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# fraud loss measurement

## a short guide to the methodology and approach

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FORENSIC SERVICES

## 1 Introduction

### 1.1

The last decade has seen the drive for greater private sector competitiveness and public sector efficiency accelerate. The paradox is that as business costs are examined in ever more detail there is rarely any great 'leap forward' in reducing them and greater and greater effort has to put made to achieve smaller and smaller gains. However, over the same decade a new methodology has been developed and implemented which provides the opportunity to measure a cost which has been known to exist but which hitherto has been thought to be unquantifiable – the cost of fraud.

### 1.2

Indeed, by the end of 2009, the previous decade had seen 132 exercises which have been undertaken around the world, to accurately measure the financial cost resulting from fraud and error. These were reported on in 'The Financial Cost of Fraud Report', published by the Centre for Counter Fraud Studies at University of Portsmouth in 2009. 44 organisations from 9 countries were involved in measurement exercises which, together, looked at losses across expenditure of 32 different types with a total value of £2 trillion sterling equivalent.

### 1.3

In China, fraud and corruption represent serious problems throughout all sectors of the economy. These include procurement, credit card and qualification fraud, tax evasion, identity theft and in my field social security benefit fraud involving in particular early retirement claims for pension, and medical insurance reimbursement. The 2009 report of the Auditor General of China identified acts of fraud totaling 1.67 billion RMB (250 million USD) and involving 20 Government bureaus. Yet the regrettable fact is that this may be the tip of an iceberg, because we know from the detailed measurement exercises that have been carried out in OECD countries that the real level of fraud could be far higher than that the detected figure.

### 1.4

Prior to the millennium, the methods used to quantify fraud were not sufficiently credible for organisations to view the results as a serious assessment of its cost in the same way as they would know about staffing, accommodation or other established business costs.

### 1.5

Accurate and statistically valid Fraud Loss Measurement (FLM) represents doesn't just look at detected fraud or the individual cases which have come to light and been prosecuted. Because there is no crime which has a 100% detection rate, adding together detected fraud significantly underestimates the extent of the problem. It is also the case that if detected fraud losses go up, does that mean that there is more fraud or that there has been better detection; equally, if detected fraud losses fall, does that mean that there is less fraud or worse detection?

1.6

Fraud Loss Measurement methodology also doesn't rely on survey-based information where those involved are asked for their opinions about the level of fraud. These tend to vary significantly according to the perceived seriousness of the problem at the time by those surveyed. While they sometimes represent a valid survey of opinion, that is very different from a valid survey of losses.

1.7

The difference between previous guestimates of fraud losses and the data produced by statistically valid and accurate exercises is equivalent to the difference between navigation by the stars and navigation by satellite. If an organisation doesn't have accurate information about the nature and scale of its losses how can it implement the right solution to reduce them or make the right investment to achieve the return on investment which is possible?

1.8

This Guide is intended to provide a brief explanation of Fraud Loss Measurement to develop the knowledge of professional counter fraud specialists. It leads logically to more in-depth training for those who wish to undertake a measurement exercise within their own organisation.

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## 2 Starting Point - the Required Sample

2.1

The starting point for Fraud Loss Measurement is a statistically valid, representative sample of payments or cases to be obtained and examined carefully. Consideration is then given to what information is available to indicate the presence of fraud, error and correctness and what this tells us.

2.2

A measurement exercise (for example) concerning expenditure cannot review every single payment which has been made because of the cost and operational disruption which would be involved, so, typically, a sample of all payments or cases is randomly selected. As not all payments are selected, there is therefore some uncertainty in the results from a sample. The sample size is selected to give precise estimates of fraud occurrence calculated on the basis of being able to measure that occurrence to within a given percentage of true value and with specified statistical confidence levels.

2.3

The level of precision concerned varies a little from within 1% levels of accuracy in Europe to within 2.5% in the United States, and with a level of statistical confidence of 95% in Europe sometimes reduced to 90% in the United States. In the United States the Improper

Payments Information Act of 2002 applies and related guidance determines these minimum levels.

**2.4**

The more accurate the result is to be and the higher the level of required statistical confidence, the larger the sample which it is necessary to examine and hence the higher the cost. Best practice is to seek to achieve a level of accuracy of +or- 1% and a 95% level of statistical confidence.

**2.5**

The likely level of fraud also affects the sample size. Where fraud losses have not been accurately measured previously, we assume that fraud is present in 4.5% of cases examined, the average global extent of fraud revealed by the report published in 2009. If the occurrence of fraud is higher, to achieve the same accuracy level, a larger sample size is required.

**2.6**

A factor that, by and of itself, does not affect the size of the sample to be examined is the total number of payments made or cases involved. In fact the sample size can be quite modest – to meet the standards of accuracy and statistical confidence indicated above, a base sample of in the region of 1700 would be required.

**2.7**

However, it is likely that the occurrence of fraud will be unresolved in some cases, because sufficient information might not be available to make a proper judgement as to the presence of correctness, error and fraud.

**2.8**

In such exercises unresolved cases like this are omitted from the analysis in the interest of statistical rigour, with the results based on resolved cases. However, by omitting the unresolved cases, this lowers the actual sample size on which the results are based. Therefore, to allow for possible unresolved cases, the sample size is inflated upwards. Best practice would involve an assumed unresolved rate of 20%. Thus our base sample of 1700 would be inflated to 2040. The sample size and costs of this exercise might increase if the unresolved rate is higher – or the level of accuracy might be reduced.

**2.9**

The sample is drawn at random from the full list of payments (in the case of fraud loss concerning expenditure) for the period concerned using a series of computer generated random numbers. Because of the variety of costs, more precise estimates of losses to fraud can be achieved by over-sampling the high cost payments, and under-sampling the low cost payments.

**2.10**

There are various options to consider for the time period from which the payments are drawn. One option is to sample from a short period of time, such as a recent month. This has the advantage of being current data, but a problem might be that the period sampled

could be unrepresentative of the year as a whole. A second option is to draw the sample from a longer period, such as a year. This may give a more representative sample, although if practices have changed over the sampling period, some payments may be regarded as too historical.

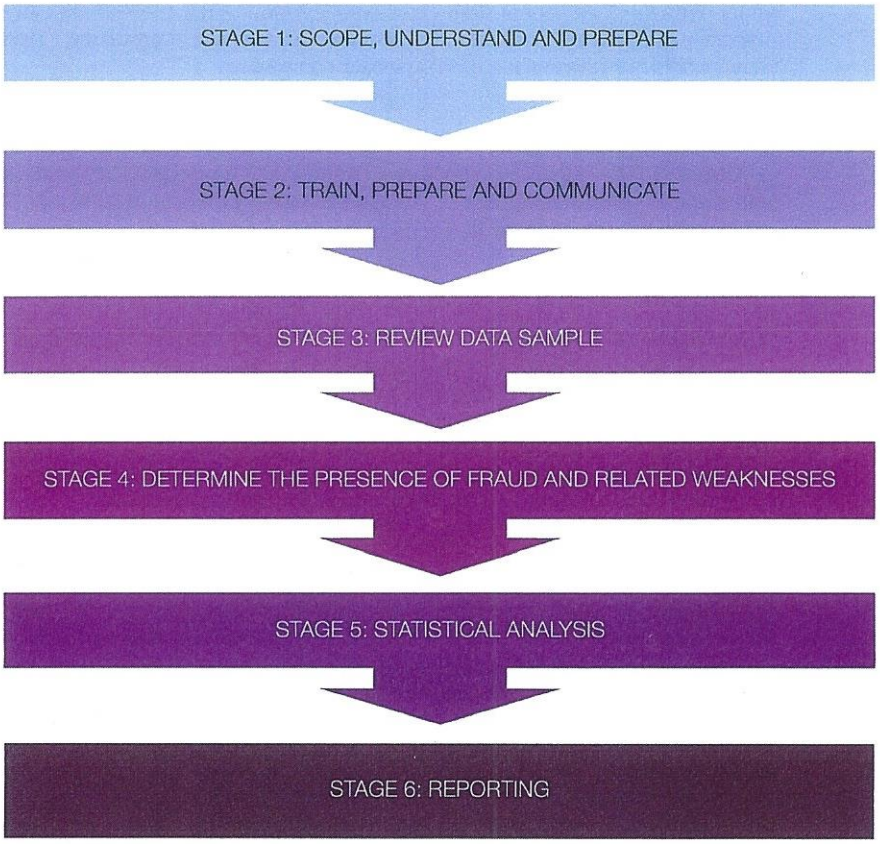
**2.11**

Sometimes it is claimed that Fraud Loss Measurement is too costly to be viable. This is not the case. While ten years ago, it might have taken 6 people 6 months to complete such an exercise (600+ days), advances in technology and process have reduced this to 100 – 150 days and progress will see these figures reduce further in coming years.

## 3 Outline of the Methodology

3.1

Each Fraud Loss Measurement exercise has a number of stages as can be seen from the diagram below:



3.2

The following section of this guide describes in more detail what is involved.

## 4 The methodology in more detail

### 4.1 The stages are as follows:

**STAGE 1** Scope, understand and prepare

- Identify the data to be sampled, the relevant data fields and determine the best method of extraction
- Understand the key processes and systems in each area
- Identify the comparator data and information which can be used to help determine the presence of fraud, error and correctness
- Design and document the exercise-specific procedures
- Design the data sample (by size and nature)
- Review the timeline, resources and costs

**STAGE 2** Train, prepare and communicate

- Train relevant staff
- Obtain the data sample
- Ensure access to comparator information
- Communicate the nature and purpose of the work to relevant senior staff, so as to create the optimum client 'ownership'
- Identify potential risks
- Mitigate potential risks

**STAGE 3** Review data sample

- Examine each payment within the data sample
- Collate comparator information (see below) and link to each payment within the sample
- Provisionally group payments according to what the information shows

**STAGE 4** Determine the presence of fraud and related weaknesses

- Determine the presence of fraud, error and correctness and classify the groups of cases (referred to above)
- Identify the process and system weaknesses which allowed cases of fraud to take place
- Discuss identified process and systems weaknesses with key staff to understand the background
- Supply the processed data, grouped by fraud, error and correctness, and by value and numbers, for statistical analysis

**STAGE 5** Statistical analysis

- Estimation of the level of fraud by percentage
- Estimation of level of fraud by volume
- Estimation of the level of fraud by financial value

**STAGE 6** Reporting

- Developing, delivering and explaining a comprehensive report indicating the nature and extent of fraud losses in each area

**4.2**

The effectiveness of Stages 3 and 4 are important.

**4.3**

The 'comparator information' referred to under Stage 3, is the information which will be used to check the validity of each case or payment within the sample. It is important to consider all information which can reasonably be obtained which may indicate the presence of correctness, error or fraud.

**4.4**

To give some examples. In a medical insurance context, is there information which shows that the surgical procedure which has been paid for is impossible? Sadly there is one famous example from the UK where a procedure was supposedly undertaken after a patient had died! In the procurement context, such information might concern the existence of the supplying company or proof of the actual delivery of the good or services which have been paid for. In the payroll context, such information might concern the existence of the employee who has been paid (so-called 'ghost' employees are sometimes found – indeed, one example concerned a finance manager who put her entire family on the payroll of the organisation concerned!); or whether the employee concerned actually had the qualification or employment history which they claimed to have.

**4.5**

This 'comparator information' needs to relate to two issues. First, has the expenditure been made correctly or incorrectly; and secondly, if the payment has been made incorrectly, is there any information which would indicate whether it has been made in error or fraudulently (i.e. in the latter case knowing that it was incorrect, or not caring whether it was correct or incorrect, and resulting in the receipt of a benefit to which the recipient was not entitled. (See the section below on 'Decision Making' for more detail).

**4.6**

Comparator information may be held within the organisation concerned or by an external organisation and may or may not be in the public domain.

**4.7**

This general methodology is adapted into a clear procedure to be followed in respect of each fraud loss measurement exercise in the specific context of the organisation concerned. Final results can then be audited and validated against the exercise-specific procedure.

## 5 Decision making

5.1

All of the payments or cases within the selected sample are examined – together with their related comparator information - with a view to determining the presence of fraud, error and correctness.

5.2

The first stage of the decision-making is to distinguish payments or cases which are incorrect from those which are correct; the second stage is to distinguish, within the group of incorrect cases, between those which involve merely error and those where fraud is present

5.3

To do this the accepted civil legal concept of fraud is applied. Why?

5.4

Firstly, it is important to apply a generally accepted, legally anchored definition of fraud. Some organisations make the mistake of developing their own definition but this runs the risk, when applied, to fraud loss measurement, of undermining the credibility of the results. Observers might claim that the definition had deliberately been developed to produce measurement figures that showed either high or low levels of losses.

5.5

Secondly, it is important that a measurement exercise measures everything that can validly be described as fraud. If one were to apply the criminal definition of fraud (for example in the UK under the Fraud Act 2006) this might exclude some losses, especially, because of the higher criminal standard of proof of beyond reasonable doubt. Fraud can be established (and losses proven and recovered) in civil law on the standard of the balance of probabilities. In any case, the main purpose of the criminal law is to penalise individuals, whereas the main purpose of the civil law is to restore what an individual has lost.

5.6

This civil law concept has been established in the UK in Derry v. Peek 1889 and subsequent case law. Internationally, the Swiss Institute of Comparative Law (SICL) examined the basis of Derry v. Peek for application in 2005. Their Report concludes that the following definition was applicable across Europe:

"Civil fraud is the use or presentation of false, incorrect or incomplete statements and/or documents, or the nondisclosure of information in violation of a legally enforceable obligation to disclose, having as its effect the misappropriation or wrongful retention of funds or property of others, or their misuse for purposes other than those specified".

5.7

This concept of fraud is applied for the purposes of Fraud Loss Measurement and it is the concept applied in nearly all non-U.S. exercises which have been completed so far.

## 6 Implementing the methodology

6.1

There are different skills sets which are required to undertake a fraud loss measurement exercise. The authors of this guide would strongly recommend that any organisation undertakes at least its first such exercise in collaboration with experienced specialists, who have already undertaken several such exercises and who understand the issues which need to be addressed to produce accurate and credible results.

6.2

These specialists will need to include a suitable, professionally qualified statistician who has previously undertaken work of this specific type to a high standard. The statistician is crucial to both the initial selection of the statistically valid sample and to the final estimation of the nature and extent of losses based on the findings from examination of that sample.

6.3

It is also necessary to use professionally qualified Accredited Counter Fraud Specialists who have been trained in this area of work and who have managed or worked on fraud loss measurement exercises previously. (More detail about specialist training in this area is included towards the end of this guide).

6.4

At the time of writing this guide the number of experience and qualified specialists who have previously undertaken this work is relatively small. However, they are available, and can undertake this work in a cost-effective and timely fashion. One of the purposes of this guide is to spread the extent of this knowledge, and to stimulate wider acquisition of the specialist skills.

## 7 Applying best practice

### 7.1

The general methodology reflects international best practice :

- that implemented successfully in 11 fraud loss measurement exercises in the UK NHS between 1999 and 2006[1];

- the Improper Payments Information Act of 2002 in the United States, which requires public sector agencies to provide estimates "based on the equivalent of a statistical random sample with a precision requiring a sample of sufficient size to yield an estimate with a 90% confidence interval of plus or minus 2.5%" [2]

- the European Healthcare Fraud and Corruption Network guidance, which provided for a "common standard of risk measurement, with annual statistically valid follow up exercises to measure progress in reducing losses to fraud and corruption throughout the EU" [3]

- the report of the UK Fraud Review Fraud Loss Measurement Working Group[4]

### 7.2

The methodology avoids guesstimates, figures derived from detected fraud losses, and figures resulting from surveys of opinion. It reflects a commitment to exercises which:

- have considered a statistically valid sample of income or expenditure

- have sought and examined information indicating the presence of fraud, error or correctness in each case within that sample

- have a measurable level of statistical confidence

- have a measurable level of accuracy

- have been completed and reported and been externally validated

[1] 'Identifying the Problem' – Department of Health - 1999
[2] Appendix C to U.S. Office of Management and Budget Circular A-123
[3] European Healthcare Fraud and Corruption Declaration 2004
[4] 'Report of the Fraud Review Fraud Loss Measurement Working Group – December 2007

## 8 Conclusion

### 8.1

Hitherto, the number of organisations which have treated fraud losses like any other business cost – something to be measured and reduced - are relatively small. Those that have done this have shown what can be achieved. As the second decade of the 21st century beckons, fraud loss measurement and reduction is one way for private companies to gain a real competitive advantage and for public sector organisations to painlessly achieve efficiencies.

### 8.2

It is to be hoped that this guide will further spread the application of accurate measurement of fraud losses. Only then will the real scale of losses become apparent, the real levels of investment in counter fraud work be made, and the real multiple return on investment be achieved.

### 8.3

This guide is a starting point on that road. Further guidance and training are available and readers are encouraged to develop their knowledge in this key area.

## FURTHER TRAINING

Information about further professional training on Fraud Loss Measurement can be obtained from

Jim Gee at jim.gee@uk.pkf.com

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Successful completion of this training results in the award of academic credits which can provide entry to more advanced courses.

## ABOUT THE AUTHORS

**Jim Gee** is Director of Counter Fraud Services at PKF and Chair of the Centre for Counter Fraud Studies at University of Portsmouth, United Kingdom.

Jim Gee is one of the leading counter fraud specialists in the UK. His accomplishments include leading the team which cleaned up London Borough of Lambeth in the mid to late 1990s; advising Right Honourable Frank Field M.P. during his periods as Chair of the House of Commons Social Security Select Committee and Minister for Welfare Reform; founding and leading the NHS Counter Fraud Service as CEO between 1998 and 2006; and being Director-General of the European Healthcare Fraud and Corruption Network between 2004 and 2006. He was also a senior advisor to the Attorney-General concerning the Government's Fraud Review which professionalised the UK's approach to fraud from 2007 and was the founding Vice-Chair of the Counter Fraud Professional Accreditation Board. Gee's work in the NHS reduced fraud-related losses by up to 60 per cent, delivering financial benefits to the tune of more than £800 million and achieving a 12:1 return on the costs of the work. He is a leading author of global reports on 'The Financial Cost of Fraud' 2009 and 'The Financial Cost of Healthcare Fraud' 2010 as well as on 'The Financial Cost of UK Public Sector Fraud' 2010.

**Mark Button** is a Reader in Criminology and Associate Head Curriculum at the Institute of Criminal Justice Studies, University of Portsmouth, United Kingdom. He has also recently founded the Centre for Counter Fraud Studies of which he is Director.

He has written extensively on counter fraud and private policing issues, publishing many articles, chapters and completing four books with one forthcoming: Private Security (published by Perpetuity Press and co-authored with the Rt. Hon. Bruce George MP), *Private Policing (published by Willan), Security Officers and Policing (Published by Ashgate), Doing Security (Published by Palgrave), and Understanding Fraud: Issues in White Collar Crime (to be published by Palgrave in early 2010 and co-authored). He is also a Director of the Security Institute, and Chairs its Academic Board, and a member of the editorial advisory board of 'Security Journal'.*

Mark founded the BSc (Hons) in Risk and Security Management, the BSc (Hons) in Counter Fraud and Criminal Justice Studies and the MSc in Counter Fraud and Counter Corruption Studies at Portsmouth University and is Head of Secretariat of the Counter Fraud Professional Accreditation Board (CFPAB). Before joining the University of Portsmouth he worked as a Research Assistant to the Rt. Hon. Bruce George MP specialising in policing, security and home affairs issues.

He completed his undergraduate studies at the University of Exeter, his Masters at the University of Warwick and his Doctorate at the London School of Economics. Mark is currently working on a research project funded by the National Fraud Strategic Authority and ACPO looking at victims of fraud and is a leading author of 'The Human Cost of Fraud Report' 2010.

**Paul Bassett** is a fellow of the Royal Statistical Society and director of Statsconsultancy Ltd, a company delivering statistical services to a wide range of clients.

These range from financial institutions to pharmaceutical companies, NHS trusts and universities. Services include advising on statistical issues, design of surveys and studies, and data analysis.

He has a background in mathematics and statistics, including a Masters degree in statistics. He has previously worked as a statistician and lectured for top ranking universities, including Imperial College and University College London.

Working with the UK's NHS Counter Fraud Service for over 5 years, he has overseen the statistical design and analysis of numerous fraud exercises, and advised on statistical methods for the European Healthcare Fraud and Corruption Network