



Initial information for the Approval of Internal Model

Background

A major thrust of APRA's supervision of regulated institutions is to encourage better risk management, and the use of internal models to assess risk and economic capital is an important tool for this purpose. The Insurance Act and GPS110 have provision for an insurer to use an APRA-approved internal model to determine its regulatory capital, as an alternative to the prescribed method.

The purpose of this paper is to set out the initial information APRA is seeking from an insurer in order to consider the adequacy of an internal model used by the insurer for approval under GPS110 Capital Adequacy.

The process is a substantial one, requiring significant investment of resources from both the insurer and APRA. It is likely that any reduction in regulatory capital allowed by APRA will be modest in the early years (at least), and will only be available if an insurer meets a broad range of criteria.

It is our understanding that this development is at the leading edge of international regulatory developments. Accordingly, the information requirements are probably more comprehensive than under any existing regulatory capital framework for non-life insurers and are perhaps best compared with what is evolving under the European Solvency II project, which is still in its developmental stage.

Outline of Approach and Timetable

APRA is developing a structured approach for the internal model approval process. The first stage of this process involves a 'road test', during which we are seeking a *pre-application self assessment* and a *preliminary application* from insurers seeking internal model approval in 2008. APRA will undertake a *preliminary assessment* of this material as we develop our internal procedures and approaches, and intend to discuss that preliminary assessment with insurers during the second quarter of 2008.

It is our general intention to be able to seek final applications later in 2008 with a view to assessing these applications prior to the end of 2008. However, this is an intended timeline and other factors may intervene to make this timeline unachievable.

During this stage, APRA will be pleased to discuss any views insurers have about the nature of the information requested, the practical implications for insurers and issues of relevance to APRA's assessment.

We also request an early indication (preferably with the pre-application self assessment) of the entities for which internal model approval is expected to be sought, and in particular whether approval is likely to be sought at a group or entity level or both.

Information Requested

The pre-application self assessment is described in Part A and should be provided to APRA by 31 January 2008. The self assessment requires senior management sign-off, and APRA would also expect it to be Board-endorsed, although not necessarily prior to submission to APRA.

The preliminary application should be provided in two parts. Part B of the information requested is intended to be non-technical material relevant to a broad range of managers in your organisation which outlines general information regarding the internal model and related risk and capital management framework. Part C of the information requested is intended to provide in-depth technical material in relation to all relevant aspects of the internal model that would normally be prepared by your actuarial team.

APRA anticipates that the final application will be submitted after Board approval, and therefore requests that the preliminary application also be Board-endorsed as part of the 'road test'. If this presents timing difficulties, we will be pleased to discuss alternatives that will both meet the desired timetable and ensure adequate involvement by the insurer's Board in the application process. APRA anticipates that Board members should be in a position in due course to express their approval of the content of Part B, and their familiarity with the process used to develop Part C.

The pre-application self assessment and preliminary application should be provided in both soft and hard copy formats. If you wish to submit information in a format different from the one suggested in the attachments or there is significant overlap in the information to be submitted for Parts B and C, please use your preferred format and provide a summary table indicating where each item is addressed.

Soft copies of documents should be provided using standard business software (e.g. Microsoft Word and/or Excel) and not proprietary software packages. Please address all such information to your frontline supervisor.

You should be aware that APRA will be applying high standards in its assessment criteria, and there is a real possibility that an application may not be approved. You should also be aware that there will be an additional supervisory levy relating to the application, details of which will be advised separately.

If you need any further information please contact your frontline supervisor in the first instance.

Helen Rowell
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GI Internal Model - Pre-Application Self Assessment - Part A

A self assessment should be provided to APRA prior to the main information supporting the application for approval.

The self assessment should identify strengths and weaknesses of the internal model and areas for future development. It should not exceed 20 pages and should be agreed by the Chief Executive Officer, the Chief Financial Officer and the Chief Risk Officer before submission to APRA. The self assessment may refer to other documents without repeating information.

The self assessment should address the following aspects in relation to the Internal Model and its use. It should include the extent to which the Risk Management Framework (RMF) and the underlying Risk Management Strategy (RMS), approved by the insurer's Board and submitted to APRA, cover points A1 to A9:

- A1. Inclusion of all the major risk types in the RMF. Relation between the risk appetite of the insurer and its capital requirements & expected shareholder returns. Linkages with external credit ratings.
- A2. Inclusion of definitions and methodologies for all significant risk types that are applied consistently across business units in the RMF. Usage of a coherent framework for measuring all risk types.
- A3. Presence of risk tolerances, risk limits and delegations across the organisation. The extent to which these are established by reference to the information referred to in A1 and A2.
- A4. The extent to which the insurer has developed and is using a Board approved internal model for economic capital, as an integral part of its capital management framework and separately from any regulatory need.
- A5. A Board-approved process for determining a 'cost of capital' and required hurdle rate(s) of return for evaluating business strategies, opportunities and product pricing. Extent to which this information is applied consistently across all the business units.
- A6. The extent to which the evaluation of new business initiatives (including acquisition and expansion plans) is based on projected returns and the economic capital required to support these initiatives. Extent to which the economic capital is based on the Internal Model and other considerations.
- A7. Extent to which the setting and monitoring of the product pricing is influenced by the economic capital allocated and the required returns relative to that capital.
- A8. The extent to which capital allocation for business units and products is based on the underlying risks as reflected in the economic capital model. Demonstration that the assessment of business unit performance is based on return on allocated capital and/or other risk-based measures.
- A9. The extent to which performance and incentive remuneration of key executives is influenced by risk based measures, including economic capital allocation.

GI Internal Model - Information Required - Part B (General)

B1 General Information

- 1.1 The reasons for seeking approval for the Internal Model by the general insurer. What does the GI aim to achieve if APRA were to grant this approval?
- 1.2 Provide the contact people for information about the Internal Model and its application.
- 1.3 Name the members of the modelling team, describe their roles and relevant qualifications and experience.

B2 Legal and Organisational Structures

- 2.1 Describe the legal entity or entities proposed to be covered by the Internal Model, and the specific entity(ies) for which the GI seeks approval of the Internal Model for use in determining the regulatory capital requirements. This information is best related to the "Level 1, 2 and 3" structure detailed by APRA in its 31 August 2007 Discussion Paper "Consolidated Group Reporting for General Insurers".
- 2.2 Describe the organisational structure responsible for development, operation (including assumption setting), review, approval and interpretation of the Internal Model and how this relates to the business unit structure and legal entity structure.
- 2.3 Describe the business unit(s) that the Internal Model covers, and how the scope and control of these business units fits into the legal entity structure.

B3 Risk Management Linkages

- 3.1 Describe how the Internal Model relates to the Risk Management Framework. You may refer to documents already submitted to APRA, although if it is more convenient to include copies of documents such as the Risk Management Strategy, Risk Register etc in the application you may do so.

B4 Internal Model Governance

- 4.1 Provide the most recent version of all relevant Internal Model Risk policies. These are the policy document or documents that set out principles and standards for the mitigation of Internal Model risk. The document(s) should describe the procedures that the institution requires to be followed for developing, maintaining and using the internal models.

Such policies would typically include requirements on topics such as:

- a) Identification of models
 - b) categorisation of models according to business criticality and complexity
 - c) roles and responsibilities of stakeholders, including ownership and sign-offs required
 - d) version control and security
 - e) model risk, including ensuring appropriate model structure and parameter estimation
 - f) IT risk including data security and business continuity issues
 - g) documentation
 - h) model review
 - i) training
 - j) usage.
- 4.2 In relation to the Internal Model, describe the nature of reporting to, influence by, and acceptance by the business unit's management, financial management, executive management, the risk management function and the relevant Board(s) of Directors.

Include a copy of relevant papers to Board(s), Board Committees and executive management. Papers provided should include all high importance papers, together with a sample of more routine and lesser importance papers.

- 4.3 Describe the nature of any external assistance used in development, operation and interpretation of the Internal Model.
- 4.4 Describe the quality control process for the development, operation and interpretation of the Internal Model, including the sign-offs required.
- 4.5 Describe the nature of any independent review (internal or external) of the development, operation and interpretation of the Internal Model. Include a copy of the scope of the review and relevant reports.

B5 Internal Model Usage

- 5.1 Describe the uses to which the current Internal Model or its part(s) have been put in the last three years. Include a copy of relevant documents. Documents relating to use more than three years prior may be included at the applicants' discretion. It is important that a comprehensive description is provided of how use of the internal model is embedded in the risk management framework of the insurer as well as its use as an input to the remuneration arrangements of senior staff.

B6 Capital Management Linkages

- 6.1 Describe how the Internal Model relates to the Capital Management Framework. This should include, but not be limited to, information about:
 - a) the role, if any, that the Internal Model has in determining target capital of the entity(ies)
 - b) the relationship between target capital and the calculated MCR from the Internal Model
 - c) any triggers for capital management action that are determined in relation to either the capital requirements determined by the Internal Model, the entity(ies) target capital, or multiples thereof.

B7 High-Level Description

- 7.1 Provide a high-level description of the Internal Model to provide an overview to a financially literate and insurance knowledgeable person without specialist statistical or actuarial skills. Include a copy of any documents used internally for this purpose. Information provided for this topic should include:
 - a) The nature and purpose of the Internal Model.
 - b) How the Internal Model works (in broad, high-level terms only).
 - c) A systems diagram showing the key systems involved in the Internal Model and data flows between them.
 - d) What are the key inputs and assumptions.
 - e) What are the outputs that are relevant.
 - f) What do these outputs mean for the business.
 - g) Usage of the Internal Model.

GI Internal Model - Information Required - Part C (Technical)

The usual approach adopted by larger insurers in creating a comprehensive Internal Model of their business is a “Dynamic Financial Analysis” (DFA), which is a projection of the insurer’s financial results over a period of years, using Monte Carlo simulation to allow for the variability of key risk factors. A DFA is usually modular, with each risk dealt with by a separate module that generates, stochastically where appropriate, projected financial and other numeric values.

In order to avoid being too general, this request for information is drawn up in a form that parallels the structure of a typical DFA model by addressing the major risk types in separate sections. That should not be interpreted as a requirement that only DFA models are acceptable. An insurer that wishes to apply for accreditation for a differently-structured model should discuss this with APRA, in order that a request for information in a form appropriate to the proposed Internal Model structure may be agreed.

There are six main risk types envisaged in the request for information. The first three are specific to the insurance industry and may be referred to collectively as ‘Insurance Risk’, while the remaining three are common to all financial institutions:

1. Catastrophe risk
2. Underwriting risk
3. Reserving risk
4. Market risk
5. Credit risk
6. Operational risk

In describing the Internal Model, the following principles should be followed at each part of the modelling hierarchy:

- The description should be sufficiently detailed to allow an experienced modeller to understand the design and specification of the Internal Model and to independently calculate sample results
- Description of Internal Model structure should be in mathematical terms, not excerpts of computer code, except where such code is easily self-explanatory and concise.
- A detailed itemisation of all parameters to the Internal Model and their values should be provided.
- The process used to choose an Internal Model structure and parameters, including any supporting analysis, should be described.
- The program for ongoing review of assumptions, including frequency, parties involved, sign-off requirements should be described.
- For the most significant stochastic variables, describe the extent to which the approach has considered and included the need for ‘fat tails’.
- Dependency structures modelled should be described, both between risk categories (eg between market and insurance risk) and between components within risk categories (eg between asset classes in market risk, between defaults of different counterparties in credit risk, or between claim costs in different lines of insurance business). Particular attention should be given to the treatment of tail dependencies - whether the model makes adequate allowance for things to go bad together.

Descriptions of the Internal Model according to these principles are required at the top level and for each of the six risk types. Section 1 of Part C covers principles of the Internal Model description. The issues identified under sections 2-7 below should be viewed as risk-specific issues that must be covered as part of, or in addition to, the description of that part of the Internal Model.

C1 Principles of Internal Model Description

1.1 The insurer should submit a full description of the Internal Model, which incorporates details of:

- the structure (formulae, distributions, dependencies);
- parameters and numeric values (such as means or standard deviations);
- data inputs (eg claims triangles, investment portfolio listings); and
- key outputs (for the purpose of determining the MCR, the relevant outputs are those that determine the capital estimate. However, details should also be supplied regarding outputs that are used for other purposes - this will provide evidence of other Internal Model usage as per section B5).
- Level of significance of the final variables included in the Internal Model
- Correlation matrix of modelled variables

C2 Top-level "Corporate" module

2.1 Describe the top-level module, in which projected values from other modules and each risk type are brought together to generate projected corporate financial results. The other modules should be listed, but do not give detail on them in this section.

The Internal Model description for this module should include:

- a) modelling of income tax obligations (other taxes, charges and levies, whether state or federal, may be dealt with at this level, or in one of the other modules, as appropriate) ;
- b) capital management, including dividends, interest payments on capital instruments, and conversion of hybrid or contingent capital instruments;
- c) investment portfolio turnover and rebalancing;
- d) other management actions (eg changes to reinsurance in response to events);
- e) any expenses not covered in other modules;
- f) process for projecting balance sheet values and P&L entries for any accounting entries that are not specifically included in the modelling of the six main risk types (this may include such items as goodwill, fixed assets, amortisation, own capital instruments), and identifying any items (including capital instruments) that are omitted from the projection, with reasons;
- g) how the proposed capital requirements are determined from the internal model;
- h) details of the modelling of dependencies between risk types.

If any of these items are covered in modules other than the top-level module, they should be described in that section and cross-referenced here.

In some capital models, there will be no modelling of items (b) or (d). APRA has no view on whether or not these items should be included in the model, but any such items must be clearly explained.

Issues specific to the six main risk types are covered in the following sections 3-8.

C3 Insurance Business Segmentation

3.1 Explain how the insurance business has been segmented for modelling purposes. Give reasons for both the make up of each segment where it is not a single and clear business line and the level of detail at which the business is modelled. Explain the approach taken to choosing which segments are either not modelled, or which are not modelled in detail, and the approach taken for those segments.

C4 Insurance Risk

The Internal Model description should cover the following risks within this risk area:

4.1 Catastrophe Risk

This is the risk of claims arising from catastrophes occurring after the balance date.

4.1.1) List all catastrophe models that are external to the main model, providing details of the model vendors (where external), and the focus and coverage of the models. APRA is aware that, for many catastrophe models, full model specification is unavailable due to model vendors' wish to safeguard their intellectual property. In such cases, the applicant should provide full details of the nature of the data files provided by the catastrophe model, and how those files are used to simulate catastrophe claims within the model. Sufficient information regarding modelled distributions of losses from different types of catastrophes, and how these are distributed between insurance segments, should be provided to give a good idea of the impact each catastrophe risk source has on the model's results. The applicant should clearly indicate the extent to which any parameters or other inputs provided by it impact the values in the files provided by the catastrophe models to the capital model.

4.1.2) The model description should include the treatment of catastrophe reinsurance, an explanation of how the risk of multiple events is modelled, and the approach to, and costs of, reinstatement of reinsurance cover after a catastrophe. The treatment of catastrophe reinsurance should indicate any adjustments that are modelled to the catastrophe cover over the second year of the projection, as the exposure gradually declines through that year (premium writing having ceased at the end of the first year).

The applicant must give APRA the authority to communicate directly with the relevant external provider(s), generally reinsurance brokers or modelling companies, to obtain information about the catastrophe models and their implementation for the applicant.

4.2 Underwriting Risk

This is the risk that future exposures will be loss making. It includes risk from unearned premiums.

4.2.1) The Internal Model description should include a description of the modelling of premiums, including any stochastic modelling of a 'premium cycle' if relevant, and the process for transforming written premiums into a pattern of paid and/or earned premiums.

4.2.2) If separate models are used for 'large' versus 'attritional' claims in some cases, the model description should cover both of these, making clear for which insurance segments this split is used and how the split is made (cut-off points, process for separating data and estimating parameters for truncated distributions, etc).

4.2.3) The description should include treatment of the non-catastrophe elements of the reinsurance programme (including any adjustments applied for the second year of exposure, as for catastrophe reinsurance), as well as commissions, expenses and any other underwriting items. The catastrophe and non-catastrophe elements of the reinsurance programme may be described in a single combined section if the applicant believes that will enable a more logical presentation.

4.3 Reserving Risk

This is the risk that provisions for past exposures will be inadequate to meet the ultimate costs when the business is run off to extinction.

4.3.1) The internal model description should explain:

- (a) how run-off outcomes different from the held provisions are generated

- (b) the way 'systemic' issues such as superimposed inflation and economic conditions are treated;
- (c) how premium-related and claim-handling expenses are modelled;
- (d) how the reinsurance program and its impact is modelled.

C5 Market Risk

The part of the internal model used to generate market rate scenarios (investment asset returns, interest rates, inflation rates, foreign exchange rates and in some cases credit spread curves for standard rating bands) is referred to here as the Economic Scenario Generator (ESG).

5.1 Applicants should indicate whether their ESG is supplied by the same source (which may be in-house) as the main part of the Internal Model and, if not, provide information about the ESG supplier.

5.2 The ESG model should be fully described according to the principles outlined in C1 above. Particular items that should be covered in the applicant's description of Market Risk are:

- a) whether the model aims to reflect risk-neutral or "real-world" probabilities. If risk-neutral, explain how the generated rates are adjusted to create real world distributions of loss in the internal model;
- b) if the ESG generates more than one indicator of inflation per currency, please specify each indicator;
- c) whether the same sets of simulated FX rates are used for modelling both liabilities and assets;
- d) whether credit risk on investments such as corporate bonds is modelled as part of market risk;
- e) dependencies among the variables produced by the ESG;
- f) whether the effects of active investment management, if present, are modelled and if so, how;
- g) whether liquidity risk is modelled and, if not, what measures are in place to ensure that the risk of liquidity problems causing losses or impeding the ability to operate is negligible. If liquidity risk is not modelled, describe how it has been captured by the ESG.

C6 Credit Risk

6.1 Applicants should indicate for which assets the credit risk is assessed by a specific credit risk part of the internal model, and for which assets it is included as part of market risk.

Credit risk of reinsurance claims (existing and potential future), premium debtors and derivative counterparties should be explicitly covered, but it is not essential to use the same methodology for each of these risks. Dependencies between defaults of reinsurers will be important.

6.2 For assets other than those whose credit risk is assessed as part of market risk, the internal model description should include:

- a) means of simulating default losses;
- b) description of whether, and if so how, the credit model addresses losses from causes other than default (eg credit rating migration or alteration in spreads)
- c) Identification of any assets, guarantees or other exposures for which credit risk is treated as immaterial, or otherwise not included in the calculation of capital requirements.

- 6.3 Applicants should specifically indicate whether they at any time have exposure to credit risk through credit derivatives and if so demonstrate how the risk of such activities is covered within the internal model.

C7 Operational Risk

- 7.1 Provide a self assessment of the treatment of Operational Risk in the company's Risk Management Framework
- 7.2 Provide documentation of the system used to record Operational Risk events, the process for updating and the extent to which historical data in the system is regarded as reliable. Provide a copy of the current contents of this system.
- 7.3 Detail the use of external data in considering Operational Risk. Specify any external data collections that the company subscribes to.
- 7.4 To the extent that Expert Judgement (sometimes referred to as Scenario Analysis) has been used to determine the structure and parameters of the Operational Risk module, describe the sources, validation processes and results.
- 7.5 Link the Operational Risk module to the company's top level Risk Register, in order to explain the manner and extent to which each Risk Issue is captured in the Internal Model.

The boundary between Operational Risk and other risk types is grey and a given event could often be quite reasonably allocated to either. APRA does not prescribe how "boundary events" should be allocated between Operational Risk and other classes. However, the applicant should document a clear set of criteria for consistently allocating events between Operational Risk and other risk types, and this should be reflected both in the recording of Operational Risk events (item 7.2 above) and the treatment of such events in the internal model.

C8 Dependencies

The nature of a DFA model is that risks are modelled simultaneously. The consequence of this is that risks are modelled as independent except where explicit dependency structures are established. Because of the danger to insurers from multiple risk types causing losses that lead to financial distress, APRA will be paying close attention to all implicit assumptions of independence that are embedded in the model. Applicants should show that they have considered all combinations of risk types and ensured that independence has been assumed (whether implicitly or explicitly) only where there is robust evidence to support that assumption. This covers dependencies:

- within risks, such as between insurance classes or investment asset classes;
- between different aspects of the same risk, such as between run-off performance and underwriting performance, or between large and attritional claims; and
- between risks, such as between insurance and operational, or market and credit.

C9 Reconciliation to Business Plans

- 9.1 Detail the process by which the results of the Internal Model are reconciled to business plans, and what type of model result is reconciled (eg midpoints such as mean or median, or some other statistic);
- 9.2 Provide results of the reconciliation to business plan, including resolution of any anomalies, explanation of significant differences and evidence of sign-off at an appropriate level;
- 9.3 Detail process and results of any other reconciliations that are performed between internal model outputs and values from other sources. (eg reconciliation of model's 75th percentile claims outcomes to Liability Valuations).

C10 Internal Model Outputs

In assessing the suitability of the Internal Model, APRA will need to examine a variety of outputs from the Internal Model, in different levels of detail. It is likely that during the process APRA may request further outputs or different forms of presentation. The required outputs are defined at three levels in the following sub-sections 10.1 to 10.3:

- Segment outputs for insurance risk
- Risk type outputs
- Entity and Group outputs.

10.1 Segment Outputs - Insurance Risk

For each segment of the insurance business, include outputs which show:

- a) In respect of Underwriting Risk ("future exposures"):
 - The distribution of the ultimate loss ratio, together with other key statistics such as mean, standard deviation and major percentiles (including 99.5);
 - Ultimate loss ratio should be calculated as C_u / P where C_u is the sum of claim payments arising from future exposures, and P is unearned premium at balance date plus future written premium;
 - Distribution and key statistics of the dollar profits/losses, being $P - C_u$;
 - Catastrophe risk should be included, with its contribution identified to the extent that is helpful in interpreting the results.
- b) In respect of Reserving Risk ("past exposures"):
 - Distribution and key statistics of 'reserving loss ratio' for past exposures;
 - Reserving loss ratio is C_r / R where C_r is the sum of claim payments arising from past exposures, and R is the relevant reserve (for accounting, not prudential purposes) at balance date, expressed in equivalent terms, such as ultimate undiscounted or balance date dollars);
 - Distribution and key statistics of future dollar profits/losses on past business, being $R - C_r$.
- c) The combination of catastrophe, underwriting and reserving risk for the segment, including the impact of dependencies.

10.2 Risk Type Outputs

- a) For each of the six required risk types (and any others used), include outputs that show:
 - The distribution of financial result contributed by that risk type
 - The degree of dependency between the risk types
 - The component of the calculated Minimum Capital Requirements (MCR) attributable to this risk type, together with an explanation of the basis of attribution.

For Catastrophe risk, in particular, include an analysis of the contribution of losses within the reinsurance cover and losses in excess of reinsurance cover (vertical or sideways) to the overall losses.

The calculated Minimum Capital Requirement from the model is to be determined as the 99.5th percentile across simulations of MinCap(s), where MinCap(s) is the minimum amount of initial capital required in the simulation to ensure that sufficient liquid or readily-realizable assets are available at every point in that simulation to allow simulated claims to be paid as they fall due.

- b) Describe the process for determining these results for individual risk types.

10.3 Entity and Group Outputs

- a) For each licensed entity relevant to the modelling, and for the relevant 'group' (if more than one licensed entity is covered), include outputs that show:

- The Minimum Capital Requirement that would be calculated under this Internal Model if a confidence level k were applied, where k covers a wide range of percentile levels (in addition to 99.5).
 - For simulations between 99% and 100% the nature of the problems giving rise to the financial stress.
- b) Explain how the internal model deals with the possibility that the company might be insolvent at some balance date during the projection period but be solvent at completion of the run off. It would be helpful if the occurrence of this or other anomalies during the simulation process can be identified.

Note that there are further requirements for presentation and analysis of outputs in section 11 below.

C11 Insurance Segment Example

- 11.1 For one representative segment of the insurance business, include more detailed documentation of the analysis used to derive assumptions, intermediate workings and internal model outputs to enable a detailed review.

C12 Validation and Sensitivity Testing

- 12.1 For internally sourced data, provide information on the reconciliation process used to ensure the accuracy of input data and its accurate transfer into the Internal Model.
- 12.2 Describe the testing performed to ensure that internal model outputs are reasonable, accurate, appropriate and comprehensive.
- 12.3 Provide a description of any Internal Model limitations or shortcomings identified during the validation process and the steps taken to address these.
- 12.4 Describe the process used to demonstrate the appropriateness of Internal Model structure and parameters e.g. sensitivity analysis.
- 12.5 List parameters or other inputs that, given a small move, may cause a significant change in the capital requirement. For each one, discuss the choice made in the light of this sensitivity.
- 12.6 List structural assumptions, such as choice of distributions or dependencies, for which the insurer is aware that making a different but still reasonable choice may cause a significant change in the capital requirement. For each one, discuss the choice made in the light of this sensitivity.
- 12.7 Provide details of any comparison models used to validate the code and mathematics of the Internal Model being accredited. Identify tolerance levels used in assessing accuracy of the internal model.
- 12.8 Document the mechanisms for reporting validation results to the appropriate levels of authority.

C13 Limitations, Deficiencies and Development Plans

- 13.1 Describe the important limitations and deficiencies in the Internal Model and the capital modelling process. Explain the implications of these and any control systems that exist to deal with them.
- 13.2 If there are plans (even indicative) for development, please outline the content and status of these plans.