

Credit Scoring and Credit Control - Coming of Age.

What allegedly started out over a cup of coffee in the mid-1980's has grown into the largest scoring conference in the world. This paper will trace the roots of the conference and its development. It will look at key themes and how they have changed or developed - or not - over the last 20 years, discussing a few of them and assessing where we are now and where we might be headed. Typically, these might include software, monitoring, reject inference, regulation, and development techniques and methodology. The paper will also touch on the growing list of publications in this area, and will also present a small statistical analysis of the delegates - numbers, countries of origin, etc.

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Credit Scoring and Credit Control - Coming of Age.

Let me start with some questions that are relevant to both academics and business:

Is coffee good for you?

Is it addictive?

Do you have to come back for more?

I'll come back to these – but this conference series started out as an idea in 1987 over a cup of coffee. And this idea became Credit Scoring and Credit Control.

When we launched the first event, it was a major step into the unknown:

The three organisers for the whole set of ten conferences, myself, Jonathan Crook, and Lyn Thomas, had a series of questions:

- ◆ Who would speak at such a conference?
- ◆ Who would attend?
- ◆ What would they want to hear?
- ◆ How many would come?
- ◆ Would they engage in open discussion?

Well, at 2 p.m. on Wednesday August 9, 1989, Professor Lyn Thomas stood up and welcomed the 53 delegates from seven different countries to the first conference.

The 2 and a half day event had 13 scheduled presentations including talks by Gerard Scallan, George Wilkinson, and Alan Lucas, all speaking here this week.

There are several interesting points to note about the 1989 first conference:

1. The key number was Four – which of course is unlucky for some but was not for us:

Ted Lewis's keynote address was entitled Credit Scoring and Credit Control from four points of view.

George Wilkinson covered the four different applications of scoring (in 1989, but still valid):

- Pre-screening
- Applications
- Behavioural
- Forecasting, especially provisions

Gerard Scallan described the four C's of credit:

- Change
- Control
- Communication
- Computers

All also still valid today

2. The invited speakers were given an hour and 15 minutes for their talks; the other papers were allocated one hour.

3. The whole conference was run in one room, in the David Hume Tower, about a mile from here.

4. Because we were not 100% sure of what would happen, we kept a spare 60-minute slot on the Friday morning – and invited delegates to speak for up to 15 minutes on a topic of their choice, perhaps from something that occurred to them during the preceding sessions. Four delegates took up this offer / challenge – and one of their presentations developed into an extremely heated technical debate which ran right through lunchtime.

5. The conference papers were put together and published as a book by the OUP, but only 200 copies were printed.

The second conference took place between September 25 and 27, 1991. We replicated and repeated much of the structure of the first one.

- ◆ We had 16 papers, accommodating a few more by starting mid-morning on the Wednesday.
- ◆ Speakers from 1991 who are also speaking this week included Bob Oliver, George Overstreet, George Wilkinson, and Chris Sykes.
- ◆ Topics included generic scoring, behavioural scoring, neural networks, and limit assignment.
- ◆ We also had the first signs of the UK Data Protection Act.

I delivered a paper at that conference – on 35 mm slides! We also had one of the strangest papers we have had in all of the conferences.

Once upon a time in a far away land lived a warrior. The land was called Collections and the warrior Pic, and he looked after the people in Collections for the Emperor.

There were many different people living in the land of Collections, some poor, a few rich, some ordinary folks and some crooks but they all had one thing in common. They were all exiles from the land of Credit, banished by the Emperor for failing to pay their debts.

Pic's job was to assess the inhabitants of Collections, to select those fit enough to undergo the dreaded trial of "Sue" and perhaps reach redemption by repaying their debts, and thus eventually returning to Credit.

All the people in Collections hated Sue, her teeth were long and very very sharp, and she put her mark upon those she held so that all would know and shun them. And so it went on.

Many of those who were there will remember it.

In 1993, with the growth in the number of delegates to 83, the venue moved to the Management School. The time allocation for papers was reduced so that the invited speakers had an hour and the contributed papers 45 minutes. This allowed 19 papers – including papers by George Overstreet, Mark Stirling and Gerard Scallan – as we have this week.

The themes occupying much of the conference were:

- ◆ Reject inference
- ◆ Bureau scores
- ◆ Profitability
- ◆ European risk management
- ◆ Fraud
- ◆ Statistical inference
- ◆ Neural networks
- ◆ Retention

In 1995, with the fourth conference, the whole series moved up a gear, but, before we investigate that, let's look at one of the recurring themes:

Recurring Theme 1 Neural networks / methodologies

From as far back as 1991, we have had discussions around neural networks in particular and the different modelling methodologies in general. There have been many papers explaining the pros and cons of the variety of available methodologies:

- ◆ linear regression
- ◆ logistic regression and other transformations
- ◆ classification trees
- ◆ nearest neighbour
- ◆ discriminant analysis
- ◆ support vectors
- ◆ neural networks
- ◆ expert systems
- ◆ genetic algorithms

- ◆ and modifications and combinations and variants of these.

From reviewing many of the papers, my conclusions are:

- ◆ no single method dominates any other
- ◆ no single method is universally weak
- ◆ those methods that may have some slight technical advantages over others tend to have practical weaknesses
- ◆ we may find that some methods are useful initially in the emerging economies but need to be overtaken by other methodologies as data history etc. develops.

Indeed one paper from 1999 concluded that

- ◆ The choice of an appropriate technology for a particular scoring problem will depend largely on the characteristics of the data.
- ◆ Preparation of the data is a crucial stage in modelling. For example, if it is known that a certain interaction exists in the data, a new field can be derived to make the interaction explicit.
- ◆ Traditional scorecards remain the most widely used form of scorecard. Acceptance of new technologies is slow but the limitations of the traditional approach are now well understood.

As stated above, the fourth conference, in September 1995, saw the series move up a gear:

1. The first three conferences had been run under the auspices of the IMA – the Institute of Mathematics and its Applications. Essentially they underwrote the conference and provided much of the admin and marketing activity. However,

- ◆ The IMA were taking a lot of money out of what was now a successful conference, and certainly a lot of money relative to the risk they were running
- ◆ The three organisers here had little control of various aspects of the conference. From 1995 on, these conferences have been run under the auspices of the University of Edinburgh. As many of you will know, we have had Jean Goldring on board since that conference to handle the admin and many of you will appreciate the great job she does.
- ◆ Also, the surpluses for the conferences are now ploughed back into credit research.

2. We introduced two pre-conference workshops. Initially, these took place first thing on the Wednesday morning but now are on the Tuesday evening. They are designed to open up

the conference to a wider audience. One workshop is very practical and applied and discusses some key business issues – and might be considered as being aimed at the academics in the target audience. The other deals with the various techniques and methodologies for modelling – and might be considered to be aimed at the business people. The result was that a far wider group of people now found the various papers being presented much more accessible.

3. We raised and circulated a proposal to establish a Credit Research Centre within the university.

It was also at the 1995 conference that we had the coffee questions

Is coffee good for you?

Is it addictive?

Do you have to come back for more?

The opening address at that conference was given by Alan Dickinson, then Director of Credit, of the Branch Banking Division of RBS. He commented that people were coming back for more. Indeed, of the 108 delegates at CSCCIV, 34 had been at two or more, and 8 people had been at all four.

The key themes at this the fourth conference were

- ◆ Comparison of methodologies
- ◆ Graphical methods
- ◆ Reject inference

With the 1997 fifth conference, we moved up another gear.

Firstly, the conference was growing and so we moved to having parallel sessions. We had 31 papers at this conference, 11 in plenary sessions and 20 in parallel sessions. Secondly, the Credit Research Centre was now established. Indeed, two of the papers at this conference were very early products of the centre's work.

Again we had some familiar names with speakers at this conference including

- ◆ Gerard Scallan
- ◆ Alan Lucas
- ◆ David Hand
- ◆ George Wilkinson
- ◆ George Overstreet
- ◆ Graham Platts

And recurring themes were

- ◆ European scorecards
- ◆ Information sharing
- ◆ Neural networks
- ◆ profitability

We attracted 150 delegates. Many of them sampled Edinburgh clubs after the conference dinner until well into the wee small hours. Luckily, we had begun to start a little bit later on the Friday morning – although the stated reason for this was to facilitate check-out at the hotels and the halls.

Recurring Theme 2 Reject Inference

At the 1993 conference, we first began to tackle this issue. David Hand and William Henley asked "Can Reject Inference Ever Work?" They described the various methods that are used - and their analysis argued that reject inference cannot work unless we have supplementary information which could be of the form of expert knowledge or the correct assumed distributions for the rejects

At the 1995 conference, we also had Inferring the Inferred, where Graham Platts, Gaynor Bennett and Jane Crossley discussed a practical problem of multiple inferences.

There are at least three papers this week with reject inference in the title, and so the discussion continues.

Being a practitioner, I am pleased to see that we have seen at the last conference and we are seeing papers here that are looking at the practical aspects. For example, what bias is there and how well can we adjust for it are interesting but the key thing is the economic value. In other words, what is the impact on the bottom line of the different methods of reject inference?

The sixth conference in 1999 saw us move to the current location, using the various rooms in the Pollock halls complex. Also, by this time, the University had upgraded the accommodation so that most people felt that the bedrooms on this site were adequate – and there have been further upgrades over the past eight years.

We had 30 papers, 10 plenaries and 20 in parallel sessions, presented to the 174 delegates. It was at this conference that I gave up any attempt to talk to every delegate – there were simply too many.

The common themes in 1999 were

- ◆ Reject inference
- ◆ Affordability
- ◆ Neural nets
- ◆ Fraud
- ◆ Data mining
- ◆ Profitability

And we had presentations from

- ◆ Ross Gayler
- ◆ Mark Kelly
- ◆ David Hand
- ◆ Bob Oliver

We also had an opening address from Professor Charles Munn, who was at the time Chief Executive of the Chartered Institute of Bankers in Scotland. He reported the advice he had received concerning credit assessment when he started his banking career in 1964:

How to assess people for loans. Get them in for an interview. If their shoes are shabby or unpolished or, worse, suede, don't lend to them.

Recurring Theme 3 Fraud

One recurring theme as we have already seen throughout the conferences is fraud or, more properly, fraud identification and fraud prevention.

It may or may not be a surprise but fraud did not formally appear within the conference presentations until the third conference in 1993, and it then disappeared as a formal topic until 1999, by which time of course, fraud losses in lending had grown substantially and continue to grow substantially.

Of course, we now recognise the different aspects of fraud – soft first party fraud and hard first party fraud and third party fraud. We separate application and transactional fraud. We recognise that there are criminal gangs targeting the lenders to extort money. There are also conspiracies, especially in mortgage fraud.

We have developed huge databases purely to identify potentially fraudulent cases, and the use of these is embedded into the scoring processes. These have been of huge benefit.

There is also a huge benefit from alternative modelling techniques. Fraudsters try to hide in the crowd. Their applications should look like genuine applications. Therefore, the development of data mining tools, looking for small nuggets of differences, rather than mainstream statistical tools which look for the general trends, have been instrumental to the modelling and predicting of fraudulent cases.

Recurring Theme 4 Retention / Churn

Although it was raised at the first conference, the first time a paper carried the word “retention” in its title was at the 1993 conference. Retention is both a practical and a technical issue.

It is a practical business issue because it may take several years to turn a new customer into profitability. However good they are in a credit sense, if we cannot retain them for a sufficiently long time, we cannot make money out of them, especially given some of the heavy marketing and acquisition costs. Research results vary regarding the ratio of the cost of attracting a new customer v. the cost of retaining an existing customer – between 5:1 and 20:1.

It is a technical issue because we need to retain enough customers for long enough so that we have stable scorecards based on time horizons where the Bad rate has begun to level off. This of course can vary from product to product.

At the last two conferences, we have had papers on different organisations’ attempts to predict customer and account churn. They have had some success – although I am still very interested in the range of practical consequences. Suppose we have an application with an acceptable credit score, a high fulfilment score, i.e. they are likely to take out the product if accepted, and a low loyalty score, i.e. a high likelihood of them churning within quite a short period. Two reasonable but quite opposite tactics are to:

- ◆ Charge them a lower rate, to encourage them to increase their loyalty
 - ◆ Charge them a higher rate, to get them closer to being profitable by the time they leave
- Which one works best, and for which segments, can probably be best discovered through scientific evaluation, i.e. experimentation.

The 2001 seventh conference saw further growth, with now 234 delegates and 44 papers, and the conference now run in three parallel sessions.

The recurring themes for this one were

- ◆ Affordability
- ◆ Fraud
- ◆ Risk Based pricing and profitability
- ◆ Reject Inference

We also had some topics which were new to the conference series:

- ◆ Credit scoring in new countries and new economies
- ◆ Collections

and some brand new topics for the industry

- ◆ Third party data
- ◆ Basel

We also started to use the Holland part of the Pollock complex - and especially Holland South Hall to handle the plenaries and the more popular papers.

It was also in 2001 that we started to get sponsors for various aspects of the conference. We have sought sponsorship for the social activities, tea and coffee breaks, lunch breaks, transport, conference dinner, printing, magazines, and various gifts. By attracting sponsorship from several organisations, we can support further credit research while also maintaining the independence of the conference series.

The eighth conference took place from 3rd to 5th September 2003, with a total of 50 papers, 45 in three parallel sessions and 5 in plenaries. Surprisingly, we actually had a slight reduction in delegate numbers, down to only 228.

Key topics were:

- ◆ Neural nets
- ◆ Risk based pricing
- ◆ Data mining
- ◆ Basel
- ◆ Fraud
- ◆ Collections
- ◆ European risk management
- ◆ Churn

and again we had presentations from David Hand, Alan Lucas, and George Wilkinson

We now come up to our recent history, with our previous conference in September 2005.

We had even more papers by reducing the time for papers so that the invited speakers got 50 minutes and the contributed papers 40 minutes. We also introduced mini-breaks of 5 minutes to allow delegates to move, mid-session, between rooms.

This meant that we could have a total of 56 papers, 48 in three parallel sessions. The increased number of papers meant that the proceedings now appeared in two volumes. It also helped us attract what was then a record number of 251 delegates.

Another increase was in our sponsors, as we had eight different organisations participating in the sponsorship programme.

Speakers again included David Hand, George Wilkinson, George Overstreet, and Bob Oliver and, what I believe is our first parent and child combination, Alan and Rebecca Lucas, both delivering papers. On a similar topic, we also had our youngest delegate, but that was back in 1991, when George Overstreet brought his 6 year-old son along for a day, and he sat quietly drawing.

The major themes were fraud, churn, neural nets, bureaux, and reject inference, but the foremost topic was Basel II, with at least 10 papers on different aspects of this topic.

We also met a host of new characters, courtesy of George Wilkinson. Most people who were there will remember his entertaining talk in which, amongst others, we met Freddie Slay from the FSA (Financial Services Authority), Lucy Nice from Citizens Advice, Harry High from the DTI (Department of Trade and Industry), Tiger Tee from the OFT (Office of Fair Trading), Busy Bee from the TSC (Treasury Select Committee), and Millie Mussels from Brussels.

Recurring Theme 5 Europe / emerging economies

The first time we looked across Europe was in a paper by Jayne Barber in 1993, where she looked at a European model for the strategic management of consumer credit portfolios. This is one of the holy grails for bank executives. - can we develop a scorecard that can be used across all of a bank's products? There are many reasons why this cannot be done or at least why this is not a good idea. However, a different aim is to have product scorecards that can be used across different territories and countries in which a bank operates, and especially with much of Europe moving towards a single currency and a single market. This probably first appeared in 1997, in a paper by Graham Platts and Ian Howe.

Their idea was to compare and contrast key discriminators across different economies for similar products. Could we build a common scorecard for different countries in Europe? This would be useful as these countries developed their consumer credit systems and cultures. Certainly there are common factors – but customers behave quite differently in different countries, even before we consider the differences in legislation, in product definitions, and in cultures of use.

EG, some countries – particularly France and Italy – are heavily dominated by debit card use rather than credit card use in other countries. Thus, credit card ownership is/was 63% in the UK, 40% in Germany, but only 7% in Italy.

EG, it is still common in Italy for men to stay with their parents, even into their 30's, until they marry. Perhaps allied to this was one other variable that provided a stark contrast - Number of Dependants. In the UK and Germany, the percentage of people on the database with 3 or more dependants was 5% - 7%; in Italy, it was 38%.

EG, the level of home ownership in Germany may lag behind several other countries in Western Europe. In the 1997 paper, their database had UK home ownership at 82%, Greece at 50%, Belgium at 37%, and Germany at 7%.

And this is before we even consider the bureau data available – restricted by culture, local legislation, by government controls, and by the history or lack of it in the data.

In their research, they built a pan-European scorecard, and also a set of scorecards with common characteristics but allowing different classifications and score weights for different countries. In all cases, there was a marked improvement when allowing these country differences.

This work was interesting and revealing; and laid the foundation for later work into developing risk management systems and scorecards for the emerging credit economies, whether in eastern Europe or in Asia. This theme was taken forward by Zoran Bohacek in his invited paper in 2001, on Bringing Credit Scoring to New Countries.

Some of the thinking of Platts and Howe was also further developed by Galena Andreeva, Jake Ansell, and Jonathan Crook, of Edinburgh University, in 2003 in a paper entitled "Credit Scoring in the Context of European Integration" and by Alex Kordichev and Natalia Katilova this year in "Scoring in the Developing Markets".

Recurring Theme 6 Basel

As noted elsewhere this topic first appeared in 2001 – or at least this was the first time that the name of that Swiss city had appeared in a title - but we have really been building up to Basel and more correctly Basel II since we started in 1989.

To a great extent, all that Basel II does is to classify and codify and standardise what is and has long been recognised as good credit risk management. The better lending institutions have been behaving in an approximately Basel-compliant way for many many years, although their standards of documentation of this may not have been sufficient.

Now, you may ask why, if the better banks have been doing this for many years, why is it taking them so long to become fully compliant and apply and be granted their waiver? Some of this may have been answered in the presentation by Dickon Brough from the UK's Financial Services Authority. However, I also think that there are other factors operating here:

- ◆ Fear – the major banks do not want to “fail” or to be seen as being deficient in any way.
- ◆ Scope – the project and the budget is much larger than it could or should be. In many organisations, there is a huge pent-up demand for better systems, new databases, and product development. In the UK, much has been put on hold in the lead-up to Y2K, and then the developments around TPD, and now we have Basel II, where we may be able to say that something is “required” to meet the demands of the regulators.
- ◆ 80:20 - Previously, the lenders might focus on their mainstream activities. Now they want to include all products and all portfolios. Now they need to analyse subsidiaries and overseas operations at the very least to ensure that they can be included under the materiality clause.

I am not going to list the Basel papers either from this week or from the previous three conferences. We have at least 13 this week and a full Basel stream if that is what interests you. However, what has been heartening is that this week and at the 2005 conference, we had presentations from the Financial Services Authority and the Federal Reserve Bank and Deutsche Bundesbank – part of our continuing efforts to get presentations from not just lenders and suppliers and the bureaux, but the regulators and legislators. Indeed, over the years, we have also had presentations from the European Commission and the Office of Fair Trading.

I can see the topic of Basel II being with us for some years to come.

So this brings us up to date with CSCCX. One change from 2005 is that we have changed the timings of presentations. The invited speakers get 45 minutes - a significant reduction from the scary 75 minutes they had in 1989. Contributed papers get 35 minutes, again a much lower burden than the 60 minutes from the first conference.

We are operating in four parallel papers, to accommodate the record number of papers, and we have a record number of delegates, ... and a record number of sponsors - 11 of them.

And the significant topics are

- ◆ Regulation
- ◆ Fraud
- ◆ Risk Based Pricing
- ◆ Modelling Methodologies
- ◆ Reject Inference
- ◆ Basel

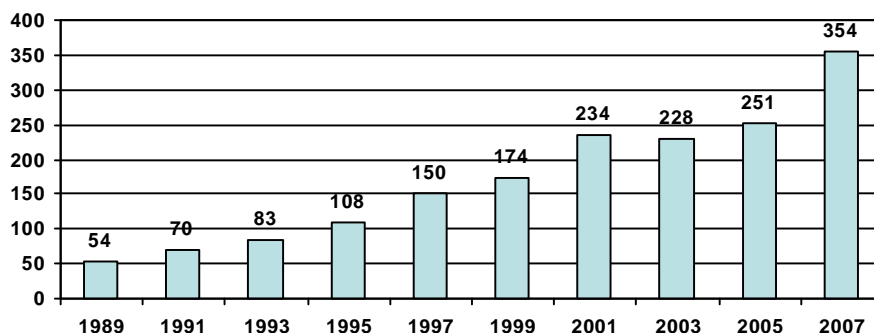
The social programmes for the conference have had several tours of sites in and around Edinburgh, five pub quizzes, and several groups being shown round the Whisky Heritage centre. This year, for the first time, we have several groups of people enjoying performances as part of the Edinburgh Festival.

One consistent part of the special programme is the conference dinner - and this year, we are using our eighth venue. The size of our conference dinners has grown in line with the number of delegates. This has meant that our desire to take the delegates to new venues has had to be curtailed by the simple issue of capacity.

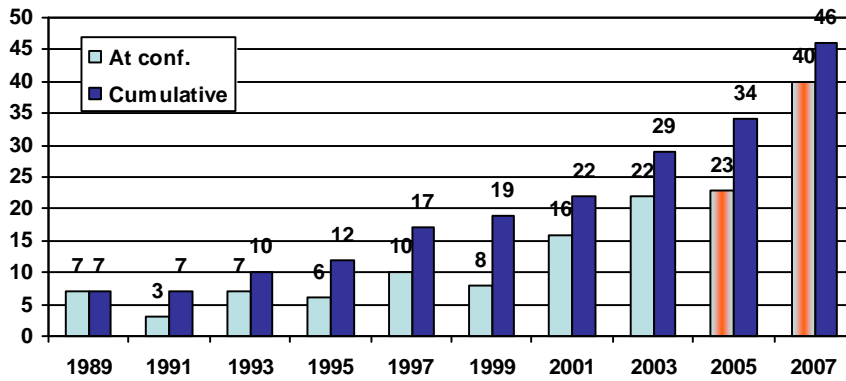
Throughout the conference series, we have managed to have many of the papers published. We had the proceedings from the first one published as a book, and also have had several special issues of academic journals - IMA Journal of Mathematics in Business and Industry, Journal of the Operational Research Society, European Journal of Operational Research - devoted to papers from the conferences, although many papers have appeared in regular issues of these and other journals. In the latter category would be the various papers that have appeared in journals in banking and finance, and also those of the Royal Statistical Society.

We have also brought the first set of proceedings up to date by producing Readings in Credit Scoring - which contains some seminal papers, some of distinct historical value, and some state-of-the-art thinking.

Some analysis

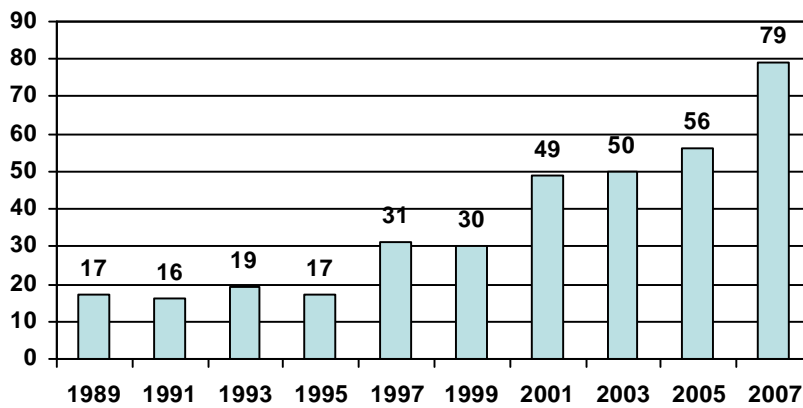


Number of delegates conference by conference

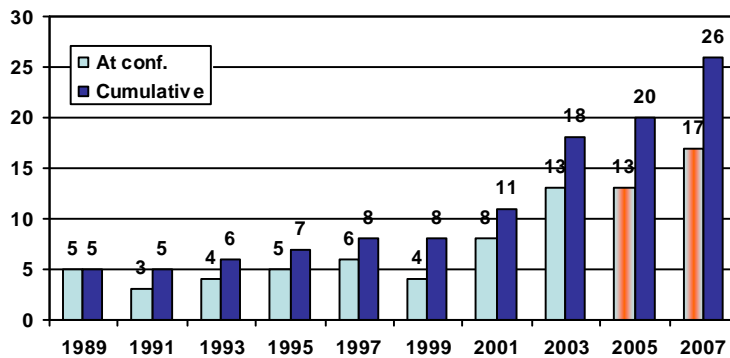


Number of countries represented by the delegates conference by conference

Here, the light blue columns are the number of countries represented at each of the conferences while the dark blue represented the number of countries represented up to and including that conference. The last two light blue columns have an orange band - denoting that all six habitable continents were represented at these two conferences.



Number of presentations at the conferences



Number of countries represented by the speakers conference by conference

Conferences	Delegates
1	850
2	164
3	55
4	34
5	12
6	5
7	2
8	5
9	1
10	7

Number of delegates by frequency

And we also have one delegate here this week who has only been at two of the conferences, this the 2007 one, and the first one back in 1989!

So where do we go from here? And what does the future hold?

In the late 1980's, scoring was not a generally accepted part of our lending businesses. It had crept or sometimes marched into the high volume, low value businesses such as mail order and credit cards, but these are also businesses where there was less emphasis on relationships and more on transactions. Also these businesses had, for the time, relatively good billing systems.

Nowadays, and especially with Basel, businesses that are not using scoring for retail lending decisions, and certainly for applications and behaviour, are not only rare but look strange, and especially from a regulatory point of view. It is true that this use of scoring could be through generic / bureau scorecards, and in many cases this is all that may be possible, either due to having few defaults or simply limited history as would be the case in emerging economies, but it is expected that they use some form of scoring. Therefore, the credit scoring industry is here to stay. This is also evidenced by the requests for training which my organisation receives from many developing and emerging economies; and I expect it is true for similar organisations.

What should also stay is the conference series. It is planned for it to continue - every two years. The biennial nature is based on a decision taken over 15 years ago. Each conference takes more than two years to plan – and the dates for the next one have already been set with provisional bookings for the bedrooms and conference rooms in place.

It is now 18 years since the first conference and this conference is like an 18th birthday or a coming-of-age party. So is scoring and the conference series maturing as it gets to the end of the teenage years? And what will happen to the conferences in the years ahead?

While it was not set out at the beginning, I see the principal aims of the conferences to be:

- ◆ providing a forum and a focal point for meaningful discussions of the issues that impact on our industry, independent of any suppliers
- ◆ promote useful and valuable research

The conference is now a major event. And there is clearly increasing demand. The conference series has been very successful. With your help and support, this will continue to be the case.