ACTUARIAL WORK IN SOUTH AFRICA

Presented by Lusani Mulaudzi
IABA General Meeting
Boston Massachusetts, USA
August 2011
AGENDA

1. INTRODUCTION
2. BACKGROUND –SA
3. BACKGROUND –ASSA
4. HIV/AIDS MODELLING
5. LIFE INSURANCE INDUSTRY
6. SOCIAL SECURITY –RETIREMENT
7. ENTERPRISE RISK MANAGEMENT
8. HEALTHCARE INDUSTRY
9. EXAMPLES
INTRODUCTION

- President of (ASABA).
- studied at the University of Stellenbosch, BcommHons (Actuarial Science).
- recipient of the prestigious University of Stellenbosch Rector’s award for succeeding against odds in 2005 and 2006.
- qualified to graduate with a Postgraduate Diploma in Actuarial Science.
- Documentation subject outstanding to qualify as a Fellow of the Actuarial Society of South Africa (Awaiting results).
- Married, with a son aged 19 months
BACKGROUND - SA

- GDP -$360bn
- 1994- end of apartheid
- Unemployment rate -25%
- High income disparities
- HIV/Aids infection rate-17% of global aids burden
- Large scale poverty
- Two tier economy
• Founded in 1948
• Governance – actuarial profession
• Local qualification – mutually recognised UK
• Hosted ICA 2010
• Number of Practice Areas;
  • Life Insurance (36%)
  • Pension (20%)
  • Healthcare (9%)
  • Investments (12%)
  • General Insurance (11%)
  • ERM and others (12%)
BACKGROUND - ASSA

Fellows Split By Race

- Black: 5%
- Coloured: 7%
- Indian: 1%
- Oriental: 1%
- Unknown: 1%
- White: 86%
HIV/AIDS MODELLING

- Actuarial profession at forefront – modeling
- Metropolitan model – Peter Doyle - 1989
- ASSA500 - 1996 – model hypothetical population
- ASSA2002 – model effect of prevention + treatment programmes
- ASSA2003 – extended to other provinces
- Latest – ASSA2008 model
LIFE INSURANCE

Proportion of Companies in each Gross Premium Income Range

- <=R50,000,000: 9%
- R1,000,000,001-R10,000,000,000: 30%
- R50,000,001-R1,000,000,000: 24%
- >R10,000,000,001: 37%
LIFE INSURANCE

Number of Companies Writing Premiums in these Categories

- Assistance: 42
- Disability: 39
- Fund: 36
- Health: 28
- Life: 70
- Sinking Fund: 25
LIFE INSURANCE

Premiums Reinsured in each Category

- Assistance: 7.1%
- Disability: 14.7%
- Fund: 6.8%
- Health: 22.9%
- Life: 6.5%
- Sinking Fund: 0.2%
LIFE INSURANCE

Liabilities by Type of Business

- With-profit business: 36%
- Linked: 22%
- Shareholders: 6%
- With-profit annuities: 21%
- Market related: 5%
- Without-profit annuities: 8%
- Other: 2%
LIFE INSURANCE

CAR Ratios

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;=1</td>
<td>3</td>
</tr>
<tr>
<td>1.1-1.2</td>
<td>5</td>
</tr>
<tr>
<td>1.2-1.3</td>
<td>5</td>
</tr>
<tr>
<td>1.3-1.4</td>
<td>5</td>
</tr>
<tr>
<td>1.4-1.5</td>
<td>6</td>
</tr>
<tr>
<td>1.5-2</td>
<td>5</td>
</tr>
<tr>
<td>2.0-2.5</td>
<td>9</td>
</tr>
<tr>
<td>2.5-3</td>
<td>11</td>
</tr>
<tr>
<td>3.0-3.5</td>
<td>7</td>
</tr>
<tr>
<td>3.5-4</td>
<td>5</td>
</tr>
<tr>
<td>4.0-5</td>
<td>6</td>
</tr>
<tr>
<td>&gt;5</td>
<td>12</td>
</tr>
</tbody>
</table>
LIFE INSURANCE

Statutory Actuary Appointments

- 38% Deloitte
- 30% Jacques Malan
- 15% Quindiem
- 8% Other
- 5% Internal
- 4% QED
LIFE INSURANCE

- Performing statutory actuarial roles
- Embedded value and appraisal value calculations
- Analysis of surplus
- Product development and premium rating
- Experience investigations
- Projected accounts and budgeting
LIFE INSURANCE – CAR

- Part of Financial Soundness valuation of liabilities
- Protection against adverse shocks
- Regulatory warning sign
• 14million South Africans depend on social assistance’
• Reforms underway to address inequalities
• Pension funds favoured over Provident funds
• Move towards DC pension funds
• Actuaries required to investigate financial health of funds
• Introduction of National Social Security Scheme
• Mandatory participation
• Encourage participation in informal economy
• Preserve funds
ENTERPRISE RISK MANAGEMENT

• Reputation – increasing pressure from stakeholders, adverse incidents attract global attention
• Capital Markets – ability to raise capital; credit rating agencies;
• Boards – pressure to ensure effective risk governance; high-profile risk management failures
• Regulatory – increasing regulations focusing on risk governance
• Convergence – increasing trend to integrate risk functions and processes; eliminate duplications, reduce complexity.
Actuarial systems have typically grown organically

This has resulted in a very complex, poorly documented maze of models, tasks and processes

- Model and process risk
- Many manual, repetitive tasks, lots of re-work
- Key-person risk
- Difficulty in on-boarding new team members
- Limited end-to-end understanding of tasks
- Duplication of tasks
- Reduced ability to deliver on requirements and add value to the business
- Time spent on calculating numbers rather than delivering insights and adding value
- Slow and difficult to change
Economic capital is central to ERM

**Risk Management**
- How much risk do we want to take?
- What risks are in our business?
- How do we measure risks?
- What is our risk profile?
- How should we allocate our “risk budget” to different types of risk?
- How do we ensure we stay within risk limits?
- What is the most efficient organisation to monitor risks?

**Capital Management**
- How much capital should we hold?
- How can we optimise return on capital?
- Which business activities should we use our capital for?
- How should we distribute capital to business units or product lines?
- How well is capital being used?
- How can we measure performance?

**Economic Capital Requirement**

- **Shareholders**
- **Policyholders**
An ERM solution should consider the entire end-to-end process

Example: Solvency II/SAM process

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>• External and internal data sets required by the calculation and reporting.</td>
<td>• Collect and transform the data required by the calculation and the reporting.</td>
<td>• Aggregation/grouping of assets and liabilities.</td>
<td>• Calculation of technical provisions and capital requirements for all risk classes.</td>
<td>• Internal and external reporting.</td>
</tr>
<tr>
<td></td>
<td>• Quality control, correction and validation.</td>
<td>• Economic scenario generation.</td>
<td>• Aggregation and consolidation.</td>
<td>• Validation of the reports.</td>
</tr>
<tr>
<td></td>
<td>• Model point files.</td>
<td>• Experience analysis and assumption setting.</td>
<td>• Balance sheet &amp; income statement projection</td>
<td>• Publication of the external reports to the regulator and the market.</td>
</tr>
</tbody>
</table>

6. Workflow management

7. Data archiving

Integration will be critical to successful implementation.
Regulatory and business demands driving ERM implementation

Actuarial functions will require stronger controls, less manual intervention and more robust IT systems

<table>
<thead>
<tr>
<th>Objective</th>
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<tbody>
<tr>
<td>• Business requirement for:</td>
</tr>
<tr>
<td>• More active (and proactive) risk and capital management</td>
</tr>
<tr>
<td>• Quantification of risk (e-cap)</td>
</tr>
<tr>
<td>• Risk adjustment of decision making processes (e.g. ALM, pricing, product design)</td>
</tr>
<tr>
<td>• Boards requiring better understanding of risks</td>
</tr>
<tr>
<td>• SAM/Solvency II compliance</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Key Implications for actuarial functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Production of timeous and accurate finance, risk and capital MI critical:</td>
</tr>
<tr>
<td>• Hard close (incl. e-cap) at least quarterly, reasonable estimates more frequently</td>
</tr>
<tr>
<td>• Regular risk metrics based on how active risk management is</td>
</tr>
<tr>
<td>• Speed essential</td>
</tr>
<tr>
<td>• Integration of risk, capital and finance information</td>
</tr>
<tr>
<td>• Flexible analysis &amp; reporting capability (what ifs/stress tests)</td>
</tr>
<tr>
<td>• Greater scrutiny and more extensive oversight requiring more robust controls</td>
</tr>
</tbody>
</table>
Shifts required in actuarial functions in order to meet the new requirements

<table>
<thead>
<tr>
<th></th>
<th>Typical current state</th>
<th>New world</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controls</td>
<td>Key people, heavy reliance on top-down macro controls (e.g. AOS)</td>
<td>Fully embedded SDLC, strong documentation, robust testing, detail controls automated</td>
</tr>
<tr>
<td>Actuarial organisational</td>
<td>Model dev &amp; use combined, models developed separately for prod dev &amp; valuation functions</td>
<td>Integration of model build for all functions (prod dev and valuations), clear separation of model development from production; independent model validation</td>
</tr>
<tr>
<td>structure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Segregation of duties</td>
<td>No clear segregation of duties, often sign off on own work</td>
<td>Risk Management function (policy and oversight) separate from business (day to day management)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Statutory Actuary?</td>
</tr>
<tr>
<td>IT organisational structure</td>
<td>Actuaries UDI</td>
<td>Specialised IT support for actuarial systems</td>
</tr>
<tr>
<td>Actuarial Culture</td>
<td>Actuarial DIY – particularly in interactions with IT</td>
<td>Specialist IT and actuarial skills leveraging off each other;</td>
</tr>
<tr>
<td></td>
<td>“Trust me, I’m an actuary” and actuarial judgement</td>
<td>Transparent, open to challenge, peer review and validation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Expert judgement the domain of a wider group of experts</td>
</tr>
<tr>
<td>Risk, Finance and Actuarial</td>
<td>Don’t always get each other</td>
<td>Risk, finance and actuarial interacting very closely</td>
</tr>
</tbody>
</table>

Careful change management will be critical.
### Shifts required in actuarial functions in order to meet the new requirements

<table>
<thead>
<tr>
<th></th>
<th>Typical current state</th>
<th>New world</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Infrastructure</strong></td>
<td>Desktop based</td>
<td>Server based and possibly externally hosted, fully productionised (HA, DR, monitoring)</td>
</tr>
<tr>
<td><strong>Models/Applications</strong></td>
<td>In-house developed &amp; multiple systems</td>
<td>Single enterprise application, vendor solutions</td>
</tr>
<tr>
<td><strong>Data management</strong></td>
<td>Weak governance, multiple feeds</td>
<td>Single golden data source, data disciplines, results managed as data</td>
</tr>
<tr>
<td><strong>Process management</strong></td>
<td>Often ad-hoc and people dependent or long list of steps in spreadsheet</td>
<td>Automated workflow management system</td>
</tr>
<tr>
<td><strong>Documentation</strong></td>
<td>What documentation?</td>
<td>Knowledge management framework; documentation of policies, procedures, methodology...</td>
</tr>
<tr>
<td><strong>Spreadsheets</strong></td>
<td>Used rampantly and typically poorly controlled</td>
<td>Largely replaced by database or mainstream modelling solutions; Clear spreadsheet standards and some form of SDLC</td>
</tr>
<tr>
<td><strong>Costs</strong></td>
<td>Shoestring</td>
<td>Larger (hopefully not too much larger!)</td>
</tr>
</tbody>
</table>

Each organisation will face different challenges in the detail.
HEALTHCARE

• Two health systems in South Africa
• Cost of Private Health Care out of control
• Cost of Public Health Care escalating at the expense of the fiscus
• Both Public and Private Health Sectors engaging very destructive, unsustainable, expensive curative health care system
Two healthcare systems in South Africa – Private and Public

Cost of Private Health Care out of control
Cost of Public Health Care escalating at the expense of the fiscus

Both Public and Private Health Sectors engaging very destructive, unsustainable, expensive curative healthcare system

ADULT CIRCUMCISION CHARGES FROM DIFFERENT PRIVATE HEALTHCARE PROVIDERS.

1. 
2. 
2.1. Hospital fees: At about R10000.00.
2.2. Urologist R1500.00
1.3. Anesthetist: R1200.00

2.1. Hospital Fees: R8200.00 for thirty minutes in theatre,
2.2. Urologist: R2000.00
2.3. Anaesthesist: R1800.00.

One of the urologist can do the procedure in his rooms, for R1500.00 (cash inclusive),

3.1. Hospital: R4184.00
3.2. Urologist: R1200.00
If the urologist do the procedure under local in his rooms at the same private clinic, he charges R1000.00 for cash which includes the local anaesthetic, the procedure and his/her fees.

4.1. Hospital Fees: R13880.00
4.2. Urologist: R1500.00
4.3. Anaesthetic: R900.00

5. G.P S’ In the townships: R600.00 to R1200.00 (inclusive).

NB: Hospital fees are for general Anaesthetic and day procedure. No other night admission. Fees can fluctuate if the procedure gets longer. These were based on the minimum of 30 minutes theatre time.

All procedures quoted are- surgical excisions. No clamp procedure,
...while hospital costs were stable (at a very high level) from 2004 to 2008, it increased again in 2009...
...hospitals demonstrated a large growth in their return on investment...
Principles of the NHI

• **The Right to Health**
  - Free at the point of use;
  - Rational choice of provider of care

• **Social solidarity & Universal Coverage**
  - Universal access to health services that meet established and acceptable quality standards
  - Mandatory progressive contributions according to their ability to pay
Considerations for achieving Universal Coverage - Dimensions


Three dimensions to consider when moving towards universal coverage:

- Population: who is covered?
- Extend to non-covered
- Current pooled funds
- Services: which services are covered?
- Direct costs: proportion of the costs covered
- Include other services
- Reduce cost sharing and fees
Current Service Delivery Platform: High Cost Curative Model

- Quaternary Curative Care Health Care
- Tertiary Level Services (Level 3 beds)
- Secondary Level (Level 2 beds/Regional)
- District Level (Level 1 beds)
- Primary Health Care
Ideal Service Delivery Platform in a Mature NHI System

Primary Health Care
(Clinic, CHC, Multidisciplinary Group Practices, Allied Health Professionals and Community Healthcare Teams)

District Level
(Level 1 beds)

Secondary Level
(Level 2 beds/ Regional)

Tertiary Level
(Level 3 beds)

Quaternary Level
(Level 4 beds)
HEALTHCARE - Private

- Consulting actuaries for Medical Schemes
- Benefit design and Pricing
- Projections of Income Statements – monthly
- Risk management
- Claims run offs
- Seasonality patterns
- Mergers
- Marketing
# MEDICAL SCHEME INCOME STATEMENT

<table>
<thead>
<tr>
<th></th>
<th>Actual</th>
<th>Budget</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contributions</td>
<td>128.6</td>
<td>125.6</td>
<td>3.0</td>
</tr>
<tr>
<td>Less claims</td>
<td>125.1</td>
<td>118.1</td>
<td>7.0</td>
</tr>
<tr>
<td>Less cap fees</td>
<td>0.6</td>
<td>0.4</td>
<td>0.2</td>
</tr>
<tr>
<td>Less expenses</td>
<td>10.4</td>
<td>10.0</td>
<td>0.4</td>
</tr>
<tr>
<td>Net Underwriting Result</td>
<td>-7.6</td>
<td>-3.0</td>
<td>-4.6</td>
</tr>
<tr>
<td>Inv income &amp; Other Income</td>
<td>6.2</td>
<td>7.4</td>
<td>-1.2</td>
</tr>
<tr>
<td>Surplus</td>
<td>-1.4</td>
<td>4.3</td>
<td>-5.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Actual</th>
<th>Budget</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surplus as % of Conts</td>
<td>-1.1%</td>
<td>3.5%</td>
<td></td>
</tr>
<tr>
<td>Solvency</td>
<td>50.0%</td>
<td>55.0%</td>
<td></td>
</tr>
</tbody>
</table>
GROWTH IN DEMAND

- Solvency 2
- Treating Customers Fairly – communication
- New legislation
- African markets
- Local education
- Investments
- Banking
- Wider fields – Utilities, Transport companies
EXAMPLES

VALUATIONS

• Preparing data – DCS
• Running model points – Prophet
• Assumptions included in Prophet
• Extracting results from Prophet
• Consolidating results into financials
• Analysis of results
• Discussions
EXAMPLES

LIFE CONSULTING

• Complete actuarial valuations in life environment from data to final published results.
• Product development and pricing of products using Prophet in lower income market
• Management of Bancassuarance in our partner countries
• Reporting actuarial numbers such as VNB, API and Operating Profit to management
• Ad-hoc investigations into commission, lapses, mortality etc.
EXAMPLES

LIFE CONSULTING (2)

- Solvency II Prophet development,
- Prophet and DSC training,
- Prophet workspace review,
- valuation of life insurance business,
- reviewing clients’ in-house valuations for adequacy and soundness,
- individual and group life product pricing and systems development.
FINANCIAL ANALYST

- Reviewing actuarial financials and liaising with actuarial finance to develop management information which assists the Executive Committee in driving strategic direction for the largest and most complex business in Old Mutual South Africa.

- Economic modelling of key financial metrics within Retail Affluent,

- Performing a financial analyst role monitoring and reporting key trends in the industry and in competitor financials.

- Investigating and researching various ad-hoc business issues, strategic initiatives and developments, often operating and liaising across different business units (product development, distribution, accounting, auditing, servicing, legal).

- Working closely with Retail Affluent Strategy in collating and coordinating Retail Affluent forecasts/strategy and target setting and the three-year business plan.
CONCLUSION

- South Africa is the capital of Africa
- As the African economy grows, South Africa’s role will expand
- Risk management is key in growing economies
- Actuaries should be at the forefront of risk management
- Actuaries should be more entrepreneurial—expand work opportunities in Africa
- Training and development of black people in actuarial profession—key challenge