trying to bring in actuarial applications at the PE level so it becomes more relevant the theory. That's where the new reference material comes in. The greater efficiency in the preliminary exam process comes from the different ways of validation, with different topics considered in different ways. Course 5 and parts of Course 6 and Course 7 are replaced by the more efficient and relevant Fundaments FAP course and FSA modules. The innovation of the modules is a significant change.

As one who has been involved in Course 7, I'm a little sensitive to the idea that we're saying it's "more efficient and more relevant" because I think Course 7 was pretty efficient and relevant in terms of helping students understand that not only do they have to understand the modeling process, but they have to be able to communicate it effectively. I hope that that content, or that experience, doesn't get lost. I think there are some other places where hopefully it will be accomplished.

There are some other things that we're implementing right away as a result of the member feedback and the Board of Governors. Nation- and practice-specific material was added back to the FSA Courses. It's going to occur before we implement the new system. We introduced the enterprise risk management (ERM) concept both in terms of a new section within the Society of Actuaries and also in terms of a new option on the specialty track, which is going to be introduced this fall. We have been responsive to the education qualification process. I'm not directly involved in a lot of it. I've been directly involved in some of it. We have been responsive to the member feedback on a more immediate time frame than just the new system.

Let's talk about the structure of the redesign. First of all, we have three parts to the

PE: topics that we consider prerequisites (some of which have been examined before), topics that we validate by what we call "educational experience" and topics that we examine. We'll talk about the specifics of that in a moment. In the FAP, which is the rest of the associateship qualification process in terms of technical content, we have interactive modules. It's a computer-based process. We have exercises, and there will be two examinations. We've retained the new Associateship Professionalism Course because we do think it's important that you introduce students to the professional aspects of being a member of the profession, including code of conduct, ethics and things like that, when they first become members of the profession.

In the FSA education structure, we have two examinations that will be similar to the Course 8 exams in terms of rigor and structure. They will be by specialty area. We will also have some additional modules at the FSA level. There will be a capstone seminar, which will be a culmination of the content that we've had, maybe some additional applications and perhaps an opportunity for the communication aspect. We will retain the Fellowship Admission Course, which, again, emphasizes the professionalism aspects of a career as an actuary. Students have opportunities to be exposed to that with case studies, the Associateship Professionalism Course and the Fellowship Admissions Course. We think that's important because when you first become a member, you're relatively early in your career and may not be sensitive to as many potential professional conduct issues as you are a few years later when you become a Fellow.

There are things that are not going to be directly validated, including linear algebra, introductory accounting and elements of business law. Calculus, which was currently directly validated on the first exam, will be tested indirectly in the exams. You need to have the calculus understanding to be able to do the probability and other mathematics and statistics. The mathematical statistics will be tested indirectly in applied statistics and some other exams, but the CAS is going to test this directly because they felt it was important enough that they keep validating that by a rigorous test.

Validation by educational experience (VEE) is the new process and one of the significant changes. The philosophy of VEE is that there are certain topics that we think are important for actuaries to know but are not core, and so they don't need to be validated in the same way that we validate other core topics. There are certain topics that are better learned and validated by an educational experience than by a multiple-choice exam. In the latter category is applied statistics. We think it's more valuable for our students to take an applied statistics course, do some data analysis and write a report than to take and pass a multiple-choice examination on formulas and ideas. With respect to topics that are important background, so we think they still need to be valuated but are not core, the economics (both macro and micro) and finance topics that are currently on Course 2 fall into that category.

We have a two-step approval process for that VEE. First of all, the courses and academic program that are going to be used for that validation must be approved by the Society of Actuaries. The universities will have to submit the courses for approval. Secondly, the student individually has to obtain at least a B- in that course or equivalent alternative and submit the appropriate paperwork to get credit. When we talk about an "equivalent alternative," we mean that if you grade on a number scale, we'll determine what the letter should be for that equivalence.

Because we recognize that not everybody is going to have this opportunity to get those credits in an academic institution, the SOA and the CAS are committed to providing alternatives. In fact, the CAS has already committed to providing stand-alone exams on economics, corporate finance and applied statistics for two more years beginning with 2005. One other alternative that has been talked about, although the VEE group is still considering a lot of different ideas on how to provide alternatives, is the College-Level Education Program (CLEP). CLEP has an examination on economics. I don't think it has one on corporate finance. That's open to anybody who wants to do it. There are online courses that might be available. With respect to applied statistics, we hope that some private vendors will offer some programs or seminars that are similar to what the Society of Actuaries had done on an elective basis prior to the 2000 syllabus when we had an elective on applied statistics. We felt that taking that seminar was an educational, valuable experience for students and we're hoping that private vendors will be able to do that. The challenge, if the SOA got involved in doing that, is if there's a much higher demand on that than when it was an elective, then it could be difficult to provide all the necessary resources.

We've decided to call the examinations by letters and names instead of numbers, partly to suggest that you don't have to do them in the order suggested in the past. The CAS is still numbering them. What is called Exam 1 (for CAS) and Exam P, or Probability (for the SOA), is essentially the current Course 1 with emphasis on problems being probability-type problems in the context of risk and insurance instead of any direct calculus problems. That's a subtle but important change in the first exam, or Probability. It's still at a three-hour examination. In terms of background and content, it shouldn't change for students; it's just the nature of the questions being more explicitly probability questions as opposed to any explicit calculus questions.

The Mathematics of Finance exam is the one that is one of the more significant changes in terms of preliminary exams. What currently is Course 2 involves four topics: microeconomics, macroeconomics, corporate finance and theory of interest. In our school and in other academic institutions, that requires several academic courses for content background. However, beginning in 2005, as I mentioned, the corporate finance and economics will be validated by educational experience and the exam, Mathematics of Finance, will focus on interest theory enhanced a bit by introduction to FE.

When we talk about introduction to FE, what we're talking about is introduction of some of the terminology, some of the financial instruments without the mathematics, and introduction of the duration, convexity and asset-liability management concept with some mathematics but no probability-based mathematics, partly so that we can still do this course in an academic institution in a semester and students can be prepared to take this course exam at an early stage in their academic career, probably even before the probability exam because the mathematics that would be required for it are probably through a third-semester calculus at the most, whereas a probability exam would also require some probability and statistics courses. It will be a two-hour examination because it's only one topic.

There are two significant issues that arose in the development of this exam. One is the FE issue. How much can we put from the FE that was on Course 6 into this one, given that we want it to be a fairly early exam and non-probability-based? We do have a little bit of FE, but not a whole lot. The second issue was that we now are going to be listing an alternative syllabus of readings for this examination. In the past, for theory of interest, it's been strictly the Kellison text, and for the other topics that were on Course 2, just a single text. However, beginning in 2005, there's going to be an alternative of the Kellison text and the text by Broverman, which is comparable to the Kellison text.

Exam M for Actuarial Modeling is similar to current Course 3. It's validated by a four-hour examination. There has been some addition of some of the Course 6-type material in terms of perhaps stochastic interest, not a lot, but still some additional stuff beyond what was in Course 2.

Exam C is the Construction and Evaluation of Risk Models exam. Exam M is where you get into contingencies, survival models and so forth, but Exam C you get into the statistical types of models, like empirical models and parametric models, and you get into graduation credibility and simulation. This one has changed in that the applied statistics is no longer required because we want it to be validated by an educational experience. It's been expanded a bit in the sense that we added graduation back in for smoothing of estimates. It, too, will be a four-hour examination.

The idea of the FAP course is to focus on education. It's a way of delivering education in a better format than just readings. It provides students an opportunity to practice and receive feedback on their work through the exercises and activities. The common threads that would be included, in terms of content, which is primarily applications of theory, would be professionalism, validation of results, stochastic versus point estimates and applications of the law. The body of knowledge (the concepts and the problems) will be in the context of actuarial applications. There will be a blend of practice and functions. What we mean by that is you'll have functions such as pricing, valuation, and asset-liability management, which may apply to all practice areas. We'll be talking about those, but we'll also be talking

about things that are specific to individual practice areas, including individual insurance, health insurance, retirement, finance and investment.

An important part of this FAP is the use of the actuarial control cycle, which was something that the Australian Institute has been using for many years. It's a fairly simple idea, but it's an important idea. You can look at actuarial work in three phases that are iterative. You have to define the problem; you have to design a solution; and you have to monitor results. You have to recognize that there are external forces that may impact all this. Then you go and repeat the cycle as necessary. There are eight modules in the FAP course that relate to this cycle. Module 1, the Role of the Professional Actuary, means that actuaries can contribute to defining the problem. Modules 2 (Core External Forces) and 3 (Common Actuarial Problems/Assignments) relate to defining the problem. Modules 4 (Solutions to Selected Actuarial Problems), 5 (Design and Pricing of an Actuarial Solution), 6 (Selection of an Actuarial Design and Model) and 7 (Selection of Initial Assumptions) relate to designing the solution. For each of those modules, remember there'll be some interactive exercises. There will be some validation of those. They won't be graded to the rigor that we grade examinations, but it gives students an immediate feedback about their work. Module 8 is Monitoring Experience.

There will be, as I mentioned, mandatory exercises. Some will be across practice areas; some will be within practice areas; and there will be some formal validation. There will be two multiple-choice examinations. The first will follow Module 5, the design and pricing module. The second will follow the completion of Module 8, the monitoring results module. There is the potential for having them "on demand," that is that they'll be available through a computer-based testing system. That may not be rolled out with the first implementation of the FAP course, but we will be looking into that very seriously.

Why the computer-based course? The advantages are things that should be intuitive to you. When you have an interactive relationship with the computer where you're working exercises and getting feedback, you're more engaged perhaps than just reading a text and taking practice exams. There's flexibility, both in terms of being able to update the content and being able to reach all parts of the world.

In the FSA education, one of the critical considerations is that its critical content will be as rigorously examined as it is currently, similar to Course 8. Other content that we think is important and good for module-based education will be done through that method, with some exercises, and then there will be the capstone course, which may be presenting some other advanced applications. The Fellowship Admissions Course that I mentioned will still be part of the process. There will be two examinations for each practice area, similar in size and scope to Course 8. Our goal is that they be optimally consistent across practice area in terms of rigor. We'll continue the control cycle concept (define the problem, design the solution and monitor results), so one exam will be a design and pricing of the products of the

plans, depending upon the particular practice area, and then there will be the company/sponsor perspective exam.

What have we done to travel time? We believe that we will have made travel time less, for a number of different reasons. The PE structure offers efficient alternatives. We've talked about some topics that were previously examined which will now be validated by educational experience and about our prerequisites, which are not validated at all. As far as the preliminary exams and the FAP exams, we're going to have more frequent administrations eventually and there's potential for on-demand administration. I should note that the Board of Governors last weekend approved, going forward with the CAS, an online administration of the Probability exam in August 2005, provided that some of the issues related to cost and administration can be worked out with the vendor that is selected. The CAS is very interested in doing this. Their board has already approved it, and Society of Actuaries' board has recently approved it. It will be phased in, in the sense that initially this online administration will be introduced while we continue to have paper-and-pencil examination administrations. Eventually, we hope that we can go all online a number of times during the year so that people have an opportunity to pass more exams more quickly.

The innovative design of the FAP course enables the learner to reduce the need for retaking the exam, presumably, by the interaction. The helpful comments that you get on your exercises should help you be better prepared when you take the examination.

I think it's a little misguided to say candidates can begin the FAP modules while studying for the PE exams. I think the idea is that you can do it during the times that you would otherwise have down times from your PE exams. You may be able to do it while you're studying for PE exams if you want a little break, but we estimate that each module is going to take 30 to 40 hours, so it's going to take some time. I believe you can do it if you can spend a few hours, leave it, come back and spend a few more hours. It's something that allows a lot of flexibility, and so you'll be able to accomplish some of this credit for the FAP course while you're going through the process of the PE exams. Similarly, you can begin the Fellowship modules when you're doing the Fellowship exams.

The conversion rules are posted and have been communicated. If you have questions about them, we can talk about that during the question-and-answer time or later. You can go to the Web site to check them out.

I do want to make a couple of comments about the status. As I mentioned, we have several design teams in place. The PE implementation teams have completed their syllabus of reading and their learning objectives for both the exams and the VEE. That has been communicated to the academic institutions so they can start preparing for changing the content of their courses as necessary. There has also been significant progress made on the VEE. There's a pilot test. The goal is that by

December 2004, there will be a list of approved courses for the VEE credit, and students can start applying for VEE in January 2005. It's a little bit of an issue in terms of who is going to apply for VEE because the question is—I'll talk about it a little later—when you can apply and what's required there. The FAP team is working on developing the first several modules. The design teams for the FSA tracks are being recruited and hopefully are close to being in place and working on the objectives and materials. The EA exams are an issue that we still haven't fully resolved, to my knowledge; we're figuring out how to map those two FSA-level components.

Mary and I are probably the only ones who care about the academic programs implications, but I'll go through this very quickly for those who may also be interested. With respect to VEE issues, when I submit courses, I have to think about which courses I should submit. You may have to have different courses for undergraduate versus graduate students. You may have to have different courses for economics. Perhaps macro should be at the introductory level and micro at the intermediate level. What courses are appropriate for that? Finance should be at the intermediate level. Applied statistics is going to be the most challenging. At the University of Nebraska, we have identified a biometry course and an econometrics course that have the type of education we want in terms of having students do data analysis, write reports and things like that. However, they don't cover both of the topics that we want them to cover, regression and time series, at least not in a single course, and so we have a little difficulty there. Some schools already have in their actuarial program a course that will satisfy the requirements.

With respect to the issue of when you take the courses and when you apply for credit, we do not allow students to apply for VEE until they've passed two examinations. That's primarily for administrative reasons, in my view. If you think about it in terms of 2005, the people who can apply for it early on will be people who have credit for two exams and either not credit for Course 2, which has some of the VEE components, or not credit for Course 4, which has the other VEE components. I don't think many people will be applying early on in 2005. In the second half of 2005, there might be a lot of people because many people will pass the math of finance exam as their second exam in May 2005 and then they'll start applying for VEE.

For the preliminary examinations, the issues relate to what courses you need to take as background, and, if you're in the actuarial science program, what courses you'll be taking. If you have problem labs at the school, as we do, you must decide which ones you should take and what exams to take when. There's the issue of what to do in November 2004. From a practical standpoint, there are special considerations, such as the change in Course 2, where we now have four topics. The challenge currently in Course 2, from my standpoint, is the breadth of material as opposed to the depth of material. Students have to have a background in all four of those topics and have to be prepared to answer questions on all four of those in one examination. Other considerations are the applied statistics as VEE, the

actuarial exams you have passed and the academic courses you have taken.

Here are some suggestions. Your priority should be passing Course 4 by the end of 2004 if you have the background. That way you don't have to take the VEE for applied statistics. I should qualify that by saying that the CAS is going to have a stand-alone exam for a couple of years on applied statistics, so you don't have to necessarily rush into Course 4. I should also qualify that by saying that I think educationally, you're a lot better off taking applied statistics by an approved VEE course to learn the material and to do data analysis, and it will be better for your career. The other priority would be to not take Course 2 in November if you can get VEE credit for economics and corporate finance because then in 2005, you can just take math of finance, a single focus, although enhanced, interest theory examination. It may improve your chances of getting credit for that.

With respect to company programs, unfortunately I don't have any great ideas. I do have a couple of observations. In PE, there's probably not much change except for what you do about VEE. What kind of support do you give to students for VEE? Perhaps you do it the same way your company does it for students taking courses for an MBA or something like that. If they're going to take a course online or if they're going to take an exam, it shouldn't be too difficult to figure out something that's consistent with things you've done already.

The FAP Course may be the most significant to think about in how you change your support because it's a different structure. If modules typically take 30 to 40 hours, maybe you can translate that into the kind of support you normally give for an exam, for instance whatever number of hours of study time you give for an exam that you think may take 300 hours to do. There will be two exams and there will be these modules, so the kind of support you might give to students may take a while to think through. There's not much change in terms of types of support for the FSA because there are two exams, but there's the module idea again and how you support those.

I'll take a couple of questions on what I've said.

FROM THE FLOOR: I have a couple of quick questions on the educational experience part. Would you anticipate that courses will be approved retroactively? For students who attend schools that don't have formal actuarial programs, what efforts are going to be made to get those approved? Should students be contacting their schools and asking them to apply?

MR. LUCKNER: This retroactivity is particularly important, particularly for us at universities. Thinking about students I'm advising who have taken the course within the last two years, if we don't apply for approval until now, will they get credit? My understanding is that there will be some retroactivity of X years that may require that they submit a course catalog description from an earlier time, but they will not be penalized if it's an appropriate course.

With respect to your second question, I've thought about that too, partly because I came from a non-actuarial school. The process for approval of courses, as it's designed right now, is relatively easy. I'm hopeful that it's not necessarily easy to get approved, but it's easy to submit the material to be considered for approval. What it requires is a detailed course syllabus and a copy of the catalog description. I'm not sure if the SOA or CAS is going to make an effort in this, but it wouldn't be too difficult to suggest through the academic relations to some colleges and universities that they consider doing this. The students maybe should take the initiative to ask their schools to submit the material. I would be encouraging my alma mater to consider doing this. They may or may not have all the courses, particularly if you're talking about a smaller college. They may not have a finance course that would qualify, but they probably would have some economics courses, so at least there would be some opportunities.

MS. HARDY: What do we want from Education and Examination? Warren and I separately came up with the same sorts of suggestions. Test the core competency in a current skill set. When you hire an actuary, when you hire somebody who has just finished his or her Fellowship, you want to know that the actuary knows the things needed now, but you also want to know that the actuary is prepared for things that are going to be needed in a year or two. We want to attract and qualify suitable candidates. We'd like to distract the unsuitable candidates, and that's often not really covered.

As way of introduction, I have been on the faculty of the University of Waterloo (UW) since 1997. I was a chief examiner for the Institute of Actuaries. I worked on the design of exams, updated curriculum and so forth for the Institute of Actuaries until about 1998. One of the curriculum changes happened at the time I became a chief examiner in 1990. People kept saying that we had to remove all the calculus because we want to be able to attract people who have a degree in music and who can't do calculus. Our opinion was that if they can't do calculus, then they can't become actuaries. I can't join the Boston Philharmonic Orchestra; they can't be actuaries. The world is not fair. Everybody can't do everything. I think that we need to make sure that candidates know that early on.
I want to mention a couple of things about VEE and microeconomics and macroeconomics. The syllabus says "discuss," "define," "explain" and "describe." Some of these are things that are very difficult to do in a multiple-choice session. VEE, where universities may have a choice to use a more sophisticated examination method, might actually be a good idea. Is a B- grade requirement enough? I'm going to ask an opinion.

Corporate finance does actually include the Black-Scholes formula, but most corporate finance courses, even at an intermediate level, do not cover Black-Scholes in any detail. That's going to be relevant, because I think the main problem with the update is the lack of financial mathematics. I was assured that when I saw the syllabus the financial math would be in there, and it isn't in there. Again, is a

grade of B- enough? The syllabus words are "describe," "calculate" and "understand," which are good higher learning words. They're definitely not the way that corporate finance is currently being done in Course 2, which would be more "define," "define" and "define," which is kind of lower level.

The description of the VEE course on applied statistical methods says, "Rather than focus on formulas and derivations, this course will focus on the analysis of data." This sentence actually annoys me. There's nothing wrong with derivations. Derivations can help you to understand things. This course will focus on the analysis on data, so if you put in a course and say that you do derivations and the analysis of data, are you going to be turned down for your VEE? I don't think so, but it could have been worded more delicately. The syllabus is minimal; there's very little discussion of what should be in these courses. At UW, this is going to be covered by two final-year courses, one in regression and one in time series. The students are going to have to get a B- in both. They're already grouching about that, but they grouch a lot. Certainly it's true that it's going to be harder for a student to get this VEE at UW than it is at other schools where they teach a single, focused course. Our courses are deeper and bigger, and they're still going to have to get a B- in both.

It leads to one of the issues—consistency between universities. For example, how are you going to accredit courses for international students who have done their corporate finance in Chinese or Bulgarian? There's a great flexibility in the syllabus. I'm a fan of VEE on the whole. I'm not too worried about inconsistency between universities, but I know that it's very controversial. Why? The main reason that's discussed is that it will discourage entry from unconventional undergraduate programs, which is not a problem provided the Society does insure that commercial providers will produce something appropriate for those who missed out. As far as equity, yes, it's going to be easier to get your VEE from some schools than others, but if you miss it at school, you have the commercial option to follow.

There's an unhappiness about the delegation of part of the qualification to external bodies like universities and individual instructors. I was at a session in Orlando at the annual meeting in November where Stuart Klugman said we're doing this because we don't really care about these topics. That's why we don't mind delegating them; these are not important topics. That's the justification personally delegated to the universities. I'm an academic and I think I do a good job, so I'm not too worried about that. Some of our students are outraged that it's going to be too easy to get the passes, and they already have them, but that's a transitory problem.

In my idle moments, I'm a participant in The Rebel Outpost actuarial discussion forum. If you have any idle moments, I suggest you visit it at the Web site www.actuary.ca. They had to put it outside the country so the SOA couldn't go and close it down. It's actually dominated by people from the United States. They had a survey. Forty-nine people out of 77 disliked the reforms in general, but the main reason cited was the VEE. The most common reason cited was the bias toward

actuarial science programs, a bias that I find completely understandable and reasonable. There was also a concern that qualification will become too easy. This is always a concern of people who are recently qualified or halfway through qualification. What's great about VEE is that if you've already done it at school and got an A, why should you have to do it again? If I don't think that Brealey & Meyers is the best corporate finance book for my students, I don't have to use it. I can use a more demanding or a more mathematical approach. I can use essays, project work, teamwork and things that are more appropriate.

In terms of the applied statistics VEE, I can use data projects and case studies. These are things that you can't do in an SOA exam. I quite like this. Weak students who get a C will go do something else. We can use the SOA expertise to focus on the core SOA material. My only problem with this is whether financial math is core SOA material. I happen to think it is.

There's a problem with FE. It's really not in the current syllabus, although we were told that it is. It was going to be in Course 3. The syllabus for Course 3 is in and 'epsilon' is in there. Quite frankly, if you know anything about FE, the content that's in the Course M syllabus doesn't actually make any sense. It's about valuing a payment in the future without using Black-Scholes but using the lognormal model. If it's an option, then you have to use Black-Scholes. If it isn't an option, then why do you need the lognormal model? It doesn't make sense as it stands. There is a lot that's good about these changes. I'm focusing on the things that I think need improving.

Warren mentioned the control cycle. What I'm going to pick out here is that there's no space for developing theory. There's no space in here for saying what a risk-neutral measure is, because that's a theoretical mathematical development. There's no math in here; it's all applications. But when they need it, aren't you somewhere in here going to mention the variable annuity contract or the controversy about the valuation of pension plans or fair value accounting? For all of those things, they're going to need some basic financial economics.

I've been hassling various people for quite a while who are involved in this process, and the first response I had was that the financial mathematics would go in the FSA modules, but only for investment, risk management or finance specialists. That would mean that the current 8I stream or 8R stream wouldn't learn any of that.

I think technical challenges coming up include fair value, non-diversifiable risk (C3 Phase 2 and all that for variable annuities and equity-indexed annuities), competition in risk management and the desire to move into broader financial services for actuaries and the pensions controversy (what's the discount rate?). Are there any other suggestions? We're qualifying people now who are 25 who are going to be actuaries before they retire for at least 30, maybe 40, years. I'm only thinking about the next five years. I'm not even trying to think 30 or 40 years ahead. I'm thinking about what's current now. ERM, which is things like variable

annuities and risk management, is relevant to all that.

What's missing? There's a bit of no arbitrage. There was a definition of arbitrage in Course M, I think. There are no swaps or forwards, no Black-Scholes theory, no P, no risk-neutral measure, no hedging and no delta hedging. You won't know what a delta hedge is or what a Greek is. There are no stochastic models. Then the new Course M syllabus came out and there are stochastic models, but not arbitrage-free models—not the Vasicek, not the Ho and Lee, not the Cox-Ingersoll-Ross. These are common language in the broader financial services. New actuaries will not know what a Vasicek model is. Pretty much all of the current Course 6 is gone. For example, every session I've been in at this meeting has mentioned "CTE" without even bothering to say what it stands for because it's such a common concept now. It's not in the exam. All of the current Course 6, although Warren said it's being shifted around, keeps getting shifted onto something that has not actually been decided yet. The whole asset side, except for specialist level and the Fellowship modules, is missing.

Communication skills and business acumen are things that the Society and the Board of Governors' initiatives want to focus on, but they're not actually going to be covered anywhere in the exams.

Stochastic simulation is now one small chapter in a textbook instead of virtually the whole textbook itself. We will continue to teach this as a whole course because I think stochastic simulation is crucially important to modern actuarial practice, but in the education process it's going down to no theory and a few examples. Multiple-state modeling is in there. I thought it wasn't going to be in there and then the syllabus came out and it is, which is good.

Is there anything in that isn't needed? For every thing you add, you either add more work or you have to take something out. I do recognize that. We can't keep adding material, even though I think the job that we're doing is more and more complex. I thought I'd say a little bit about what's happening in other countries so you can see where we stand. Australia and the United Kingdom are also changing for 2005. Continental Europe is a bit different because they have a university-based system. By doing your undergraduate degree, you've pretty much qualified. It's sort of like a medical thing or a law thing here, I guess. Australia and the United Kingdom are also going to be based on this control cycle feature, which is basically applications.

The United Kingdom in 2005 going to have core technical and core applications. They're going to have a business-skill seminar, which is interesting. They give university exemptions. If you've studied these things in an accredited university and got a good enough grade, then you don't have to take them with the Institute or the Faculty.

Core technical is math of finance, finance and financial reporting (that's an

accounting paper), probability and mathematical statistics, modeling, contingencies, statistical methods, economics and FE. That's the one that we're missing. We're also missing the accounting paper, but I don't know how many people care about that. It might matter. They also care about communication and business skills, and so they're introducing courses on business skills that your employer has to set you through. You have to do it right at the start, so if you really can't cope with working in the English language or in whatever is the appropriate language, then you don't even get to the core applications and control cycle. You have business skills first, then a communications paper. They already have that in the Institute. They set a communications paper saying to explain this vaguely straightforward actuarial concept to a non-actuary. They were expecting a 95 percent pass rate. They got about a 35 percent pass rate and it never got higher.

At the specialist level, you have to be a specialist in two practice areas if you're in the United Kingdom rather than one. FE is a whole paper including some tough stuff. Martingales, Brownian motion and Ito calculus are all in that paper. Every U.K. actuary has to learn that stuff. We don't have it anywhere. We don't even have risk-neutral measures. I understand I'm saying the same thing over and over again, but there are some people in the room who have some influence over this and I'm hoping that eventually it will change.

When academics want to work in some area, they go and see if there is any theory that's already there. As far as examination theory (I'm summarizing four textbooks here, so I'm not being entirely fair to the whole discipline), the bottom line is that the exams should be fair and reliable. Being reliable means that if I set the same exam two days running, I have to pass the same people. It's quite easy to be reliable. I can pass everybody with the surnames A through H and fail everybody higher, so it's not enough to be reliable. "Reliable" means you pass the same people each time if you set the same exam under the same set of circumstances. "Fair" means that you pass the people who know the things that you want them to know. What makes exams less fair or reliable? You get a fair exam if the examined material is close to the syllabus and tuition materials. Your examiners should be well acquainted with the tuition material and should have a higher qualification than simply having passed the exam. You need well-qualified examiners, both in technical skills and in education. They are preferably people who have set a lot of exams, such as academics, who have more idea of what's going on. The United Kingdom moved their technical papers, the equivalent of the current ones, from industry to the universities. All of the principal examiners were university academics. Without anybody being able to spot any diminution in standards at all, the pass rate went up from 35 percent to 60 percent in all those four exams, just because the academics are better at finding out what you know rather than trying to find out what you don't know.

To be considered fair, there can be no ambiguities, errors or trick questions. Faulty questions are a real problem. I've heard examiners here say that faulty questions don't matter, and they just throw them out. Actually, they do matter because

different levels of preparation lead to different amounts of distraction if you set a faulty question. Time allowed should be realistic. Sometimes I worry about what we put these poor kids through for the SOA. I also proctor. These kids come in at 8:00, they have a four-hour exam and they're not allowed to eat, drink or take sugar. Then they have this incredible time constraint, which means that there isn't time to do all the questions thoroughly, in a risk-averse way, which is what actuarial students are going to want to do. They not only want to check that A is the right answer, but they also want to check that B, C, D and E are the wrong answers, for example.

I want to talk about higher-level skills. I don't have Bloom's taxonomy handy, so I'm just going from what I can remember. The lowest level is straight memorizing facts, lists and so on. The highest level is synthesis, meaning you can pull material together and see how things are connected in ways that you haven't specifically been taught. Doing an example you've seen before with different numbers is lower level. Doing a calculation that you haven't seen before, which is testing aspects of comprehension, is higher level. Can you take what you did here and apply it in a slightly different situation? If you have a low pass rate, it's probably unfair, particularly in actuarial science for the later exams, where people are taking these exams very seriously. Multiple-choice exams are not very fair because they focus on the lower-level skills.

Reliable exams have predictable questions. One of the things that makes a reliable exam is if your tuition material is reasonable in quantity compared with the length of the exam. For example, in the current Course 2 or the current Course 5, you have thousands and thousands of pages of reading, which you have to then demonstrate your knowledge of in Course 2 in four hours and Course 5 in five or six hours. The reason it's unreliable is that the bit that you know the least could come up disproportionately, or you may have only read one book, but you may be able to get through it on the one book. That makes it unreliable.

Reliable exams have realistic time constraints. Endurance tests are unreliable, which I think the SOA excels in. Again, exams with a low pass rate or pass mark near the mode are unreliable. If the students are leaving with little sense of whether they've done well or done badly, that's probably an unreliable exam, so that means more problems with multiple choice. I should say, though, that the students actually like multiple choice. From an educator's point of view, it's not great. Students love it, particularly since they can wing it.

This seems to be another contradiction. 2005 ASAs will be entirely examined by multiple choice. Actuaries lack communication skills, but we're actually taking out the communication skills aspect of the exams, in Course 5 and Course 6 for example, by moving the ASA entirely to a multiple-choice format. Any alternative would require a huge organization of markers if we moved away from multiple choice, but people do it. They do it in the United Kingdom. They take every new Fellow, maybe give him or her six months, and then after six months write him or

her and say, "Come and join us and be a marker for us." Virtually every new Fellow is going to be a marker for maybe three, four or five years. That's how you engage. That's how you get your workforce and that's how you engage all of the Fellows in the process, which is a good thing. It works pretty well. The Institute started with multiple-choice exams, found them unsatisfactory, and doesn't use them now. Students like multiple choice. They don't want to move away from multiple choice. They like the luck aspect, and they like the fact that you can get through by memorizing large amounts and not having to actually learn anything.

I want to give an example of the higher-level skills. I pulled this off one of the Waterloo exams. The first part asks you to explain what the Bayesian approach to statistics is about, rather than just be able to go through the motions of doing a Bayesian calculation. In the second part, it's is all fairly standard, although it's a different distribution. They hadn't seen this distribution before, so it's calculation, but an unseen calculation, because the inverse gamma is a bit of a pain to work with. It tests that they know what a conjugate is and if they can they do the calculations. The last part is the synthesis. They have a maximum likelihood estimate (MLE) and a Bayesian estimate of the same thing, and they're a long way apart, so they must analyze the situation, work out why they're so different and which one looks like a better result. There's no answer. It's not true that the Bayesian is always better or the MLE is always better. In this case, the Bayesian prior had too much effect; it was inconsistent with the data and they should have picked the MLE. That's an example of synthesis. That's what you can do to test higher-level skills if you're not tied to multiple choice. You can't do it in a multiple-choice framework.

The university exemption system is interesting because it's an ongoing issue in the Society of Actuaries that does raise a lot of hackles. People are not happy with the idea of university exemptions, i.e., that you would not have to take Course P or Course MS, but you could just say, "I got an A in this at the University of Waterloo. I have demonstrated that I know this topic well enough." The backdoor route to exemptions already exists because Institute of Actuaries credits, whether you got them by exam or exemption, can be traded for SOA credits. In principal, a student could take courses at the University of Waterloo (we've actually applied for Institute of Actuaries exemption status, not for this purpose but for international students who are interested in pursuing the Institute route), get Institute of Actuaries credits for Waterloo courses and then convert those into SOA credits. The possibility already exists, although I don't think there's a big market in this right now.

What are the main things I want you to take away from my talk? The omission of FE from the syllabus is a huge mistake. Although people are telling us it's going to be in the FAP and it's going to be in the Fellowship modules, currently there's no space for it there. I think it's too critical to the upcoming challenges to leave it out completely. What's going to be the effect on university curriculum of 2005 changes? For my university, there is going to be no effect whatsoever. The good things we're already doing, and the things that we don't like (FE, the reduction of emphasis on

stochastic simulation), we think that actuaries need them and our curriculum is based on what we think actuaries need rather than what they need to pass SOA exams. There are problems with multiple choice. I'd like to put that out there even though there's absolutely no call for them to be eliminated. There are issues with the university exemptions.

MR. RANDY GANTT: Is there a specific course of reading for the FAP modules, or is everything learned through the modules themselves?

MR. LUCKNER: My understanding is that there will be content that they have to read as part of the modules. Then they will do the exercises based on that.

MR. GANTT: So the offline reading is in addition to working through the modules. Do you know the length of the FAP examinations?

MR. LUCKNER: In terms of hours, no.

MR. KENNETH S. VANDE VREDE: Can you talk a little more about what's happening with the Course 8 exams? You said there's a company-sponsored section now?

MR. LUCKNER: That means that the nature of the examination and content for that exam will be from the company/sponsor perspective, that is, for a sponsor of a pension plan, the issues related to that. That's just a way to try to provide some consistency across the practice areas of the nature of the two different exams. One is design and pricing and one is looking at it from a company/sponsor perspective. Both exams will be comparable in terms of amount of material and the rigor as the current Course 8 exam.

FROM THE FLOOR: I'd like to mention two issues with the possible online exams. First, by offering them on demand, isn't there a concern that there aren't going to be enough questions available to rotate through? Secondly, is there a concern about students somehow copying the questions or printing the questions to have for future access?

MR. LUCKNER: Those are very legitimate concerns. The task force involved in investigating and researching this did a very thorough job. They got responses from about nine different vendors that do this type of thing. They cut it down to three finalists. They have identified a priority vendor. The thoroughness with which they've responded gives me some comfort that the security issues will be addressed fairly rigorously. With regard to the number of questions, the vendors were asked how they would be involved in developing question banks (an actuarial review of the professional question writers) and also the amount of questions that are needed for reliable exams from session to session. These are groups that have had a lot of experience with doing these for other entities, so we're pretty comfortable with that.

The original proposal was to implement it in May 2005. These concerns are some of the reasons why we want to delay it until at least August, so that we get some more comfort with how they're going to go about doing it. Again, we would only have it available within a window, like a week or so, every so often, several times a year. They would be proctored just like they do for other exams. I know that the medical profession does this for some of their exams, as do a number of other professions. I was a little surprised to learn that the medical profession does this. There are other professions that do this online type of thing. There are organizations that provide the testing centers, which are monitored by proctors. We address the security issues by telling them how they should proctor, like no writing down, no taking material from the exam center, and those types of things.

In terms of full disclosure, I'm on the board right now, so I have some responsibility and obligation for all this. In the discussion at the board meeting, of some concern was the amount of expense involved in doing this, which was surprising to a number of us. However, part of that is looking at it in terms of what we're getting for that. If you think about it in terms of how we currently administer exams, we have all these exam centers which we get for free and we get all these monitors for free because people volunteer. We would be paying for that, basically. That's actually going to be in the ultimate scenario because as we phase in, we're going to be doing both, so that's part of the reason why it's going to be a little expensive. Some people would say that we're maybe 10 or 15 years behind in doing these kinds of things. I think it's something that we ought to do, but there are some issues that have caused us to delay our approval of the recommendation to delay until we're comfortable with the resolution of all those issues.

MR. CHRISTOPHER POIRIER: First, it seems backwards to me that we are doing statistics through the VEE, but we're explicitly testing the probability. I would think if anything that we'd want to be doing that the other way around. Also, I really don't like the lettered exam system. I'm already looking forward to questions from senior managers whose hearts are in the right spot when they ask about how students are doing. We used to be able to tell them that they've passed this, they have 100 credits out of 450 or they have three out of eight exams now. I don't know how we're going to tell them that they have MF and they have M, but there are still eight modules, two exams for this and two exams for that. It's going to be a little difficult to communicate all that. The question I have on the computer-based FAP modules is, is that going to be Internet-based or is that going to be a diskette type of thing?

MR. LUCKNER: I think it's Internet-based.

MR. POIRIER: My concern is that if students are not going to be studying at work, we're going to be requiring them to have some sort of Internet connection at home or wherever they're going to be doing their studying.

MR. LUCKNER: That would be the implication, yes. I think nowadays there are enough other resources that they can get to it. As far as your first two questions with respect to the lettered exams, think about it in terms of words instead of letters. That helps a bit. The CAS still talks about its numbered exams. Even with the words or letters, you can talk about it as three or four exams. I think the more complicated things are the modules and the FAP because of the fact that there are a lot of components. Ultimately we look at that as something that might be comparable to a couple of exams. Some of the communication issues may have to be addressed by individual companies.

Regarding the content issue of probability versus applied statistics, there are two things. One is that generally you learn probability before you learn statistics. You introduce the probability and then you do some statistical work, in the theoretical aspects of it. In terms of applied statistics, the way you learn is actually by doing the data analysis. I don't think there's anything in learning probability in terms of a significant advantage. I do agree with Mary that maybe more could be done in making use of the academic community for some of the qualification processing, but I don't think it's as significant as this issue of applied statistics and learning how to do data as opposed to learning formulas to repeat on an exam.

MS. HARDY: I think there would be a case, though, for adding introductory statistics to the PE exams on the grounds that they'll come to Course C where they're doing quite tricky inference and they've not actually seen it before. Before they can do the equivalent of Course C at Waterloo, they've taken two full-semester courses in statistics and statistical inference. They're going to come to it cold if they're doing it on their own, so I think it's a shame it has not been covered.

MR. LUCKNER: We actually have students take that before they do a probability exam.

MS. HARDY: Can I just ask a question while there's still a reasonable amount of people here? Who thinks VEE is in principle a good idea? Who does not? That's a majority. That's interesting. I'm going to ask two more questions. Is math of finance core to actuarial science and practice? I mean the FE: risk-neutral distributions, delta hedging, elementary arbitrage-free interest rate models, CTE, variable annuity and risk management. Those are the things you need for that topic. Is that core to actuarial science? Yes? No? It looks to me like the general opinion is that it should be on the core syllabus, not on the specialist syllabus.

MR. MARK EVANS: I trade derivatives for a living, so I want to weigh in. I think in-depth financial mathematics should be available on one of the tracks, at an absolute minimum. Otherwise we're making a huge mistake. We're having trouble finding people who know enough about the actuarial and the derivative side to do what we need to do. I'm sure other companies are facing a similar situation.

MS. HARDY: It will definitely be a specialist track. The question is whether we

should have somebody qualified on the insurance track who does not know what a derivative is and why a variable annuity is an embedded derivative.