YSOFT's

RADAR

The Risk Management model
with Asset-Liability management tools

The forward-looking management information tool for senior insurance executives

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A simple to use yet sophisticated modeling tool, designed to aid board level decision making within the Insurance industry. Providing a deeper insight into management problems, therebye aiding the search for solutions.

User benefits

- Optimise projected Surplus
- Improve return on capital within acceptable and evaluated levels of risk.
- Understand and control the principal risks affecting a non-life insurance business.
- Provides timely, forward looking management information.
- Know the contribution likely to be made to projected Surplus by the different components of the business.
- No surprises! Subject the budget to stress tests using scenario and probability analysis.
- Evaluate both assets and liabilities in terms of volatility of expected returns.
- Define the insurance business in terms of cost of funds.
- Find the best investment structure for the chosen insurance risk profile.

Objectives

Assets – the objective of the asset part of the model is to make decisions about the allocation of the investment portfolio so as to provide the desired risk: return profile for the market value surplus in the forecast period, taking into account the insurance liabilities.

Liabilities (particularly insurance) – the objective of the liabilities modeling process, which uses estimates of the future cash flows, including the cost of run-off, is to find the underwriting profile that provides the highest expected return commensurate with an acceptable level of risk. The liability, or insurance part of the model determines, or drives, the assets profile.

Surplus (assets minus liabilities) – the prime purpose of the model is to maximise the surplus whilst, at the same time, minimising the risk of the surplus being eroded, particularly by future risk.

Regulatory constraints – to take into account the regulatory or statutory rules that the insurance industry has to work within, such as solvency margins and statutory accounting rules.

Radar is about optimising Surplus within the operating and capital constraints of the Insurance industry.

Features

- Models both sides of the balance sheet, applying cash flow analysis to the whole of the business and;
- does this in a probabilistic and realistic way that reflects the complexities of real life, something that traditional models cannot do.
- Uses 3 definitions of surplus, **Market value** basis, **Statutory accounting** basis and **Solvency** basis.
- Allows 'what-if' modeling and the evaluation of different scenarios as well as looking at the probability of a particular outcome occurring (value at risk) using Monte Carlo simulation. Simulation is applied to the variables that have future uncertainty (**loss ratios**, **yield curves**, **equity indices**, **exchange rates**).
- Benchmarks the company's performance using key ratios, enabling comparison of peer performance.
- Values the business – allows a value to be calculated for the business
- Variables (loss ratios and claims development, yield curves, exchange rates, expenses and tax) can be easily input and changed.
- Allows the user to see the effect of different underwriting portfolio strategies.
- Includes a sophisticated investment calculator for investment by investment input; alternatively input portfolio summaries. The user can see how different asset allocation strategies change the surplus and risk profile.
- Handles up to 5 accounting currencies, 125 underwriting classes and offers a multitude of reports and over 100 graphs and key ratios.
- Runs within Microsoft's Windows and Excel; no special operating software required.

Key issues or questions that Radar answers (cont'd on back page)

What is the real value of the company?

Involved in acquisitions, need a tool to aid valuation?

Can I increase Surplus without damaging solvency margin or credit rating?

Introduction

This remainder of this document illustrates ***just some*** of the many features available in the Radar risk management and forecasting model for non-life insurance companies. The company used, XYZ Insurance Company, a fictional one, keeps it's trial balance in two accounting currencies and writes five classes of business.

This document illustrates a further advantage accruing from Radar having been developed using Excel as the development container:–

a) Users familiar with Excel can create their own graphs and reports and have these directly linked to Radar.

b) Radar graphs and reports can be easily added to presentations or documents, such as this one, as Radar is an integral part of the Office suite.

c) Transferring data from accounting systems to Radar becomes straightforward.

Sections

The following sections are contained in the remainder of this document:

1) **Balance sheet summary** – Comments on some of the information available in the Balance sheet summary report; this shows the forecast balance sheet in market value, book and solvency forms.

2) **Ratios** – Example of some of the ratio data available.

3) **Underwriting data** – Illustration of some of the underwriting analytics.

4) **Value at Risk** – A third party application is included with Radar; this allows multiple forecast simulations to be run and probabilities of the forecast occurring to be calculated. Use of this package and third party financial functions, which are also supplied with Radar, can be used outside of the Radar model.

In Radar, all major variables can be changed at will and each forecast scenario can be saved for future reference.

Projected Surplus can also be calculated on a probability basis using Monte Carlo simulation; simulations are run against the user's core forecast which acts as a starting point for the probability distribution analysis. Probabilities of a forecast occurring can then be calculated.

A 5 year projection is easily created from the core forecast using ratios or trends.

1. Balance sheet summary

There are three ways to calculate the forecast Surplus (assets minus liabilities) and balance sheet in Radar:

a) market value basis – net present value of estimated future cash flows;

b) book value basis – akin to the annual, statutory balance sheet and

c) solvency value basis – incorporating the main DTI requirements or constraints.

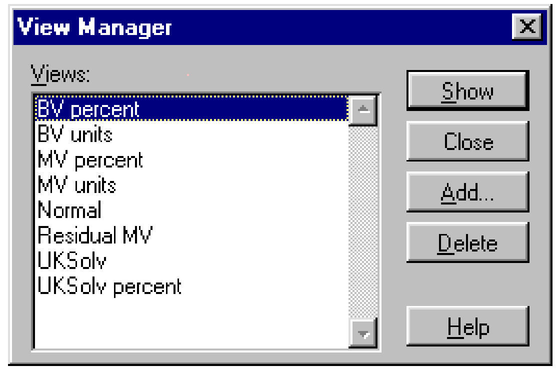


Figure 1:

A report such as the Balance sheet can be viewed in a number of different ways; for example in Figure 1 clicking “MV units” shows the balance sheet in market value mode (see adjacent) which can be printed.

Market value basis shows assets & liabilities at net present value of estimated future cash flows

The reports also show the probability of losses, which have been used for the reserving forecast, actually occurring and the risk attached to forecasts.

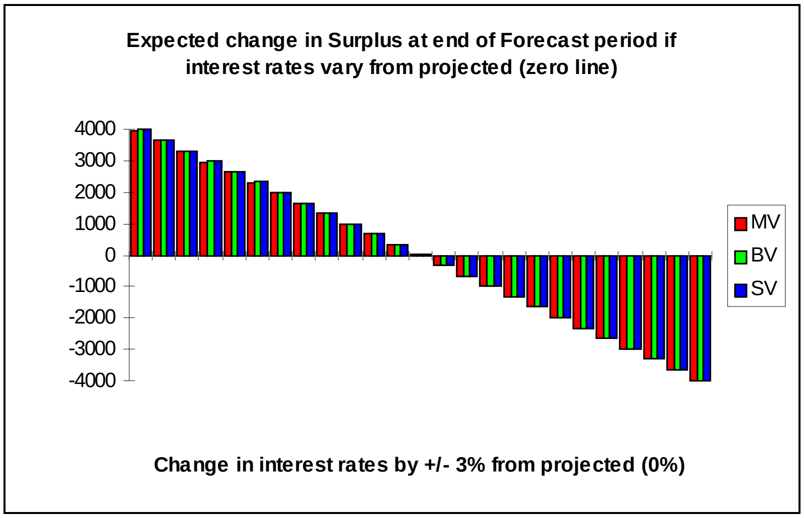
MARKET VALUE				XYZ Insurance Company		
ZAR		31/12/97		31/12/96	1995	199
ASSET		FORECAST	ORIG. F'CST			
Propert		0	0	0		
Equitie	Y	9,370	3,505	3,612		
Mortgage		0	0	0		
Bonds		2,362	105	127		
Cash		2,925	10,799	3,843		
		14,657	14,410	7,582	0	
Insurance		524	524	529		
Other		(335)	(335)	98		
		14,846	14,599	8,209	0	
MDUR-		8.94	3.31	5.90		
CONV-		0.04	0.01	0.01		
RISK		15%	7%	11%		
IRR%		3%	3%	3%		
VOL*		(643)	(244)	(172)		
LIABILITIES						
Reserve	p	1,719	1,642	463		
Other		1,512	1,542	673		
		3,230	3,184	1,136	0	
MDUR-		0.13	0.15	(0.07)		
CONV-		12.05	14.11	(39.62)		
RISK	Risk(a	12%	8%	10%		
IRR%		12%	12%	21%		
VOL*		(32)	(36)	(61)		
MARG%		#VALUE!	#VALUE!	#VALUE!		
SURPLUS		11,616	11,415	7,073	0	
*Net of Tax						
CURRENCY ANALYSIS		%	%	%	%	%
	ZAR	87%	87%	100		
	USD	13%	13%	0%		
	USD	0%	0%	0%		
	FALSE	0%	0%	0%		
	FALSE	0%	0%	0%		
		100	100	100	0%	

Discounted cash flow measures are calculated from estimated cash flows; providing a wealth of management information

Estimates are done in accounting currency so that currency exposures can be calculated

Balance sheet summary cont'd

With the forecast market value surplus calculated and DCF factors known, the sensitivity of the surplus to changes in interest rates can be estimated, as the graph illustrates.



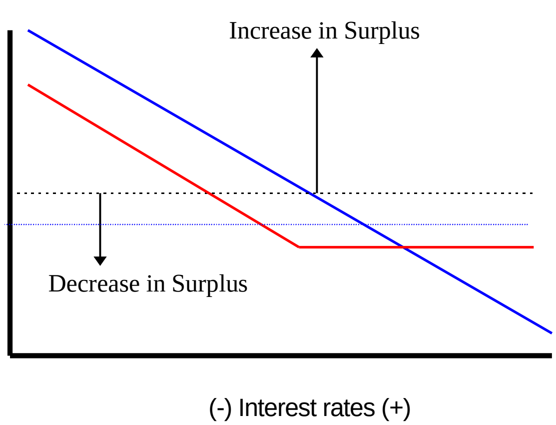
SURPLUS			
Per Book	9,825	9,693	6,174
Reserve	2,457	2,533	1,382
Investments	0	0	0
Addl. Exch. G/L	0	0	0
Tax on Revaln.	(668)	(813)	(484)
	11,615	11,414	7,072
SURPLUS:			
MDUR - yrs	11.39	4.19	6.86
CONV - yrs	(3.30)	(3.92)	6.37
IRR%*	3%	3%	3%
VOL* (ooo)	(610)	(208)	(111)
MARG%*	#VALUE!	#VALUE!	#VALUE!
RISK%	16%	7%	11%
CURRENCY EXPOSURE	ZAR	USD	USD
Opening	7,073	0	0
Change p/e 31/12/97	3,089	360	0
Closing	10,163	360	0
Gain/loss +/-10% E/R change in	0	(132)	0
Total	(132)		

The system also analyses the surplus by constituent currencies, calculates currency movements &, in this case, the expected additional loss if exchange rates at the forecast period end are 10% worse than forecast.

Reports and graphs can be produced to show the balance sheet in all 3 modes and, on a book value basis, a revenue and profit and loss account is produced as well as a cash flow forecast report.

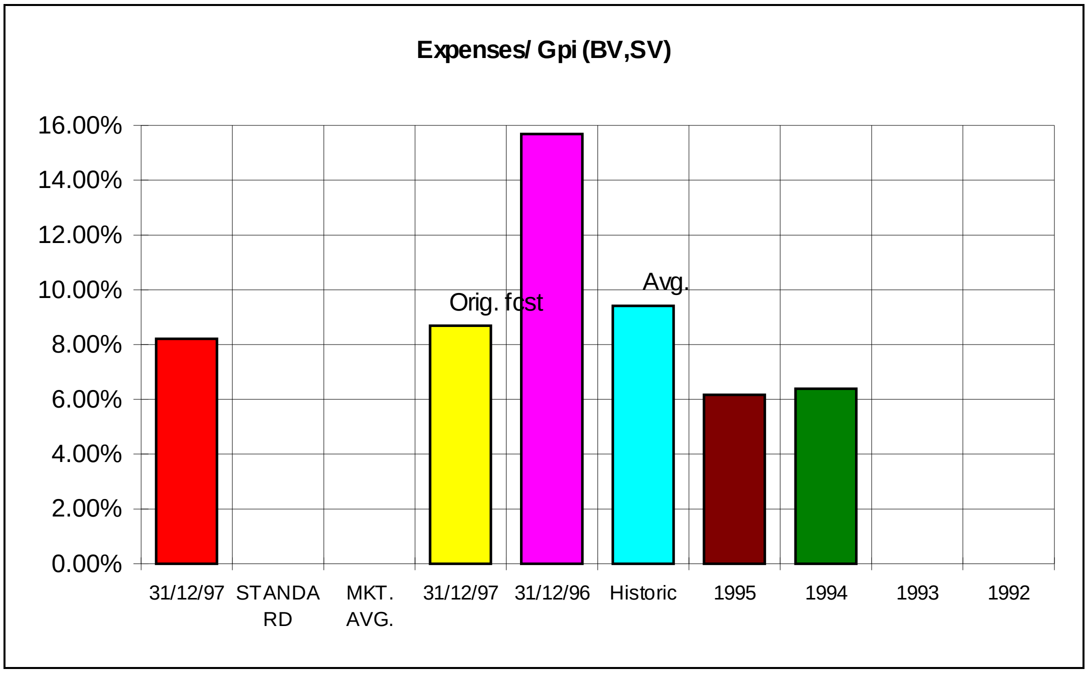
Investment strategies:

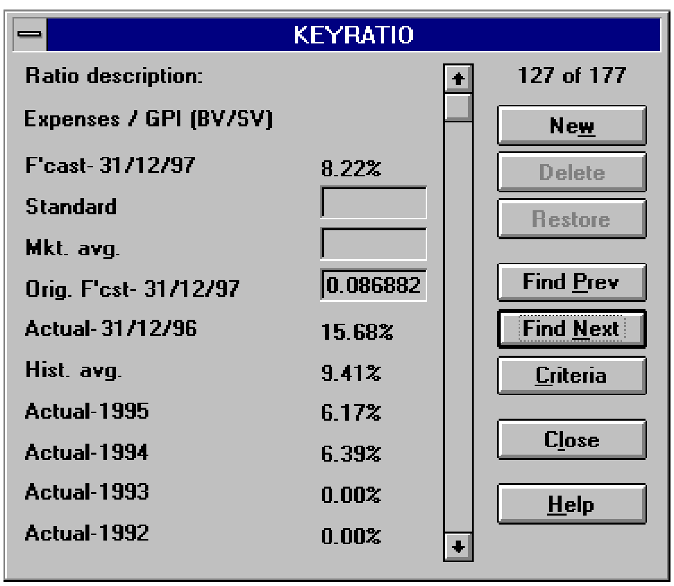
With the information that Radar provides, surplus optimisation investment strategies (including exchange rate exposure management) can now be adopted with confidence, therebye adding to the competitive advantages that the model brings within reach.

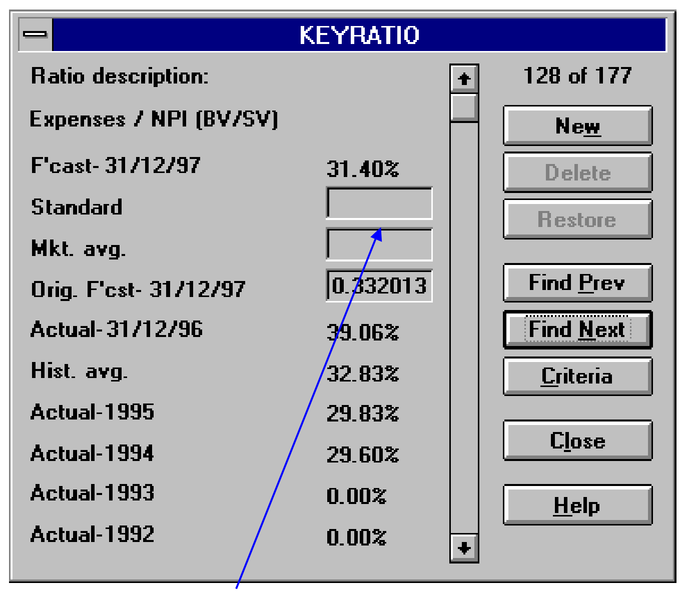


2. Ratios

Radar generates many key ratios which can be viewed as a report, in printed form or on screen, as a graph or in a dialog box.



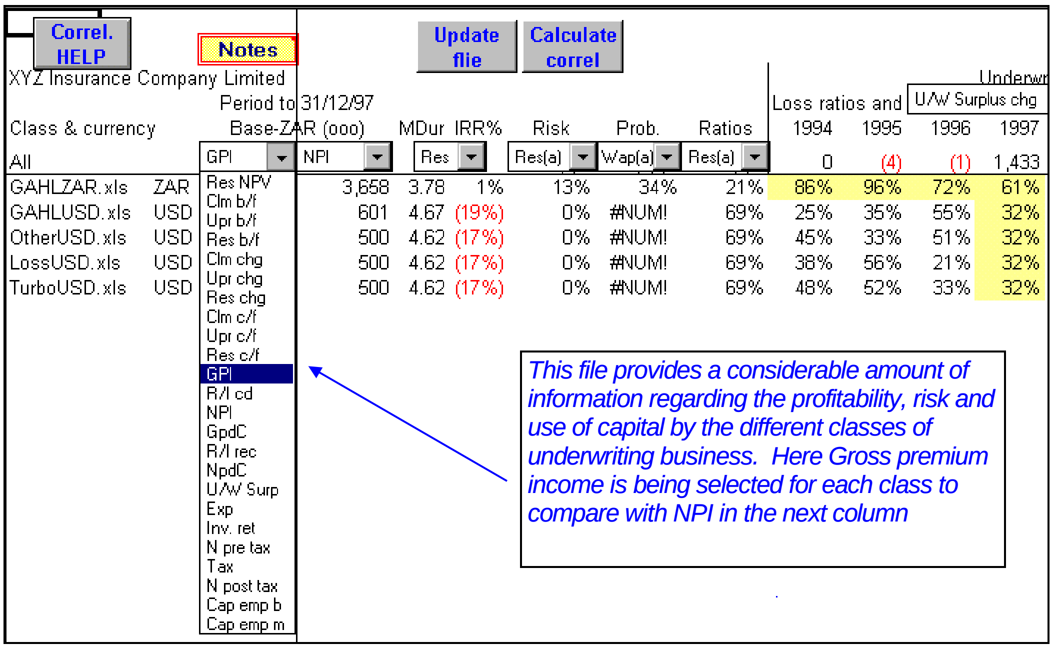




Users can also input their own market, or standard, ratios for comparison

3. Underwriting data

Underwriting data is input at a triangular level and the model requires that projections are made for loss ratios and development; tools are available to help do the projections. Comprehensive reports are produced, the picture below being a snapshot of the Underwriting summary file:



Class & currency				MDur	IRR%	Risk	Prob.	Ratios	1994	1995	1996	1997
All		GPI	NPI	Res		Res(a)	Wap(a)	Res(a)	0	(4)	(1)	1,433
GAHLZAR.xls	ZAR		3,658	3.78	1%	13%	34%	21%	86%	96%	72%	61%
GAHLUSD.xls	USD		601	4.67	(19%)	0%	#NUM!	69%	25%	35%	55%	32%
OtherUSD.xls	USD		500	4.62	(17%)	0%	#NUM!	69%	45%	33%	51%	32%
LossUSD.xls	USD		500	4.62	(17%)	0%	#NUM!	69%	38%	56%	21%	32%
TurboUSD.xls	USD		500	4.62	(17%)	0%	#NUM!	69%	48%	52%	33%	32%

Correlation – the Underwriting summary file is also used to estimate the correlation between underwriting classes. For example, based on historical data, it is likely that the underwriting classes (indicated by blue circles), in the correlation report below, will produce either underwriting profits or losses at the same time.

XYZ Insurance Company Limited

U/W years included in Correlation Matrix: 1994 to 1997

	GAHLZAR.xls	GAHLUSD.xls	OtherUSD.xls	LossUSD.xls	TurboUSD.xls
GAHLZAR.xls	1				
GAHLUSD.xls	-0.554837465	1			
OtherUSD.xls	0.487767105	0.543365359	1		
LossUSD.xls	0.992893231	-0.452398386	-0.455290417	1	
TurboUSD.xls	0.938373433	-0.489880035	-0.167552464	0.931919938	1

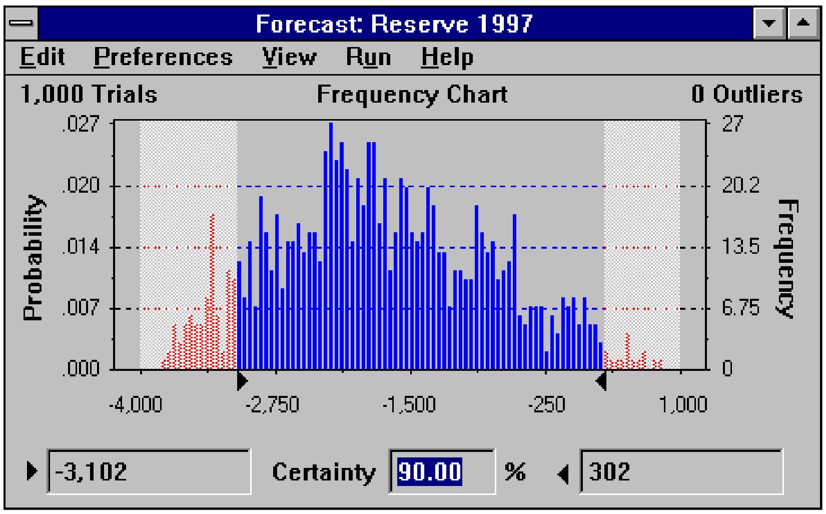
Reports and graphs can also be produced at an individual underwriting class level. For example, graphs can plot the actual and projected premium and claims development for an underwriting year. Or the user can plot the financial results for the year being forecast and which are calculated, by the model, to be attributable to that class of business. Radar allocates capital, investment return and expenses to each class of business being modeled.

4. Value at Risk

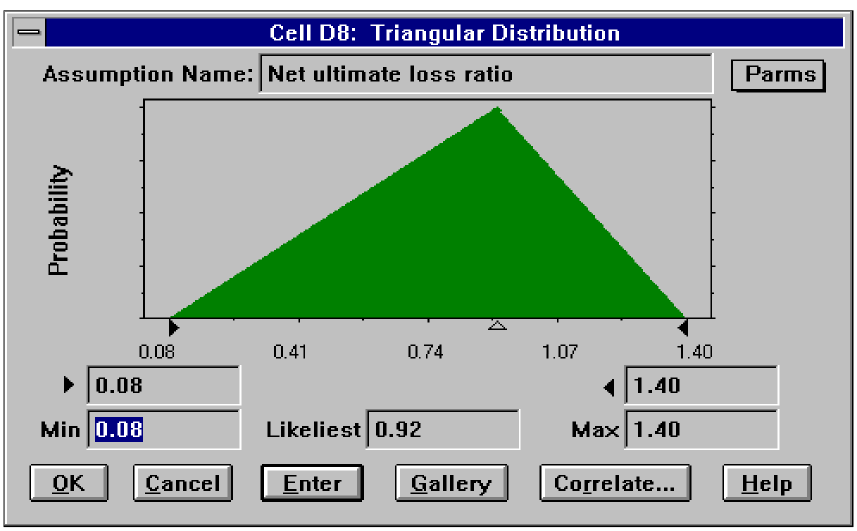
Apply multiple forecast simulations to your core Radar forecast and determine the Value at Risk.

VAR summarises the predicted maximum loss (worst loss) over a target horizon within a given confidence interval (certainty level).

Bundled with and linked to Radar, is a third party simulation application which allows the user to:



- create a best fit probability distribution for historic data and apply probability distributions (e.g. the Triangular distribution graph below) to the model's variables;
- run multiple simulations to generate forecasts (the Forecast reserve graph above);
- produce sensitivity analyses – see which variables have the most affect on the projected results;
- An Optimisation calculator is also included (Windows 95/ NT version only).



These features can be applied at any level you choose within the Radar model, ranging from:– **individual classes** through to the **whole account** and both sides of the **Balance sheet** to the **Surplus**.

Key issues or questions that Radar seeks to answer

Financial

How adequate is our capital base?

Can I securitise (take off balance sheet) some classes of business?

Can we make money out of run-offs, how should we price run-off business?

How do we compare against our competitors?

Will the action I'm taking improve our peer group standing, will our credit rating improve, worsen?

Being left behind by changes in the industry, the way it does business, calculates risk?

Underwriting

Are the reserves adequate, how do they compare with historic reserving?

What's the probability that reserves are inadequate?

Are we taking too much risk for too little reward? Can we take more risk?

What's the real profit of class A, is it too risky/ volatile?

How good is the reinsurance programme, should we be using derivative products as well?

Is there a correlation between the losses over different underwriting classes; how do we reduce risk concentration?

'What-if'

I need answers, fast – what happens to Surplus/ Solvency margins/ return on capital if: –

- interest rates rise by X%, fall by Y%, the yield curve changes shape;
- $:£ exchange rate goes from 1.52 to 1.68;
- Equity market falls by 10%, 20%;
- I cut the expense ratio to 5%;
- we change the asset allocation;
- loss ratios for class A are 200% instead 95%;
- development pattern changes

Management accounting

I need the figures now! Why wait until accounts/ actuarial/ underwriting departments can get round to it.

Concerned about the real value of the budget exercise? Like to do it better, quicker, on an ongoing basis?

E-mail mailto:contact@consultdatex.com **for further information**