ABSTRACT OF THE DISCUSSION

HELD BY THE FACULTY OF ACTUARIES

Mr J. Goford, F.I.A.: [Mr Goford introduced the paper at this meeting and at the sessional meeting held by the Institute of Actuaries, and what he said at both meetings appears in the abstract of that discussion on pages 255-258 of this part of *B.A.J.*]

Dr D. J. P. Hare, F.F.A. (opening the discussion)**:** I draw your attention to the extent of consultation which lies behind the paper. Whether the extent of it is unprecedented in our profession, I do not know, but it has been a very welcome part of this project, and, I believe, a necessary one, given the importance of education to the profession, both in the United Kingdom and abroad. Various discussion papers have been issued, and all responses carefully analysed. A day conference has been held, not to mention a whole series of regional consultation meetings. Ample opportunity has been given for Fellows and students to comment on the issues and proposals as they have developed, culminating, of course, in this sessional meeting, and a corresponding discussion at the Institute on 22 January. What is particularly encouraging is that the consultation process has not been a thinly disguised promotional strategy, but genuine consultation, and the responses made have actually been taken on board by the authors, and a number of changes made, in order to reflect the opinions given. The authors deserve to be congratulated for that.

The result is a paper which, on a quick read, is likely to appear reasonably acceptable to most, if not all, readers. It is probably inevitable that certain details will jump out at some readers (for example, the comment, in ¶2.7, that full implementation could take until 2020 to achieve), but I expect that the main thrust of the paper will seem fine — on a quick read, that is.

Of course, that just shows what a masterful job the authors have done in trying to balance all the different views that they have heard, and I congratulate them for that! The problem is, though, that certain key tensions still remain, and will need to be confronted at some point — and, perhaps, now is as good a time as any.

Before I go on to stoke controversy, I would like to assure the authors that I can see many attractions in the model that they are proposing. Many of their principles: particularly those which refer to quality and high standards; a unified U.K. profession; a global approach to aspects of education; the consideration of alternative assessment methods, where appropriate; and the emphasis on the importance of business and management skills; are all to be enthusiastically endorsed. However, there are other aspects over which we may find agreement harder to reach, but that is not to say that, as a profession, we should not try.

Principle 4 states that: "The future education system will need to help individual members of the actuarial profession prepare to take on different roles, both specialist and generalist", and raises the old chestnut of: "Exactly what is an actuary?" and: "is there such a thing as a 'specialist actuary' and a 'generalist actuary', and is there such a thing as a 'traditional generalist actuary' and a 'modern generalist actuary'?" Because I presume that the type of actuary who is in this room is the product of the present education and qualification system, or some variant of the same, then, presumably, we are all 'traditional generalists', but some of us must not be, or, presumably, we would not have all these other headings! I am not sure that the list in ¶3.2.4.3 is entirely helpful in taking us forward. It is worth having to show the breadth of jobs that we have, but, surely all actuaries are 'generalists' who specialise in some particular aspect. Perhaps that is being recognised in moving to a 'fat T' from a rectangle, to use Mr Goford's eloquent phrases.

Principle 7 states that: "The actuarial profession must be attractive to bright people from a range of numerate backgrounds." As Chairman of the Careers Committee, I can confirm that we are regularly bombarded by people who tell us that the profession is not getting the brighter students, but we are not able to define who the brightest students are, nor identify why we are not getting them. Perhaps some of the brightest students are not those with the broad

management flair and the creativity which modern employers look for, and maybe they are the ones who are staying in higher education or going into research-oriented fields, which do not necessarily require broad management skills. That is not to say, of course, that everyone who stays in research is somehow incapable of doing anything else — it would be completely wrong to suggest that. However, we do have this myth in the profession that we are not getting the bright students, and, in a bid to do that, we are now watering down our standards in some way, and no longer can careers material encourage people that they need to have a mathematics degree, but rather just a numerate background, whatever that means. This is one of the issues that concerns me, that we could be moving to change an education system to make something more attractive to a certain group of people, and I will touch on this further when I consider Principle 9.

Principle 8 states that: "The education strategy, in its development, will ensure that members have different qualification completion points. After completion of a qualification, members will be encouraged to continue studies for further qualifications or to actively undertake CPD. We will not require attainment of one qualification before progression to another." In ¶3.3.2.1 reference is made to a 'qualification ladder', and it is an interesting sort of ladder, where you do not need to attain one level before going on to the next. However, Principle 8 does raise an important cultural change which we will need to address, but which, from what I understand, the profession is finding hard to address — that we could have meaningful qualifications for actuaries who have not passed all the examinations. I think that that is a necessary follow-on from Vision and Values in broadening the profession, but it is not one that we will find easy to accept. However, if we hear other people's views on it in the discussion, it might help us to find some sort of workable compromise moving forward. I am not sure that current employers necessarily want many different qualifications, nor that people who currently are not involved at all with the actuarial profession will want to be just because they only have two years of examinations to sit, rather than possibly six, but it is something that is on the table, and should be considered. However, we must ensure, in all this, that we do not end up devaluing the full Fellowship, and what it really means to be an actuary.

Principle 9 states that: "There should be more certainty in the duration of time to appropriate qualification." Reference has already been made to the fact that a shorter time to qualification is not one of the principles. I think that it would have been nice if it had been one of the principles, but many people said they did not want that, since they found it hard to square that with retaining standards and retaining coverage of material in the examinations. We definitely do have an issue in the time it takes to qualify, and I am not sure that just assuring someone that it will be somewhere between three and eight years will necessarily take that away. Yes, it does take less time to pass accountancy or law examinations, to use the two examples given in the paper. Perhaps that may tell us something, in the legal case, about entry standards levied upon people who study law at university, or, perhaps, in the accountancy case, something about the amount of material and the nature of material being examined. However, perhaps we do need to bite this bullet, and talk a bit more about time to qualify.

If you look at the model in Section 4, for students from a non-mathematical or statistical background, the new model will not help at all, because they are the people who will fall foul of the pre-entry requirements in the centre of the flower diagram presented earlier by Mr Goford, and, for these numerate, broader intake, people, who do not know the mathematics or the statistics that we feel that they should, they are still going to be looking at something like three to eight years to qualify, if you count the whole process. So this does not seem to hit that one at all.

For mathematics and statistics students, the new model will help, and it seems to help, looking between the lines, in two ways: one, by reducing the number of examinations sat, albeit slightly; and two, it would appear, by having more full-time study or block release. The latter then raises the issue of whether it is easier to pass an examination when you have studied for it full-time or in block release, than when you have studied for it part-time while working in a job. Now, it may well be the case that it is. As someone who went on the Heriot-Watt University

diploma course, I would hate it if that then devalued the role of the diploma, and, in my view, it does not. However, maybe the secret was what Mr Goford said about the move from 'unconscious competence' to 'conscious competence' in how we examine. So, if I understand correctly, what I think that the group is now proposing is that we change the way we examine as well as the way we educate. Maybe we do not need to wait 20 years before we fully achieve that, and the sooner that we get alternative assessment methods, or alternative approaches to examinations, on the table for discussion, the better.

However, even if we do change the way in which we have examinations in order to make it easier to pass them, if we have worked hard and achieved the relevant standards, I am not sure that that necessarily hits the issue of making an actuarial career more attractive to other people. To quote from ¶3.2.7.1: "There is an intention to make the actuarial profession more attractive and appear broader to future entrants." On the Careers Committee, we are told to encourage as much as possible and to see what we can do, through advertising and promotional work, to counter the situation which we have, where we seem to lose the best people, or indeed just good people, to City posts that do not involve sitting many examinations, and we are certainly glad to do that. However, I am not convinced that you can make even-more-certain-to-pass examinations, along with a slightly lower salary, attractive to someone who is being offered a 'golden-hello', a much higher salary, and the prospect of no examinations and great rewards through a career in the City not as an actuary; and I am not sure that you can.

Of course, we do need to develop our educational strategy. I think that it needs to be developed for two reasons. One is that the volume of material that constitutes actuarial thought, nowadays, is too vast for any one person to hold it in his or her head all the time, and so I think that we have to move from what Mr Goford described as a rectangle to a 'fat T', and the authors are quite right in seeking to move us down that path. Second is the trend towards globalisation in the profession, and all the hard work that has been done to achieve parity of standards and reciprocal qualification recognition between us and some of the major actuarial groupings in the world. Because of this trend towards globalisation, again, I think that it is very important that we review our educational strategy in the light of what is going on in the rest of the world.

For those reasons, I wholeheartedly endorse the model before us. Of course, 'the devil will be in the detail', but there are many attractive features about this. So, perhaps, what I am saying is that I would not confront all these other issues, which in some ways are peripheral to the subject of educating actuaries, but leave them to one side, and concentrate, instead, on taking forward to implementation this excellent model, which is the result of so much hard work.

Mr G. M. Murray, C.B.E., F.F.A.: Until fairly recently, I have been actively involved in the actuarial education process, both nationally and internationally, and I am in broad agreement with the direction in which this paper is heading. However, there are a number of forks, as we go along the mainstream route, and whilst few of them are likely to lead to total disaster, some may lead to destinations which the unwary find disappointing when they get there. Therefore, I feel that it is important that as many of our members as possible give thought to this route map now.

One of the aspects of the review which I have always found disappointing is the extent to which it is being influenced by superficial attention to the accountancy profession. In ¶3.2.4.5 emphasis is placed on how, once mastered and supported by rigorous application of actuarial skills, these concepts distinguish actuaries from other professionals. These skills certainly have not been applied to the comparison between the two professions. I admit to not having carried out a rigorous analysis myself, but I feel convinced that any such analysis would show that the proportion of our profession which is employed on a broad range of business skills is every bit as large as that of the accountants. They are better known in generic terms, but that is due to their numbers. Their overall quality, by whatever method you wish to choose, it will be considerably lower than our own, and so, if we want to compete for recognition in the minds of the general public, then it can only be by creating actuaries of a lower quality than those who are currently

produced. Put another way, this means encouraging the development of an actuary as someone between the current Dip.Act.Tech. level and Associateship level, or, in terms of the model of the future in Section 4, someone who has reached the second stage of development. As long as we retain the requirements of the additional stages for other levels of recognition, with completion of the fourth stage being equivalent to our current actuary, then, possibly, it does not matter as long as the path being travelled is recognised.

However, it does have ramifications for the profession and its membership categories and responsibilities, because, if this route — the four level route — is taken, then I think that more thought should be given to these aspects before proceeding. It has significant implications for the applicability of Principle 5, that is retaining one professional body across disciplines. In addition, I believe that the taking of this route leads to a requirement for the rewording of Principle 3. If an actuary, in the future, is produced at the level that I have suggested, then it is totally unrealistic to expect the same unique characteristics as those demonstrated by current actuaries. Therefore, Principle 3 is capable of being applied as a generalisation in these circumstances.

This route also makes a principle along the lines of Principle 7 as essential, but I doubt whether the changes are likely to appeal to current numerate highfliers. They, by definition, have not gone on the accountancy route, and so it is really the current accountancy undergraduates who are, in effect, being targeted. Thus, Principle 7 only stands if the profession agrees to go by this route.

In general terms, I have no disagreement with the other principles and the overall aims, or with most of those in the 'the way forward', that is Principles 8 to 18. In fact, I believe that the pressures currently on the United Kingdom profession, both domestically and internationally, are pushing our education system towards the Australian model. It might be a bit difficult for our British egos to move straightforwardly to the Australian system, but I would actually prefer two specialisations at the third stage, rather than the one, as stated in ¶4.4.3.

As regards some of the other principles, I am not sure about the wording of Principal 2. The phrase: "as demonstrated through the work that actuaries are able to do" should surely read: "trained to do". We are able to do very many things that we are not trained to do, but whether standards are appropriate to what we are able to do is a different question. In Principle 4 the wording of many of the paragraphs is very loose in relation to whether we are talking about the present or the future, and the insertion of a reference to some actuarial training adds to this confusion, since, surely, it only applies in the context of a new format with a different type of actuary.

I take issue with the suggestion, in ¶3.2.2, that the emphasis, in the past, has been for actuarial training to be on knowledge, and not on skills. I believe that the difficulties that we have with pass rates are because of the difficulties that students have in demonstrating skills, and the complaints of the examiners are that students are trying to demonstrate knowledge rather than skills. If we are going to change from the old emphasis, then beware of what we are going to produce in future. However, whatever we do change to, I am sure that many of the features will be those demonstrated in the summary section.

It had not been clear to me that the MBA route was intended as a route to becoming a fully qualified actuary. I have no problem with including management subjects in an actuarial MBA, they are essential, but I would want to see the type of papers that are being set, if this business qualification is intended to produce an actuary who is equivalent in quality to those who we are currently producing.

Dr L. W. G. Tutt, F.F.A.: Experience suggests to me that, even after agreement has been reached by different countries on stated aspects of international co-operation, the word 'co-operation' can be interpreted somewhat differently in the various countries involved. I wonder whether the same applies to the word 'globalisation', as used in the paper. Thus, can the authors be more specific as to the advantages to the U.K. which might arise from globalisation, and the likely cost, for example by way of concessions, to be paid for them, to justify the somewhat heavy emphasis that they give to globalisation in their suggested education strategy at the expense of other highly important issues, such as training in the finance and investment sphere.

Much of the strategy put forward in the paper gives regard to the modern views of educationalists. I agree that it is right that these views should be considered carefully and analysed in depth, although the implementation of the recommendations of some such experts in other spheres, in the past, has met with varying degrees of success. Nevertheless, nowadays there is much talk by educationalists on such things as metacognition, learning how to think, and so on.

Again, I wonder whether attention to such an outlook, as reflected in ¶3.3.6.1, goes a little too far when it states that skills needed by actuaries: "will include learning how to learn". Apart from implying, perhaps questionably, that such an art has not been mastered by past and present actuaries, I ask whether it would be more appropriate for our education strategy to concentrate, instead, rather on more specific issues, such as finance and investment.

In connection with ¶3.2.4.2, it cannot be overstressed that it is absolutely vital that we still offer education for actuaries working in the current core role as signatories under legislative requirements, for such statutory responsibilities reflect the very high status of our profession.

Paragraph 3.2.4.2 refers also to broadening the profession. In such regard there are immense opportunities for actuaries, to the advantage of all, to extend their influence in the areas of finance and investment.

Paragraph 3.2.7.1 mentions students interested in financial services, yet I fear that many such students might well find the paper somewhat unspecific. We have so much to offer in the realms of quantitative finance, but students will be aware that there are other accepted routes to entering this field of activity. As an example, acquiring a good honours degree in mathematics, followed by a master's degree in finance, is an approach which is clear-cut and free from vagueness. It is not only universities which are catering for such students. To exemplify, the Institute of Physics provides commercially orientated master classes in quantitative finance, covering a very wide range of aspects, including derivatives, financial modelling mathematics, stochastic processes, generalised Lotka-Volterra models, and so on. The requirements for this course include a good honours degree, such as mathematics, physics or engineering, and familiarity with spreadsheet applications and a knowledge of computational problem solving; plus satisfactory completion of a pre-course study package and assessment. Again, this approach is clear-cut and free from vagueness. It must be of interest to us that the Government's Chief Scientific Officer and Head of the Office of Science and Technology has stated, publicly, his gratification in the way that this postgraduate diploma course is carrying forward the recommendation of the Foresight Financial Services Panel.

Could it be that these other routes into finance and investment work are presented, by their specific manner, in a way which could have greater appeal to students than the far less specific strategy sketched out in the paper? We are being challenged, and challenged on our own ground.

I consider that high technical ability and skills, involving applied mathematics of a high order, are vital for the members of our great profession, and I add now that I consider that such applies, with emphasis, to finance and investment work. This is the area which has such great potential for students, and is an area in which we should be devoting intense attention in our education strategy

I ask, and I am sure that you will understand that I do so with proper respect to all, whether the education strategy, as put forward in the paper, could be looked at further and carefully, so as to ensure that the actuaries of the future will not be overshadowed in technical knowledge, and not overshadowed in the application of technical skills, by others outwith our profession, in the important spheres of finance and investment.

Professor A. D. Wilkie, C.B.E., F.F.A., F.I.A.: This discussion is about education; and, in my view, education, like charity, begins at home. Those who are most in need of education at present are some of the more senior members of our profession.

The actuaries who have, in the past, been in charge of 'an old-established English mutual life office that has recently closed to new business' have been in need of education to learn how to

reserve for, price and charge for, annuity guarantees. It is not as if the methodology has been unknown. It has been known for many years, at least since the early 1980s, but these senior actuaries did not appear to know it. They needed education.

This is the first life office that I know of that has been brought down by actuarial mismanagement. It does not seem to be the only one that has reserved insufficiently for guaranteed annuity options, but other offices seem to have been able to stand their losses. Nevertheless, I have seen no indication that the actuaries of any office have been reserving and charging for them properly. They may have been, but, if so, they seem to have kept their methodology quiet. The question remains: "How many other Appointed Actuaries need education?"

What about the members of the Life Board? In spite of a sensible working party report produced some three or four years ago, the guidance from the Life Board, at least as indicated by the document that still appears on the profession's website, fails to assist any actuary in the right way of dealing with the problem of guaranteed annuity options. Do not the members of the Life Board need some education, too?

Then, what about the supervisors? It may, indeed, be that they have been giving the right guidance to life office actuaries for some time; but, if so, they have been doing it so secretly that no one else knows about it, or is it that they, too, had not understood the principles laid down by the Maturity Guarantees Working Party about a very similar problem, over 20 years ago (*J.I.A.* **107**, 101-212), or had not appreciated how those principles applied to this new situation? Do the supervisors need education too?

However, it is not just life actuaries who seem to have been failing to keep up. The Pensions Board, jointly with the Department of Social Security, issued a document on *Illustrations for Money Purchase Pensions* a few months ago. This document could have been written 40 years ago. It suggests giving single point forecasts of the results of investment over periods up to 40 years ahead, with no indication at all of the uncertainty involved. Have they not heard of stochastic methods, or not understood their applicability? Has their education not been lacking too? If their proposed method for giving forecasts for money purchase pensions is not substantially revised, I can foresee yet another mis-selling scandal that will fall on the heads of the actuarial profession in years to come.

I mention these things because the emphasis of the paper is on widening the boundaries of the actuarial profession, on breadth, and not on depth, yet the failings that I have referred to indicate that what we need to do is to improve the depth of our understanding in our core areas, life assurance and pensions. Who will wish to get advice from an actuary in an area that is not our core area, when we are so manifestly falling down, as a profession, in our core areas?

One of the many objectives of this paper, and of some of the most senior members of our profession, seems to be to increase the number of actuaries willy-nilly. I see no advantage in increasing the number of actuaries, if the additional ones admitted in future are ill-educated and incompetent. What we need is a sufficient number of skilled actuaries; sufficiently many to do our core tasks, and sufficiently skilled to do them well. This point is made in Principles 1 and 2, but the paper emphasises the wider field approach thereafter.

Therefore, I suggest that the education strategy should be refocused to ensure that at least future students (if not the presently qualified actuaries) are taught thoroughly the stochastic methodology that needs to be at the heart of the actuarial profession in future. The only way that we can 'make financial sense of the future' is by understanding and quantifying the uncertainty that exists about the future, and not by pretending that we have some crystal ball that allows us to foresee the uncertain future with accuracy.

This paper is relatively short on details, but one of them indicates movement in quite the wrong direction. In ¶4.4.1.2 it is suggested that subjects 103 and 109, stochastic modelling and financial economics, could be merged into one subject. This is going totally the wrong way. These are new subjects in the course, but they are the core of the future, not just a whim of some academics. They do involve harder mathematics than much more traditional actuarial work, but this should not be too hard for the bulk of students who are recruited with mathematics or

statistics degrees. If they are too hard for some of our more senior members, then they should step aside gracefully, and not obstruct the new methodology.

One good suggestion is that fuller specialisation may be acceptable. However, in my view, this is needed, because our main subjects, life assurance, pensions, general insurance and investment, have all become more complicated, and so a longer course is necessary in order that students can understand at least one aspect (or possibly two) in sufficient depth. It is unrealistic to make all the courses longer, so one has to reduce what the student learns about subjects W, X and Y, so that he or she gets a thorough training in subject Z. So, I am in favour of the 'fat T' approach. I am very doubtful about Mr Goford's flower. I would have thought that something more like a tulip, with about six petals, would illustrate the point better — six special subjects, rather than twenty something.

I now raise a small practical point (not that my other remarks have been impractical, but they have been matters of principle). When we had textbooks, qualified actuaries could, if they wished, buy (or borrow from a library) the latest version, read it, and keep themselves up to date. Now the corresponding education material is rather concealed in core reading and in the courses supplied by the Actuarial Education Company. These courses are expensive, are produced in an inconveniently large loose-leaf format, and are not made available to libraries. In theory, they may not be lent, or even shown, by the purchaser to anyone else.

If we wish to ensure that the members of the profession do keep up to date, not with the very latest ideas, but with what is now considered the current contemporary wisdom, then we need textbooks, or their equivalent, readily available to all. I am glad to read elsewhere that something may be happening in this direction, but I know how difficult it is to get adequate textbooks written, so better availability of the existing educational material would be enormously helpful in the meantime.

Professor A. S. Macdonald, F.F.A.: I take as my starting point the changes urged upon the profession in 'Vision and Values'. In my opinion, many of these changes are defensive. We have seen the obsolescence of traditional actuarial education — I have in mind most of what I learned when I qualified — which was, in large part, a collection of pre-computer, numerical methods, directed at a narrow range of problems, in support of the management of a narrow range of (historically unusually stable) institutions. The arrival of computing power shifted interest from computational issues within that narrow world to the risk characteristics of the underlying products themselves. Along with that, we have seen the appearance of new experts, bringing with them high levels of technical ability, but little of the professional baggage that actuaries carry around (for better or worse). So, we are in the position of having to learn this new language, which, perhaps, is being found to be uncomfortable. Also, to some extent, we run up against the old Anglo-Saxon fear of being accused of being technical experts.

To a great extent, the current review aims, yet again, at wider fields. That leads to the 'fat T' approach which Mr Goford introduced, and which I would take a step further. Underneath the 'fat T' there has to be an even broader education in the early subjects. To work backwards from current applications in an attempt to narrow the extent of the basic subjects is to build a pyramid upside down.

I think that university is the right place to study the mathematical subjects and the wrong place to study the later, business subjects. All our experience of the later subjects, which have been through several well-meant reviews, suggests that relevant experience should play a part in their success, both from the students' and the profession's points of view. I do not think that the current 300 series subjects are suitable for exemptions, and I do not think that the proposed third level subjects should be pushed in a more academic direction; quite the opposite.

Could the review be even more radical in respect of the current 300 level subjects? That part of the education has not, in recent times, been made to work satisfactorily. Consistently we have low pass rates, marks bunched around the pass mark, and a tendency towards rote learning. I think that our system here must be labelled as a failure, and even its very educational value must be in doubt. Possibly greater specialisation will help, but I think that pushing the system away

from the field of experience and towards universities will not help. Perhaps, some of the more radical approaches being considered for level 4 would help at level 3.

The report lays considerable emphasis on using the universities more, and this is something that my colleagues and I have discussed. I think that the following broadly represents our views. There may be many ways in which universities can help the profession, but the reality is that universities are now business-like, so, what is in it for them? Will it lead to profitable teaching activities, possibly outside degree courses? If so, what will it cost? Traditional universities are strongly research-led, and employ staff chiefly because of their research interests; in fact, in highly competitive professions like ours, research is the main motivation for an academic career, not teaching. Research-led universities are unlikely to divert substantial resources towards a field that might not be a major research area. One might even go so far as to suggest that the Universities Initiative, in talking to institutions like Oxford, Cambridge, Edinburgh and Glasgow Universities, is aiming at the wrong group of universities. If the aim is to get universities to take on the burdens of actuarial teaching, the profession might have more success with some of the new universities, like North London or Glasgow Caledonian.

It should not be taken for granted that any subjects that the profession defines will be of acceptable standards to universities. In the early subjects, in my view, some of the restrictions on the syllabus caused by the adherence to three-hour closed book examinations are already unsatisfactory. For example, almost all computer-based subjects (including most of modern statistics) are unavailable to the profession. Of course universities can teach them, but only 'off the syllabus', and the profession looks silly. This will become increasingly unacceptable at most universities, whose first duty is to their students. The review will not lead to the establishment and continuation of new courses without any evidence of employer support, and, as yet, we see little of that.

To end on a positive note, the review does consider alternative methods of assessment, and the sooner the better, in my view. This is one area in which the universities could provide real help. One route to Fellowship might be by a research dissertation and oral examination, and universities have great experience in supervising and assessing research degrees (MPhil and PhD), which the profession could, perhaps, harness. An MPhil at Heriot-Watt University, for example, may be taken by off-campus study over a minimum of two years, leading to assessment by an external examiner. With the appointment of an examiner approved by both university and the profession (as is usually the case for exemptions), and a mixture of academic and industry supervision (which is encouraged anyway), the MPhil route would assure the profession of proper, benchmarked standards. It could make a real contribution to research in wider fields, where the profession would find it more difficult to examine along traditional lines, which would greatly raise the profession's profile. It would lead to the creation of a small, but valuable, pool of research-trained actuaries. The benefits, to the profession and to the universities, appear to be entirely mutual.

Mr G. Humphreys (a visitor)**:** I am group personnel manager for Scottish Equitable or Aegon U.K., depending on my particular hat at the particular time. I speak as someone representing the employer's point of view, and someone who has been involved for many years, in one way or another, directly or indirectly, with the profession. I detect a certain degree of uncertainty about how pre-eminent the actuarial profession remains within the financial service industries. My view is that its pre-eminence remains, and is unlikely to be challenged seriously in the foreseeable future. However, you have to make sure that you guard that with great care.

It has always struck me as odd that a profession, which is so soundly based in statistical methods, arrives at a situation where, of those who start out on the course of study, only about 30% reach the end successfully. That throws up two questions. One is: "Are we selecting the right people who embark on a course of study?" Secondly: "Are we right in setting this goal, which is a very worthwhile goal, and are we failing to recognise that, somewhere along the way, there are extremely worthwhile pieces of learning taking place, which are extremely relevant and important to our particular interests? Do we need recognition of completion of parts of the full course?"

On the use of employers in helping the education process and the link between employers and academic institutions, I find that different ways of assessing people's capabilities are important, and should be looked at. An advantage of having workplace projects supervised by someone from a university is that this ensures that the economic rigour, which is absolutely paramount to the profession, remains unchallenged.

The way in which the general education system is moving at the moment indicates that it will be a relatively small number of years before we reach the stage where, of those who begin a course of study, such as the actuarial one, very few, if any, of the students will have any experience whatsoever of having done examinations. We may well be trying, at some point, to test and examine something that very few people have the background to embark on. The strategy has to be to look at what the input will look like in five to ten years' time, compared with what we have now. The course of study and method of assessment need to change to reflect these changes. Extremely able people may not then have the skills and the background to enable them to pass the examinations. The idea of having core studies initially tested by core examinations should remain fundamental. As soon as some sort of experience is gained about different means of assessing people's abilities, the better. Perhaps, the sooner that we leave behind the thinking that: "I had to pass the examinations, so why should not the next generation?" the better. This kind of thinking may be holding the actuarial profession back.

Professor H. R. Waters, F.I.A., F.F.A.: The paper sets out some principles for an education system for actuaries. I have little difficulty agreeing with many of these principles, and so I will confine my remarks to the more important points where I disagree.

A paper which sets out principles, and a possible future model, for actuarial education could be expected to start with a critical analysis of the current system, but this paper, surprisingly, does not. The Faculty's current education system was implemented in two stages, with the final stage, the introduction of Subjects 101 to 109, being in April 2000. This is one year after the authors started work on this paper. Clearly, the maxim: "If it ain't broke, don't fix it" was not being applied in this case.

No education system is perfect, and, in my opinion, major problems with the current system and its predecessors are:

— low pass rates, particularly in the later subjects;
— the uncertainty over the time to qualify; and
— the number of very able entrants to the profession who do not go on to qualify as actuaries.

These problems are mentioned in the paper; and Principle 11, encouraging universities to offer full-time courses leading to exemption from the common core and further non-country specific specialist material, is intended, as Mr Goford mentioned, to go some way to solving them. This is reminiscent of the proposals in the Kennedy Report on actuarial education, presented to the profession in 1984. That report envisaged that, by 1991, there would be five universities in the U.K. offering one-year courses covering what are now subjects 101 to 109, with a combined intake of between 120 and 200 students each year. That, as we now know, has not happened — although there are very successful courses at Heriot-Watt and City Universities. Since the authors envisage an increased role for universities, it might have been useful for them to have analysed why the recommendations of the Kennedy Report were not fully implemented. More generally, it would be interesting to know with which universities the authors have discussed their proposals — as far as I know they have not discussed them with mine.

In several places in the paper the authors state that a future common core of actuarial subjects will be a subset of the current subjects 101 to 109. If an actuary is to be someone who can manage financial risk, then I would strongly suggest that all of these subjects are an essential part of an actuarial education. These subjects cover the traditional background material — statistics, economics, accounting, the time value of money — together with the background material necessary for modern developments in the management of financial risk — stochastic processes. The applications in subjects 101 to 109 cover areas where some of the risks might

reasonably be considered independent, and so diversifiable: subjects 104, 105 and 106; and areas where the financial economists have shown us how to deal with non-diversifiable risk: subject 109. A future education system which does not cover these topics may well be useful, but would not, in my opinion, fully equip someone to manage financial risk, and so would not be adequate for someone who was to be awarded a Fellowship by the Faculty of Actuaries.

The greatest present threat to the actuarial profession is to be seen to be lacking in competence in dealing with financial risk. I think that some of the proposals in this paper are likely to increase that threat.

Mr D. G. R. Ferguson, F.I.A.: [Mr Ferguson also spoke in the discussion on the paper at the sessional meeting held by the Institute of Actuaries, and an amplified version of what he said in this discussion appears in the abstract of that discussion on page 271 of this part of *B.A.J.*]

Dr E. M. Goodwin: [Dr Goodwin also spoke in the discussion on the paper at the sessional meeting held by the Institute of Actuaries, and what she said in this discussion appears in the abstract of that discussion on pages 268-269 of this part of *B.A.J.*]

Dr D. C. Bowie, F.F.A.: Perhaps inevitably, a paper on the education strategy prompts a revisiting of the process, namely Vision and Values, that prompted the review itself. It is, perhaps, because it makes many of the concepts less abstract — after all, someone is going to have to construct a syllabus, and teach and examine within the strategy.

Most of the principles in the paper are uncontentious, and that is testimony to the process that the review has been through already. I would particularly like to endorse one issue raised in the paper, namely that any revision to the structure needs to be implemented carefully. This is so that it is robust, and can grow and adapt in an evolutionary style, with a body of knowledge that will certainly not stay static. 'Big bang' changes to the three dimensions of structure, syllabus and assessment (especially when implemented all at once) of the process are not only inconvenient for students and educators, but will actively thwart the intentions of Vision and Values.

The proposed Stage 2 of the structure strikes me as key. Placing assets and liabilities and asset/liability modelling at the conceptual heart of the syllabus strikes me as appropriate, since these are the defining characteristics of the profession. I am, though, sceptical of some of the specifics. Generalised asset or liability courses could, without a proper framework, be anything from trivial to fearsomely theoretical. I do not think that the Control Cycle is a framework at all, let alone the right one for asset and liability studies. It may well be a useful consulting tool, but it is free of content, and explains nothing about the way in which asset and liabilities relate each other. At best, a student will be very disappointed that something as vacuous as the Control Cycle forms the core of their studies. At worst, trying to force all problem solving and modelling approaches into something that looks like a Control Cycle will stifle creativity and innovative approaches to tackling real problems.

If the profession really wants to take an opportunity to move its education and the place that actuaries might hold in the future forward, then we should consider using financial economics as the framework for Stage 2. Financial economics is well-established, and provides concrete approaches to understanding investment strategies, pricing and liability valuation. I would encourage the authors to find a more central role for financial economics within the strategy. Professor Wilkie has already mentioned the case of guaranteed annuity options; with a financial economic framework they could not have been ignored. Whatever actuaries may have thought about financial economics in the past, it is time to realise that it is currently the best contender for forming such a framework.

With reference to a comment made in the introduction of the paper, I am strongly opposed to blurring the boundaries between an actuarial qualification and an MBA. This opposition extends from the later stages of the process down to the 'business awareness' course proposed in the Stage 1 core. This is a waste of resources and an unnecessary hurdle for students. It strikes

me as akin to forcing doctors to take a course in bedside manners. There is already extensive work experience built into the proposed structure, and this introductory course serves no useful purpose for students intent on becoming actuaries. We have already had the experience of offering a non-actuarial subject in 'communication', which is, thankfully, being dropped in the proposed strategy. Let us learn.

I strongly agree with earlier speakers, who rejected the idea of combining stochastic modelling and financial economics into one subject. This combination makes no sense at all. Stochastic processes and modelling are applicable in survival models and other areas, as well as in financial economics. It is a language that is useful for describing the technicalities of financial economics, but all the financial economic concepts are independent of stochastic processes, and can, somewhat laboriously admittedly, be explained in English.

To confuse students into thinking that financial economics and stochastic processes are somehow intrinsically related is frankly disingenuous. If, somehow, we were to reduce the number of subjects, the stochastic processes would belong more with the statistics and economics modules.

Mr P. H. Grace, F.F.A. (closing the discussion)**:** We have heard from many contributors, both with support for many of the principles and also with strong views on certain aspects. Where there has been disagreement with the principles or the strategy, these have been noted by us, and will be taken into account in our future deliberations. Getting the balance right between the subjects included, the way in which they are examined, and the levels of specialisation, will be a challenge, but must be achieved if we are to meet the targets set by 'Vision and Values'.

The President (Mr T. D. Kingston, F.F.A.): I should like to make a special plea on behalf of investment, because I chaired the group which looked at the investment strategy of the profession 18 months ago. That has certainly driven my views of education very strongly.

It is very clear that we are not reaching sufficient depth in finance to attract the sort of people that have been referred to by Dr Tutt and others. The only way in which you can do that is to produce more examinations in that area, and clearly you cannot add examinations to the present system. That brings out my concern which centres around the later examinations. I do not think that there is very much wrong with the early examinations, and that seems to be the general thrust of the discussion. There are two problems with the later examinations, as they get deeper: we are not going into sufficient depth in any of them; and the pass rates at the 300 level are really unacceptably low.

I thank Mr Goford and Mr Grace for introducing and closing the discussion, together with Dr Goodwin and all the strategy group for producing a paper which has provided a very stimulating discussion. The general feeling is that this is in the right direction, although, as Dr Hare said: "the devil may well be in the detail."

WRITTEN CONTRIBUTIONS

Professor Sir Michael Atiyah, O.M., Hon.F.F.A.: I am glad to hear about your plans to modernise the training of actuaries. I note, in particular, your worries that the new financial opportunities open to good mathematicians may reduce the quality of the intake into the actuarial profession. It is certainly the case that many very bright students from the mathematical sciences are attracted into the world of finance. My colleagues in the universities are full of stories of how their best students are offered such large salaries. The complaint that I hear is that the sort of student who might, in the past, have gone into academic life is now bribed away by the City. These may not necessarily be the ones who would have become actuaries in the past, so the loss may not be yours, but that of the universities (which affects you only indirectly).

More research would be needed to look into this, and a small survey of university mathematics departments might be useful for this purpose. The answer is probably mixed, but the scale of your problem is not easy to guess.

More generally, once you have clarified your ideas on how you would like to see the training of actuaries altered, it will be essential to enter into serious discussions with the university mathematical community to see how your ideas could be implemented.

Professor D. C. M. Dickson, F.F.A.: The paper considers a range of possible future directions for actuarial education. I note, with some concern, both from this document and from the recent Presidential Address, that education strategy seems to be moving in the Australian direction. I believe that I am uniquely placed among Faculty Fellows to comment on what has happened in education in Australia, being Director of the University of Melbourne actuarial program. As part of this program, we offer subjects leading to exemption from both Part I — the U.K. 100 series examinations — and Part II of the professional qualification of the Institute of Actuaries of Australia.

By way of background, prior to the current system, in addition to Part I subjects, students in Australia had to complete examinations in life insurance, superannuation, general insurance and investment. Two of these examinations had to be taken at specialist level, and two at ordinary level. There are now no ordinary level examinations, but students must still pass two specialist examinations, now out of a choice of five, as finance has been added to the list. In essence, Part II replaces the two ordinary level exams. At the time that the change was made, I do not recall anyone explaining what was wrong with the existing system.

Part II is taught and examined only by the universities with actuarial programs. Although the courses are based on a syllabus set down by the profession, the universities have a certain amount of latitude in how they teach and assess the material. The major objectives of the course indicate that successful candidates should be able to discuss and describe the likes of benefit design, pricing assumptions, how reserves could be calculated, what investments are available, how solvency is defined, how experience should be monitored and assessed, where profit comes from, and what factors affect the distribution of profit. It interests me that the objectives do not state that a successful candidate can actually do something!

Students taking these courses fall into three categories: final year university students; non-university students who attend classes at a university; and non-university students who live outside the university towns and who receive distance education. Although I have not conducted formal research, I think that I can say, with confidence, that the experience at the University of Melbourne, which was the sole distance education provider for three years, is that distance education students have performed best, and that university students have struggled. This does not surprise me. Distance education students tend to have a few years' office experience, and have met many of the Part II topics in practice. By contrast, university students have little, if any, practical experience. My conclusion is that Part II is a straightforward subject for someone with a little experience and maturity.

The official aim of Part II, as stated in the Australian Institute's *Education Handbook*, is to equip candidates with the generalised actuarial approach necessary to tackle a range of commercial problems, not necessarily in traditional areas. I would seriously question whether this aim has been achieved. There is nothing in the Part II syllabus that specifically trains or educates actuaries for non-traditional roles. The Part II course taught at the University of Melbourne is approved by the Australian Institute, and provides students with the basics of practice in life insurance, superannuation, general insurance and investment. It is important to appreciate that students can avoid each of these practice areas in their Part III specialisation, so that Part II represents the only formal education that students will have in either two or three of the main practice areas. Such a change may yet lead to the regulators demanding practising certificates. In my view, the introduction of Part II has diluted the value of the FIAA qualification. I believe that students currently completing the Australian professional examinations have an inferior knowledge compared to previous generations of students, and I do not believe that the big insight

that they have gained from Part II — that feedback loops are as useful in actuarial work as they are in many other walks of life — compensates for this. Of course, it is difficult to provide hard evidence to back this view. However, I can report that the Australian Institute is currently reviewing both its Part II and Part III offerings. At focus group meetings in both Sydney and Melbourne the view was expressed that Part II is simply too easy.

An important point to realise about Part II is that, despite the official line, it is nothing more than an introduction to actuarial practice, across the main subject areas. By its nature, it does not provide an in-depth education in any one practice area, traditional or otherwise. A question that I believe the Australian Institute has yet to address is how the Part II and Part III subjects are integrated. In short, it is not clear to those teaching and examining Part III subjects exactly what someone who has completed Part II knows — or should know!

It is interesting to note that, while the Australian Institute refers to Part II as the 'Actuarial Control Cycle', this nomenclature has been rejected by three of the four universities currently accredited by the profession to teach subjects leading to exemption from Part II. Quite simply, the name does not reflect the content of either the profession's Part II syllabus or these universities' subjects. Indeed, what does the name mean? When the notion of an 'actuarial control cycle' was first introduced in Australia a few years ago, my impression was that it was the profession's version of the 'Emperor's New Clothes'. Nothing has swayed me from that view. I find it embarrassing that some actuaries trumpet this as the way forward for the profession. It is nothing but a feedback loop. There is nothing actuarial about it, and, in some of its applications, e.g. the graduation of standard tables, one wonders exactly what is being controlled. Generations of actuaries have used past experience as a starting point to solve problems, but it is not an approach unique to our profession, and it never will be. Nor will it ever be our route into wider fields. By contrast, I believe that a solid education in the modern applications of financial mathematics and probability theory will open doors for future generations of actuaries. If I remember correctly, it is not so long ago that the syllabus for the first U.K. professional actuarial examination expected students to explain the 'actuarial scientific method'. This has rightly gone. Let us not replace it with something which was described by a Council Member of the Institute of Actuaries of Australia in a recent paper as: "the epitome of an abstraction which has been emptied of content".

I believe that the introduction of Part II was significant, but for the wrong reasons! By contrast, the introduction of the 100 series subjects as Part I was, I believe, an important step forward. Our profession is based on applying mathematical skills to solve real world problems. Reducing the technical content of our education, particularly at the expense of soft options, would erode what distinguishes our professional skill set to the point where we would be nothing more than general business consultants. I would, therefore, oppose any of the proposed models which reduce the technical content of our professional qualification. The FFA qualification has real meaning. Let us keep it that way.

Mr C. G. Thomson, F.F.A.: I am generally comfortable with the authors' proposals, but it is very difficult to comment when, of necessity to keep the paper to a reasonable length, the conclusions are reached without a discussion of the advantages and disadvantages of the various approaches. My comments may be ones that the authors have considered and discarded for good reason.

The first point is the most basic and the most difficult to answer: "What do we see as the unique features of actuaries as distinct from other professionals in 20 years' time?" Our traditional strongholds will be less and less relevant, and our general financial skills are not sufficiently distinctive to support a separate profession. I do not believe that the work in this paper or within 'Visions and Values' has reached a satisfactory answer to this. There may not be an answer that this generation of actuaries would find comfortable. Within such an uncertain context, the proposals seem a generally very sound response, but we need to keep trying to answer the basic question.

My second point is the modern confusion between input and output. When there is a 'Maxwell' or a 'Shipman', the response is to create more rules and more documentation. Since these people broke all the rules anyway, this is not a rational response. Rules do not prevent, they merely make unlawful. A more rational response would be a more sophisticated system of detection of the unfit.

In our context, we should not confuse the need for continuing professional development to produce the output of skilled and reliable professionals with the input of logbooks of courses attended. A former colleague once remarked: "Education is what is left when you have forgotten what you learned." The logbook merely records the material that you have had the opportunity to absorb, regardless of whether or not you did. It is hard to see that that is important. In the same way, I am concerned that the sort of formality envisaged in ¶3.2.4.1 makes it more, rather than less, difficult to move from one area to another — the candidate may have the knowledge, but does not have the 'Brownie points'.

Likewise, I do not agree that Principle 16 (which, at face value, seems unexceptionable) should be used to justify mandatory periods of work experience. Our professional responsibilities demand that we do not tackle work with inadequate capability. Why is that not sufficient? If the principle is not sufficient, then why do we believe that the rule of minimum time served is in any way better?

I am not convinced by the examples in Section 4.5. To compete with other career paths, we need our best graduate intake to believe that Fellowship is attainable within three years, and is unlikely to take longer than four years. Fellowship has always only marked a point on the path towards full professional competence, not the final step. If reducing the time means that we must set the levels of intellectual achievement at the same heights as before, but reduce the content, then so be it.