ABSTRACT OF THE DISCUSSION

Mr G. C. Orros, F.I.A. (introducing the paper)**:** Enterprise Risk Management (ERM) is a process of risk and opportunity management. It impinges on the four main functions of boards, which are: policy formulation, which is a long-term external, rather than an internal, function; strategic thinking, which is long term, but internally focused within the business enterprise; supervisory management, which is short term and internally focused within the company, trying to achieve what should be coming out of its policy and getting at its strategy; and then, once the results come through, accountability to the public, to stakeholders, to regulators and to shareholders, which is external, but is based on short-term performance.

The respective control cycles of each of these activities need to be considered. It is a control cycle loop, where you learn from experience.

In practice, there are many working definitions of ERM and other potentially useful risk management processes. After much consideration, the authors thought that there was merit in the definition put forward by Chapman (2006), in ¶2.2.3.1, that ERM "... is a systematic process, embedded in a company's system of internal control (spanning all business activity), to satisfy policies effected by its board of directors, aimed at fulfilling its business objectives and safeguarding both the shareholder's investment and the company's assets. The purpose of this process is to manage and effectively control risk appropriately (without stifling entrepreneurial endeavour) within the company's overall risk appetite. The process reflects the nature of risk, which does not respect artificial departmental boundaries and manages the interdependencies between the risks. Additionally, the process is accomplished through regular reviews, which are modified when necessary to reflect the continually evolving business environment."

Figure 5, which comes from Chapman (2006), was based on a similar picture from Garratt (2003).

Here the corporate governance regime for business enterprise should be based on the principles behind a learning organisation model, as illustrated in Figure D.1. It is very much a matter of continuous learning, continuous improvement, rather than going through a process once.

The strategic agenda for corporate governance in ERM and its ultimate effectiveness are determined by the board of directors. ERM effectively impinges on the four main board functions and their control cycles. Although ERM-based policy formulation does not inevitably lead to effective corporate strategies or to business plans, a sound understanding of the value drivers and the value destroyers, which imply a comprehension of which risks to take and which risks to avoid, are, in effect, a pre-requisite for the strategic direction.

The Chapman model also provides us with a very holistic view of risk and opportunity management, where the qualitative aspects are just as important as the quantitative aspects, and the upside risks, if not anticipated, can be more catastrophic than any downside risk.

The risk management process is an iterative process involving six stages. In Figure 6 it shows that you cannot proceed until you have satisfied all of the previous iterative steps, and each of these six risk management processes has its own inputs, outputs, controls and mechanisms. The modes of data connectivity can be charted using a process mapping technique, known as IDEFO, which stands for 'integrated definition for function modelling'. Chapman also categorises the micro and the macro influences which can be considered as risks and opportunities for the enterprise, and can shape the business performance. The internal sources are quite well known in terms of operational risk, technology risk and financial risk.

More important are the external factors, such as social, economic, environmental, market, political and legal risks, which, in many cases, can be more catastrophic than internal sources.

Finally, when Chapman updates his 2006 book, he may choose to include some additional external risk factors which well-run boards now have to consider, such as the climate change risk and the ecological green lobby risk.

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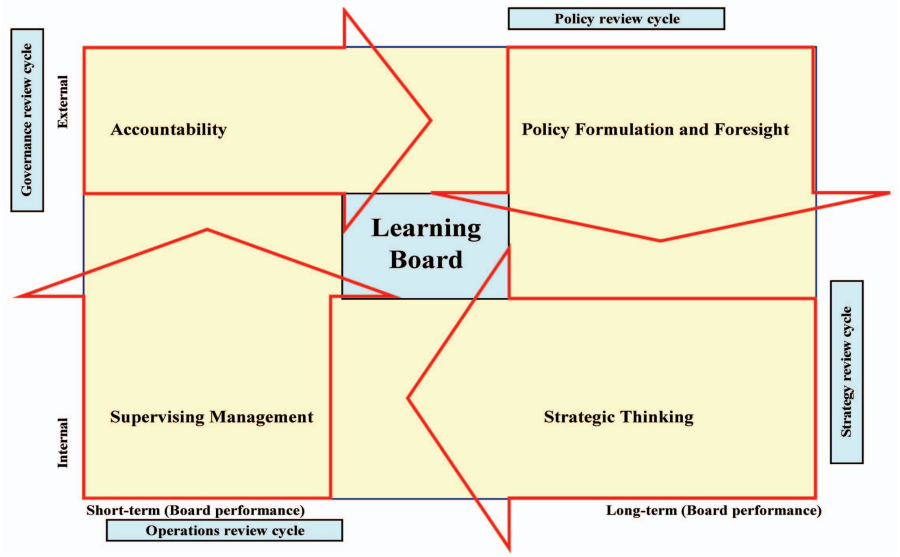

Figure D.1. ERM impinges on four main board functions, based on a learning organisation model

Mrs K. A. Morgan, F.I.A. (also introducing the paper)**:** Our paper looks at ERM from a general insurance perspective, although points in the paper do apply more widely to other types of financial institutions, such as life insurance or pension funds.

One of the key things which we propose is our maturity framework, which is a way for firms to look at where they are in their own development of ERM, and how far along the curve they are to developing a good ERM framework.

The key elements are set out in Tables 1 to 8. It is worth emphasising the first one. It is important that a firm thinks about its philosophy and its attitudes to risk. One thing about which the authors have been very clear is that risk includes reward as well, so that firms need to be clear about what their risk appetite is. They should not just be reducing risk, but, maybe, be increasing risk to increase reward. They should also be looking at upside risk, as well as downside risk.

There is no one single path to developing an ERM framework. There is no checklist where, once you have ticked off everything, you are there. It requires a high level of board sponsorship. The key point which we have emphasised in the GIRO papers which we have produced is that the culture is very important. We produced two case studies which demonstrated that culture could be a big factor in the failure of the ERM framework.

Another key point is that the framework should be flexible. It should be able to evolve over time. This could be a kind of gradual evolution, or, perhaps,something more dramatic and discontinuous, responding to large events.

ERM has to be used with other tools; for example, capital models, catastrophe models or stress and scenario testing. It is one thing in a firm's armoury of methods for managing and for controlling its risks.

This links into our view of how to maximise the potential of ERM. It is important to understand the entire spectrum of risk outcomes, but also to link that to the capital which a firm

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needs, so that it can use its capital most efficiently and effectively, in line with its own risk appetite and goals.

Mr G. R. Perry (also introducing the paper)**:** I shall speak briefly about the implications for the general insurance actuary. One of the main issues is the examinations from, say, 2009. There is the expectation that there will be a core application subject in actuarial risk management, and, following that, in 2010, a specialist subject in ERM risk management. Along with that there is the issue of CPD.

The other key thing from the paper is the opportunities for the 'ERM actuary', since the role is following on from the lines of the reserving actuary and the pricing actuary, a defined role where these actuaries are members of multi-disciplinary teams, and who finally stake our claim as chief risk officers (CROs) with insurance enterprises. A few actuaries have become CROs, and this will be an increasing trend. That is not to say that we are the only ones who can do it; it is just that we are good candidates for that role, from our education experience and from our understanding of uncertainty and risk.

We are proposing that there should be a Wiki on the ERM, and we say boldly that about 30% of CPD should be for ERM.

There is quite a wide scope for learning in this field. There is a wide variety of conferences, some run by the Actuarial Profession and others by non-actuarial professions. Some of those here are from other associated professions and associations which have an interest in ERM. ERM is a wide area, and we have our own particular perspective on it.

Mr T. A. G. Marcuson, F.I.A. (opening the discussion)**:** It is easy to see this paper as a review of an emerging topic, attempting to discuss ERM concepts in the language of general insurance actuaries. As such it performs well, providing the newcomer with a helpful overview of the subject, and the experienced practitioner with a useful reference.

This paper is more radical than it seems at first sight, in the way in which it puts forward a vision of where we, as a Profession, might be in 20 years' time. In doing so, it sets out an agenda for how we can adapt to reach this destination collectively.

There are three questions which are ERM relevant:

(1) Does implementing an ERM framework really make an insurance company more successful?
(2) How do insurers implement ERM to make the bottom-up and top-down views of the world combine?
(3) How should the Profession be responding to the needs of ERM?

Taking these in turn. the benefits which ERM provides to a company are set out in Section 3. The statements may appear to be obvious, but this is to fail to understand what the authors are saying, and its importance for all of us.

While individually components may not seem to add much, the construction of an over-arching risk edifice represents a major accomplishment. If well designed and well implemented by an insurer, it can serve to liberate the entrepreneurial spark at the heart of winning firms. I say well implemented, as, while I see good ERM as a component of success, poorly built and unwieldy frameworks can prove costly to firms, as a number of dangers lurk, among them:

— failing to code all of the micro level risk tools correctly into the framework;
— making an organisation too dependent on the risk architecture, or too consumed by completing its process needs, so as to lose sight of big picture risks; and
— suffocating through excessive process rather than liberating commercially driven insurance executives.

So, on its own, ERM is by no means the magic bullet. Companies which successfully implement an ERM framework as part of their overall governance structure, led and overseen by those at the top of the firm, have a key ingredient for success. However, it can only be a necessary feature, and not something sufficient in its own right to make a company outperform its peers. Here buy-in from the top is critical, and the increasing profile of board level CROs is

proving helpful. The involvement of the board and the most senior company executives provides a top-down context for ERM. However, much of the challenge of making ERM a success can be seen in the details shown in the paper.

This leads to my second question: "How do insurers implement ERM to make the bottom-up and top-down views of the world combine?" The difficulty is that, operationally, a company can establish a variety of risk committees, charged with overseeing, recording and controlling risks which arise at a micro level. Equally, boards can use the ERM principles to take decisions by considering the various facets of risk facing the business. A company can exist with both of these structures operating effectively (along with the various intermediate level committees applying similar principles), but still not necessarily 'get' ERM.

There are two 'magic' ingredients which are needed to make ERM successful:

— *the culture*, getting the people of the firm aligned behind similar beliefs and views on acceptable risk norms; and
— *the infrastructure*, having the information systems developed in order to capture and to report on the decisions being made at each level of the company, so that the organisation can operate as one.

To return to the professional angle, the paper outlines some of the ongoing activity in relation to the qualifications, the training and the research. These developments are to be welcomed, as it is clear that the level of activity in capital modelling amongst United Kingdom actuaries has outpaced rapidly the tuition material in the field. That said, the suggestion in the paper that qualified actuaries should spend at least 30% of their CPD time working on ERM is a significant step beyond this, suggesting that we are moving towards a world where ERM will become the core work for many practising actuaries in 20 years' time.

This brings me to my final question: "How should the Profession be responding to the needs of ERM?" Already we have an ERM Practice Executive Committee, and are developing new examinations on this topic. However, it is important that, in our ambition to develop the CROs of the future from our membership and to demonstrate our brilliant business acumen, we do not discard our core disciplines, which have served to build our professional brand.

In summary, this is a topical and long-overdue paper on this important subject, particularly timely given the recent launch by the European Commission of its Fourth Quantitative Impact Study.

Mr J. P. Ryan, F.I.A.: Risk management has been around for quite some time. There is an Institute of Risk Management, which deserves a slightly higher profile than it had in the paper. I am a Fellow of the Institute of Risk Management, and much of the management process is covered by them, although, obviously, it has a much greater emphasis on physical and insurance type risks rather than ERM, which includes the commercial and financial risks as well, and provides a holistic net.

The issue which distinguishes the paper from the work done by the Institute of Risk Management is the diversification impact of including commercial and financial risk as well as physical risk. It would be beneficial if that had come out a little more clearly in the paper.

The paper provides much on the process of risk management. I prefer the risk management circle approach, starting with identification, control, financing and administration, which was included in the paper to the Institute on financial condition reporting, by a Working Party which I chaired ('Financial Condition Reporting', by J. P. Ryan *et al*. Paper presented to the joint GIRO/CAS Convention, 2001). This provides a useful way of looking at risk management. It puts the process in a circle, and shows how each activity flows from the other, but each is inter-related, rather than using a serial approach, as is used in the paper. My approach comes from a former colleague of mine, Felix Kloman, who is referred to in the paper, and who has provided some of the most interesting insights into the whole risk management process.

Also, I prefer the word 'circle' rather than 'cycle', because it is not a cyclical process, in that we start off somewhere and come back up again. Each is inter-related, one with the other. Some

of the identification process can be involved in some of the detailed quantification. It is not a trivial issue.

Some of these points may seem slightly semantic, but they are an important aspect in getting a risk management culture into an organisation. As part of my career, I have had some responsibility for a risk management unit and I am aware that it is very important, if you are going to have a successful risk management function in an organisation, to get the culture right. So, terms like 'circle' rather than 'cycle' can be quite important in the process.

A similar issue arises with upside risk. I do not believe that we should be using the words 'upside risk'. Risk is not an opportunity, it is definitely a cost. Mathematically, it does not lead to any great problems, and it does not lead to any analytical issues *per se*, but it does have a major impact on the cultural aspect, because, if you get people saying that it is good to take on risk, and so on, then, actually, you do not get the cultural impact going the right way through the organisation. To implement a successful risk management process, you need to get it right the way down throughout the organisation, and there needs to be a clear understanding that taking on risk without getting a corresponding return somewhere is a bad thing. That is an important cultural aspect.

However, other people's risks are clearly an opportunity. If you can take them on and manage them more effectively, which is basically what insurance companies do, then, clearly, that is an important benefit. It is very important to take into account the positive returns from taking on those risks. In that sense, a mathematical element of upside does come into play.

The other item which comes through from the paper is that this is more about capital issues and risk appetites for organisations. This is an important part of the process, but it is not the *only* part of the process. There is an important part in reducing the cost of risk. To the extent that an organisation can reduce the cost of its risk, and can include the capital cost of retaining risk on the balance sheet in the organisation, compared to its competitors, it could then achieve a real competitive advantage. Managing and controlling risk, reducing the cost of risk, transferring risk, using insurance, using physical processes to reduce risk, for instance the introduction of sprinklers, can be equally important as a part of the systematic risk management process. It is mentioned in the paper, but it does not come through as important.

I strongly agree with what the authors say in ¶3.4.13, when they say that sophisticated modelling, in itself, is not sophisticated ERM. In many cases the modelling process can be very useful for identifying the key risk drivers for an organisation, and that can focus the minds of top management very effectively; much more so than really sophisticated models. This is not to say that sophisticated models are not an important part of the process, but they are needed, principally, to fine tune and to optimise the process, rather than in the risk identification process.

It may be difficult to identify some of the parameters which affect the really sophisticated models. However, models can also be helpful in analysing tail correlations, and can help actuaries, in particular, and other mathematically orientated people, to understand some of the really extreme risks which will affect an organisation. On the other hand, trying to rely on a model to do this blindly can create many problems for a CRO, because of the difficulty of modelling the tail correlations correctly.

Long-Term Capital Management (LTCM) is an extremely good example of this. It was an organisation which had two Nobel prize winners on its board, including experts on financial modelling, and had, probably, extremely sophisticated modelling techniques, and models which were the envy of other organisations. Unfortunately, LTCM was ruined by its complex models. The point which it missed was a fairly esoteric one. It correctly identified all the bond correlations which had occurred in the past, so that it could do its hedging using the correlations, including sovereign default risk. The latter was one of the areas where it was taking on big risks. What it had not realised was that a country could default on its domestic risk, but not on its sovereign risk. This had never happened before. None of the correlations and none of the data, therefore, picked it up, but it ruined LTCM.

This is a clear example of the importance of risk identification in the detailed management

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and the control of risk. That is why the circle comes into play, and why risk identification skills are extremely important.

There is an interesting section (Section 4.3) on ERM in 2025. There is talk of real-time modelling of ERM. This is probably not going to be a big area, except in respect of the area of market and financial risk. Big banks do need this at the moment. However they have to use value at risk (VaR) rather than more sophisticated risk measures because computing skills are not up to speed to do that. Except for somebody operating on short-term trading issues, like a bank with a big trading desk, probably that is not going to be an issue.

Paragraph 4.3.7 talks about highly sophisticated modelling coming into play, leaving us with just the identification of unknown risks. In many cases it is the unknown which is by far the most 'interesting' part of modelling. The example of LTCM was simply highlighting that it did not know that you could default on one type of risk and not on the other.

The identification skills are going to be the ones which become the most key item, and technical sophistication will allow us to do a much better job, a faster job, but will not eliminate the need to develop, because the world changes very rapidly.

Paragraph 4.3.9, which talks about a highly capitalised company being able to invest in BBB bonds, suggests that the authors should have taken on the ERM approach themselves in that particular section, because you do not have to be highly capitalised in order to do that. A company writing high risk catastrophe property capital business, a high risk/high return type of business, could optimise its capital requirements and optimise its situation by writing BBB risks, provided that BBB is not due to the exposure to natural catastrophes, because both have a high return/high risk area, and both will, effectively, combined together, reduce the capital requirements and increase the return. You need to take into account the return in order to justify the statement in the paper. It is just not necessary for the company to be highly capitalised.

In ¶4.4.1, the authors say that the failure of financial institutions is not acceptable to the public. I disagree. The failure of financial institutions, for example a bank or an insurance company, is acceptable to the public. What is not acceptable is a high degree of loss to the public, and therefore compensation schemes or nationalisation, as in the case of Northern Rock, can get round that. It is possible, and may be in the industry's interest, to put together compensation schemes, because they will reduce the overall capital required. Perhaps it is not appreciated fully that financial institutions concentrate risk, and provide concentrations of risk where they did not exist previously. This is something about which more thought is needed. A good example of this is the banking crisis. The problems with the sub-prime mortgages in the United States of America would have affected only some house builders and only some regional areas in the U.S.A., had it not been for the existence of the banking system. You had similar problems with windstorm exposures or flood exposures. It is only when you have big insurance exposures to risk that it creates a problem which spreads out into wider areas, because we now have a financial crisis which could bring down the entire banking system, as opposed to bankrupting a few house builders, and similarly with insurance-type issues. It is important to realise that, and to identify it as a risk, and for CROs to identify that area.

A good example is the case of a hedge fund which became insolvent, although it very cleverly shorted the sub-prime market, made a lot of money, and carefully put its money into AAA mortgage-backed securities. What it had not realised was that the concentration of the risk within the banking system meant that there was no market for those securities, however good they were, because no bank could afford to take them on its balance sheet, because of its existing exposures. So, concentrations of risk in financial institutions are extremely interesting, and where actuaries can contribute.

It needs to be part of the organisation, and I have had, on two occasions, to use the paper in my risk management area. One is dealing with a questionnaire about the annual risk assessment, which stockbrokers need to do with private clients. One of the questions on that is: "How much are you prepared to put into high-risk securities?" If the Financial Services Authority (FSA) understood what ERM was, it would not tolerate that question, because, if the answer was: "I am not prepared to put anything into high-risk securities, but I am prepared to put 100% into

AAA-backed ones," I might have gone insolvent, too. I suggest that the FSA needs to have a look at this.

Mr G. P. M. Maher, F.I.A.: This paper could not be more timely, as we are experiencing, currently, the consequences of failure in the U.S.A., the U.K. and the European banking sectors, all of which relate to poor risk management, whether falling under the headings of analytic or of cultural failures. The consequences for individuals have also been severe.

We, as actuaries, have an enormous amount to add to this process. Our work in general insurance is around hazard risk, but there is more to it than that. We are now in times when general insurance markets are soft or softening, and the general insurance actuary must make judgement calls. These can have a significant impact on performance measures for the insurer and for the individual. These judgement calls will be challenged.

It is almost impossible to function as a general insurance actuary without understanding people risk; without understanding behaviours, natures and motivations; without being able to communicate at different levels, and that is true, not only of general insurance, but more widely in the profession. We do not know it all, either in the area of hazard risk or of people risk; but we have enough of the pieces and a willingness to learn.

In Tables 1 to 8 the authors consider various risks. Much thought has gone into these tables, and it is useful to stand back and to look at them. For each of these risks there are subsections, which I have counted. Out of modelling, risk management, planning, people, processes, risk cycle, and so on, the winner (by number count) is risk management, closely followed by people, and, more distantly, by model. Risk is not just people risk, but if you ignore, or fail to give due weight to, the people risk, you miss the point entirely. This is true of insurance failures, where corporate culture encouraged over-optimism, prevented the correct interpretation of information, encouraged recklessness, and, as the markets soften, we see that this continues. When we consider some past failures, we find the same culture failures. We are not short of case studies in this area.

Corporate culture is a differentiator in the highly competitive, commodity insurance markets, both as regards risk and reward. Our continuing experience of the differences in corporate cultures in the general insurance environment gives us an advantage, though not a unique advantage, in the risk management area. We should learn from other areas, and there are many cases of industries from which we can learn. As an example, in March 2000, a fire at a certain semi-conductor fabrication plant in the U.S.A. caused it to be burnt down. It supplied essential parts to both Nokia and to Ericsson. Nokia reacted instantly, and Ericsson moved more slowly. The corporate cultures were different, and those cultural differences had financial consequences. Nokia increased its sales by 3%. Ericsson lost $2 billion, and was forced to close its handset division. The underlying risk was a hazard risk, but what made the difference was people risk, culture and organisational differences. This example also illustrates the other side of the coin. A good corporate culture and a good understanding of people risk create opportunities.

I have read this paper, not as what it is billed as: 'Enterprise Risk Management from the General Insurance Actuarial Perspective', but as 'Enterprise Risk Management for Corporates'. I do not disagree with the title, but you have to start somewhere. Imagine yourself as the CFO of a pharmaceutical company, or of an energy company, and ask yourself whether Figure 2 or Table 3 are relevant. The answer to both is 'yes'.

Mr S. Creedon, F.I.A.: I am a member of the ERM Executive Committee. Like the authors, I believe that ERM is a dimension of management which is relevant to all enterprises, and, particularly, to all financial service enterprises, with their particular mix of stakeholder interests. I was relieved to see that the authors recognise this, and that the content of the paper is broadly drawn. Nevertheless, I should like to see more actuaries, and more life and pensions actuaries, get involved in taking this subject further.

In several places in the paper the authors emphasise the 'yin and yang' of effective ERM, where the 'yin' is the quantitative analysis and modelling, using our traditional tool kit of actuarial techniques, and the 'yang' is the qualitative and intuitive flair, which takes into

account the cultural and the behavioural dimension, and which can anticipate the unexpected creatively.

The history of the last nine months' market turmoil is still being written, but it seems to be clear already that the difference between those investment banks which have suffered considerable losses and those which appear to survive relatively unscathed relates mainly to culture. The better performing groups, so far, appear to share the characteristics of rigorously enforced controls, rapid transmission of information between trading desk and boardroom in both directions, vigorous debate of risk appetite, and incentives more aligned with the interests of investors. Limitations of risk and valuation models based on market history have been cruelly exposed, except for those organisations which asked themselves how it could be different this time. Thanks to greater regulatory and investor transparency, and thanks to the Internet, a rich seam of case studies and a rich seam of future educational material is going to emerge from the credit crunch. That will deserve the attention of future authors in our profession.

Arising out of the crisis, and the criticism of Basel II, is what implications, if any, recent events will have for the Solvency II supervisory framework development for insurers in the European Union. Pillar I of Solvency II is intended to encourage European insurers positively to develop partial, or full, models of their required capital, on the basis of a minimum threshold of confidence for asset sufficiency. Pillar II of the framework will require firms to carry out a more qualitative assessment of the full range of risks to which they are subject, and their implications.

The Actuarial Profession, in the form of the Groupe Consultatif, is proposing a required form of solvency report — I think that we would call it a financial condition report — which should be prepared for boards of insurers, with a view to onwards transmission to supervisors. We have already lost the battle that it should be actuaries who are required to prepare such reports. That is not too harmful, provided that we can suggest the appropriate content and the structures which should lie behind such reports.

I would paraphrase the paper, which is underlined by recent events, suggesting that Pillar II of the solvency framework is at least as important as Pillar I. That is quite a change of culture for supervisors and for the supervised.

I can bring you up-to-date on the development of a global enterprise risk management credential, as mentioned by the authors. The motivation for this stems from the context which they have described: from an international consensus among actuarial associations that ERM is a more universally comprehensible way of describing what actuaries have always been about; and from the very rapid growth of new organisations in this emerging discipline.

On behalf of the Profession, I have been working with colleagues in Australia, North America and elsewhere with a view to producing proposals for the Presidents' Forum at the forthcoming International Actuarial Association meeting in Quebec city. I am optimistic that there will be substantial agreement, and that a globally recognised credential would help the Profession attract talented people. The challenge for us is to produce a minimum syllabus for this credential, which reconciles our aspirations to be recognised by candidates and employers as solid citizens in this field with a reasonable travel time to completion.

The President (Mr N. J. Dumbreck, F.I.A.): I have a question for Mr Creedon, as a member of the ERM Executive Committee, and as someone who has been involved heavily in the educational developments in this area. It seems fairly clear that we are going along the right path as far as the syllabus for future students is concerned, but the proposed changes will not help qualified actuaries, and may be too late for those students who are already coming through the system. Should we be doing more than just regular CPD for existing actuaries and students who are keen to move more into this area?

Mr Creedon: My view is that we should, and it is an objective for the development of this global credential, and, indeed, for the development of the examination, that we should be able to take the same syllabus development work and position it as a credential which could be acquired by existing actuaries.

We have an example in the way in which the Society of Actuaries has offered its Chartered Enterprise Risk Analyst (CERA) qualification both to actuaries of the future and to existing actuaries. That is a model which we would like to see, albeit that we think that that particular model can be improved slightly.

Mr T. J. Birse, F.I.A.: I also should like to touch on what is happening to the education strategy, and, in particular, to the forthcoming revisions to subject CA1. For those of you who are not up-to-date with the current syllabus, this is the last generalist subject before students begin to specialise.

We have renamed the subject 'Actuarial Risk Management'. There was a working party to review the syllabus. What has emerged is quite a lot of reordering and restructuring, but probably no more than 10% to 15% of new text, of which I wrote a substantive part.

What comes over to me from that exercise is something which we must not forget, as a Profession. As actuaries, we have been doing risk management since time immemorial. What we are doing in the revisions to CA1, in the work behind this paper, and in other work going on in the Profession, is bringing things together, reordering and restructuring. We are not changing the fundamental core skills of actuaries, which are to analyse and to quantify risk.

Mrs K. A. Morgan: I should like to add some comments about the paper in the context of Solvency II, which follows on from what Mr Creedon was saying.

Risk management is the main theme underpinning the Solvency II framework. Solvency II is all about firms identifying, understanding, measuring and managing their risks, so that ERM is very important. In my view, ERM is a grown up way of looking at a firm's risks, and Solvency II is a very grown up way of supervising firms. It relies on firms behaving sensibly and being open about what they do. It is also about linking risks to capital, and you cannot do that without a good risk management framework.

The internal model approach to calculating a firm's solvency capital requirement starts with the risk management framework, so that firms need that in place and embedded before they can even think about asking for approval to use it. The standard formula for calculating the solvency capital requirement may not be perfect, but it is a risk-based attempt, and it is much more risk based than what we have in Solvency I.

The own risk and solvency assessment in Pillar II — and this is very much at the heart of Solvency II, as Mr Creedon said — requires firms to understand their risk and to link it to their own assessment of their capital requirements. There is going to be a big supervisory emphasis placed on this.

U.K. firms are, fortunately, some way down this road, thanks to the work which we are doing on Individual Capital Adequacy Standards (ICAS), but there are some big gaps. For example, the use test is not part of ICAS, and ICAS does not approve models for use, it only approves the capital number. Also, ICAS is fairly private, whereas Solvency II is going to have much more public disclosure.

The FSA is going to issue a discussion paper, later in 2008, to help firms prepare for Solvency II, and we, at the FSA, are recommending that all firms and all stakeholders read and respond to this. The European Commission is also running the quantitative impact study number 4, which is not just about the standard formula and how that is calibrated. There are questions on internal models, and also on operational risk, which will influence thinking in Europe. So, I would encourage everybody to take part in that exercise as much as they can.

The Committee of European Insurance and Occupational Supervisors (CEIOPS) is also going to publish issue papers on Pillar V issues later in 2008: on governance; on the own risk and the solvency assessments; on capital add-ons; on reporting; and on the supervisory review process; all of which link in with risk management. Again, firms and other stakeholders should read these and respond.

Mr D. K. O'Connor, F.I.A. (in a written contribution which was read to the meeting)**:** This paper on ERM is a welcome addition in a subject area where knowledge and practice are

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evolving. Throughout the paper there are many references to the need for balance. The paper, itself, reflects a desire, on the part of authors, to readdress the balance, by majoring on the non-modelling aspects of ERM.

Balanced decision making and strategy development are pre-requisites of success in business. The search for balance is central to corporate governance, and touches on the behavioural and human resource practices of the enterprise. Undue weakness or excessive strength of corporate abilities, in key risk management or in wider areas, both ultimately represent weakness in a governance framework.

Some examples from the last 20 years of corporate history help to highlight the need for balance. Modelling became the core capability in LTCM. The model and the 'quant culture' dominated decision making, and the consideration of a wider strategy became secondary. Its trading strategy was described as 'collecting pennies in front of a steamroller'. Arthur Andersen had the corporate tag line 'think straight /talk straight'. The creative accounting standards which proved its downfall give the lie to such aspiration. The practice of puffing quarterly numbers spread like wildfire in corporate America. All this was seen as part of the culture of the time. The current fallout from sub-prime lending derives from the collective behaviour of banks and a failure on the part of market participants to set strategy independently of the culture and the climate within their sectors.

These examples highlight a critical question in ERM practice. A review of governance is a must to validate the independence of strategy setting, execution and reward from the short-term influences and perverse incentives. Billions of dollars and pounds have been lost, and untold damage has been done to consumer and to shareholder interests, because of the failure of companies to determine their strategy by reference to a balanced expression of shareholder interests, including the measurement of skills and the brand value, as well as the short-run financial results. Patience is required to build the long-term value in the enterprise, and this form of evaluation should be central to ERM assessment, rather than a comparative financial valuation in your peer group and 'not standing out from the crowd'.

Professor P. J. M. Klumpes, Hon. F.I.A.: I am an educator of actuaries and I am also an accountant. So, as an ethical remark, I was an auditor of a big audit firm which has just been mentioned. I work at Imperial College, which is run by a scientist who worried about controlled environments, and I was offered the opportunity to work for a big insurance company in Australia, which subsequently got involved in HIH.

I have four definitions and four recommendations. In terms of the background, I note that insurance firms specialise in reporting and in managing idiosyncratic risk, whereas much of the risk management literature actually is directed to market participants and to players who price diversifiable risk.

There were a few definitions which I was surprised about in the paper.

From a stewardship perspective, I would like to define what risk management is: it is the analysis and the disclosures of assets, liabilities and equity to determine the magnitude of the exposure of their values to basic economic risk factors. The important issue for investors is to assess the performance of corporations, like insurance firms, in managing and in transforming their financial instruments to manage those risks.

Also, I notice that the organisation which started many of these topics was called the committee of sponsoring organisations, or COSO. It came up with a revised definition for ERM which was not quite the same as the one in Chapman (2006). COSO defines it as a process effected by an entity's board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events, which may affect the entity, and to manage the risks to be within its risk appetite. So, it is a pity that the corporate governance aspect of ERM was not so strongly pursued in the paper.

Another important issue is that of people risk. The Swiss solvency test does not necessarily allow for this risk, which was a big issue when I was an internal auditor in an Australian bank, uncovering a 'Nick Leeson', who liked to book his bad swap deals into a suspense account.

The other area on this is getting some evidence on ERM. In other words, what is the

academic evidence that having ERM in place provides value to the firm? I carried out a survey, looking at the influence of having a compliance programme in the form of a strong programme and a quality internal control department in financial firms. The survey found that there was a link between the quality of the internal control department, the earnings at risk, and even the asset liability at risk. Strangely enough, for the European continental firms, we found that there was a real lack of internal control quality departments, especially in one very large French bank. In conclusion, I would go further and make some connections with internal control, with people risk, and with financial reporting and accountability. Also, there should be more risk disclosures related to the quality of ERM. It is a big issue in the U.S.A. at the moment; the body charged with auditing the auditors is not providing any disclosures about what is happening.

Then there should be steps to link the reporting and the concerns about allowing the users of financial statements actually to assess the ability of firms to manage their own risk for a given capital risk, or earnings at risk. Finally, there should be a link to the conceptual framework which the Board of Actuarial Standards is proposing to issue. I hope that ERM is something which is addressed as part of the conceptual framework.

Mr C. A. Cowling, F.I.A.: I echo the plea of Mr Creedon for more work to be done to educate our actuaries about ERM. Although ERM is not in my specialised field, it is central to what we do. We should embed a lot of this within wider actuarial work.

I am a pensions actuary, so why am I commenting on a paper about general insurance and ERM? It was the contribution of Mr O'Connor which struck a chord with me. I spent a few years advising remuneration committees on executive pay. One of the things which struck me very strongly from this paper was the fact that ERM is a cultural thing. It is top down and it is all linked to a firm's appetite for risk.

I have sat in enough remuneration committee meetings and board meetings to know that a company's appetite for risk is not always rational, and is led by many things other than delivering value. So, I would like to throw out this question to the authors: "How could you link the good work which you have done to the tricky area of how you set objectives for executives?" If you really want to embed ERM within a firm, the only way in which you are going to do it is by ensuring that it is within the remuneration committee's remit and is part of what is driving executive reward.

Mr B. Tyley (a visitor)**:** I am from the Professional Risk Managers' Association (PRMIA). I am not an actuary, but I am a mathematician, which leads me to consider the whole question of ERM. I think that this is a critical component of corporate development going forwards in the forthcoming years. What is ERM? Although we had a quotation from Chapman (2006), I must admit that, if that was designed to get people on the bandwagon for supporting ERM, I am not sure that it had the desired effect.

From my perspective, looking at financial institutions, ERM is all about helping to get the right answer to how are we maximising the profitability of our businesses. That profitability has to be risk adjusted. If we do not get the denominator right, then, at some stage, it will fail, and our numerator being optimised is not going to help us.

Who is a fit and proper person to work on this? That is now starting to drill down into what the role of an actuary is in the process, and so on. To be a fit and proper person working in ERM, presumably you need your capabilities, you need experience, you need quantitative ability, and these are all areas in which actuaries have very appropriate experience and the capability to add to the topic.

It is likely that there may be many non-actuaries who also have the appropriate experience. Where would a difference between being an actuary or not being an actuary be relevant within this process?

The key thing which struck me is all to do with silos. ERM, as a whole, is something about breaking out of silos, being able to apply all those core strengths in all the different components. You need to understand risk in all its forms, and manage it enterprise-wide. However, most of us work within our silos, which we may be very good at, but do not necessarily connect very well

across the breadth. What we have to try to manage in this process is how to leverage our strength within our silo while then breaking out of it to work across the breadth. By understanding what we are trying to do at the top, we can then direct the work better in the silo.

I liked the LTCM example. One of the problems with the LTCM situation was that the model was talking about risk under normal behaviour. What LTCM was not doing, which, from an ERM perspective you might want to do, was to check what happens when your assumptions are wrong. If you assume that markets are not all going to converge in the way in which you thought, and that they might diverge at the same time, your VaR in that situation is $3 billion. It does not require much quantitative work to come up with that, but it requires a small amount of connection between what this number is delivering to management and what management is needing from its number. You need to try to get that balance between breadth and depth.

This is something which I see happening within the Actuarial Profession, even outside the concept of ERM. There is a number of points which have highlighted that to me here. The fact that one might be concerned, potentially, as being a life actuary, to speak in front of general insurance actuaries, and so on, suggests that those silo barriers still exist. Also, the fact that you mentioned that your last course before specialising, which is now called actuarial risk management, contains everything which you do currently. As you say, it is redefinition, it is refocusing on what you are trying to achieve, and, maybe, that could be built in deeper into the silos, instead of being what sounded more like the end of the introduction before you got on with your real job. That was my initial thought: how to take the strength you have within the silo and then bring it up into that broadening level.

The next step then becomes the opportunity. The opportunity is the development of best practice. We can read our latest Basel II reports; we can read the latest joint forum reports; we can read every report out there. Financial institutions, particularly banks on this occasion, have demonstrated, on average, horrendous risk management.

If you look through the number of consultation papers (CPs), not just from the FSA, and the number of documents which refer to the fact that there is no established best practice yet for x, there is no general agreement on y. There is a huge opportunity to be able to deliver smart, intellectual content into these areas. At the same time, you need a receptive audience.

One of the advantages of the latest banking crisis has been to deliver a much more receptive audience, an audience which was becoming more receptive already, due to Basel II and Solvency II, making institutions think hard about risk, and, as they started to do so, they realised that this was a good thing to be doing, and they started to implement economic capital processes independently within their organisations.

The audience is potentially receptive; the demand for smart content is definitely there. It is finding the way to break out, to take the skills, and then to broaden it into the environment which is going to be one of the biggest challenges.

We heard Mr Creedon also refer to Pillar II becoming increasingly important compared to Pillar I. Pillar I is about internal modelling. We have a backlash against modelling, so that we cannot just be model orientated, going forwards. However, as well as Pillar II we have Pillar III, risk disclosure. This is already happening. If you go to some of the Scandinavian banks you will see their Pillar III risk disclosures as part of Basel II. This is going to come throughout the whole of the financial industry world. Firms are going to be competing on their ability to do this well, and are going to be penalised by the shareholders if they do not.

This is a very timely paper. I am not sure that the paper, itself, answers the question of how to get there; but, without the stepping stones, of course we never will.

The President (Mr N. J. Dumbreck, F.I.A.): A couple of our speakers have mentioned LTCM, and for those of you who have not read the book 'When Genius Failed' (Lowenstein, 2001), it is an extremely entertaining read and very interesting. It is particularly pertinent in the light of the credit crunch, because a lot of the circumstances in 1998 are not very different from those in 2007 and 2008. Certainly, LTCM could have calculated the VaR on its exposures, and compared it with their available capital.

However, whether they would have got it right I do not know, because it is heavily dependent

on the correlations in extreme circumstances, and these are difficult to determine. In August 2007 we had the extraordinary spectacle of the finance director of a large investment bank saying that it had witnessed 25 standard deviation events several days in a row in one of its client funds. A more plausible interpretation is that much less extreme events had exposed weaknesses in their models, and that they had almost certainly underestimated tail correlations.

Reference

Lowenstein, R. (2001). *When genius failed: the rise and fall of Long-Term Capital Management.* Random House.

Mr D. J. Millar (a visitor)**:** I also am from PRMIA. I am not a mathematician, but I run the Risk Management Association. This is an excellent paper, and one which we, who work in the risk management business, need. It covers a wide range of areas. Somebody likened it to a corporate paper as opposed to an insurance paper. That is true. On my side, it illustrates a difference between a European view of enterprise risk management and the American view of enterprise risk management. I find them very different.

In Europe, we are looking at a top down approach. It is the approach which I take. I am a procedural person. We are trying to cover the whole range of risks within an organisation, including many areas which we do not understand. We do not know how to manage the risk in those areas, some of the strategic risk areas, some of the environmental risk areas, but we try to cover everything.

The American approach, from my view, is that it is very much a bottom up approach. They look at what they can measure. They look at what they understand well, and they build a model which sits around that. That is, perhaps, why there is a huge emphasis on models which sit out there. Some models have been discredited, but, perhaps, what should be discredited is not so much the models themselves, but this complete faith that the model is right. I do not think that anybody expected those models to be right.

What is needed is how we can bring those two approaches together; how we can bring together, for the high-level view, trying to encompass the whole area of risk, with the lower-level view.

What is needed differs tremendously across institutions, across industries. The way in which we are going to manage it is not going to be the same for investment banking — and I will stay within the finance area — as it is going to be for general insurance.

I was in Chicago recently, when the Society of Actuaries was running what they call their ERM symposium. It was very heavily into the modelling area. There were presentations which I went to where I had no idea what was going on; it was way over my head. On the other hand, there were some very good presentations. We had a little stand there presenting our accreditation. We run a risk management examination. Time and time again people would come to me, mainly from the medium to the small insurance companies in the U.S.A., and they were saying: "Do you have a book which tells us how to do it — a sort of 'dummies' guide?" That is really what the industry is looking for. Somehow we would like to foster or to sponsor or to encourage somebody to bring out something like that.

Looking at this paper, we are looking forward to the next edition, where I hope that the authors will take what they have now and will build the detailed insurance view on top of it. That will satisfy many people in the insurance business, who have been given this responsibility for risk, and are saying: "What are we going to do next?"

Mr D. Roberts (a visitor; closing the discussion)**:** This paper provides a really useful reference document at an opportune moment in the development of ERM. Many firms will find it very useful to access the tables in Section 4, to place themselves in the overall spectrum of development, and to make appropriate choices for them as to where they feel they want to sit.

I agree very much with Mr Maher, who said that this paper is wider than just general insurance. As I read through it, you could substitute 'general insurer' for any number of different

firms. The authors have done themselves a little bit of a disservice by limiting it to the general insurance area, or by risking limiting it to the general insurer area by its title.

On the other hand, to pick up the point made by Mr Millar, the real general insurance practitioner might be a little disappointed by the lack of specific content. I would very much urge the authors, if they have the time, to move on and to develop their work further.

The issue of remuneration has been raised once or twice. This is a very important area in how ERM works. It is part of the people part of the section. Table 4 lists a whole number of people issues. To me this was the most important part of the paper.

Remuneration is clearly a balance of potentially conflicting needs within an organisation. In our context, it is usually the writing of profitable insurance business, and allying that to effective risk management. The risks are the overburdening of the risk management system, or, once it is perceived to be overburdened, driving too much risk aversion into the organisation.

There is also another problem around the measurement of results and the effectiveness of ERM. Accounting methods struggle to distinguish the effective risk management from, perhaps, the merely lucky underwriter. Such opaqueness could last for a number of years. There is a need to try to work out how we either risk adjust earnings to allow for this — I suspect that there would be major accounting difficulties in achieving that — or, at least, to improve the disclosure around how a firm is managing its risk, so that its stakeholders can get a better view of how they should adjust earnings for their quality.

To turn to the people theme, there are any number of behavioural issues which can have an impact on the effectiveness of an ERM implementation. A number of speakers have raised these issues. Also, there is a risk that ERM is often a compliance-led or a rating agency-led development. This is making the project of implementation more likely to fail. They must be business-led projects, and should have the backing of the highest members of the organisation.

A further people risk in an implementation field is fear. There are people who will not, or feel they will not, understand the complexity which is sometimes allied with such an implementation, and so they do their best to block it. Alternatively, there can be a threat to certain jobs in organisations, and, again, limited enthusiasm for its development can creep in easily.

Finally, there is the risk of the gaming of the system. All systems will be gamed. Effective, ERM requires the right control setups, to ensure that this risk is mitigated. I suggest that this is not an easy thing to do.

In ¶¶4.3.2 and 4.3.6 the authors speculate that models will become more detailed, and that algorithms with greater predictive powers may be developed. A number of speakers have touched upon the risk of over-reliance on models. To me, this area is a trade-off between the parameterisation of your model and the predictive power. Given that we will test the outcome of models, perhaps, only once a year from an insurance perspective, I wonder whether we will really ever get any greater predictive power.

There is also a view, expressed in ¶4.3.1.2, that there will be one global regulator by 2025. As I see the developments under Solvency II, which again has been alluded to by a number of speakers, there is more likely to be a need to work with a panel of regulators from various states around the world, each with their own interests.

In terms of capital markets, they may also develop in such a way that the availability of capital, or the flow of capital, between insurers and markets could become less frictional. I suggest that this would make a significant difference in the way in which insurers manage their capital base and the associated risks. We will have to wait to see whether this develops. However, if a low friction way of raising and giving back funds to the market arises, then that gives all sorts of opportunities which will be based on the ERM basis.

A couple of speakers have alluded to the training of actuaries. It is obviously important that we continue to broaden our development. We should not forget the nous, the commonsense, and the grey hair in this area. The taking on and the absorption of a wide range of risk possibilities is as equally important as any training. I urge people who are preparing this material to not keep the material too narrow and risk blinkering our thought processes.

Mr M. H. Tripp, F.I.A. (responding)**:** In places, our paper was deliberately provocative, and it

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is to be hoped that this discussion has borne the fruits of that. Overall, on behalf of the authors, I am glad that the general feeling of the meeting has been that the paper is timely. These things have been talked about in the past, but we felt that it was the right moment to put something on the table, which would open up the discussion. We hope that more work will come, which will help us all.

There are many approaches to ERM. We spent much time discussing: "Is there one right approach?" At the moment we do not believe that there is one approach. It is about learning from the diversity of approaches and adapting to the organisation with which you are working. That is something which requires judgement, and is something on which we all need to work. We believe that the tables in the paper provide a basis to judge where your organisation might be, and to give pointers as to how the organisation could be taken forward.

As Mr Ryan said, ERM is a system, and there are many things which link together, whatever your visual preference, for instance whether you like circles, cycles, squares, triangles, or whatever. The point is that it is a system. The law of unintended consequences and the unexpected is part of that.

Of course, you have to be wary about getting lost in the semantics. We found a great deal of discussion and argument goes on about semantics. Somehow or other you have to get beneath the skin of the semantics to what is really being said. Breaking out of silos is part of that. The different semantics from different professions is part of that.

There is also an issue about best practice. What does it not like? Can you articulate it now? How do you develop it? Clearly, there is more work to be done on this topic.

We spent much time talking about culture and people. This, perhaps, is another question for the Institute. There is a role for actuaries, clearly; but what is that role? How narrowly do we want to define it? How widely do we want to define it? That is a big conversation piece. Yes, risk management has been around for a long time, whether in life, pensions, general insurance, financial markets or other markets which we serve, but very often it is narrowly defined. There was some reference to 'yin and yang'. My understanding of *feng shui* is that 'yin' is the bad energy; you could choose to think of modelling in that light; in which case 'yang', as a good energy, might be the intuitive and the qualitative. That is an interesting reflection.

There is much thinking to be done on these questions for the Institute and for the Profession. What sort of people do we want? What recruitment policy does it require to provide people with the intuition and the ability to think these things through in a way which not every mathematician can? Obviously, education follows. Breaking out of silos, listening, working through the diversity issues. There is a lot more to do.

I was surprised to hear a request for the sequel to this paper. I am sure that my fellow authors would be delighted to have a go at a sequel, but I suspect that the sequel is even more difficult.

In the general insurance world of reserving, a working party was set up and eventually a reserving oversight committee was formed. The same thing has happened in general insurance with premium rating. Is ERM the sort of thing which the Institute needs to tackle in this manner, not just from a general insurance point of view, but from the overall perspective? Perhaps it is under the auspices of the ERM Practice Committee? There is something there which the Institute, the Profession, could take forward, because there is a real piece of work. I am sure that some of us would be delighted to volunteer to help.

In conclusion, we have enjoyed the work and the discussion. Thank you to the authors for sticking at it.

The President (Mr N. J. Dumbreck, F.I.A.): This evening we have had the perfect sessional meeting with an excellent paper and an excellent discussion. We are grateful to our authors for producing the paper. They have made a major contribution to promoting the role of actuaries in this very important area. Therefore I express my thanks to the authors, the opener, the closer and to all of those who have participated in this discussion, and invite you to show your appreciation.

WRITTEN CONTRIBUTION

Mr M. G. White, F.I.A. (who spoke briefly at the meeting, and who subsequently submitted the following in writing)**:** This discussion brings to life the fact that, if you get your rewards wrong, then you get the corresponding action wrong, and no amount of technical sophistication will change that. Speakers emphasised that the issues were relevant, not only to non-life insurance, but to businesses generally. Also, people issues were also given a great deal of attention. Mr Maher and Mr O'Connor both emphasised the vital importance of culture in the governance of businesses, especially a culture which encourages an intelligent approach to risk taking.

People risks exist in all businesses, especially the risk that people will be aiming at the wrong targets. Frequently, the leaders of businesses do have the wrong targets. The current substantial asset write-downs in many financial firms give some support to this view, as also does the fact that insurers frequently chase premiums in very soft markets, in spite of it being obviously contrary to shareholders' interests so to do. Mr Cowling clearly spoke from experience about company motivations being led by things other than delivering value. If an ERM framework is to be really good, it is vital that it does not duck the question of the objectives which are used to steer the company.

In my view, these objectives should be based on the principle of stewardship, looking after the shareholders' wealth over the long term. For an insurer, this is entirely consistent with giving a good level of security to policyholders. It is not necessarily about maximising easily manipulated measures, such as the return on capital or the earnings per share. The banking sector gives a good example of how not to do it, with large bonuses given to senior staff for a number of years, but ending in serious losses for shareholders in many cases — effectively an option against the shareholders. The right model for the participation of management should involve sharing the pain as well as the pleasure, which share options, for example, clearly fail to achieve.

It was good to hear Professor Klumpes' comments on governance, financial reporting and accountability. His Rector at Imperial College, Sir Richard Sykes, led a project titled 'Restoring Trust: Investment in the twenty-first century', in 2004. Recognising that the public had lost faith in the financial system as a means of saving, with the Equitable Life as one of the catalysts, the members of the inquiry team looked at each stage in the wealth creation and the ownership system, and concluded that there were failings of governance throughout, associated with inappropriate incentives and conflicts of interest at many of the links in the chain. The core problem, relevant to the discussion on the ERM paper, was that those with the voting power did not use it to ensure a long-term value-creating culture in the companies in which they invested. Instead, the project reported that 40% or more of boardroom time was taken in discussing how to present results, as opposed to deciding on the future direction of the business.

It is easy to point out the failings of the typical approach to management incentives in terms of how they conflict with the objective of stewardship and building value over a long period. Mr Cowling's remuneration committees clearly do not think like true owners of the business. However, it is not easy at all to design a coherent and a practical alternative. Any set of business objectives and incentives, both financial and otherwise, needs to be suitable for the industry concerned, so that one should expect a wide variation in the appropriate objectives and success criteria. Given the complexity of the insurance business, it offers some very special challenges. This is an area where we could help, but which, to my knowledge, the Actuarial Profession has yet to tackle. It is something which would involve all the various disciplines within the Actuarial Profession, as well as non-actuaries from many other disciplines.