Objectives of this Workshop
- Some Words of Warning

• The objective of the workshop is to share some initial views on a few key issues - and to kick off discussions about how the requirements might apply in practice

• Doesn’t need to be said but;
  - CEIOPS have published a large volume of high level principles for IMAP
  - These principles are still in DRAFT
  - How these principles will be finalised, and ultimately be applied in practice will only emerge over the next 12-24 months

• There will be an Institute working party focussing on these and other IMAP issues during 2009/2010
Focus of today’s workshop

What we have done
• Selected a few of the most interesting/challenging requirements in CP56
• Spoken to a small sample of ‘keen’ capital actuaries to get views on these requirements might apply in practice

What we will cover today
1. Use Test
   • Planned uses for the internal model
   • Challenges in demonstrating the use test
2. Calibration
   • Plans to address some of the recalibration issues in Solvency II
3. Statistical Quality & Expert Judgement
   • What the requirements are for assumption setting
   • Possible responses
4. Meeting the entry criteria for the FSA’s first wave IMAP submission (“dry run”)
   • How much do you plan to achieve by April-October 2010
Introduction to IMAP

Preparing for Solvency II internal model approval

IMAP timetable

- Firms confirm intent to use internal models
- Firms clarify whether they intend to enter the wave pre-application process
- Firms work towards satisfying pre-application qualifying criteria
- Firms submit combination of pre-application qualifying criteria compliance
- Phased entry into the pre-application process
- First wave pre-application process
- Increasing dialogue with firms: guidance, supervisory engagement, feedback
- FSA develop thematic reviews to aid firms’ preparations
- Firms submit pre-application for review
- FSA review of “complete” application
- Second wave pre-application process
- Second wave applications
- Review of second wave
Requirements for internal model approval

The recent consultation paper specifies certain requirements that (re)insurers must pass in order to get their models approved to calculate their SCR.

**Use Test**
- Senior management needs to understand and control the risk and capital evaluations from the internal model as a core driver in its business planning and strategic decision-making processes.

**Statistical Quality (Data)**
- Evaluations need to be based on timely, reliable, consistent and comprehensive risk data and be underpinned by current, credible and verifiable risk assumptions.

**Calibration**
- Outputs need to be calibrated to a 99.5% value at risk (VaR) over a one year period.

**Profit and Loss Attribution**
- Companies need to regularly check whether the categorization of risk and attribution of profit/loss in their models accurately reflects the causes and sources of profit/loss within business units.

**Validation**
- Evaluations and underlying assumptions need to be regularly assessed against actual experience. Companies also need to gauge the sensitivity of outputs to changes in key assumptions.

**Model Governance**
- Not an official "test", however supervisors have emphasized its importance; the internal model may only be approved if the insurer has adequate governance and internal controls in place.

**External Models and Data**
- The tests specified apply also to data or models supplied by a third party.

Internal model definition

**ORSA**
- Reward Strategy
- Business Strategy
- Risk Mitigation
- Exposure Management

**Assumptions**
- Data systems (internal and external)
  - Assumptions from external models (e.g. ESG, Cat Models)
  - Reserving Models
  - Risk Register

**Calculation Kernel**
- Management Information
- Economic Capital Allocation
- Regulatory Capital

**Risk Management**
- Outward Reinsurance Purchase
- Financial Plans
- Financial Statements
Topic 1 – The Use Test

Use Test

Principles
1) Senior management shall be able to demonstrate understanding of the internal model.
2) The internal model shall fit the business model.
3) The internal model shall cover sufficient risks to make it useful for risk management and decision-making.
4) The internal model shall be widely integrated with the risk-management system.
5) The integration into the risk-management system shall be on a consistent basis for all uses
6) The internal model shall be used to support and verify decision-making in the undertaking.
7) The SCR shall be calculated at least annually from a full run of the internal model, and also when there is a significant change to the undertaking’s risk profile, assumptions underlying the model and / or the methodology.
8) The internal model shall be used to improve the undertaking’s risk-management system.
9) Undertakings should design the internal model in such a way that it facilitates analysis of business decisions.
Example Uses
Note these are potential examples of model uses set out in CP56, and do not form a ‘checklist’ or list of required uses for model approval

- Adequate pricing
- Asset / liability management
- Business planning / strategy
- Capital Management
- Development and monitoring of risk appetite
- Development of risk strategies
- Efficient use of capital
- Exposure management and limit setting
- External risk reporting
- Financial Reporting - internal model provides market valuations for IFRS
- Incentive / target setting
- Internal Risk monitoring (through MI)
- Investment decisions e.g. strategic, tactical and operational decisions
- M&A
- Measurement of material risks
- ORSA
- Other risk mitigation
- Portfolio transfer pricing
- Producing MI
- Product development / Pricing
- Regulatory capital (SCR for solo and for groups)
- Reinsurance decisions e.g. strategic
- Reinsurance strategy and development of reinsurance programme
- Reporting on MCEV / EV
- Reporting on business performance
- Risk Mitigation
- Setting profit targets
- Underwriting policies

Example Uses - Potential Priorities for Non-Life firms
Note potential areas of priority (in bold) are suggestions only

Within the Corporate Calendar
- Adequate pricing
- Asset / liability management
- Business planning / strategy
- Capital Management
- Development and monitoring of risk appetite
- Efficient use of capital
- Exposure management and limit setting
- Reporting on business performance
- External risk reporting
- Incentive / target setting
- Setting profit targets
- Product development / Pricing

Risk Management
- Measurement of material risks
- Development of risk strategies
- Other risk mitigation
- Internal Risk monitoring (through MI)
- Producing MI
- Risk Mitigation
- Underwriting policies

Strategic
- M&A
- Portfolio transfer pricing
- Reinsurance decisions e.g. strategic
- Investment decisions e.g. strategic, tactical and operational decisions

External Reporting
- ORSA
- Regulatory capital (SCR for solo and for groups)
- Reporting on MCEV / EV
- Financial Reporting - internal model provides market valuations for IFRS
Which uses might be in your ‘scope’ for the use test by 2011?

Strawman A: Small, mutual

Business Need
• Strong focus on downside risk management and policyholder protection
• Planning for capital calls, accurate pricing
• Limited resources, including management time and actuarial/modelling

Possible solution
• Annual or quarterly economic and solvency capital reporting
• Capital Planning
• Business Planning e.g. testing new plans
• Simpler Risk Management – quantifying, managing at mitigating risks
• Pricing?

Which uses might be in your ‘scope’ for the use test by 2011?

Strawman B: Medium Sized Corporate, Buys into Capital Allocation

Business Need
• Deliver on shareholder expectations
• Policyholder/ Broker relationships
• Monitoring risk-adjusted performance by LOB (e.g. RORAC)
• Optimise reinsurance purchase vs capital held

Possible Solution
• As A – with quarterly economic and solvency capital assessment
• Risk Appetite (e.g. EaR, VaR) quantified and monitored on quarterly basis
• Performance Targets integrated into business planning MI
• RI strategy developed using main or parallel (consistent) models
Which uses might be in your ‘scope’ for the use test by 2011?
Strawman C: Large, Group, Capital Allocation Sceptic

Business Need
• Deliver on shareholder expectations
• Policyholder/ Broker relationships
• Enhanced performance, risk and capital management - clear line of sight across divisions and entities

Possible Solution
• As A – quarterly or monthly risk & capital assessment
• Risk & Capital Metrics integrated into all business planning and governance MI (risk committee, underwriting, investment, reinsurance, etc)
• Risk Appetite (e.g. EaR, VaR) quantified and monitored by division/ entity
• Performance measured on risk adjusted basis by division and entity
• Portfolio / Reinsurance Optimisation [sic]

Use Test : Potential Cultural Challenges
Sample of top three issues from interviews

1. Demonstrating the Use Test
   • Senior Management Understanding
   • Evidence
2. Change in focus from regulatory (ICA) to economic
   • Focus on assumptions in near-term v tail
   • Consistency of assumptions for different uses/ decisions
3. How invasive to make the test
   • Built into decision making, before, during or after the decision (1st line)
   • Used as check/ test (2nd line)
Which of the following options best represents the likely use of your model by 2011 (=point of final submission)?

A  
Risk Appetite, Economic and Regulatory Capital Assessment, Business Planning, Strategic

B  
.....+ Use in Reinsurance Purchasing &/or Investment Decisions

C  
.....+ Performance Monitoring by LOB (e.g. RORAC)

D  
.....+ Pricing by policy/contract

Topic 2 - Calibration
Calibration of the SCR
The key difference – time horizon

“Firms’ economic capital might differ from regulatory capital as a result of a different calibration of the regulatory capital requirement compared with the firm’s risk appetite… for internal model approval, where firms develop their economic capital models to assess required capital at the level of their own risk appetite, they would then need to recalibrate to different levels, including the regulatory level of 99.5% over one year (SCR).”

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ICA (at t=0)
99.5% VaR over 1 year new business, emergence of risk measured over lifetime of liabilities

SCR (at t=0)
99.5% VaR over 1 year new business, emergence of risk measured over 12 month time horizon

Technical Provisions (at t=0) – Valuation Basis
Technical Provisions = Discounted Best Estimate + Risk Margin
Risk Margin = \( \sum (i) \) CoC factor \( \times \) SCR\( (i) \) \( \times \) v\( (i) \)

Determine the cost of holding future SCRs, by multiplying the projected SCR by the CoC factor
### What modelling approaches are being considered

**Some ‘strawmen’**

<table>
<thead>
<tr>
<th>Approach</th>
<th>Description</th>
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</table>
| Full Annual       | - Annual cash-flow modelling for years 1, 2, 3, …  
| Cashflow          | - Underwriting and reserve risk modelled on a more consistent basis  
| Modelling         | - Reserve deteriorations and investment income modelled on annual basis  |
| Half way          | - Explicit assessment of capital requirement in year 1  
|                   | - Deterministic pattern applied to run-off year 1 capital over years 2, 3, …  
|                   | (e.g. QIS4, SST, MCEV - in proportion to reserves or reserve volatility)  |
| No change         | - Model unchanged from ICA (run-off basis)  
|                   | - Deterministic pattern applied to total capital requirement to spread over  
|                   | year 1, 2, 3, …                                                             |
| Undecided         | - Waiting for additional guidance from the FSA and Lloyd’s                  |

*Route taken likely to depend on management’s requirements (e.g. risk appetite definition).*

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### How do you plan to calculate the SCR (1 year time horizon)?

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Full annual cashflow modelling</td>
</tr>
<tr>
<td>B</td>
<td>Half-way i.e. assess year 1 capital requirement</td>
</tr>
<tr>
<td>C</td>
<td>No change to ICAS model i.e. assess ‘to ultimate or run-off’ capital requirement</td>
</tr>
<tr>
<td>D</td>
<td>Undecided</td>
</tr>
</tbody>
</table>

*VOTE*
Requirements for statistical quality: CEIOPS view

An overview of the requirements

- **Probability Distribution Forecast**
  - Financial impact of future events must be modelled. Allows for continuous distribution or key points on distribution only.

- **Methodology & Assumptions**

- **Data Quality**
  - Applies to all data used in the model. Sufficiently accurate, complete & appropriate (without biases). Data policy, data quality control & monitoring in place. Expert judgement applied in translating data to assumptions.

- **Risk Mitigation**
  - Credit may be taken if risk mitigation is effective, enforceable and liquid in normal and stressed conditions. Secondary risks e.g. credit must be considered.

- **Risk Ranking**
  - All material risks in scope. Qualitative & Quantitative indicators. Model reflects risk management system. Model captures and differentiates between risks sufficiently to enable management decisions.

- **Diversification**
  - System to measure/recognise diversification must be adequate in normal and stress conditions – assumptions justified, drivers identified, robust validation, aligns to economic view of diversification benefits.

- **Future Management Actions**
  - Must be justified and evidenced e.g. future reinsurance purchase.
What role does expert judgement play in the stat quality test?
One interpretation of the current draft requirements

Methodology & Assumptions
- Actuarial & Statistical Methods must be “adequate” and fully justified
- Assumptions are “current & credible”
- “Competence” requirements - appropriate experience, qualifications & peer review

Data Quality (& Expert Judgement)
- Combination of expert judgement and data leads to model assumptions
- “Expert Judgement if admissible only if …
  … it is falsifiable, refutable, testable & applied with known or potential error rate
  … it is validated and documented”

Correlations
- Requires information or data which may not be available / is unknown
- Expert Judgement requirements then apply

Senior Management Understanding
- Management must demonstrate understanding of model limitations and show that
  these are considered in decision making
- Strengths and limitations of the internal model are understood & considered in
  decision making

What might the statistical quality test mean in practice?
Strawman A – More Explicit Assumptions (e.g. Parameterisation)

CP56 Draft Requirements
- All assumptions identified, justified and documented (5.115, 5.118)
- Explain significance, associated limitations, model risk, alternative assumptions and
  implications (5.116)
- Demonstrate senior management understanding of above (Principle 1)

Possible solution
- Enhanced documentation and version control (live or offline)
- Documented standards
- Where possible, statistical analysis (e.g. goodness of fit)
- External and internal benchmark data ?
- Clear governance & control, including independent peer review and internal audit
  testing
What might the statistical quality test mean in practice?
Strawman B – More Implicit Assumptions (e.g. Model Structure)

**CP56 Draft Requirements**
- Regular methodological reviews, including assessment of alternative methods
- Same requirements for justification, documentation and senior management understanding as for more explicit assumptions!

**Possible solution**
- Little appetite for anything more than peer review and external challenge
- Problems with objective tests (e.g. mini or parallel models, on / off switches) noted – including challenge to make these work in practice
- Stress/Scenario including reverse stress testing seen as a pragmatic solution

**Key challenge**
- To increase transparency around judgement / limitations, without

What might the statistical quality test mean in practice?
Strawman C – Materiality of Assumptions

**CP56 Draft Requirements**
- To assess materiality of assumptions (5.117)
- Qualitative and Quantitative assessment of materiality (5.117)

**Possible solution**
- Clear statement on materiality
  - opportunity to reduce burden of statistical quality, validation tests?
- Different views of materiality
  - Impact on SCR
  - Impact on key metrics (e.g. EaR)
  - Impact on users / decisions made (e.g. reinsurance purchase / pricing)
- Linking to users understanding of real world events
  - clearer understanding of key risk drivers & combinations of risk drivers
In which of following will you make progress over next 6-12 months?

A
Additional analysis (e.g. benchmarking, goodness of fit, etc)

B
Developing policy/standards on statistical quality

C
Communicating assumptions / limitations to users

D
Governance including documentation, peer review & Internal Audit testing

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Topic 4 – Planning for entry to the FSA’s First Wave Pre-Approval Process (“PreApp”)
Readiness for the “Pre-App”
The FSA’s view (from October 2008)

**Worthwhile initial progress** … we shall be discussing with the industry, in the IMEG and elsewhere, what kind of qualifying benchmarks should be set … they are likely to include …

- the QIS4 spreadsheet … and any QIS spreadsheet subsequently specified by CEIOPS or the Commission;
- made substantial progress towards documentation of its model, including an indication of progress towards satisfying the various requirements to be set;
- prepared a Solvency II implementation plan, to get its modelling, risk management and associated systems embedded and fully compliant;
- a plan to develop iteratively its internal model, including periodic recalculation of its SCR, through a systematic process designed to ensure continuing compliance with requirements’

FSA DP08/04

Requirements for IMAP submission to the regulator
CEIOPS view (CP37)

A. Cover letter requesting approval
B. Confirmation that all clarifications and documentation have been provided
C. Application approval from the administrative or management body
D. Results of the latest ORSA and details of business and risk strategies
E. Scope of application – full or partial model approval
F. Risk management process and risk profile
G. Self-assessment (of internal model for compliance with the six tests) including strengths and weaknesses of the model
H. Technical characteristics of the internal model
I. Use of external models and data
J. Model governance, systems and controls including documentation
K. Relevant organisation charts
L. Up-to-date independent review/validation report
M. Change policy for the full/partial model and other model governance policies
N. Plan for future model improvement
O. Capital requirement, including an estimate of the SCR using the standard formula
Which of the following activities do you plan to complete by entry to First Wave PreApp (April to October 2010)?

Some activities firms are considering now – note further FSA guidance will follow on form of PreApp submission

A. The basics – QIS4, implementation plan, self assessment v tests, documentation

B. Design of model governance and control framework

C. First attempt at ORSA

D. Fundamental ‘rebuild’ of ‘Solvency II’ model e.g. cashflows, investment

E. Independent Review/Validation

F. Calculation of SII capital requirement (SCR)

Questions and Close
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