

“Actuaries and Product Development: A step beyond $P_{x:n} = A_{x:n} / \ddot{a}_{x:n}$ ”
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Summary

The paper will review the historic role of actuaries in product development and will look at how this may change in future. It will highlight additional sources of expertise and information and will examine how actuarial skills and techniques may need to changes if we are to maintain an active role in this area.

**“Aktuare und Produktentwicklung: Ein Schritt weiter als $P_{x:n} = A_{x:n} / \ddot{a}_{x:n}$ ”
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Zusammenfassung

Die Studie gibt einen Überblick über die Rolle des Aktuars in der Produktentwicklung in der Vergangenheit sowie einen Ausblick in die Zukunft. Es werden zusätzliche Erfahrungs- und Informationsquellen präsentiert. Diskutiert werden die notwendigen Änderungen der technischen sowie allgemeinen Aktuarstätigkeiten, so daß Aktuare weiterhin eine aktive Rolle in der Produktentwicklung spielen können.

1 Introduction

Actuaries have, for many years, played a key role in the development of financial services products. In a recent survey carried out jointly by the Institute of Actuaries and the Faculty of Actuaries, almost 30% of actuaries working in the life insurance field reported their type of occupation as “products/marketing/sales/in-force business”.

Actuaries have developed new skills and discovered new opportunities to apply actuarial expertise as the environment has changed and new challenges have emerged. The pace of change over the coming years will be at least as rapid and commercial success will depend heavily upon the ability of financial services providers to develop and market new products quickly and successfully.

This paper reviews the actuarial profession’s track record and current standing and examines the challenges and opportunities to which actuaries should now be responding to maintain their ability to influence and add value to this important area of work. The references to the profession’s historic role are drawn largely from UK experience but relate to aspects which may have parallels with, or at least relevance to, other markets. The ideas about future development, particularly regarding the closer integration of actuarial and marketing thinking, are intended to be applicable globally.

The paper is deliberately non-technical. There is just one (very simple) actuarial formula and this only appears in the title. This is not to suggest that the technical aspects are not important, but rather that these are already well covered in existing literature to which there are numerous references. The main emphasis for this paper is on applying these and possibly also other less theoretical approaches in the practical environment.

Abercromby and Hall, in their 1994 paper on “Developing Products Which Are Bought Not Sold“, set out some important themes and observations. In particular they referred to:

- the importance of understanding customer opinions and needs;
- the impact of increased competition; and
- the potential influences of technology

along with other critical success factors for good product development. This paper builds on some of these themes, but attempts to do so from a broader perspective with greater emphasis on lessons from history and a more speculative view of what the future may hold.

The other key emphasis is on the importance of merging the skills, experience and access to information of actuaries and marketing specialists involved in the product development process. The paper concludes that success in future will require a much broader understanding and analysis of factors which influence the success of financial services products. Importantly, some of the most important information may lie in “softer” data rather than the “hard” financial indicators with which actuaries are more familiar and comfortable. This may demand radically new approaches to data capture and financial modelling.

We received extensive, helpful comments in preparing this paper from many (too numerous to mention) of our colleagues for which we are very grateful. We are also most grateful to Jeremy Goford and Paul Grace for their advice and guidance and to Andrew Summerfield and Georgina Ivers at the Institute of Actuaries. Our particular thanks go to Joanne Gardiner and Christine Vann for their tireless efforts in collating, redrafting and coordinating the process which eventually produced this final version.

The opinions expressed in this paper are, however, purely our own and do not necessarily reflect the views of our employer. Any errors or omissions are also entirely our responsibility.

2 Traditional Involvement of Actuaries in Product Development

Historically, actuaries have played a pivotal role in product development in many of the world's leading insurance markets. Their ideas have shaped the design of these products, not only in terms of their financial structure but, increasingly in recent years, also in terms of the wordings used to define how the products would operate, what conditions would apply and what prospective policyholders could "reasonably" expect the product to deliver in the form of benefits.

Without consciously setting out to do so, actuaries have almost certainly also influenced the way these products have been sold. Commission and other sales remuneration structures have evolved over time, partly as a consequence of actuarial analyses aimed at producing financially efficient products. Each of these has featured incentives and disincentives for salespeople to approach customers (both initially and post sale) in differing ways.

The dominant extent of actuarial influence on product development reflects a more general tenet that insurance products are primarily financial instruments and that their design and operation therefore requires financial expertise. Few would argue with this, but increasingly the components of good product design are being defined more broadly.

This section is intended to provide a simplistic, high level review of some of the main areas of actuarial influence on product development in the past. In reality, these influences and the factors contributing to them have been far more numerous and complex than this summary suggests. The authors therefore acknowledge the incompleteness of what follows and the possibility that some of the conclusions drawn may be speculative. The main intention however is to remind the reader of the significant part actuaries have played in the evolution of financial services products and to illustrate the different stages of actuarial thinking developed en route.

This review also relates mainly to the UK. However, many of the principles, and indeed some of the specific issues, applied equally in other territories, either concurrently with events in the UK or at different times depending on the stage of development of the market (which might have been either ahead or behind the UK) or on the differing timing and intensity of changes in investment and other market conditions. It is therefore hoped that the summary, while heavily UK-influenced, might also provide a relevant insight into the evolving role of actuaries in product development around the world.

2.1 A Version of History

Actuaries began by developing expertise in the “pure” risks involved in insurance business, based on statistical analysis. The most obvious example is mortality. A customer need for life assurance has existed for many centuries. Actuaries developed the concept of pooling mortality risk and of using age and term as principal rating factors on which to base individual assessment of the cost of insurance. Until relatively recently, uncertainty remained high and actuaries compensated by building in substantial margins to their mortality assumptions. The products and their distribution were simple and, although administrative cost was significant, the “price” of cover was dominated by the “pure” mortality risk cost. Essentially, assessing the mortality cost was the only game in town so actuaries developed the products.

Level premium products quickly became the established norm and actuaries (equally quickly) recognised the need to accumulate reserves to reflect the differing timing of expected income and outgo. This brought an extra dimension to the management of these products and an additional consideration for their design. Mortality risk remained the principal cost driver but capital adequacy considerations began to focus attention away from the assessment of individual risk towards the management of the fund as a whole. Concepts such as cost of capital would take much longer to emerge but understanding the calculation and dynamics of reserves at a fund level soon became a fundamental skill of the actuary.

The mechanics were complex and, without the benefit of the powerful calculation machinery we now take for granted, actuaries became adept at developing mathematical aids such as commutation factors which made the processes manageable. The elegance of these devices should not be underestimated - they reflected a level of innovation and creative thinking seldom associated with actuaries today and which deserves enormous respect. One consequence however was that life insurance product design remained solely an exercise in financial mathematics, defined by an evolving language of terms and symbols unique to the actuarial profession.

Over time, the implicit margins in these products, together with the results of effective risk and investment management, produced healthy surpluses. Deciding what to do with these became the next actuarial challenge, and arguably has remained so ever since. The initial response was to offer reductions in premiums. This then progressed to the use of regular bonuses to enhance guaranteed benefits. Prudence prevailed and deferred the association of these surpluses with particular generations of policyholders, the issue so eloquently described by Redington in his classic tale of *The Flock and the Sheep*. With profits policies became the “product design” answer to this complex issue, not based on a customer need for a smoothed equity investment vehicle, but as a means of managing a financial conundrum. It has often been observed that only actuaries could have invented with profits policies.

As experience and the number of insurance providers increased, past margins were gradually recognised and competitive influences began to become increasingly significant. The margins which could be included in the “pure” risk component of the premium rate slowly began to be squeezed. Consequently, other assumptions such as expenses, investment return and withdrawal rates became more important for actuaries to allow for “properly”.

Another key component was tax. From the 1950s onwards there has been an endless stream of increasingly complex legislation which has defined various categories of tax privileged insurance and savings products, reflecting the priorities and political objectives of successive governments. The majority of these have been in the pensions field, requiring pensions actuaries in particular to develop specialist skills in taxation and legislation to ensure that the products they designed satisfied the criteria demanded to attract maximum tax-efficiency. Both policyholder and company tax were important – the former dictated the evolving construction of individual and group policies or schemes. The latter became increasingly complex as insurance offices began to offer a rapidly widening range of products, many of which required different tax treatment. Specifically, the balance of an insurance office's portfolio between pensions, annuity, life and other business became a key driver of its overall (corporate) tax position. Actuaries had to understand the underlying dynamics and find ways to model how these would interact, not only to optimize the office's ongoing tax position, but also to ensure that the tax assumptions allowed for in pricing the various products were appropriate.

Increased rates of investment return helped to prompt an expansion of insurance business beyond the pure risk categories. Investment assumptions became a key component of pricing and investment performance became a major competitive differentiator. From a financial perspective, investment return (net of tax) was a vital element of profitability. This was highlighted very clearly in the early-mid 1970s when raging inflation and rapid rises in interest rates brought chaos to the investment markets. Despite the work of Redington and others earlier, many offices at that time found that mismatched positions in invested assets relative to their liabilities were severely exposed. Although the crisis was short-lived, it heralded a new era during which actuaries would increase significantly their skills and understanding of asset liability management.

Arguably, the shock of the investment collapse in 1974/5 left insurance offices very wary of carrying investment risk. This was one of the factors which hastened the evolution of unit-linked (or "universal") business, although the development of these products had started almost twenty years earlier. Actuaries were the pioneers of this business and they undoubtedly recognised the mutual benefits (to insurance providers and policyholders) afforded by breaking the products down into simpler, more transparent components. The marketing potential of these products was recognised and realised by several new entrants who went on to become major market players through specialisation in this sector.

While much was made since of the additional flexibility and choice these products offered to policyholders, the actuaries leading their development were also driven by a recognition of the growing complexity in interactions of "pure" insurance risk, investment risk, expenses and commission, taxation and early withdrawal terms and the bluntness of traditional product designs in allowing appropriate charges to be passed on to policyholders to reflect these.

Once again, one should not underestimate the innovation demonstrated by actuaries in developing these products. While some of the devices have since been discredited because of their potential for misleading policyholders, these products exhibited exceptional financial elegance and efficiency in terms of their ability to:

- accommodate the impact of policy expenses;

- allow direct charging for insurance risk;
- simplify the calculation of surrender values;
- minimise reserving and other capital requirements; and
- facilitate equitable treatment of policyholders via the concept of unit pricing.

Despite the extreme investment experiences of the 1970s, not all went along with the trend towards requiring policyholders to bear their own investment risk. Traditional with profits business continued to flourish, assisted by a tax regime which particularly favoured mutual life offices (dominant in with profits business) and mortgage-related saving. The uniquely stable and high investment returns which prevailed throughout the 1980s encouraged actuaries towards increased reversionary bonus rates, which not only raised the implicit guarantees under these contracts but also drove market expectations about likely maturity values to unrealistically high levels. The consequences of this remain with us today, with a significant proportion of UK house purchasers now being told that their mortgage endowment policies are unlikely to produce adequate proceeds to repay their loans in full. The reputation of the life industry and the profession have both suffered badly from this. Yet, as those who lived through this period will recall, many actuaries recognised the potential problems but, arguably, were unable to exert their influence on product design and market expectations early or decisively enough.

There are some important lessons to learn from this period in actuarial development but, for now, the only point to highlight is the increased interest life office actuaries started to take in investment modelling. Specifically, the events of 1974/5 had illustrated how dangerous it could be to rely on deterministic investment projections based on steady continuing investment yields, particularly with the increasing proportions of life office assets invested in equities. Despite the growing popularity of unit-linked business, demand for investment guarantees within savings-related life products remained strong and the idea of incorporating maturity guarantees within emerging unit-linked designs soon attracted attention.

Wilkie's work "An Option Pricing Approach to Bonus Policy", firstly in connection with the investigations of the Maturity Guarantees Working Party and subsequently, began to set new standards for actuaries in the modelling of investment risk. There have been numerous (at times, heated) discussions about the relative pros and cons of Wilkie's original and later models and about the appropriateness or otherwise of the various parameters and statistical methodologies chosen. Much more importantly however, the concept of applying modern statistical techniques in time series analysis to produce a stochastic framework to enable the dynamic modelling of investment risk became established as recognised actuarial practice, although some would argue this was long overdue and represented no more than a "catch-up" exercise relative to progress already made in the investment banking fraternity.

The rampant inflation of the early 1970s also raised the importance of expenses in life office management. An obvious consequence was the need for pricing actuaries to look more closely at how expenses were allowed for in product terms, including the potential need for charges designed to fund certain categories of recurrent expense to be inflation-linked or reviewable at the office's discretion. Allowance for expenses within the valuation process also became more important and some actuaries became closely involved in developing

activity-based costing and other analytical techniques to provide a clearer understanding of the drivers of expenses and the efficiency of their funding via product charges and loadings.

Luffrum et al in their paper in April 1986 comment on interest in this topic dating back to 1959. An inter-office expense investigation was originally initiated by the Associated Scottish Life Offices and this was subsequently adopted by Life Offices Association in the late 1960s. They go on to explore the relevance of this investigation to the management of life office expenses and the more general actuarial considerations in this area, including some views on future trends which remain highly relevant today.

More recently, actuaries have had to return to their roots to find ways of allowing for the financial impact of new elements affecting the “pure” insurance risk factors of mortality and morbidity. Some actuaries have specialised in modelling the impact of HIV and AIDS on product pricing and reserving. Others have developed pricing models for a wide range of health-related products including critical illness and long term care, demonstrating an impressive ability to identify and apply (often imperfect) data and statistics to provide a scientific basis for assessing new categories of risk.

Understanding the financial impact of the timing of cashflows has always been a core actuarial skill. Increased interest from various sources in the value of profits embedded within long-term insurance portfolios has been one of the main areas in which actuaries have applied this expertise in recent years. The challenges here have included “unravelling” shareholders’ and policyholders’ respective interests in with profit funds and placing values on complete books of business in respect of companies involved in mergers and acquisitions. The impact of this on new product development has been indirect and less obvious than some of the other examples mentioned above. However, the evolution of model office and profit testing techniques, which have provided the building blocks for these developments, has provided new ways for actuaries to assess the absolute and relative financial efficiencies of various product designs.

More generally, some would argue that, despite adapting their skills to meet new demands, the influence of actuaries in product development and indeed other aspects of insurance management have been diluted. This has perhaps been most acute in Australia where the extent of recent regulatory change has been very dramatic. Some would say that certain aspects of the deregulation which took place there led directly to a significant reduction in the role played by traditional life offices which, in turn, has limited unnecessarily the choices now offered to purchasers of financial services products. There is a feeling that, had actuaries taken a firmer stand on some issues, such dramatic regulatory change would not have been considered necessary. One consequence is that Australian actuaries are now much less involved in senior roles concerned with life office product management and defined benefit pension consulting. While this has enabled a more rapid branching out into “wider fields” such as general insurance, merchant banking, investment management and other areas of financial management, there is a concern that the expertise actuaries can offer in pricing and managing complex (but “traditional”) risks may be lost or reduced over time.

2.2 Observations and Conclusions

So what can we learn from this brief review of history? In particular, are there messages about how we need to adapt to maximise the value we can bring to product development in the future?

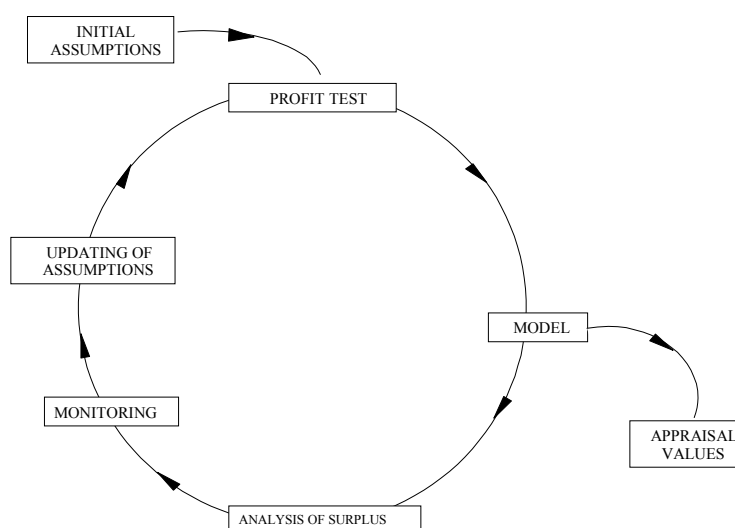
To date, the main focus of actuaries has been on analysing and modelling financial outcomes, principally with a view to ensuring they were priced appropriately. This is no surprise given their training, reputation and core strengths. They began by concentrating on the main insurance risk elements of mortality and morbidity. Over time, investment assumptions, expenses, tax and persistency each became more important in terms of their impact on financial outcomes. They therefore developed skills in the modelling of these aspects, making good use of advances in technology to assist their calculations. The most recent of these advances have enabled actuaries to construct sophisticated computer models which can support both deterministic and stochastic analyses of all the key financial components, not only of individual products but of complete office portfolios.

2.3 The Control Cycle

Goford formulated a practical framework for bringing together the various components discussed above to produce an integrated, holistic methodology to drive the ongoing pricing of life office products.

The Control Cycle was written primarily to identify responsibility for the finances of the company and to clarify accountability for variations in bottom line results. It aimed to bring transparency not only to the financial mechanics of the company but also to corporate governance and the management of the finances.

Figure 1: The control cycle



This has become the cornerstone of actuarial management and is widely recognised, not only in the UK, but worldwide. Crucially, its focus is pricing. It requires various analyses to be carried out to monitor progress compared with expected outcomes in all the key components of the pricing basis and this neatly encapsulates many important elements of sound, ongoing life office management. But the key point is the principle of feeding the results of these analyses back into the pricing process.

The following “imaginary” case study illustrates the way the control cycle is currently used in practice.

Imaginary Case Study: Simplified Savings Product

A financial services provider launched a regular premium savings product several years ago. Profits from this product emerge principally from management charges deducted on a monthly basis from the underlying investment funds. Profitability is therefore highly dependent on persistency.

The provider had analysed past experience from similar products before launching and, based on this, had chosen the following initial pricing assumptions:

Lapse rates:	12% (years 1-2), 9% (years 3-4), 7% thereafter
New business volumes per annum:	\$320m
PV of future profits from each year’s new business:	\$15.5m

The traditional control cycle approach was used to monitor the emerging performance. After 3 years new business sales were on track but the overall lapse rates were much higher than expected. Fortunately, good quality administration systems had been put in place and the provider was able to break down the lapse experience by distribution channel and duration. This gave the following results:

Duration	Channel X	Channel Y	Channel Z
Policy Year 1	18.0%	40.0%	6.9%
Policy Year 2	20.3%	36.8%	5.7%
Policy Year 3	24.6%	28.6%	5.0%

New business sales volumes were also available split by distribution channel and these had been stable at the following levels:

Channel X	Channel Y	Channel Z
\$120m	\$100m	\$100m

The conclusions drawn from this were as follows:

- lapse rates (and hence profitability) varied widely by distribution channel;
- business produced through Channel Y was showing unacceptably high lapse rates;
- business through Channel X was also showing much poorer lapse experience than allowed for in pricing;
- Channel Z was the most profitable with lapse rates lower than the pricing assumptions.

The original business plan also broke down expected sales volumes by distribution channel. Compared with this, Channel Z was below target (plan volumes \$120m p.a.) and Channel X was ahead of target (plan volumes \$100m p.a.) Channel Y production was on track.

Based on this analysis the provider decided on the following action plan:

- cut management charge and introduce a penalty for early surrender;
- additional incentives for Channel Z producers to boost volumes.

After a further three years the results of the “new style” product were analysed and the results were as follows:

Lapse rates

	Channel X	Channel Y	Channel Z
Policy Year 1	13.0%	35.0%	6.0%
Policy Year 2	15.3%	31.8%	3.8%
Policy Year 3	19.6%	23.6%	2.6%

New business sales volumes:

Channel X	Channel Y	Channel Z
\$140m	\$120m	\$150m

The conclusion was that the changes had been successful in producing a significant overall profitability improvement, although the persistency levels for Channel Y remained a concern.

We will return to this example later to examine how other approaches might have produced different outcomes.

The following sections examine the criteria likely to be needed for successful product development in the coming years. They consider whether, to accommodate these criteria fully, an expanded version of the Control Cycle now needs to be developed. The paper goes

on to discuss the components this might include. Most importantly, it looks at areas where actuaries may be able to apply existing or newly developed skills to play a more active and influential role in product development processes.

Before considering these aspects however, it is helpful to broaden the thinking beyond the traditional actuarial focus. Many actuaries involved in product development work are already used to working with colleagues from other disciplines who bring different expertise, experience and perspectives. The authors firmly believe that this type of holistic approach will be increasingly important for future success in this area, and indeed in many others where actuaries have traditionally been involved. “Marketing” perspectives and skills are perhaps the most obvious example, although we would also strongly recommend the direct involvement of underwriters, claims managers and other technical experts in the development of financial services products. An understanding of marketing concepts and techniques is therefore important and these are discussed briefly in the next section.

3 A “Marketing” Perspective on Product Development

It would be inappropriate in this paper to go into great detail on the theory of marketing. However, since a key theme of the paper is the importance of an holistic approach incorporating actuarial and marketing thinking, it is important to clarify what is meant by this. This is particularly so as there are many different definitions of “marketing” in use and so the sense in which the term is used in this paper needs to be explained.

What is common to most definitions is the fact that the customer sits at the heart of the concept. The definition chosen for this paper is a very simple, yet very broad one, namely:

marketing is a business philosophy which seeks to meet customer needs profitably

That final word is crucial and highlights the fact that marketing is not a woolly notion centred purely on things like sales or advertising. It is a much more fundamental business concept which encompasses the following:

- identification of target markets: exactly which segments of the population does the company believe it is capable of serving profitably?
- market research and analysis: to gain a thorough understanding of the needs and wants of the target market and how these needs are currently being satisfied (if they are) by the activity of competitors;
- product development: once needs are understood the process of developing products to satisfy those needs can begin - clearly pricing to ensure profitability is a key component of this;
- product promotion: communication of the benefits of the products to the target market leading to sales - the marketing mix is of vital importance and covers aspects such as advertising, distribution techniques, sales support, and customer services;
- monitoring and customer development: retaining customers and converting them into

longer term, higher value clients by ensuring that they are satisfied with their original purchase and go on to buy more.

It is also worth adding that marketing is not a static concept. It is cyclical in nature and involves a continuous process of analysis and reassessment as the market environment changes.

It is not unusual to hear of companies being described as "marketing-led" in a derogatory sense. This may stem from a misunderstanding of the concept which, hopefully, the above definition clarifies. Normally what is actually meant when it is used as a criticism is "sales led" and this may well be a valid criticism if it implies the pursuit of sales at the expense of short-term profit and long-term relationships.

A further point worth stressing is that the importance of profit within the definition means that whilst customer needs are highlighted as key, there is also a recognition of the importance of other stakeholders in the business (notably shareholders). Indeed some definitions stress this more implicitly by including reference to the need to balance the requirements of the various stakeholders in the business (customers, shareholders, staff, management, suppliers, governments and creditors).

A key contention of this paper is that "marketing-led" is a commendable attribute for financial services providers to exhibit and aspire to, since it encapsulates a structured, analysis-based approach towards achieving long-term commercial and reputational success. Since these are features with which actuaries are both comfortable and familiar, moving towards the holistic approach advocated in this paper should not be difficult.

History includes many examples of the power of applying technical expertise to meet customer needs profitably. The motor industry is, arguably, one of the best and includes clear analogies which highlight the potential advantages of combining technical and marketing expertise.

3.1 Case Study: The Motor Car Industry

The origins of the motor car go back to the late 1800s. In 1860 Ettiene Lenoir in France built the first internal combustion engine, although this ran on illuminating gas and was quite different from the modern engine. In 1876, Nikolous Otto patented (in Germany) the four-stroke gasoline engine of the type used today in almost all cars. Work on the first "horseless carriages" was being conducted during the 1880s in many different countries – by Karl Benz and Gottlieb Daimler in Germany, Louis Renault, Rene Panhard, Emile Lavassor and the Peugeot brothers in France, David Buick and Henry Ford in USA. Not surprisingly these men were all engineering wizards with a dream of bringing about motorised transport. Benz in Germany was the first to put an automobile into production; a three-wheeler that he first built in 1885.

With early models capable of speeds no more than 10mph and being rare items of great expense, "marketing" in the sense described above was of limited direct relevance.

While Henry Ford was not the first to build a car, his major contribution resulted from his vision of making cars available for everyone, not just the rich. Mass production was his way ahead. He founded the Ford Motor Company in 1903, sold his first car (also in 1903) and went on to introduce the famous Model T in 1908. The car was priced at US\$850 and was Ford's notion of a universal car. Of course he is also responsible for that famous quote "you can have any colour as long as it's black".

The 1920s brought great change. By then, at least in the US, just about every family had a car. Now cars had to be sold to buyers who already owned one and, by and large, they all functioned in much the same way.

To quote from "West of Laramie – a Brief History of the Auto Industry", "The auto industry began selling not only cars but dreams. Leadership began shifting from the original mechanical wizards to men like Alfred P Sloan and Harley Earle of General Motors, Walter P. Chrysler and Ned Jordan – men who were concerned with defining the automobile's role in the life of the consumer. Advertising began stressing the intangibles – image, romance, fun – instead of the cars mechanical attributes and its often utilitarian value compared with the horse."

This marketing focus has accelerated ever since and the motor industry today, in most well developed economies, is dominated by companies which segment their markets by offering models for all different tastes and price ranges – tiny cars, sports cars, four-wheel drives, multi-purpose vehicles, family saloons, hatchbacks, estates to name a few (the ability to meet the preferences of different segments is enhanced further by a plethora of different options on each model). They conduct in-depth market research to find out what is important to their target markets, before developing and launching new models and are responsible for some of the most high profile advertising around. Even long established distribution techniques through dealers are being reassessed thoroughly due to market pressures and the ever-demanding customer.

Few would argue that there was a fundamental shift away from leadership by the technicians to a heavily marketing-led approach and that this was an essential pre-requisite for large-scale commercial success. Technical excellence remains vital however. The performance, safety and equipment specifications are key components of brand and product differentiation. In this giant and fiercely competitive environment, the seamless coordination of technical and marketing skills is vital for survival, let alone success.

There are a couple of other interesting features of the industry worth a mention although they fall a little outside of the scope of this paper, namely; the pressures to improve efficiency leading to the increased use of outsourcing in the manufacturing process and the global nature of the industry.

3.2 Further Experience from the Motor Industry

There is an interesting example, also from the motor industry, of what can go wrong if some of these principles are not followed. The story is as follows.

It had been a long held personal dream of UK based Sir Clive Sinclair to produce some form of electrically powered vehicle for general public use. When, in March 1980, the UK government abolished motor tax for all types of electric transport this motivated Sinclair to accelerate his development programme.

Work on product development was finalised towards the end of 1983. The new product would be called the Sinclair C5 and was basically a low speed, open topped, electric powered three wheeler. A suitable production plant was established based on production projections of 200,000 - 500,000 units per year. By the end of 1984, the first batch of the new "Sinclair C5s" had come off the production line ready to find a market.

It was initially decided that the product would only be available on a mail-order basis but this did not mean a low-profile launch. Television advertising and colour supplement spreads were used and the official launch took place at Alexandra Palace in London. The vehicle was unveiled on 10 January 1985 and priced at £399.

Fairly spectacular failure followed. 1000 sales in the first 4 weeks were encouraging (although this has to be weighed against the forecasted 200,000 to be produced in the first year) and there were claims that one month later 5000 were on the road. However, press comment became very negative and it soon became clear that the public had major concerns, particularly over safety (quote from Daily Telegraph 11 January 1985 "In fact I would not want to drive a C5 in any traffic at all. My head was on a level with the top of a juggernaut's tyres, the exhaust fumes blasted into my face. Even with the minuscule front and rear lights on, I could not feel confident that a lorry driver so high, above the ground would see me."). By March 1985 concern grew and despite a promotional campaign things did not get appreciably better.

Attempts to open up overseas markets failed and in August 1985, it was announced publicly that production would cease.

It is definitely not the intention of the authors of this paper to hold this episode up for ridicule - the entrepreneurial spirit that sits behind the story is to be applauded. Nevertheless, hindsight tells us that things went drastically wrong and different commentators have varying views on the exact causes:

- some suggest that the main failure related to inadequate development of the battery that powered the vehicle;
- others point out that launch timing cannot have helped - an open top vehicle in the middle of the English winter!

What does seem clear though is that insufficient groundwork was done to gauge the reaction of the buying public (and the press) to such a vehicle. Had this research been carried out the major worries over safety and the general lack of appeal of the design to almost any sector of the market would surely have become apparent. This might have led to abandonment or modification but either way could have saved substantial investment.

The authors do not have access to the details but it is almost certain that some consumer research was conducted. This may have been limited to asking consumers what they wanted

from personal transport and would probably have prompted references to attributes such as “quiet”, “economical”, “easy to park” and “environmentally friendly”, all of which the C5 met admirably. However the reality is that image, comfort and safety seem more important than these other factors when it comes to consumers parting with their money. This illustrates how difficult it can be to design effective consumer research. In general, it is unrealistic to expect consumers to design products for you, but it is normally possible to gain insight into how they might react to new ideas by exploring their priorities, insecurities and motivations.

The C5 story does not prove that a product developed as a result of an entrepreneurial dream cannot work but rather demonstrates the possible dangers of not including broader skills and perspectives in the commercial implementation of a creative idea.

As a final comment on the C5 story it is perhaps interesting to note that in more recent times the C5 has acquired near cult status among a small group of enthusiasts and a good condition model now changes hands at prices well in excess of the original sale value! Niche market successes often take longer to materialise and attract less attention than mass market failures.

This section has provided some background and insight from a “marketing” perspective and has illustrated the potential power of an holistic approach in achieving commercial success from new product concepts. The next section develops this thinking further and attempts to outline some key principles and components of a “best practice” approach to product development.

4 Critical Success Factors for Future Product Development

It is often cited (to the point that it has become a cliché) that insurance is sold rather than bought. This “fact” is used, if not to justify, certainly to explain why:

- sales-related expenses form such a high proportion of life office costs;
- such a low proportion of “leads” result in sales of insurance products; and
- penetration rates within most target market segments are so low.

Arguably, it also encourages acceptance of high lapse rates as unavoidable.

Most commentators would agree that the future is likely to involve increased rather than reduced competitive pressures. Focus on costs is therefore likely to increase and inefficient processes will not be sustainable. The development of a new market based on helping customers to satisfy genuine needs will be the way forward. The winners will follow two key principles:

Key Principle #1: “Understand Your Customer”

New technology, the internet in particular, offers potential which is being actively explored. Consumers can look forward to a continuing stream of advances offering increased choice and flexibility in the way they purchase all sorts of products and

services. Providers offering anything which is “sold rather than bought” seem destined for hard times in this world where consumers will have, or at least feel they have, more control than ever over what and how they choose to buy.

In this age of “consumer power”, one of the keys to success will be understanding how consumers view products and, in particular, what are the main triggers which compel consumers to buy. Over the past 20 years, term assurance, endowment and, latterly, critical illness products have been among the more successful financial services products in the UK. Arguably, in a large majority of cases, sales of these products were driven not by a consumer need to buy insurance but by high demand for house purchase and hence mortgages. Successful product development will, in future, require a deeper understanding of consumer behaviour, attitudes and preferences across a much broader spectrum than the narrow world of financial services business.

Key Principle #2: “Anticipate Change”

Regulatory change has, historically, provided many opportunities for life offices. Tax advantaged categories of insurance business are, perhaps, the most obvious examples of this. Changes in rules governing qualification for or benefit levels of state-funded welfare provision have also had a direct effect on the attractiveness of insurance products available in the private sector.

More recently, regulation has tended to provide more threat than opportunity. Controls on the way financial services products are sold have been welcomed in principle and, in time, will help to rebuild the reputation of an industry which has suffered a fall in consumer confidence over recent decades. Further regulatory and legislative pressures look certain to emerge, also related to governmental concern for the welfare of consumers. The most significant of these for life offices will be those which constrain traditional underwriting practices.

While relatively few applicants are declined and ratings are very much the exception rather than the rule, medical underwriting in particular is viewed as an important and fundamental aspect of sound life office management. Across the world however, regulatory and legislative measures are being introduced which will force financial services providers to change their traditional underwriting procedures. Examples include:

Netherlands

Medical Screening Act - Wet op de Medische Keuringen (1997)

- prohibits use of medical information for group business;
- compulsory acceptance for certain type of medex covers.

New Zealand

Human Rights Act

- all applicants must be offered insurance terms (declinatures prohibited) and any ratings must be capable of statistical justification.

Europe

Council of Europe Human Rights & Biomedicine and Medical Examinations Conventions

- limitations on access to and use of results of genetic tests.

United States

Various Federal and State legislation on human rights

- increases the rights of various groups to access to health insurance.

South Africa, Australia

- community rating of health insurance.

In addition, restrictions on genetic testing have been introduced in many markets, either in the form of legislation or industry codes of conduct, and significant further developments are expected in this area.

Some of these changes will have direct, practical consequences for the financial services industry. Others may influence or contribute to broader societal attitudes which will need to be recognised and accommodated in future product designs and marketing messages. The latter may be difficult to predict. For example, consumer attitudes to medical underwriting may be driven by a social concern that insurance should be accessible to everyone. Equally, if this causes the cost of insurance to increase significantly, some consumers may rebel against the concept of the healthy subsidising the “sub-standard“. In most societies there will be scope for a wide spectrum of attitudes and values to co-exist.

The most successful players will take these principles further and will develop their own “best practice” product development framework. These will vary from one provider to another but will share the common characteristic of supporting an ongoing process of re-invention, refinement and effective implementation to maintain a competitive edge in each provider’s chosen market(s). The following sections provide a generic guide to developing such a framework.

4.1 A Modern “Best Practice” Approach to Product Development

This section explores the components which might be considered in formulating a modern “best practice” approach to developing new financial services products. It is (deliberately) written from a “non-actuarial” standpoint, focusing instead on the “marketing” perspective, to highlight the value and importance of incorporating this with traditional actuarial expertise.

This paper is far from unique in highlighting the importance of combining “actuarial” and “marketing” perspectives in the product development process. Shane A Chalke produced a particularly thorough review in his 1991 paper to the Society of Actuaries, focusing specifically on the pricing implications of this and the dangers of not achieving an optimal balance. The following sections address a more general range of considerations.

4.1.1 Some Basic Ingredients

It is impractical to provide market specific guidance for every aspect of the process in a summary of this kind. For example, the process of gaining regulatory approval for a product forms a much greater part of the process in some countries than others. In addition, in some markets companies do not have total flexibility on pricing policy due to regulatory controls. The aim here is to combine common sense and lessons from our own and other industries to produce a practical generic process which can be adapted for a wide variety of applications by providers in any market.

A starting point for trying to define generic *best practice* in the process of product development is to consider:

- what has to be done to develop and launch a new product;
- how each step contributes to the success of the project overall;
- what the project manager needs to know about each step in order to manage the project effectively.

Product development can be a costly and time-consuming task with a high risk of failure. Nothing can guarantee success, but the risk is reduced if an appropriate and efficient development process is followed.

It is helpful to begin by thinking of a “product” outside the world of financial services. For example, if the task is to develop and open a new restaurant, the approach might be as follows:

- the product is defined as food and, seemingly quite reasonably, much of the thinking behind the development is driven after the recruitment of some top quality chefs;
- with a desire to utilise fully the skills and abilities of the chefs, it is decided that the restaurant will focus on a wide range of exotic and fairly expensive foods;
- the premises are designed to reflect this expensive image and, in particular, the kitchen area is designed to provide the chefs with an excellent working environment in which they can use their skills to the full;
- the restaurant is opened and the wait is then on for the first customer.

This approach might succeed, but the risk of failure is high, largely because little has been done to establish whether there is a need for this type of restaurant, whether there is demand from consumers for exotic foods at high prices or how the offering compares with other restaurants in the area. In other words, success will depend almost entirely on luck rather than the development process itself.

The flaws are obvious yet it bears worrying similarity to the product development process all too commonly used in the financial services industry - a narrow definition of product, insufficient exploration of the business environment, lack of consumer research, and a view

that the design of what the provider believes to be a “good product” will naturally lead to consumers buying it (or more accurately, to the sales force selling it). Consider the following alternative approach:

- the product is defined as the *total customer experience* from entering the restaurant to departure. As such it includes the décor, lighting, music, general ambience, the service and, of course, the food;
- a thorough examination of the environment is conducted, including a look at what other restaurants in the area are providing and which ones are doing particularly well;
- consumer research is carried out to establish what people in the area are looking for in a restaurant and what they feel is missing from the area at present;
- through the research, a specific target market is identified and the restaurant is developed based on the preferences of that target market;
- the development itself is conducted by a multi-disciplinary team consisting of specialists in each of the important areas which have been defined as part of the total customer experience;
- thorough staff training is conducted before the restaurant is opened. This ensures that all staff members have the appropriate skills and that they understand all of the processes necessary to deliver the customer experience required;
- even with all of this preparatory work, it is recognised that competition is intense and there is a need to differentiate the restaurant in some way. A themed style is therefore adopted which makes this restaurant quite different from others in the area;
- the opening of the restaurant is preceded by a promotional campaign and special launch offers. Once opened, there are regular customer satisfaction surveys to identify areas for improvement.

There remains no guarantee of success but the odds should now be much improved.

There are obviously significant differences between developing a financial services product and opening a restaurant, but there are also similarities. For example, increasing competition, declining margins and demanding consumers are features many actuaries involved in product development will recognise. The second approach goes little beyond applied common sense, but it requires a deceptively fundamental shift in established thinking. It demands a more thorough exploration of the business environment and a greater focus on consumer needs and preferences than the more familiar distributor-driven approach. That is not to suggest that distributors are unimportant – their part in the overall marketing process is clearly vital. However, if greater effort is put into ensuring that products are developed with the customer in mind, the task of distributors will become easier. In fact the task becomes one of allowing customers access to benefits rather than distributing products.

Market research can be a key component of understanding customer needs. It is, however, not without dangers. People will not always know what they want or be able to express it clearly in an artificial research environment. They might even change their mind. Often a need can be created once a product exists which consumers would never have considered before. Having used the motor insurance analogy previously, a quote from Henry Ford springs to mind; "if I had asked people what they wanted, they would have said a faster horse." Market research is a useful tool but no more than that.

4.1.2 The Product Strategy

A company's product strategy should be a subset of its overall business strategy which will define, amongst other things, its target market and the needs of that market which the company is looking to satisfy.

Although it is acknowledged that many product developments in our industry are the result of shorter-term tactical initiatives, the most effective way in which new products can be developed is for the development to take place in the context of the overall product strategy. Such a strategy makes generalised judgements about the way in which the company will approach products and product development, and deals with questions such as:

- how does the company want to be perceived in the market place?
- what are the implications for the competitive position required of products?
- on what basis will the financial viability of a product be measured and what will be the profit criteria? The key considerations are:
 - the amount of capital required;
 - the expected return on capital;
 - the potential volatility of future earnings;
 - the incidence of distributable profit.
- what role will distribution channels play in adding value to customers?
- will the products be individually branded?
- will products be developed exclusively using internal resources or by using the resources of other organisations?

Different product strategies require different approaches to product development and these differences need to be consciously managed over time, rather than as part of an individual product development.

4.1.3 The Product Concept

There is a wide range of definitions of product.

One is a narrow technical definition where the product is a defined set of benefits and options, a premium or pattern of premiums, and a set of conditions that each party is obliged to meet. These conditions are specified in the policy documentation which provides the confirmation and evidence of the policy.

A second approach defines the product in terms of the security or reassurance the customer is seeking. This psychological definition tells us what effect one has to have on the customer if they are to buy the product, and feel they have made the correct decision.

The weakness of the first definition is that it focuses on those aspects of the product least influential in persuading people to buy. The weakness of the second is that it does not identify what needs to be done to have the right effect. Something is needed to bridge the gap between the two definitions.

A third definition seeks to bridge that gap. The total product concept analyses what the insurer does that is capable of providing the feeling of security which customers need.

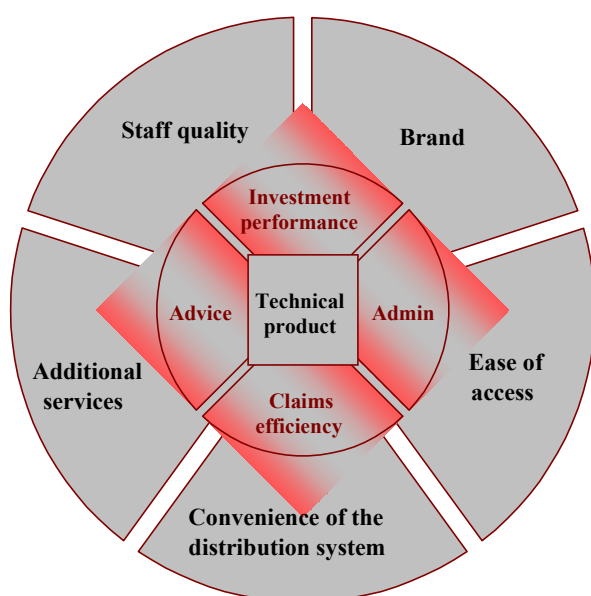
The concept of the total product recognises that what provides customers with the security and reassurance they need are the promises made in the policy supplemented by the service provided by the company. This service extends from the first contact with the customer to the attitude and helpfulness of company staff, and the degree of reassurance provided to customers by the whole experience of buying and owning the product - the total customer experience.

So what people “buy” when purchasing insurance are often those things that “surround” the product, including:

- the advice, assistance and service provided by the distribution system both in buying the policy and throughout its life;
- the reassurance provided by the insurance company’s reputation or “brand”;
- how basic policy administration tasks – underwriting and setting up, premium collection, policy alterations, etc – are carried out;
- additional services, over and above basic administration, provided by the company throughout the life of the policy;
- investment returns, where applicable;
- the speed and effectiveness of claims processing.

For a product that is distributed wholly or partly through third parties – financial advisers or brokers – the product may also include:

- the quality and speed of service to the agent or broker;
- the technical and sales support offered.

Figure 2: The concept of the total product

The significance of this concept, illustrated in Figure 2, is three-fold.

First, the things that people see and touch for most if not all of the lifetime of the product are the surrounding characteristics, not the functional core. These are therefore far more influential in determining whether customers remain enthusiastic about their purchase (and loyal to the company).

Second, the many and varied aspects of the product “surround” provide an agenda of those things that need to be consciously considered as the design of the product is brought together.

Third, given that the scope for innovation at the technical level may be limited as life insurance markets continue to mature, a high percentage of product innovation takes place in the product surround. Product development is now increasingly focused on developing aspects of service such as:

- buying insurance at banks and postal counters;
- buying cover over the telephone or the Internet;
- monitoring policy performance and amending the policy over the Internet;
- getting a better and more comprehensive service from the sales person.

An important decision that needs to be made in developing a product strategy is the extent to which elements of the product surround are going to be featured in the company’s typical product proposition.

4.1.4 The Importance of the Customer

The importance of making the needs and perceptions of the customer the focus of all product development activities cannot be overstated. The product should meet a genuine need and offer customers value for money. Marketing material must represent the product fairly and transparently. The sales process must be designed to sell the product only to those customers who need and can benefit from it.

The reasons for such an approach are not based purely on ethical values but also on long-term self-interest. Companies which follow these principles are more likely to sell to their customers a second, third and fourth time. They are more likely to sell products with a high level of persistency and they are far less likely to encounter mis-selling or other market conduct challenges.

A good example of such a customer centric approach was the development of a product known as “Smart Lady” in 1997 by National Mutual Life in Hong Kong. The idea originated from a series of consumer focus groups which were designed to explore the fears, insecurities and aspirations of a variety of people. One of the major findings was the extent to which women feared the insecurity surrounding certain female cancers and the potential complications of childbirth. After some development work and further research to test consumer reactions to various concepts “Smart Lady” (basically a protection plan which includes cover against female cancers and pregnancy complications) was launched. Its market appeal led to impressive sales and many other companies in that market have followed with similar products.

4.1.5 Understanding the Environment

For a product to be successful within a market, it must have a suitable fit to that market. Factors such as demographics, economic situation, culture, taxation systems, state benefits, public attitudes and religion could all have an impact on whether a product is right for the market. The early stages of product development should therefore include a thorough analysis of the market environment.

4.1.6 Distribution

An important component in the total product concept is the potential value of the distribution channel. This has two implications.

First, part of the development of a product strategy involves making a decision about what role the distribution channel will play in adding to perceived customer value. How will it contribute to the company’s overall product proposition? This decision cannot be made with each new product development, but needs to be part of the overall approach to products.

Second, where there is a choice of distribution mechanisms, it is important to recognise that each major distribution option has its own potential strengths, and that different distribution channels will be more or less suited to certain types of product or product design.

As a result, the product designer will have to consider a range of questions, such as:

- which of the available distribution channels is best suited to this type of product?
- what design constraints does the chosen channel place on the product?
- what price constraints does the chosen channel place on the product?
- should new channels be considered?

4.1.7 Branding

The essential purpose of branding is to differentiate a company from its competitors. Brands are designed to give consumers reasons to choose one company's products rather than those of another. In an industry such as financial services, where products – at the technical level at least – can be virtually identical, the attraction of strong branding is obvious.

The subject of corporate branding is too large to tackle here, but the question does arise as to whether to develop individual product brands, or identities, to help differentiate them in the minds of distributors and consumers. The questions for the product strategy are:

- are individual product brands required?
- what are the potential sources of differentiation at a product level?

Differentiation at a technical level is hard to sustain for individual products since successful innovations can, and will, be copied rapidly. There is however considerable scope for differentiation in the product surround. The areas of image, ease of access and added-value services provide considerable scope to develop superiority over the competition.

Arguably one of the hardest challenges in product development is to develop a distinctive product proposition that can be developed into a brand. The total product concept provides adequate scope for developing such a proposition.

4.1.8 Product Development Methodology

Part of the overall product strategy should be to draw outline conclusions as to how products are going to be developed. There are two options (apart from the major strategic step of acquiring another company that has the product):

- to develop the product internally;
- to develop it through a partnership or alliance with one or more external organisations.

To some extent this decision can be, and is, made on a product-by-product basis. The shortcoming with this is that each approach calls upon different skills that need to be developed over time. If all product development is typically done using purely internal resources, the company may not have the management skills and processes necessary to manage external suppliers and strategic alliances.

Each option has advantages and disadvantage (see Table 1).

Table 1: Some advantages and disadvantages of alternative development options

Internal development	Strategic alliance
Low risk	Medium risk
High control	Potentially high control
Reliant on current skills	Access to wide range of skills
Limited opportunity for synergy	Opportunity for synergies
Requires substantial technical resource	Requires substantial management resource
Potentially long lead time	Potentially short lead time
Low leakage of skills/knowledge	Risk of skills/knowledge leakage

One problem providers have in developing suitable alliances is that many of the companies that could offer the sought-after skills are actual or potential competitors. The alternative is to seek these skills from other organisations such as reinsurers, consultants, IT advisers, investment houses and local third-party administrators.

A further consideration when assessing the overall approach is the extent to which the company would be prepared to badge the products of other organisations or to outsource aspects of product development and maintenance.

4.2 The Product Development Process

This section looks at the reasons why products often fail and suggests that a consistent and efficient product development process can help prevent such failings. It then goes on to outline some of the important aspects of such a process and to propose a possible structured approach.

4.2.1 Why Product Developments Fail

A key objective in product development is to ensure the maximum chance of success for the new product by planning to avoid the key causes of failure.

There are two quite different types of failure:

- failure of the *product* to meet its stated objectives;
- failure of the *project* to meet its time, cost and quality objectives.

Of the many reasons why products can fail, the most common are listed in Table 2.

Table 2: Possible reasons for product failure

Failure to meet a real (perceived) market need
Insufficient differentiation from more established products
Poor value for money
Mismatch between product type and company reputation
Too complex for the distributor and/or the customer
Insufficient rewards to the distributor
Failure to market test and evaluate the systems support
Inadequate assessment of the costs involved
Inadequate modelling of the likely investment returns, mortality/morbidity, expenses
Failure to provide a realistic assessment of sales volumes/impact on other products
Inadequate clarity about reason for product introduction
Failure to design the product and support systems to match the objective
Inappropriate launch and post-launch promotion
Events outside of the company's control (e.g. market crash)

4.2.2 The Need for a Process

A well thought-out and carefully managed product development process can ensure that a higher percentage of product developments reach the market and succeed.

Table 3: Why employ a product development process?

Reduce the risk of failure, increase the chance of success
Hasten time to market
Reduce overall costs of development
Use resources, including financial, more effectively
Improve control (including management control) over a complex chain of tasks
Ensure consistent quality in design and development
Develop future product and project managers

4.2.3 The Need for Flexibility

It is important to realise the potential dangers involved in any process. Foremost is that the process may be too rigid, or too rigidly applied. For example, processes developed for major, flagship products involving new IT systems can be overly complex and bureaucratic for tactically-motivated product enhancements. Once the process is seen as bureaucratic and rigid, managers and staff will lose confidence and find ways around it.

The process needs to be sufficiently flexible to be scaled up or down to meet the differing needs of the product under development. The key issue is that the principles are understood and applied in every case.

The degree to which the full, formal processes should be applied will depend on:

- the degree of importance of the product to the company's marketing and financial plans;
- the complexity of the product and the market;
- the magnitude of the task – including the degree of systems development work required;
- the time available to deliver the product.

There are two dimensions in which the process can be scaled down to suit specific projects:

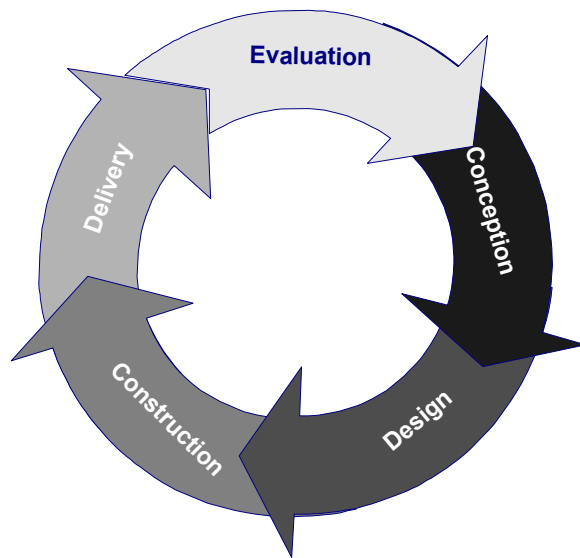
- specific tasks or steps in the process may be unnecessary in the circumstances;
- specific tasks may be tackled more pragmatically.

For example, for “flagship” products, “understanding the market need” may involve a significant programme of original research into the needs and perceptions of customers in the target market. For tactical product enhancement, a structured discussion group with senior agents in this field may be sufficient. The principle of understanding the market requirements however, must be met.

4.2.4 The Product Development Cycle

The ideal process is cyclical in nature, and consists of five phases (see Figure 3). Each of these is different in character and needs to be managed accordingly, but with a co-ordinating role integrating all five. This role is normally taken by a product manager or equivalent.

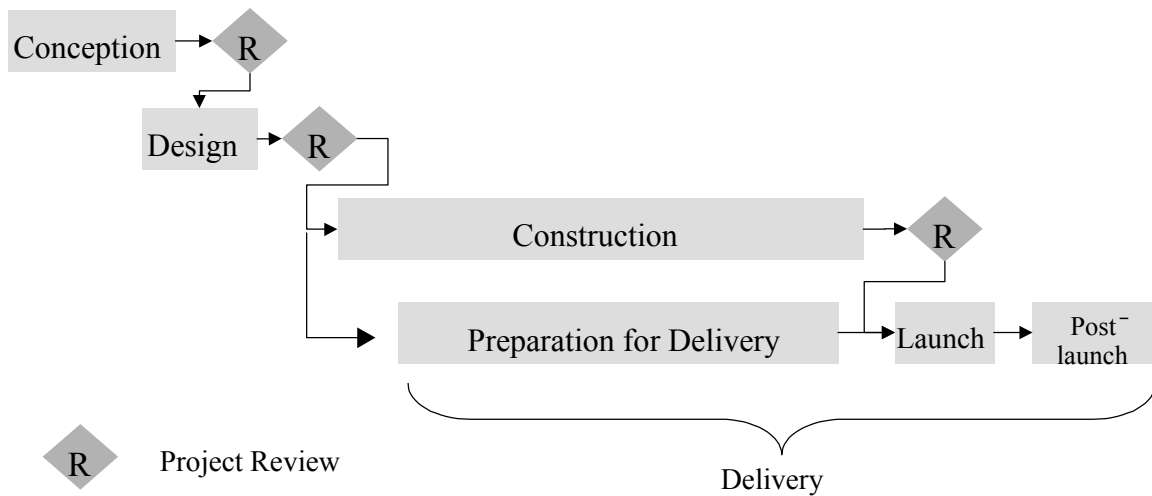
Figure 3: The development cycle



The *Evaluation Phase* is a continuous process of evaluating the performance of each product against its objectives, and assessing whether further product development is required. The *Conception Phase* gathers and assimilates product ideas and converts them into a clear product proposal. The *Design Phase* converts the product proposal into a fully detailed product specification, while the *Construction Phase* builds the IT systems, administrative processes and technical resources needed to sell and support the product. The *Delivery Phase* includes preparation for delivery and launches the product into the market. It also ensures it meets its sales and marketing objectives. Finally, the *Evaluation Phase* completes the cycle by evaluating the product's success.

4.2.5 The Development Project

For specific product development projects, this cyclical process can be more helpfully represented as a flow chart (see Figure 4). The scope covered by the four phases in the flow chart is shown in Table 4.

Figure 4: Product development — outline flow chart

For smaller scale projects, the phases can typically be combined into two, i.e.:

- Design (a combination of Conception and Design);
- Delivery (a combination of Construction and Delivery).

For major products, each of these phases should be seen as a separate project linked by common project management personnel. The resources required for each will be different and planning any phase may be difficult until the preceding phase is complete. However, as the flow chart shows, there is scope for overlap between the construction phase and preparation for delivery.

Table 4 shows the likely outputs delivered during each phase of a typical development cycle. The deliverables from each phase form the inputs for the succeeding parts of the cycle.

Table 4: Key deliverables for the product development phases

Conception	Design	Construction	Delivery
Initiation	Full design brief	Product pricing and profit-testing	Marketing and sales plan
Initial research	Consumer and distributor research	System and process design	Consumer research
Product ideas development and alternative product solutions	Iterative product design through a sequence of prototypes	Obtaining authorisation	Marketing and promotional material
Pricing strategy	Final product design	Product documentation	Training and preparing the distribution system
Outline marketing plan	Revised business case	IT and financial systems	Designing and conducting the product launch
Internal research and development, leading to:		Administration processes	Designing and conducting post-launch promotional support
<ul style="list-style-type: none"> • The feasibility study • Recommended product • Outline business case 		Staff training	
		Marketing and distribution systems	
		Staff and distributor training material	

The various stages outlined above are intended to provide a practical generic framework for successful product development, based on current views of “best practice” in this area. Few of the ideas extend beyond basic common sense and there is certainly nothing “ground-breaking” in the thinking. The input and analysis required to complete each stage successfully however extend beyond the “hard” financial aspects in which actuaries have traditionally been involved. To contribute more as a profession we therefore need to examine new techniques and skills which we could usefully contribute to the wider aspects of this process. These are considered in more detail in the next section.

5 How Can Actuaries Add More Value?

The previous sections have reviewed actuaries’ historic involvement in and influence on product development and have considered modern thinking, from a “marketing” perspective, on the essential components of successful future product development. This section will attempt to draw these together. In particular, it will examine an expanded form of the familiar control cycle incorporating both the traditional (pricing) and “marketing” aspects and will consider the skills actuaries will need to draw upon to make this work effectively in practice.

Let us first return to the imaginary case study introduced in Section 2.3 (please note that this has been created for illustrative purposes and is not based on any factual examples).

Imaginary Case Study (Simplified Savings Product) Revisited

Imagine now that another provider (Provider B) had also launched a product identical to that first launched by the original provider (Provider A). Provider B had an arrangement with a national chain of supermarkets which allowed it to distribute its products both direct to the supermarket's customers and through agents operating from the stores. This arrangement included the facility to access substantial data on the supermarket's customers, whether or not they were purchasers of the savings product and to carry out consumer research on those customers from time to time.

After three years, Provider B reviewed the product's performance. Traditional methods were used which showed that volumes were broadly on track but lapse rates were higher than the pricing assumptions (which, by coincidence) were identical to those originally used by Provider A.

Provider B then began to examine the customer data in some detail. It looked at purchase, non-purchase and lapse behaviour by:

- age of purchaser;
- occupation of purchaser;
- family size;
- salary band;
- region/store;
- agent or direct sale;
- level of savings (absolute terms, proportion of salary, proportion of spend in store);

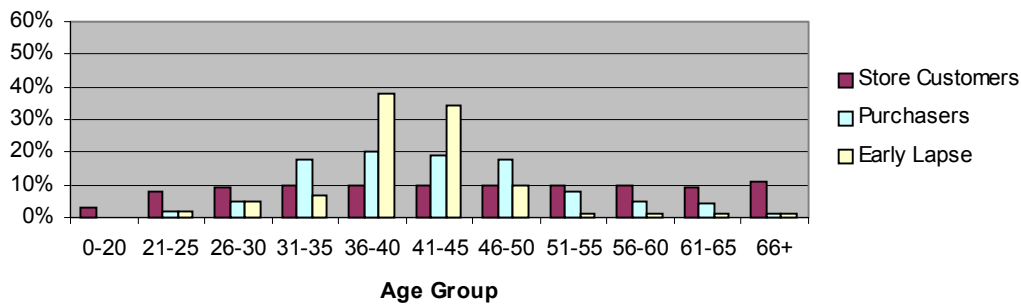
and many other factors. By using data for all the supermarket's customers it was possible to produce a large benchmark group against which to compare results. Many of these revealed little insight but some showed distributions either very different from the benchmark group or counter-intuitive in some way. A selection of the analysis results is shown below. In each case Provider B concentrated on how the proportions of customers buying or lapsing policies in each category compared with those of the supermarket's customer base as a whole.

Distribution By Occupation Class



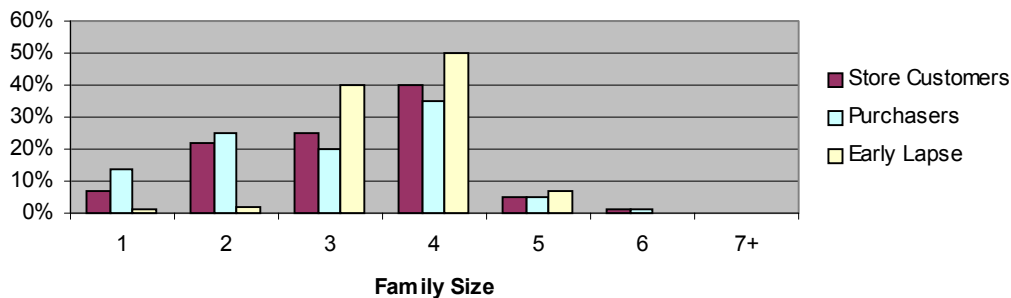
This first set of results confirmed the intuitive expectation that those buying policies tended to be from the higher occupational classes. Interestingly though, it illustrated a particular tendency among these classes to surrender early.

Distribution By Age



The analysis by age of customer showed a high concentration of purchasers in the 31-50 age range and, even more interestingly, a very strong tendency for early lapse in the 36-45 age range.

Distribution By Family Size



Finally, Provider B noticed a further strong correlation by family size. The vast majority of those lapsing early were from families of size 3 or more – a much stronger concentration than for the customer base as a whole or for the group purchasing the product.

These results prompted Provider B to design and carry out some targeted consumer research on both purchasers and non-purchasers of its products. The results were fascinating:

- one of the leading financial concerns among 35-45 year olds was paying for their children's higher education;
- this was particularly true of purchasers of the product but was also a strong finding among non-purchasers;
- "funding education needs" was overwhelmingly (65%) the most common reason given for lapsing the policy;
- a massive proportion (85%) of people lapsing turned out to have children in the age-range 16-20.

Based on these findings, Provider B redesigned its product. It launched two new versions:

- one aimed at higher net worth savers looking for long-term stability and value for money;
- another designed specifically as a vehicle to fund education fees; this included a preferential loan facility which could be exercised whenever a child moved into higher education and a series of links to providers offering discounts and preferred terms for a wide range of products and services of interest to students.

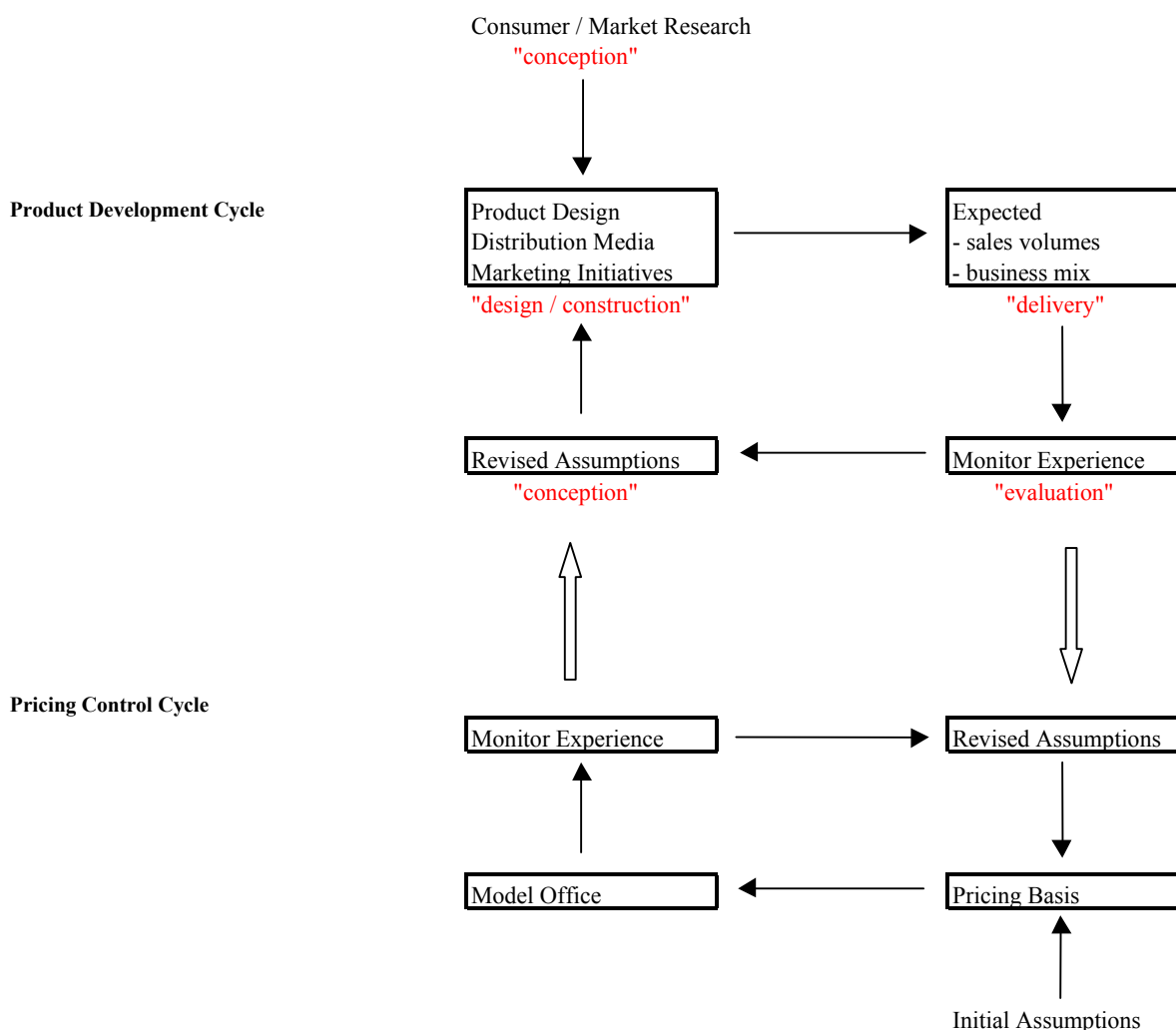
Both versions sold well and overall profits doubled over the following three years.

5.1 Extending the Control Cycle Concept

Sadly, the "revisited" case study above is entirely fictional. It illustrates nonetheless the potential which may be available by broadening the traditional actuarial concept of the control cycle.

The "marketing" concept of a "product development cycle" described above bears some immediate resemblance to the control cycle. The similarity becomes clearer if the steps are defined slightly differently and the two cycles are drawn adjacent to each other. More importantly, this highlights the potential for information generated within one cycle to be used as valuable input within the other.

Figure 5: Interaction of “Marketing” and “Actuarial” cycles



This is a specific example of a broader subject of increasing interest to actuaries. Traditionally the profession has focused on financial modelling based purely on “hard” financial parameters. The resulting models define how these parameters interact and therefore, providing the parameters themselves can be quantified and the relationships remain stable, provide a reliable means of forecasting future financial outcomes.

For example, the pricing model for a term assurance product might include lapse rates as a key parameter. The model might be quite sophisticated, reflecting not only that lapse rates might vary by policy duration but also, perhaps, by age, distribution channel, policy size and possibly other factors. The most sophisticated models might even assume some dependency of lapse rates on market interest rates and might reflect an element of antiselection such that underlying mortality rates might be a function of lapse rates.

However, such models rely on one major assumption – that the system they are being used to define is “closed” i.e. is dependent only on the parameters identified in the model.

Therefore, even if the model is perfect in its definition of how one parameter will affect another, it may be prone to the basic flaw that a different parameter, which can materially affect the outcome, has been overlooked completely.

There are many examples of where this can go wrong. The modelling approach used for disability income business in the United States in the 1980s is possibly one of the best. The rating factors for pricing disability income business at that time included age, policy term, deferred period, gender (sometimes) and occupation class. The last of these proved a very coarse differentiating factor with a large majority of those purchasing individual disability income policies being classified as Occupation Class 1. The monitoring of the business focused on the parameters used in the pricing model. Over time, the claims experience for Occupation Class 1 became very poor relative to the pricing assumptions and providers eventually had to respond by increasing premium rates. Delays in the emergence of the worsening experience however meant that the premium rate increases always lagged behind the true “burning cost” of the underlying insurance risks. It is estimated that total losses to the US insurance industry were around US\$2bn.

The modelling and pricing of individual disability income business in the US was, and remains, the domain of actuaries. Those involved in the sales and marketing of the business would, no doubt, have been more interested in other measures such as penetration rates of different distribution sectors, sales volumes relative to targets and the profiles of customers buying and not buying the products. The last of these might have been invaluable to the actuaries. Regular monitoring of purchaser profiles would have revealed that a large and growing proportion of the policyholders were physicians, dentists and members of other medical professions. This coincided with the introduction of healthcare reforms in the US which significantly and detrimentally affected the employment and earnings potential of medical professionals. Not only did this group represent a disproportionately high proportion of new claims relative to their (already high) proportion of the in force business, but they also turned out to exhibit particularly low termination rates. Had ongoing monitoring of cause of claim been carried out, this would have shown a growing proportion of claims due to musculo-skeletal and mental/nervous disorders (notably “stress”) particularly among the medical occupations group. However, “cause of claim” did not appear in the model as a pricing parameter so it was not tracked (at least in the early stages).

The specific flaws here are obvious with the benefit of hindsight. They arose however due to a persistent belief in the appropriateness, completeness and durability of the financial model used as the basis for the control cycle. In fact, the system was not “closed”; there were many factors other than those identified as pricing parameters which materially affected the underlying risk and whose characteristics changed over time. There is a clear need to develop a new approach to financial modelling which caters for a much wider range of both “hard” and “soft” factors affecting the outcome and for the influence of these changing over time. Specifically, modelling approaches are needed which can accommodate uncertainty and make use of new, unforeseen, information as it emerges to influence future decision making.

Stochastic modelling takes an important and fundamental step towards this by recognising an element of random fluctuation within some model parameters. The use of stochastic models by actuaries however has tended to be confined mainly to the specific area of investment modelling. It is also generally based on a rigid definition of the probability

distribution influencing the random fluctuations and on an assumption that the model parameters define fully (and permanently) the system in question.

5.2 “Operational” Risk

The idea of extending the scope of the control cycle is very much in line with the increasing interest in “operational” risk, not only within the financial services sector but throughout many branches of industry. Business managers in general are increasingly recognising the importance of understanding all the risk factors faced by their operations and of ensuring appropriate controls are in place to mitigate these as effectively as possible. This is the foundation of corporate governance requirements which are now becoming commonplace in many countries either in the form of legislation or voluntary codes of practice representing acknowledged best practice standards.

“Operational” risks include systems failure, regulatory/legal change, litigation, failure to meet market conduct standards (which may change retrospectively), dependence on counter-parties and any other factors which could affect the financial status of a business. Actuaries should be well equipped to assist in identifying and prioritising these risks, in assessing their potential impact, and in advising on key indicators and monitoring frameworks which can enable management teams to control them.

5.3 The “Real Options” Concept

Another approach now attracting increasing attention uses the concept of “real options”. The rationale is that the theory of option pricing can be extended beyond the field of investment management to any situation in which one or more party(ies) in a process can make choices which can influence the financial outcome. This concept is explained particularly well by Amram and Kulatilaka who argue that the potential power of this approach has, to date, been overlooked by business managers, partly because the “big picture” is lost in the mathematical complexity of most literature on options and option pricing. If this is true, there must be an opportunity for actuaries to bridge the gap.

Amram and Kulatilaka illustrate the potential advantages of the “real options” approach mainly in the context of long term projects involving strategic capital investments. They demonstrate that such projects can usually be broken down into distinct phases, each including significant uncertainty, at the end of which choices can be made before embarking on the next phase. These choices represent value which might be overlooked by more traditional cash-flow based analysis techniques. Amram and Kulatilaka use numerous examples, one of the simplest being a company considering producing skis. If they go ahead they will, as a by-product, acquire information which would be useful in making and selling ski boots, so they would have an option to expand. The more volatile the ski boot business is, the more important this “inside” knowledge could be, i.e. the more valuable their option. Amram and Kulatilaka argue that option pricing techniques can be used to calculate such option values and these can significantly alter the financial attractiveness of the initial investment decision. Other examples include oil exploration, venture capital investments and decisions regarding entry into or exit from specific markets.

The development of financial services products can also be considered in the same way. The traditional approach has been to view this as a long-term, single phase exercise. Once designed, products are expected to have a long shelf -life with little or no need (or scope) for modification to adapt to emerging changes. An alternative approach would be to view product development as an ongoing process comprising numerous “check-points” at which the current design and financial performance would be reviewed and used to influence the next phase of development.

In some cases, this might produce a decision to withdraw a product. Amram and Kulatilaka explain the importance of embracing the real options approach as a way of thinking and a key element of this is to avoid regarding such decisions as “failure”. Withdrawal from the US individual disability income market in 1987 would have been a stroke of strategic genius, particularly if followed by the launch of a modified product targeted specifically at groups other than medical professionals (or a product for medical professions designed and priced more appropriately). Most providers however would have needed much more compelling evidence than was available at that time to deviate from their original course.

The control cycle provides many of the essential ingredients. It encourages and supports the concept of product management as an ongoing process, with constant updating of the underlying pricing models to reflect emerging experience. The weakness however is that this is usually applied in a way which will only recognise changes in the parameters allowed for in the pricing model and these will often not be the major source of uncertainty.

The use of established option pricing techniques provides a means of incorporating uncertainty wherever “real options” can be identified and is one way of improving the realism of the models used in conjunction with the traditional application of the control cycle.

5.4 Data Mining

Fundamentally, the key issue in improving product development processes and the models used to assist them is to acknowledge that the most important influences of the ultimate outcome are likely to be unknown and/or impossible to identify at outset. The “real options” approach deals with this by allowing explicitly for uncertainty at each stage and in adopting a “Bayesian” style of decision making to constantly reassess future uncertainty allowing for the new knowledge from emerging (intermediate) outcomes.

A less sophisticated, but possibly more powerful, approach is to try to capture and monitor data well beyond those defined by the initial pricing parameters. Credit card companies and supermarkets have already achieved success in this area. Their approach is to collect as much information about their customers as possible, regardless of whether or not current thinking suggests it will be relevant for future commercial decisions. They then look for correlations between the captured data and buying patterns of their customers. This type of approach has become known as “data mining”.

Data mining is simply the term used to describe the way the data on the customer can be manipulated to support business initiatives. In many ways it is a term which has been stretched beyond its limits to apply to just about any form of data analysis, but the original

meaning is to uncover hidden nuggets of value inside the database and to strike “gold” in unexpected places. Essentially, mining is the act of turning unstructured data into information (discovered patterns) followed by knowledge (valuable descriptions of interesting and useful patterns) and finally into decisions for business purposes.

The technology historically available to support the administration of financial services operations would have prevented such an approach and may still represent a significant barrier. The emergence of bancassurers was expected to herald a revolution in this area, opening up the possibility to use existing customer data more intelligently than ever before to target new sales opportunities. There has been some success but overall progress has not matched expectations and some attribute this to the data records and processing systems being inadequate to support a process capable of yielding the full marketing potential of these operations. Technological improvements will enable greater progress in future and we can also expect to see data being sold commercially to a much greater extent than at present.

5.5 New Technology

No forward-looking paper would be complete without considering the possible impact of new and emerging technology. The paper, “e-Actuaries” by Cornall et al provided a particularly good overview of the emerging environment and the implications for actuaries. It echoes the need to develop a wider range of skills and a more holistic approach, including incorporation of some of the marketing concepts already discussed in this paper.

Although other implications of the growth in internet use are also considered, Cornall et al portray the internet principally as a sales and distribution medium. This is also true of most other literature on this subject. Arguably however, this will not be the most important dimension for the financial services industry in general or for actuaries in particular. There is a substantial body of opinion, shared by the authors, that internet-selling of financial services products is unlikely to become a dominant distribution medium – there are simply too many other, more interesting, things people will think of buying first. Of much greater interest is the enormous quantity of data on customer preferences and behaviour which will be generated through web-based activity. The potential of applying effective data mining techniques in this area is vast.

In addition, the database technology now available should support a much more ambitious approach to data capture. In future, different barriers might emerge in the form of data protection regulation and/or legislation, the likelihood of which will increase if financial services providers seek (or are perceived to seek) to use data in an unfair or selective way. The industry therefore needs to move carefully and responsibly.

In this context, the combination of the “product development cycle” and the “control cycle” starts to look very powerful. A true “data mining” approach could yield vast quantities of information on the behaviour and characteristics of customers, non-purchasers and distributors. Over time correlations may become visible between some of these and changes in the parameters driving the traditional actuarial model, which cannot be explained in the context of the control cycle. Actuaries who establish themselves as experts in spotting these correlations (and, in particular in recognising which are statistically significant and

understanding their implications) could add enormous value and insight to the product development process.

5.6 Valuing Customers

Another important recent development, highlighting the benefits of combining actuarial and marketing expertise, is the concept of measuring the financial value of customers. The paper “Valuing Our Customers” by Gott et al provides an excellent overview and illustrates how the techniques can be applied in practice. As the potential sources of customer-specific data increase so these concepts will become more important as a means of identifying and targeting the most profitable business segments.

Gott et al develop the concept of a “customer value model” and go on to illustrate the extension of this to a “customer control cycle”. These ideas are very similar to the thoughts expressed in this paper on how the “traditional” control cycle could be extended to incorporate customer/marketing based aspects. The key point is the importance of capturing a wider range of data to understand more fully the drivers of financial outcomes.

6 Conclusions

Actuaries have enjoyed a long history of strong, and largely successful, influence in all aspects of life office management including the development of financial services products. It is by no means certain that this will continue and signs already exist of erosion in the role of actuaries in this area. Actuaries will have to earn a continuation of this influence by further adaptation of the skills and expertise they can provide.

This paper has aimed to illustrate that these challenges are not new and that actuaries have repeatedly adapted successfully to changing environments in the past. We believe, specifically in the area of product development, that the key to future success lies, not only in building on and developing existing actuarial techniques, but also in forging more direct links with other professionals with complementary skills and expertise. This paper has concentrated on bringing together “actuarial” and “marketing” thinking to create the more holistic approach which we believe will be crucial to meet future product development needs successfully. We would also stress the need for similar integration of other disciplines (e.g. underwriting and claims management) although these have not been explored in the same detail. We would encourage more work in this area.

Closer integration of these disciplines and the capabilities offered by new technology open up a wide range of opportunities for actuarial analysis techniques to be developed and applied to great practical effect in future.

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