



BOARD FOR ACTUARIAL STANDARDS

GENERIC DATA STANDARD

CONSULTATION PAPER

SEPTEMBER 2008

FOREWORD BY THE CHAIRMAN

Why has the BAS chosen to address data issues at this early stage of its development of new standards? Are data issues really so important? Part of the answer to those questions can be seen in the results of a survey recently carried out by the Data Quality Working Party of the General Insurance Research Organisation (GIRO). The survey indicated that actuaries working in general insurance spend on average 27% of their time on data quality issues, and that 34% of projects undertaken by them are adversely affected by data quality issues.

The significance of data issues has grown in recent years with the information revolution. As a working party of the Casualty Actuarial Society in the US pointed out in a recent paper¹, "Computerisation and cheap data storage along with changes in regulatory requirements have led to extraordinary amounts of data being captured, stored and provided to actuaries. Consequently, enormous amounts of data can amass enormous numbers of errors and inconsistencies."

Our aim is to ensure that information provided by actuaries to users is of high quality; poor data is an obvious and ever-present threat to the quality of actuarial output ("garbage in, garbage out"). Moreover, data is usually maintained and processed by people who may not be subject to the same professional standards as actuaries. However, we have not concluded from this that actuaries should go to any lengths to clean up the data, but rather that whatever efforts are made to improve data quality should be proportionate.

Proportionality is the basis of one of four overriding principles that we discuss in section 3 and to which I'd particularly like to draw your attention: the other three principles relate to the needs of the user, the scope of the actuarial work being performed and materiality. These principles have influenced our thinking throughout.

We have considered the various steps in collecting and processing data, setting out our thinking in what we believe to be a transparent manner. We have proposed principles that should be applied at a relatively high level, in tune with our objective of having a principles-based rather than a prescriptive approach. This may require actuaries to stop and think about how to apply the principles to their work, rather than apply, with little thought, standards that are more rules-based; that is intentional and will in the end contribute to a higher quality of actuarial advice, we believe. We also believe that our proposed principles will encourage and reinforce the wider use of existing best practices.

I would like to take this opportunity to thank publicly the members of our working group, listed in Appendix D, who offered their very considerable experience of data issues and served as a sounding board for our proposed principles.

I look forward to reading your responses.

Paul Seymour
September 2008

¹ Dirty Data on Both Sides of the Pond by Campbell et al., published in the CAS E-Forum Winter 2008.

CONTENTS

<i>Section</i>	<i>Page</i>
Foreword by the Chairman	1
1 Introduction	3
2 Purpose, scope and authority	6
3 Overriding principles	10
4 Steps in processing data	14
5 Estimates and Measures of uncertainty	21
6 Reporting	24
7 Invitation to Comment	26
 <i>Appendix</i>	 <i>Page</i>
A Adopted guidance notes	28
B Examples	30
C List of definitions and principles	32
D Members of the Board and of the Working Group	35

1 INTRODUCTION

BACKGROUND

- 1.1 In its *Conceptual Framework for Technical Actuarial Standards*², the Board for Actuarial Standards (the BAS) noted that one of the ingredients of the calculations that arise in actuarial work is the data provided. In order to produce a suitable model and determine suitable parameters, data needs to be considered and judgements need to be made about the relevance of the observed data to the future environment. Such data may result from past observations, from current observations (such as the rate of inflation) or from expectations of future changes (such as legislative changes that have not yet come into effect) and the expected implications of those changes.
- 1.2 There are several references to data in the guidance notes adopted by the BAS (some of which are quoted in Appendix A), although there is no guidance note specifically addressing data. The Actuarial Standards Board in North America has developed a standard on Data Quality (ASOP No. 23), which was adopted in December 2004.
- 1.3 In its *Conceptual Framework for Technical Actuarial Standards*, the BAS recognised that complete and accurate data is not always available in precisely the form needed for the intended calculations. It recognised the need for tests to be carried out on the data used for specific calculations and/or adjustments to be made to compensate for uncertainty in, or inappropriateness of, the data. It therefore proposed, in its Consultation Paper on the *Structure of New BAS Standards*³, to develop a generic standard addressing data.
- 1.4 The EU's draft Framework Directive for Solvency II⁴ provides for an actuarial function to assess the sufficiency and quality of the data used in the calculation of technical provisions; this will be an area of discussion between the Financial Services Authority (FSA) and the BAS in implementing Solvency II in the UK. Also, The Pensions Regulator (TPR) has launched a consultation on member record-keeping in pension schemes⁵, which is complementary to our consultation on selection and testing of data for actuarial information.

PURPOSE OF THIS PAPER

- 1.5 The BAS has now developed some draft principles on data. In line with the commitments given in its conceptual framework, this paper has been issued in order to expose the principles for consultation, prior to drafting of the standard, and to set out a rationale for those principles.
- 1.6 This paper discusses the responsibilities for assessing the adequacy and accuracy of the data used for actuarial work. It also discusses the responsibility for advising an insurer, or the trustees or sponsoring employer of a pension scheme, on the data that is needed for actuarial work.

² Available online at <http://www.frc.org.uk/bas/publications>.

³ Available online at <http://www.frc.org.uk/bas/publications/consultation.cfm>.

⁴ Available online at http://ec.europa.eu/internal_market/insurance/solvency/index_en.htm.

⁵ Available online at <http://www.tpr.gov.uk/onlinePublications/policy.aspx>.

- 1.7 Its *Scope & Authority of Technical Standards*⁶ also requires the BAS to consider the economic, legal and practical implications of the introduction of the principles it sets out. The BAS considers that the principles proposed in this paper would not alter the current legal implications of the responsibilities outlined in the previous paragraph. Our working group of practitioners has considered the practical implications, and we will consider the economic implications as part of a regulatory impact assessment before we publish an exposure draft.
- 1.8 The practical issues to which data gives rise appear to us to be rather different in the main practice areas, as discussed in the following subparagraphs.
- (a) Much of the data with which life actuaries are normally provided has been extracted from the insurer's policy administration records. Those records are subject to the FSA's rules on Systems & Controls (SYSC)⁷ and may have been reviewed by the auditor for the purpose of the accounts or regulatory returns. However, as discussed in GN7 (shown in paragraph A.2 of Appendix A), it may be inappropriate to rely on the auditor's review and actuaries commonly carry out further checks on the data extracts for their own purposes.
 - (b) Although general insurance actuaries often work with large volumes of data (for instance for pricing purposes), in the case of work falling within the current scope of BAS standards (principally, for reserving purposes) they will generally be provided with data that has already been aggregated. As for life insurers, the policy administration records are subject to SYSC and may have been reviewed by the auditor for the purpose of the accounts and for those parts of the FSA returns that are audited. However, the scope, the level of materiality and the degree of assurance to which the auditor has worked are often insufficient for the purpose of the actuaries' work. In some circumstances (particularly in the London Market), general insurance actuaries may have very little relevant data available to them.
 - (c) The schemes that pensions actuaries advise typically have smaller numbers of members and, consequently, smaller volumes of data than the numbers of policies with which life and general insurance actuaries work. However, the data is not normally audited and the quality can be extremely variable. TPR has found evidence of data problems, particularly in schemes with legacy data.
- 1.9 In view of the differences outlined in paragraph 1.8, the BAS expects that the standards specific to practice areas, which it will develop in due course, may also need to address data issues at a more detailed level than is possible in a generic standard.

AUDIENCE FOR THIS PAPER

- 1.10 This paper has been written for anyone who is likely to be affected by standards that the BAS may publish on data issues. The intended audience includes actuaries, the entities that actuaries advise, the regulators of and shareholders in those entities, and those for whom those entities provide

⁶ Available online at <http://www.frc.org.uk/bas/publications>.

⁷ For example, SYSC 3.2.20R and SYSC 14.1.53R.

services (typically, but not exclusively, holders of pension benefits, insurance policies, or annuities).

- 1.11 The BAS would welcome views on the paper, and in particular on the questions listed in section 7. These responses will inform the BAS's thinking as it goes on to develop first an exposure draft and then a Technical Actuarial Standard (TAS) on generic data issues.

STRUCTURE OF THIS PAPER

- 1.12 In section 2 we consider the objective and scope of a generic data standard, and in section 3 we consider proposed principles that should override all other data considerations. We break down the processing of data into steps in section 4, and consider how the overriding principles apply, setting out proposed principles, and our rationale. In section 5 we set out our views on estimates and measures of uncertainty around those estimates; and in section 6 we propose a principle on reporting data issues.

- 1.13 The principles proposed in this paper are listed in Appendix C.

RESPONSES TO THIS CONSULTATION PAPER

- 1.14 Details of how to respond to this paper are set out in Section 7, *Invitation to Comment*. Comments should reach the FRC by **15 December 2008**.

2 PURPOSE, SCOPE AND AUTHORITY

INTRODUCTION

2.1 The BAS's conceptual framework makes clear that each TAS will set out its purpose, its scope of application and any underlying legal or regulatory authority.

PURPOSE OF THE TAS

2.2 The overall aim of the BAS is to establish actuarial standards that are coherent, consistent and comprehensive and thereby to help promote high quality actuarial practice. This is consistent with one of the FRC's strategic outcomes⁸, which is to ensure that users of actuarial information can place a high degree of reliance on its relevance, transparency of assumptions, completeness and comprehensibility.

2.3 The Data Management Educational Materials Working Party of the Casualty Actuarial Society in North America distinguishes between data quality and information quality, as expressed in the formula: DATA + ANALYSIS = INFORMATION.

2.4 Everyone has heard the old IT adage "garbage in, garbage out" – poor quality inputs will lead to poor quality outputs, and a model, no matter how good, cannot correct bad input. The GIRO Data Quality Working Party⁹ conducted an experiment to test how true this is in an actuarial context. Taking a dataset around 15 years old (which meant that the actual ultimate outcomes were available), the Working Party carried out actuarial calculations using subsets of the dataset (to test the effect of incompleteness in the data) and modified datasets (to test the effect of data errors). The report concluded: "The outcome of the data experiment indicated a significant increase in the uncertainty of results when data quality problems arising from incompleteness of data and data errors occur. The size of these errors can significantly reduce the reliability of actuarial analyses, and this could have a direct impact on an insurer's financial statements."

2.5 In May 2008, the BAS and the Professional Oversight Board worked together to produce an FRC paper discussing the quality of actuarial work.¹⁰ In that paper we concluded that actuarial quality is difficult to assess directly, and that it is therefore important to consider the main factors or drivers which contribute to quality, and the threats to those drivers.

2.6 One of the drivers we identified was the reliability and usefulness of actuarial methods, and one of the threats to that driver concerns problems or uncertainties about underlying data. Actuarial information thus depends crucially on the data that is used in producing it. The BAS therefore proposes that the purpose of the data TAS should be to set standards for dealing with

⁸ The Financial Reporting Council (FRC) is the UK's independent regulator responsible for promoting confidence in corporate reporting and governance. The BAS is an operating body of the FRC.

⁹ Campbell, R.; Francis, L.; Prevosto, V.; Rothwell, M; Sheaf, S., "Report of the Data Quality Working Party" 2006, http://www.actuaries.org.uk/data/assets/pdf_file/0010/30070/Francis.pdf.

¹⁰ *Promoting Actuarial Quality*, available online at <http://www.frc.org.uk/publications/pubs.cfm>.

those problems and uncertainties, with the objective of improving the reliability and usefulness of actuarial methods, and thus improving the quality of actuarial information insofar as it depends on:

- selection of data,
- testing of the adequacy and accuracy of data used, and
- steps taken to address the insufficiency of the data.

SCOPE

- 2.7 The standard that the BAS proposes to develop will address not the unadjusted data provided for actuarial work, but the process whereby that data is selected, checked and made fit for purpose. The BAS intends that it should apply to all data used in preparing actuarial information that falls within the defined scope of the TAS.
- 2.8 Since it will be a generic TAS, the standard will apply to work specified in the Schedule to the BAS's *Scope & Authority of Technical Standards*. The scope of application is intended to be no less wide than the overall scope of specific standards that the BAS intends to develop. The intended scope largely comprises information required by regulation that must, by the regulation, be provided by an actuary ("reserved work") or that is usually, but not necessarily, provided by an actuary ("required but not reserved"). The specific standards are intended to cover long term insurance, general insurance, pensions, business rearrangements and pre-paid funeral plans.
- 2.9 To avoid repetition, the proposed principles do not explicitly state that they apply to work falling within the scope of BAS standards; nevertheless this should be understood when reading this paper.

EXCLUSIONS

- 2.10 At the same time as developing a generic data standard, the BAS is also developing a generic modelling standard. The modelling standard will include principles relating to the following topics, which will therefore not be addressed in the data standard:
- assumptions used in modelling,
 - means of deriving models from the data and assumptions, and
 - mechanisms by which risk and uncertainty are reflected in the assumptions and the model.
- 2.11 In some cases the methods to be used for a particular task are specified by the regulator. For example, the Pension Protection Fund requires the value of liabilities calculated for its purposes to be the present value of accrued benefits using certain specified assumptions. In other cases there may be a choice of methods, and the sufficiency and quality of data may well influence the choice of method.
- 2.12 In general, more sophisticated methods require greater volumes of reliable data and a simpler method is usually used if data availability or reliability is more limited. Specific examples from the adopted Guidance Notes (GNs) are shown in paragraphs A.3 and A.4 of Appendix A. However, the relationship between the data and the choice of method depends on the particular matters

under consideration and is therefore an issue that the BAS will normally address in specific, not generic, standards.

- 2.13 Policy data or (as the case may be) membership data is frequently grouped for the purposes of actuarial work (and almost always grouped when a stochastic model is being used). Grouping means that, instead of carrying out individual calculations on each policy (or each member), groups of similar policies (or similar members) are totalled prior to performing the calculations. The purpose of this grouping may be either to give more credibility from the statistical point of view (for example when mortality experience or motor claims experience is being investigated) or to shorten the time taken to run an actuarial model or to lower the cost of carrying out the work.
- 2.14 The way in which data is grouped is usually driven by the features of the modelling method rather than by the inherent characteristics of the data, and so the BAS proposes to address grouping issues in its modelling standard, rather than in its data standard.
- 2.15 In some cases the same organisation (or even the same individual) has both the responsibility for keeping and maintaining the data records and the responsibility for the actuarial information. However, the BAS regards data maintenance as an administrative function, not an actuarial one, and proposes to exclude it from its standards.
- 2.16 Handling data for use in actuarial work often involves the responsibility for maintaining the security and confidentiality of the data. However, the BAS regards this as a matter of professional conduct, not a technical matter, and proposes to exclude it from its standards.
- 2.17 The TAS will address testing the adequacy and accuracy of data only to the extent that the data will be used in preparing actuarial information. Testing data for any other purposes will be excluded from the TAS (the converse situation where data that has already been reviewed for another purpose is used for actuarial information is discussed in paragraphs 4.25 to 4.27).

LEGAL AND REGULATORY AUTHORITY

- 2.18 Some holders of Reserved Roles are required by regulation to advise on the data that should be kept and maintained. For example the FSA Handbook (SUP 4.3.16AR) requires the With Profits Actuary to “advise the firm as to the data and systems that he reasonably considers necessary to be kept and maintained” in order for him to perform his duties. It also requires firms to “hold such data and establish such systems as he reasonably requires” (SUP 4.3.17).
- 2.19 Also, the draft Framework Directive for Solvency II sets out some requirements for testing the adequacy and accuracy of data used, eg Article 47 states that “Insurance and reinsurance undertakings shall provide for an effective actuarial function to undertake the following:....(c) to assess the sufficiency and quality of the data used in the calculation of technical provisions;” and Article 122 requires that “The model validation process shall include....an assessment of the accuracy, completeness and appropriateness of the data used by the internal model.”
- 2.20 In general, however, the needs addressed by the standard will arise indirectly from the need (referred to in paragraph 1.3) for tests on and adjustments to

data in the course of performing required work, rather than directly from legal or regulatory requirements.

- 2.21 The BAS proposes that, if a BAS standard establishes requirements in addition to those imposed by applicable law, regulation, or other binding authority, the requirements of both the applicable law and the standard should be satisfied. To the extent that this standard conflicts with applicable law, compliance with such applicable law would not be deemed a deviation from the relevant standard, provided it is disclosed, when reporting the actuarial information or advice, that the actuarial assignment was performed in accordance with the requirements of such applicable law.

Paragraph 2.6 sets out the purpose of the generic standard that the BAS proposes to develop in respect of data. In paragraph 2.7 the BAS proposes that the standard will address not the unadjusted data provided for actuarial work, but the process whereby that data is selected, checked and made fit for purpose.

Paragraphs 2.10 to 2.17 discuss certain matters relating to data that the BAS proposes to exclude from the scope of the generic data TAS. Some of these matters will be addressed in specific standards or in the generic modelling standard.

The BAS would welcome any views that respondents might have on the proposed purpose and scope of the generic data standard.

3 OVERRIDING PRINCIPLES

INTRODUCTION

- 3.1 Four overriding principles will form the starting point for the generic data standard. They have all been discussed in previous BAS consultation papers (to which some references are made in this section), and relate to user needs, the scope of the work, materiality and proportionality. They are discussed in turn in this section, together with definitions of materiality and proportionality. As mentioned in paragraph 2.9, they should be understood to apply to work falling within the scope of BAS standards. The section ends with a discussion of the judgement that should be used in applying these overriding principles.

USER NEEDS

- 3.2 As it has stated in its *Conceptual Framework for Technical Actuarial Standards*, the BAS believes that professional judgement and consideration for the needs of the users are paramount. The application of judgement is discussed in paragraphs 3.20 to 3.23. In the context of user needs, the consequences of poor quality data are not only that output quality is poor (as discussed in paragraphs 2.3 and 2.4), but also that users may be unable to place a sufficiently high degree of reliance on actuarial information in their decision making. We therefore propose the following overriding principle for the data TAS:

An overriding consideration in processing data should be the needs of users of the resulting information.

- 3.3 In this principle “processing” should be taken to include all the steps set out in paragraph 4.1 below.
- 3.4 Users of actuarial information are frequently insurance company directors, pensions scheme trustees or corporate sponsors of pensions schemes, who have a relationship with policyholders or scheme members as well as with the preparers of the information. Such situations can lead to possible conflicts of interest, for example in insurance companies where the primary duty of directors – who are the users of the actuarial information – is to act in the interests of shareholders rather than policyholders. In the past actuaries have been accused of designing insurance products that served the needs of users but paid too little regard to the interests of policyholders, such as pension products where the impact of charges was, by design, not readily apparent to policyholders.
- 3.5 It has been suggested to the BAS that there should be a requirement on the preparers of actuarial information to evaluate whether or not the user needs that they are meeting could be detrimental to the interests of other parties, such as beneficiaries. Such a requirement would be consistent with the FRC strategic outcome that actuaries and actuarial firms can be relied on to act with integrity and competence, having regard to the public interest. For example, since directors of UK insurers are already bound by the FSA’s high-level principle that they treat customers fairly, the BAS could require that actuarial information provided to insurers should meet user needs only to the extent that customers are likely not to be treated unfairly as a result.

- 3.6 Where an actuary prepares the work, the actuary will be subject to the Profession's ethical standards, which will indirectly reflect the needs of third parties and the public interest. However, the BAS wishes to set its standards in such a way that they can be adopted more widely than only by members of the Actuarial Profession. We are aware of discussions currently taking place in this area, in the contexts of the FRC's consultation on *Promoting Actuarial Quality* and of the profession's consultation on the Actuaries' Code. While we have been unable to identify specific issues related to data, we would welcome views on whether data-specific issues arise and on how such issues might affect the above principle (and any other principles proposed in this paper).

SCOPE OF ACTUARIAL WORK

- 3.7 As discussed in the *Conceptual Framework for Technical Actuarial Standards*, understanding a calculation's nature and objective is an essential ingredient of the calculation. Also, it is the responsibility of those making the decisions to define the scope of the actuarial information they need (together with the scope of information from other sources needed for their decisions).
- 3.8 Decisions on the scope of actuarial information often arise out of discussions between the providers of the information and the users. For instance, TPR's guidance for pension scheme trustees states that "Trustees will need to discuss with the actuary the scope of the advice needed. This should enable trustees to identify the features or circumstances which are particular to their scheme and in relation to which actuarial advice would be desirable."¹¹ Such discussions fall within the scope of BAS standards.
- 3.9 The BAS proposes that, in order to give more definition to the requirements of its generic data standard, it should include the following underlying principle:

Processing data should be commensurate with the scope of the actuarial information that has been commissioned.

MATERIALITY

- 3.10 The BAS also believes that materiality is a vital concept in the context of its standards. The following definition is proposed:
- The exclusion of data is material, and the inaccuracy or incompleteness of data that has been included is material, if it might reasonably be expected to influence the decisions of users of the resulting actuarial information.
- 3.11 This definition is consistent with the equivalent definition of materiality that we intend to propose for use in our generic TASs on *Reporting Actuarial Information* and *Modelling*. We believe it is also consistent with the definition given in the ASB's *Statement of Principles for Financial Reporting* and used in accounting standards.
- 3.12 Whether the exclusion of data or an error in the data is material depends on the size and nature of the item in question as judged in the particular circumstances of the case. It will usually be a combination of factors, rather than any one in particular, that determines materiality.

¹¹ Code of practice 03, Funding defined benefits, paragraph 40.
<http://www.tpr.gov.uk/codesOfPractice/definedBenefit/defBen-11.aspx>.

3.13 The BAS proposes the following principle:

Data (or its checking or its adjustment) should only be included if it is material; immaterial details should be excluded.

3.14 In the context of insurance policies or pension scheme members, the exclusion of, for example, one policy or one member would, in itself, normally be immaterial. The materiality test should, however, be applied to the whole policy class and not to individual policies or members; it should also be applied to the inclusion (or exclusion) of particular parameters that might be used for the whole class (such as are illustrated in paragraph B.2(a) of Appendix B), for example the age or sex of the policyholder or member. There may be other cases where the principle needs to be interpreted similarly.

PROPORTIONALITY

3.15 Proportionality is one of the five principles advocated by the UK Government's Better Regulation Executive. In the context of technical actuarial standards, the BAS interprets the principle of proportionality to mean that any effort or cost needed to comply with its standards should not outweigh the benefits to users of actuarial information.

3.16 The issue of proportionality was raised by many respondents in our consultation on the Conceptual Framework, and was discussed in the *Analysis of Responses to the Consultation Paper* that we published in April 2008. The BAS is committed to proportionate regulation, and has borne in mind the cost of applying standards in drafting the proposals in this paper.

3.17 The BAS therefore proposes the following definition of proportionality:

An improvement in the quality of data is proportionate if the additional effort to achieve that improvement is outweighed by the consequent benefits to the user of the actuarial information and by the potential benefits to beneficiaries.

3.18 This definition follows the policy that is set out in the BAS's *Conceptual Framework for Actuarial Standards*, and is consistent with the equivalent definition of proportionality that we intend to propose in our generic TASs on *Reporting Actuarial Information* and *Modelling*.

3.19 The BAS proposes the following principle:

Processing data should be proportionate.

APPLICATION AND JUDGEMENT

3.20 The way in which the principles set out in a TAS are applied is a matter of judgement for the individual(s) responsible for the preparation of actuarial information. In particular, it can be difficult to assess whether inaccuracy in data will have a material effect on the results without actually carrying out the calculation on alternative sets of data. This may not be proportionate, so it is often necessary to make judgements about what is, or is not, material or proportionate.

3.21 It follows that a BAS standard on data will only be effective in ensuring the high quality of actuarial information if high quality judgement is used in its application. The BAS therefore proposes the following principle:

Judging what is, or is not, material or proportionate should be done in a reasoned and justifiable manner, and the reasoning behind such judgements should be documented.

- 3.22 It will not generally be necessary to communicate such judgements to the users of actuarial information; if a matter is judged not to be material or proportionate, then often it will not be material or proportionate to report either the matter or the judgement; and if the matter is judged to be material or proportionate, then it should be included in the actuarial information anyway, making it unnecessary to report the judgement. However, the quality of actuarial information depends on its consistency, among other things, and so it is important that such judgements are applied consistently, whether different people are involved in the work or similar information is provided at a later date.
- 3.23 One way of improving consistency is by documenting the reasoning behind judgements, so that another person can be aware of that reasoning, or so that the same person has a reminder of it at a later date. The BAS is minded to require that there should be some documentation of the reasoning behind the judgements that have been made, provided that such documentation is proportionate. The issue of documentation is also discussed in paragraph 6.3.

In section 3 the BAS proposes four overriding principles, together (in two cases) with associated definitions. These principles relate to user needs (paragraphs 3.2 to 3.6), the scope of actuarial work (paragraphs 3.7 to 3.9), materiality (paragraphs 3.10 to 3.14) and proportionality (paragraphs 3.15 to 3.19). Paragraphs 3.4 to 3.6 discuss whether the principle relating to users' needs should be qualified by a requirement to evaluate the fairness to others of those needs.

In paragraphs 3.20 to 3.23 the BAS also proposes that judging what is, or is not, material or proportionate should be done in a reasoned and justifiable manner, and the reasoning behind such judgements should be documented.

The BAS would welcome any views that respondents might have on the proposed overriding principles, on the associated definitions and on the principle that they should be applied with reasoned and justifiable judgement.

The BAS would also welcome respondents' views on whether any issues specific to processing data arise in respect of the interests of beneficiaries, or of public interest, and on how such issues might affect the proposed overriding consideration for users' needs.

4 STEPS IN PROCESSING DATA

INTRODUCTION

- 4.1 In this section we address data issues in the order in which they might arise in processing data for use in actuarial work. For a calculation with a specific objective, the following steps are normally performed:
- (a) consider the data that is required to carry out the calculation;
 - (b) investigate possible sources of the data;
 - (c) consider whether data from the available sources is fit for purpose and how it should be grouped (if that is appropriate);
 - (d) gather the data;
 - (e) assess the data in order to verify its accuracy and completeness; and,
 - (f) if the data is found to be materially inadequate or incomplete, consider what steps should be taken.
- 4.2 We have set out the steps in a logical order in paragraph 4.1, but in practice there is often iteration through the steps. For instance, if the available data is found not to be fit for purpose in step 4.1(c), it might be decided to use a simpler method than originally intended (see paragraph 2.12), in which case it would be appropriate to go back to step 4.1(a) and determine the data required for the revised method. Similarly, if the data is found to be materially inaccurate or incomplete in step 4.1(e) and cannot be satisfactorily adjusted, then it might be decided to go back to step 4.1(b) and investigate alternative sources of data.

DATA REQUIREMENTS

- 4.3 In some cases those providing the actuarial information have little or no influence over the data available to them for a particular task, while in other cases they are in a position to advise the data provider (who might be the insurer or the pension scheme trustees or sponsoring employer) of the data that is needed. As mentioned in paragraph 2.18, some holders of Reserved Roles are required by regulation to advise on the data that should be kept and maintained.
- 4.4 Regardless of how much influence can be exerted over data availability, once the nature and scope of the required actuarial work are clear (see paragraph 3.9), early steps in any actuarial work are to consider what data is required, and to establish where it might be obtained (steps 4.1(a) and 4.1(b)). These steps might be taken at the same time as or after considering the methodology and model(s) required (in which case the iteration referred to in paragraph 4.2 might arise).
- 4.5 Furthermore, there is a danger that scarcity of available data may lead either to the scope of the work being more limited than was commissioned or to the needs of the user not being met in full. It may well be acceptable on, say, a research project to tailor the scope of the project according to the data that is available. However, this is unlikely to be acceptable for work that is required by regulation or by legal obligation. The BAS proposes the following principle, therefore, for all work that falls within the scope of its standards:

A list of data requirements should be drawn up to satisfy the user needs and scope of the work, prior to any investigation of sources of that data: the data requirements should take into account materiality and proportionality.

- 4.6 It is not sufficient to assume, for a task that has been performed previously, that all that is required is to update the data. New analytical techniques may require new data fields; for example, postcode analysis of annuitant mortality may require address details; and new sources may make data available that was previously unobtainable. The BAS proposes a further principle as follows:

Data requirements and sources of data should be assessed every time actuarial information is required.

- 4.7 The principle in paragraph 4.6 does not require that new or updated data should necessarily be actively sought on each occasion; it does, however, require consideration of the relevant circumstances on each occasion, and it is then a matter of judgement whether it is appropriate to seek new data.
- 4.8 In its *Conceptual Framework for Technical Actuarial Standards*, the BAS recognised that actuarial information may be imparted in stages. In such situations the principle in paragraph 4.6 should be interpreted as requiring consideration of the data for that stage of the project every time that particular stage is carried out.
- 4.9 The BAS also recognised that some actuarial work calls for a method of calculation to be specified, or a precedent to be set, which is then re-applied many times over in a succession of calculations addressing individual cases. The principle in paragraph 4.6 does not require that data be considered when a method is reapplied to individual cases (other than the data specific to the individual case), but only when the method is specified or the precedent set.

SOURCES OF DATA

- 4.10 The relationship between considering data requirements and investigating sources of data is discussed in paragraph 4.5, and the need to consider sources of data every time actuarial information is required is discussed in paragraph 4.6. Otherwise the investigation of possible sources is specific to each particular sort of data. We therefore do not regard this step as amenable to generic treatment and so do not address it further in this paper.

ADEQUACY OF DATA FOR CALCULATION OBJECTIVE

- 4.11 Once sources of data in a useable form have been investigated, the fitness of that data for the purpose of the actuarial work needs to be considered (step 4.1(c)). Actuarial information needs to be both reliable and relevant. Furthermore, where choices have to be made between options that are reliable and relevant but mutually exclusive, the option selected should be the one that results in the relevance of the information package as a whole being maximised – in other words, the one that is reliable and would be of most use in taking decisions – taking account of the costs involved in each option. Information is relevant if it has the ability to influence the decisions of users and is provided in time to influence those decisions.
- 4.12 For the purpose of illustration, we set out below a few examples of factors that may limit the availability or the adequacy of data.

- **Timeliness of data:** the provision of data frequently involves delay (eg arising from the processes required to extract the data). Also there are often deadlines for the completion of the work (eg deadlines set by regulators for submission of returns) and, even where there are no deadlines, delay may impair the relevance of the results. To the extent that work may have to be carried out using data that is not as up to date as desired, the potential impact needs to be quantified.
 - **Granularity:** the level of detail that is material for the work should be considered.
 - **Basis risk:** consideration should be given, where appropriate, to how well the population from which the data is taken matches the population for which calculation is required. To the extent the populations differ, the potential impact needs to be assessed.
 - **Confidentiality:** for example, the experience of other insurers operating in similar markets might well include valuable data but, for reasons of commercial sensitivity, little or no details might be available.
 - **Technology:** the data might be spread over different systems that are mutually incompatible, or the system on which the data is held might be incompatible with the system on which the calculations are to be performed.
 - **Lack of documentation:** the data might be held on a system where the documentation is lacking, or the data might be mislabelled or incompletely labelled, and hence the precise definition or meaning of some of the fields cannot be determined or can easily be misinterpreted.
 - **Legislative restrictions:** there may be legal or regulatory limitations on the data that can be used, such as age for the purpose of pricing motor insurance in Ireland.
- 4.13 When the availability or the adequacy of required data is found to be materially limited, the original provider may sometimes be able to provide additional data (for example, 15 years' experience rather than 5 years'). More often, compensating for limited availability or adequacy of data will mean using external sources, eg from industry, peer groups and public sources, in which case the introduction of basis risk (see above) will need to be borne in mind. For instance, if data is unavailable for reasons of commercial sensitivity, one way of gaining access to such data that should be considered is to join a benchmarking group that shares data on an anonymised basis (as the Continuous Mortality Investigation does for mortality).
- 4.14 As an example, mortality data from external sources is frequently used to supplement the experience of the group of lives for which the work is required. The BAS discussion paper on *Actuarial Mortality Assumptions* sets out principles for when internal data alone is sufficient (basically, the group must be large enough for the estimates to be statistically valid using data from a fairly small number of years) and describes different methods for combining the internal data with external data, such as adjusting on the basis of key characteristics.
- 4.15 Motor insurance is a good example of a class of insurance for which possible risk factors can be identified, which do not meet the criteria needed to use them as rating factors. For example, the following are all risk factors: the number of miles driven; the density of the traffic where the car is driven; the

ability of the driver; the speed at which the vehicle is usually driven and its general level of performance; the ease with which the vehicle can be damaged and the cost of repairing it. However, the insurer cannot depend on information on these risks received from policyholders as there is considerable scope for bias and subjectivity.

- 4.16 Other rating factors are reliable proxies for those risk factors for which direct information is unreliable. These include: the use to which the vehicle is put; the age of the vehicle; the occupation of the policyholder/drivers; additional drivers; sex of main driver; age of policyholder/driver; whether or not driving is restricted to certain named drivers; make and model of vehicle; the extent of any modification to the engine or body; location of vehicle overnight.
- 4.17 Actuaries are frequently concerned with large populations of many thousands, such as policyholders, policies, claims, buildings or employees. When it is not practical to obtain details of the entire population, it may be possible to obtain details of a sample of the population and, by applying statistical techniques, to ensure that the sample is not materially biased.

- 4.18 The BAS proposes, therefore, the following principle :

When required data is unavailable or materially inadequate to meet user needs within the scope of the work, investigations should be made into additional sources, proxies and sampling methods that might be used to supplement or substitute for the data.

- 4.19 Consideration of additional sources etc should take into account the principle of proportionality (as discussed in paragraph 3.15).
- 4.20 Having considered all the steps outlined in paragraph 4.18, it may be that there are still material reservations about the adequacy of the data, to the extent that they are likely to limit the usefulness of the resulting actuarial information for decision making. In this situation it is appropriate that the user be given an opportunity to take a decision whether the work should continue with an amended scope or, in the extreme, be abandoned. The BAS proposes as a principle, therefore :

If it has been concluded that required data is unavailable or inadequate and that satisfactory additional sources or proxies cannot be found, this conclusion should be reported to the user commissioning the work.

- 4.21 In keeping with the draft reporting standard, this conclusion should be reported together with the relevant information the user will need to make the appropriate decision on, for instance, any amendment of the scope of the work. The implications of the information are a critical aspect of this reporting. The promptness with which the conclusion is reported may also be important, if the user is to make timely decisions.

DATA GATHERING

- 4.22 This step is very specific to the sort of data and to its source (or sources) and so the BAS considers that it is not amenable to any generic principle.

ASSESSING ACCURACY AND COMPLETENESS OF DATA

- 4.23 The implication of poor quality data discussed in paragraphs 2.3 and 2.4 is that investigations should always be considered and (to the extent to which they are appropriate) carried out. The purpose of these investigations is to

assess whether the data is sufficiently accurate and complete for the purpose for which it is being used and, hence, whether the resulting actuarial information will be sufficiently reliable for the user's decision making. This is step (e) in paragraph 4.1 above. Some examples of typical checks are given in Appendix B.

- 4.24 The application of the underlying principles described in section 3 to this step implies that the assessment of the accuracy and completeness of the data should be commensurate with the needs of the user of the actuarial information. The BAS believes this will help to ensure the high quality of actuarial information. It therefore proposes the following principle:

A set of data checks should be constructed and performed in order to determine whether or not, taken overall, the data is sufficiently accurate and complete to meet the needs of the user of the actuarial information. The set of checks should also take into account the scope of the work, materiality and proportionality.

- 4.25 Data provided for actuarial work may, as mentioned in paragraph 1.8, have been reviewed by an auditor, for example as part of an audit of financial statements or regulatory returns. However, this does not mean that checks on such data should be dispensed with, unless they have been explicitly excluded from the scope of the task that has been commissioned. The auditor's procedures may well have been for a different purpose and, as discussed in GN7 (shown in paragraph A.2 of Appendix A), it is often inappropriate to extend the scope of the auditor's work to give comfort for the use of data in actuarial work.

- 4.26 Before dispensing with any checks, the relevant aspects of the review work carried out by the auditor should be investigated and considered, including:

- the purpose of the work, and the users for whose benefit it was performed;
- the level of materiality to which the auditor worked (what is not material for the financial statements may nevertheless be material for the actuarial task in question);
- the level of risk assigned to the data by the auditor; and
- the degree of assurance that the auditor was able to give.

- 4.27 The principle in paragraph 4.24 does not imply that checks should be carried out specifically to assess whether data was falsified or intentionally misleading.

- 4.28 The process followed in the assessment of the data and the outcome of that assessment (such as any defects found in the data) should be described in the actuarial information that is reported to the user. There may be situations where it is not possible to assess aspects of the accuracy and completeness of data and where reliance must be placed on other aspects, for instance whether documentation is up-to-date and complete. In such situations reliance on data provided by others should be communicated when the resulting actuarial information is provided, together with an explanation that it has not been possible to check or validate aspects of the data independently.

COMPENSATING FOR INACCURATE OR INCOMPLETE DATA

4.29 If the checks discussed in paragraphs 4.23 to 4.25 indicate that the data may be materially inaccurate or incomplete in any respect, adjustments can in some cases compensate for the defects and produce a satisfactory set of data. Examples of such adjustments might be:

- Substituting average values for invalid entries, or
- Scaling up to compensate for missing data, where it is reasonable to suppose that a missing segment of data is similar on average to the rest of the data.

4.30 It follows that any adjustments as described in paragraph 4.29 should comply with the overriding principles discussed in section 3. The BAS therefore proposes the following principle:

To the extent that the data is found to be inaccurate or incomplete, the feasibility of compensating for this by a set of adjustments to the data should be investigated. Taken overall, these adjustments should ensure the resulting actuarial information is sufficiently accurate and complete to meet the needs of the user, within the scope of the work, taking into account materiality and proportionality.

4.31 The actuarial information that is reported to the user should include a description of any material adjustments or modifications made to the data, other than routine corrections made by reference to source documents, including the rationale for any such adjustments or modifications. The primary objective of this is to help the user understand the reliance on and limitations of the data, but it may also be important if the adjusted data is used for another purpose. For instance, the first example given above (substituting average values for invalid entries) has the effect of decreasing the variance of the overall set of values, which may be irrelevant for the actuarial work in hand, but may be a material factor for other purposes.

4.32 If adjustments would not compensate for the inaccuracy or incompleteness satisfactorily, the steps outlined in paragraphs 4.13 to 4.20 should be followed – additional sources and proxies and of sampling should be considered and, if additional sources or proxies are found, further data should be collected and assessed for accuracy and completeness. The BAS proposes the following principle:

If required data is inaccurate or incomplete and satisfactory adjustments cannot be found, as many steps of the data process as are appropriate should be repeated.

4.33 The process described in paragraph 4.32 implies an iterative process as discussed in paragraph 4.2. For example, if additional sources or proxies are found and gathered but, on assessment, are judged to be materially inaccurate or incomplete, then a further iteration may be required and further sources or proxies sought.

4.34 Having been through the process described above iteratively, until all likely sources and proxies have been exhausted, there may be situations where there are still material reservations about the accuracy or completeness of the data, to the extent that they are likely to limit the usefulness of the resulting actuarial information for decision making. These reservations, together with their implications, should be communicated to the users, to enable them to

decide whether they will be able to make the decision for which the actuarial information is required.

- 4.35 Although it is common to make adjustments to address specific concerns about the data, it is less usual to make a general adjustment for the unsatisfactory quality of data. A number of authors on more general issues of data quality have proposed measures of overall data quality and some of their papers have been investigated by the Data Management Educational Materials Working Party of the Casualty Actuarial Society in North America, with a view to their possible application in actuarial work¹². In general, the method is to take different metrics (such as measures of accuracy, timeliness and completeness) and weight them together into an overall data quality index.
- 4.36 In its paper *Record-keeping: a consultation document*, TPR has proposed that pension scheme providers should measure the presence of some of the most important items of member data and report the results of these measurements. The BAS welcomes this initiative, which it regards as a first step in the development of measures that may in time make weighted overall indices a possibility.
- 4.37 The BAS believes that the development of an overall data quality measure (or measures) would be very helpful to users of actuarial information. However, because the assignment of weights is very subjective, it regards such measures as unsuitable for inclusion in its standards, at least for the foreseeable future.

In section 4 the BAS proposes principles relating to the data process, covering data requirements (paragraphs 4.3 to 4.9), the adequacy of data for the calculation objective (paragraphs 4.11 to 4.21), the assessment of accuracy and completeness of data (paragraphs 4.23 to 4.28) and compensation for inaccurate or incomplete data (paragraphs 4.29 to 4.34). Paragraphs 4.35 to 4.37 discuss overall data quality measures.

The BAS would welcome any views that respondents might have on the proposed principles relating to the data process.

The BAS would also welcome respondents' views on whether overall data quality measures are unsuitable for inclusion in BAS standards, at least for the foreseeable future.

¹² Refer to section 3.5 of Actuarial I.Q. (Information Quality), published on www.casact.org as part of the CAS E-Forum Winter 2008.

5 ESTIMATES AND MEASURES OF UNCERTAINTY

INTRODUCTION

- 5.1 Current generally accepted actuarial practice in the assessment of insurance liabilities and capital requirements is to make additions to liabilities and capital requirements if there are doubts about the accuracy of the data on which they are based. This practice is embodied in several GNs that the BAS has adopted – specific examples are shown in paragraphs A.5 to A.7 of Appendix A. The practice also occurs in other areas of actuarial work, such as the funding of pension schemes and the pricing of insurance products. This issue is discussed in paragraphs 5.3 and 5.6.
- 5.2 As discussed in its *Conceptual Framework for Technical Actuarial Standards*, the BAS takes the view that actuarial information cannot be regarded as complete unless it includes an indication of any inherent uncertainty. The implications of this for uncertainties in the data are discussed in paragraphs 5.11 and 5.12.

MARGINS TO COMPENSATE FOR DATA INACCURACY OR INCOMPLETENESS

- 5.3 Current actuarial practice, as described above, in many cases stems from the requirements of regulators or accounting standard setters. For example, FSA rules¹³ require insurance firms to include appropriate margins for adverse deviation in determining mathematical reserves, and pensions regulations¹⁴ require trustees to consider whether, and if so to what extent, account should be taken of a margin for adverse deviation when choosing prudent economic and actuarial assumptions.
- 5.4 The current trend, with the development of more risk sensitive methodologies, is for both regulators and accounting standard setters to move away from requiring margins for adverse deviation in assumptions for valuing liabilities, determining capital requirements and assessing solvency. Instead, there are requirements for economic, realistic market consistent values or “fair values”, together with the calculation of current or best estimates and explicit capital requirements.
- 5.5 As well as featuring in both the EU’s Draft Framework Directive for Solvency II and the IASB’s 2007 discussion paper on Insurance Contracts, the calculations of current or best estimates and explicit capital requirements are already part of the FSA’s Realistic Balance Sheet and Individual Capital Assessment requirements. A specific example of this approach in an adopted GN is shown in A.8 of Appendix A.
- 5.6 The actuarial information that users need in order to make decisions normally includes current or best estimates. If users then wish to add margins to the assumptions, the information needed to determine those margins can be provided separately, together with a discussion of the degree of market consistency or prudence that is implied by the chosen margin.

¹³ Eg PRU 7.3.10R(4) and PRU 7.3.13R.

¹⁴ Eg Occupational Pension Schemes (Scheme Funding) Regulations 2005, sub-paragraph 5(4)(a).

- 5.7 An example of the process outlined above can be found in TPR's guidance for pension scheme trustees¹⁵, which states that "trustees should discuss with their actuary both the range of potential values and the likelihood of their being experienced so as to determine the appropriate margin (if any) to take over best estimate values." This issue will be discussed further in our consultation paper on a generic modelling TAS.
- 5.8 In order that users of actuarial information are provided with the information they need to make their decisions, the BAS believes that the generic data TAS should require the current or best estimate approach rather than allowing the inclusion of implicit margins for inaccuracy or incompleteness in the data. Specific standards may make exceptions for particular circumstances in which users or regulators require the use of margins. If so, the effect of the margins should be shown separately in the actuarial information provided to the user.
- 5.9 The BAS therefore proposes the following principle:
- Margins should not be incorporated into actuarial information to compensate for inaccuracy or incompleteness of the data unless specifically required by the user, regulation or a specific actuarial standard. If margins are incorporated, their effect should be separately identified.
- 5.10 The actuarial information should make clear whether a current or best estimate approach has been used or margins have been included with respect to inadequate, inaccurate or incomplete data. If margins have been included, the rationale should also be given, including the relevant user requirement, regulatory requirement or specific actuarial standard together with the effect of the margins on the actuarial information. These requirements are consistent with those that are intended to form part of the generic TAS on *Reporting*.

MEASURES OF UNCERTAINTY

- 5.11 In its Exposure Draft of *Reporting Actuarial Information*, the BAS set out a number of ways to express the uncertainty of the results. The options include, but are not limited to:
- a range (eg from the Mth percentile to the Nth in the range of potential outcomes, if the percentiles are quantifiable),
 - the numerical consequences of changes in assumptions,
 - stress testing, ie testing the outcome of extreme scenarios, and
 - the severity of potential losses or, if the probabilities are quantifiable, a measure of the value at risk.
- 5.12 Estimates can often be made of the increases in uncertainty caused by data issues. For example, if the sensitivity to changes in assumptions is being used to express other sources of risk, such as parameter risk or model risk, a further sensitivity test could be used for data issues. This may imply the calculation of an estimate of what the results would be on the basis of data

¹⁵ Code of Practice 03, Funding Defined Benefits, paragraph 85.
<http://www.tpr.gov.uk/codesOfPractice/definedBenefit/defBen-15.aspx>.

adjusted to give more reasonable values to the checks (rather than on the basis of the actual data provided).

- 5.13 Respondents are invited to give their views on measures of uncertainty that are appropriate for data issues, and on whether it is desirable and practical for the same measures being used for other sources of risk to be used for data issues.

Paragraphs 5.3 to 5.10 discuss the use of margins to compensate for inaccuracy or incompleteness of the data, and paragraphs 5.11 to 5.13 discuss measures of uncertainty.

The BAS would welcome any views that respondents might have on the proposed principle relating to the use of margins to compensate for inaccuracy or incompleteness of the data.

The BAS would also welcome respondents' views on how any uncertainties about the accuracy or completeness of the data should be expressed and, in particular, on whether they should be expressed in a similar way to which other sources of risk are expressed.

6 REPORTING

INTRODUCTION

6.1 Although reporting issues will be addressed in our generic TAS on *Reporting*, the reporting of data issues to users of actuarial information is an important topic. Further details relating specifically to data issues have therefore been discussed in this paper. They are summarised in the next paragraph, together with references to the paragraphs of the paper in which they are discussed.

SUMMARY OF REPORTING ISSUES

6.2 The BAS proposes as a principle that:

Those of the following items that apply, together with their implications, should be reported to users:

- to the extent the BAS generic data standard conflicts with any applicable law, that the work was performed in accordance with the requirements of the applicable law, regulation, or other binding authority (paragraph 2.21);
- that it has been concluded that required data is unavailable or inadequate and that satisfactory additional sources or proxies cannot be found (paragraph 4.20), together with the relevant information the user will need to make the appropriate decision on, for instance, any amendment of the scope of the work (paragraph 4.21);
- that reliance was placed on data provided by others and that it has not been possible to check or validate aspects of the data independently (paragraph 4.28);
- any material adjustments or modifications made to the data, other than routine corrections made by reference to source documents, including the rationale for any such adjustments or modifications (paragraph 4.31);
- any material reservations about the accuracy or completeness of the data, to the extent that they are likely to limit the usefulness of the resulting actuarial information for decision making (paragraph 4.34);
- an indication of any uncertainty inherent in the information (paragraph 5.2); and
- whether a best estimate approach has been taken or whether margins have been included with respect to inadequate, inaccurate or incomplete data. If margins have been included, the rationale, the relevant user requirement, regulatory requirement or specific actuarial standard and the effect of the margins should be stated (paragraph 5.10).

DOCUMENTATION

6.3 In addition to the actuarial information provided to users, further documentation will often be appropriate, eg of the reasoning behind judgements that have been made (see paragraph 3.23), of the sources of data and of the definitions of data fields. The principles of materiality (paragraph

3.13) and proportionality (paragraph 3.19) should be applied to documentation in the same way as to actuarial information, although the outcomes may well be different, since what is material and proportionate for documentation purposes may not be material or proportionate for the purpose of reporting actuarial information.

- 6.4 The BAS expects that documentation issues will be discussed further in developing its generic modelling standard and, possibly, specific standards.

Paragraphs 6.1 to 6.2 lists items that the BAS proposes should be included in actuarial information. Paragraph 6.3 discusses further documentation.

The BAS would welcome any views that respondents might have on the proposed principle relating to reporting.

7 INVITATION TO COMMENT

QUESTIONS

- 7.1 The BAS invites the views of those stakeholders and other parties interested in actuarial practice who wish to comment on the content of this document. The BAS would like to know whether respondents believe that the principles proposed for inclusion in the TAS would further the BAS's aim of increasing the reliance that users of actuarial information can place on it. In particular the BAS would welcome respondents' views on the following issues:
- 1 Do respondents agree with the proposed purpose and scope of the generic data standard as set out in section 2?
 - 2 The BAS sets out a number of overriding principles in section 3.
 - a) Do respondents agree that it is appropriate for the TAS to include the proposed overriding principles, the associated definitions and the principle that they should be applied with reasoned and justifiable judgement?
 - b) Do respondents have any views on whether any issues specific to processing data arise in respect of the interests of beneficiaries, or of public interest, and on how such issues might affect the proposed overriding consideration for users' needs?
 - c) Do respondents believe that it would be desirable for BAS standards to require documentation for the reasoning supporting judgements on how to apply the principles?
 - 3 Principles relating to the data process are set out in section 4.
 - a) Do respondents have any views on the proposed principles relating to the data process?
 - b) Do respondents agree that overall data quality measures are unsuitable for inclusion in BAS standards, at least for the foreseeable future?
 - 4 Section 5 discusses matters concerned with estimates and uncertainty.
 - a) Do respondents have any views on the proposed principle relating to margins in respect of data inadequacy?
 - b) Do respondents have any views on suitable methods of expressing any uncertainties about the accuracy or completeness of the data and, in particular, on whether they should be expressed in a similar way to which other sources of risk are expressed?
 - 5 Do respondents have any views on the proposed principle relating to reporting set out in section 6?
- 7.2 In addition to the specific questions listed above, the BAS invites respondents' views on any other topics discussed in this paper. To ensure that the significance of their point is fully appreciated by the BAS, respondents are encouraged to indicate how their comments address the BAS's aim of increasing the reliance that users of actuarial information can place on it.

RESPONSES

- 7.3 For ease of handling, we prefer comments to be sent electronically to **basdata@frc.org.uk**.

Comments may also be sent in hard copy form to:

The Director
Board for Actuarial Standards
5th Floor, Aldwych House
71-91 Aldwych
London,
WC2B 4HN

- 7.4 Comments should reach the FRC by **15 December 2008**.
- 7.5 All responses will be regarded as being on the public record unless confidentiality is expressly requested by the respondent. A standard confidentiality statement in an e-mail message will not be regarded as a request for non disclosure. We do not edit personal information (such as telephone numbers or email addresses) from submissions; therefore only information that you wish to publish should be submitted. If you are sending a confidential response by e-mail, please include the word “confidential” in the subject line of your e-mail.
- 7.6 We aim to publish non confidential responses on our web site within ten working days of receipt. We will publish a summary of the consultation responses, either as a separate document or as part of, or alongside, any decision.

A ADOPTED GUIDANCE NOTES

INTRODUCTION

- A.1 There are numerous references to data in the adopted Guidance Notes. The selected extracts in this appendix were chosen on the basis of their direct relevance to passages in the body of the text.

RELATIONSHIP WITH AUDITORS

- A.2 GN7 *The Role of Actuaries in Relation to Financial Statements of Insurers and Insurance Groups writing Long-term Business and their Relationship with Auditors* states that “There are aspects of work where the Reporting Actuary may be relying on other areas within the company to produce information on which to base his or her calculation of the long term business provision. This information will be subject to audit but it may be inappropriate for the Reporting Actuary to place reliance on the Auditor for its accuracy or completeness as the Auditor may have carried out the work to a different level of materiality from that required by the Reporting Actuary. Further, the Auditor may well take the view that it is inappropriate to extend the scope of the Auditor’s work to give comfort to the Reporting Actuary. This is on the grounds that the work of the Reporting Actuary may be regarded as being central to the preparation of the financial statements in which case the Auditor is required to be able to express an independent opinion on it.”

RELATIONSHIP OF DATA AND CHOICE OF METHOD

- A.3 GN46 *Individual Capital Assessment* states that “... if credible historic data on any relevant operational or group risks are available... the data should be regarded as an important input to the assessment of the potential exposure to risks of the type to which the data apply. More subjective methods will need to be used in the absence of credible data.”
- A.4 GN18 *UK General Insurance Companies writing US Regulated Business* states that “In some cases the available historical data may be insufficient to enable the actuary to use conventional projection techniques. Benchmarking and methods such as the Bornhuetter-Ferguson method are generally accepted actuarial techniques...”

MARGINS TO COMPENSATE FOR DATA INACCURACY OR INCOMPLETENESS

- A.5 GN43 *The Appropriate Actuary* states that “If the appropriate actuary has any doubts about the accuracy of the data, reserves must be established for the risk that the actual value of the liabilities will be greater than that derived from the available data.”
- A.6 GN44 *Mathematical Reserves and Resilience Capital Requirement* states that “If there are any doubts about the accuracy of the data, an additional mathematical reserve must be made for the risk that the actual value of the liabilities will be greater, or the value of assets less, than that derived from the available data.”
- A.7 GN45 *Determining the With-Profits Insurance Capital Component* states that “If the effect of inaccurate data on the liabilities is uncertain, then an addition to the risk capital margin must be made for the risk that the actual value of the liabilities will be greater, or the value of assets less, than that derived

from the available data. However, if the impact of the data inaccuracy is likely to increase liabilities, then an addition to the realistic liabilities must be made.”

- A.8 GN46 *Individual Capital Assessment* states that: “...there are necessarily limited data on which to base the assumptions required for the ICA. There is therefore an element of subjectivity involved in setting these assumptions. Despite this, it is not necessary to introduce any prudence within the assumptions, although the sensitivity of the results to the key assumptions should be investigated.”

B EXAMPLES

INTRODUCTION

B.1 For the purpose of illustration, we set out a few examples of the sort of data actuaries typically require, and the checks that are typically applied to them. Many of them relate specifically to life insurance, but the same considerations also apply to pensions and general insurance.

ITEMS OF DATA

B.2 For the purpose of illustration, we set out a few examples of the sort of data actuaries typically require:

- (a) details of the policies in force (in the case of insurance), which might include sums assured, premiums, dates of birth, term, etc, or details of the members (in the case of pension schemes), including dates of birth, sex, salaries, etc;
- (b) details of changes in the policy portfolio or the membership (this is required in order to carry out investigations of recent mortality rates, surrender rates, etc for assumption setting, and also to calculate reconciliations of the results from one valuation to the next);
- (c) details of the policy terms and conditions (in the case of insurance) or details of the benefits (in the case of pensions);
- (d) details of reinsurance treaties;
- (e) details of the assets;
- (f) various revenue account items, such as investment income, premium income, benefit payouts, etc;
- (g) analysis of expenses, exposure to misselling costs, fines etc and details of current policy charges; and
- (h) details of economic conditions, such as interest rates, volatilities, rates of inflation, currency exchange rates, etc.

TYPICAL CHECKS

B.3 For the purpose of illustration, we set out below the sort of tests a life actuary would typically carry out for each of the data types listed in paragraph B.2:

- (a) Checks that data all lie within reasonable limits (eg dates of birth resulting in ages between, say, 16 and 70 depending on the product) and that ratios of certain items (eg premiums to sums assured) lie within reasonable limits;
- (b) Reconciliations of data in force at the last valuation with the data in force at this valuation;
- (c) Checks that the formulae for calculating benefits are consistent with the terms and conditions set out in policy documents and marketing literature;

- (d) Checks that the data on reinsured policies is consistent with the types and generations of policies listed in the reinsurance treaties;
- (e) Reconciliations of the total market value of the investments and of the values of current assets and liabilities with the figures in the accounts and in the relevant regulatory returns;
- (f) Checks that the investment income is consistent with the values of assets and yields on appropriate stock market indices, that the premium income is consistent with the policies in force over the year, that the benefit outgo is consistent with the movements in policies, etc;
- (g) Checks that the aggregate totals of expenses implied by the expenses analysis reconcile with the expenses outgo shown in the accounts; and
- (h) Checks that the data is consistent with published sources, eg financial journals, Bank of England, ONS.

INTERNAL CONSISTENCY AND RECONCILIATIONS

- B.4 An important form of checks on the data is to ensure that totals of key variables can be reconciled from one stage of the process to the next, for example from administration system to data extract to model office to results summary.
- B.5 Another important form of check is to reconcile totals from one period to the next, for instance to reconcile the total number of policies in force (in the case of insurance) or of members (in the case of pension schemes) at the two calculation dates, using previous data and movement data, and similarly to reconcile total benefit amounts and premiums.

EXTERNAL CONSISTENCY

- B.6 Some data items can be checked for consistency with the entity's financial statements, if only approximately. For example, movement data can be checked against benefit payments and other appropriate revenue account items, and the income implied by the asset data can be checked against investment income in the accounts.
- B.7 Some data items can be checked for consistency with market data. For example, yields on the investments held can be checked against market indices of similar investments.

SPOT CHECKS

- B.8 The kinds of checks described in paragraphs B.4 to B.7 operate at an aggregate level. Consideration should be given to random spot checks on data for individual members or policies or assets, even when they form part of a set on which aggregate checks have been successfully carried out, as the spot checks can identify different kinds of error.

GRAPHS

- B.9 Plotting the most significant features of the data on a graph or chart is often a good way of identifying anomalies in the data.

C LIST OF DEFINITIONS AND PRINCIPLES

- C.1 This appendix lists:
- the overriding principles proposed in section 3, together with the associated definitions and the principle relating to the judgement with which they should be applied,
 - the principles relating to steps in the processing of data that are proposed in section 4,
 - the proposed principle on margins with respect to data inadequacy, and
 - the proposed principle relating to reporting.
- C.2 As mentioned in paragraph 2.9, all the principles should be understood to apply to work falling within the scope of BAS standards.

OVERRIDING PRINCIPLES

User needs

- C.3 An overriding consideration in processing data should be the needs of users of the resulting information (paragraph 3.2).

Scope of Actuarial Work

- C.4 Processing data should be commensurate with the scope of the actuarial information that has been commissioned (paragraph 3.9).

Materiality

- C.5 (Definition) The exclusion of data is material, and the inaccuracy or incompleteness of data that has been included is material, if it might reasonably be expected to influence the decisions of users of the resulting actuarial information (paragraph 3.10).
- C.6 Data (or its checking or its adjustment) should only be included if it is material; immaterial details should be excluded (paragraph 3.13).

Proportionality

- C.7 (Definition) An improvement in the quality of data is proportionate if the additional effort to achieve that improvement is outweighed by the consequent benefits to the user of the actuarial information and by the potential benefits to beneficiaries (paragraph 3.17).
- C.8 Processing data should be proportionate (paragraph 3.19).

OTHER PRINCIPLES

Judgement

- C.9 Judging what is, or is not, material or proportionate should be done in a reasoned and justifiable manner, and the reasoning behind such judgements should be documented (paragraph 3.21).

Requirements

- C.10 A list of data requirements should be drawn up to satisfy the user needs and scope of the work, prior to any investigation of sources of that data: the data requirements should take into account materiality and proportionality (paragraph 4.5).
- C.11 Data requirements and sources of data should be assessed every time actuarial information is required (paragraph 4.6).

Supplementing data

- C.12 When required data is unavailable or materially inadequate to meet user needs within the scope of the work, investigations should be made into additional sources, proxies and sampling methods that might be used to supplement or substitute for the data (paragraph 4.18).

Checks

- C.13 A set of data checks should be constructed and performed in order to determine whether or not, taken overall, the data is sufficiently accurate and complete to meet the needs of the user of the actuarial information. The set of checks should take into account the scope of the analysis, materiality and proportionality (paragraph 4.24).

Compensating adjustments

- C.14 To the extent that the data is found to be inaccurate or incomplete, the feasibility of compensating for this by a set of adjustments to the data should be investigated. Taken overall, these adjustments should ensure the resulting actuarial information is sufficiently accurate and complete to meet the needs of the user, within the scope of the work, taking into account materiality and proportionality (paragraph 4.30).

Iteration

- C.15 If required data is inaccurate or incomplete and satisfactory adjustments cannot be found, as many steps of the data process as are appropriate should be repeated (paragraph 4.32).

Estimates

- C.16 Margins should not be incorporated into actuarial information to compensate for inaccuracy or incompleteness of the data unless specifically required by the user, regulation or a specific actuarial standard. If margins are incorporated, their effect should be separately identified (paragraph 5.9).

Reporting

- C.17 Those of the following items that apply, together with their implications, should be reported to users:
- to the extent the BAS generic data standard conflicts with any applicable law, that the work was performed in accordance with the requirements of the applicable law, regulation, or other binding authority (paragraph 2.21);
 - that it has been concluded that required data is unavailable or inadequate and that satisfactory additional sources or proxies cannot be

found (paragraph 4.20), together with the relevant information the user will need to make the appropriate decision on, for instance, any amendment of the scope of the work (paragraph 4.21);

- that reliance was placed on data provided by others and that it has not been possible to check or validate aspects of the data independently (paragraph 4.28);
- any material adjustments or modifications made to the data, other than routine corrections made by reference to source documents, including the rationale for any such adjustments or modifications (paragraph 4.31);
- any material reservations about the accuracy or completeness of the data, to the extent that they are likely to limit the usefulness of the resulting actuarial information for decision making (paragraph 4.34);
- an indication of any uncertainty inherent in the information (paragraph 5.2); and
- whether a best estimate approach has been taken or whether margins have been included with respect to inadequate, inaccurate or incomplete data. If margins have been included, the rationale, the relevant user requirement, regulatory requirement or specific actuarial standard and the effect of the margins should be stated (paragraph 5.10).

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