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## Overview

### The need

With Solvency II on the horizon, Legal & General needed a risk modelling solution to calculate its capital requirements. The company saw this as an opportunity to gain deeper insight into risk across its business.

### The solution

Legal & General used the IBM® Algorhythmics® Economic Capital, Enterprise Risk Management and Solvency II solution to enable a simulation-based approach for determining solvency capital, modelling each asset individually and using curve-fitting techniques to model liabilities.

### The benefit

A simulation-based approach for capital modelling can often produce lower capital requirements than a factor-based approach, and enables better decision-making with greater visibility of risk at different levels within the organisation. The IBM solution supports multiple types of risk modelling with a single standardised platform.

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# Legal & General takes a sophisticated approach to capital modelling

*Developing powerful “what if” analysis capabilities for economic capital and beyond*

How can you stop seeing regulatory change as an obstacle, and start seeing it as an opportunity?

As regulators in the insurance sector increase their focus on risk management, insurers need to respond quickly to put new systems and processes in place. Many have taken a bare-minimum, box-ticking approach to compliance; but Legal & General’s philosophy has been quite different.

By treating the modelling requirements of the EU Solvency II Directive as an opportunity to enhance its risk management capabilities, the business has built a solution that delivers value far beyond the scope of compliance.

## Setting the scene

For more than 175 years, Legal & General has been a leading player in the UK general insurance, life insurance, pensions and investments sectors. The company now operates internationally in Egypt, France, Germany, the Gulf, the Netherlands and the USA, and offers customers a broad spectrum of financial and insurance services. In 2012, the company generated £1,087 million in operating profits before tax, and managed assets worth a total of £406 billion.

Like all insurers in the European Union, Legal & General will be obliged to comply with the Solvency II Directive, which is expected to come into effect in 2016. The directive aims to set new standards for risk management in the industry and ensure that all insurers reserve sufficient risk-based capital to meet their projected policy-holder obligations.

One of the three main “pillars” of Solvency II describes the framework and approach for determining the solvency capital requirement (SCR). Given the complexity of SCR calculations, insurers will need to adopt or develop a risk modelling capability that can accurately calculate the amount of capital that needs to be held.



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## Solution components

### Software

- IBM® Algorithmics® Economic Capital, Enterprise Risk Management and Solvency II solution
  - IBM Algo One Economic Capital and Solvency II Capital Workflow Manager
  - IBM Algo One Economic Capital and Solvency II Base®
- IBM Algo Asset Liability Management

### Services

- IBM Business Analytics Software Services
    - IBM Lab Services
    - IBM Risk Analytics Support
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## Solvency II and beyond

Robert Jamieson, Director of Risk Solutions & Analytics at Legal & General, comments: “We knew that developing an internal model for Solvency II compliance would be a major investment, but we also realised that if we could create a robust, versatile, high-performance platform for risk modelling, we would be able to use it for much more than just Solvency II calculations.”

To achieve its ambitions fully, Legal & General’s new solution would need to be able to model all of the company’s assets at an individual level – an enormously complex task involving vast quantities of data. It was also vital to gain a deeper understanding of the company’s liabilities, and then combine the two in order to model the entire balance sheet. To cover both asset and liability modelling, Legal & General needed a platform that could scale to perform all the necessary calculations reliably and rapidly.

## Finding the best-fit solution

The company performed a very detailed evaluation of the various solutions available on the market, and ultimately selected the IBM Algorithmics Economic Capital, Enterprise Risk Management and Solvency II solution rather than alternatives from several major competitors.

“Because we decided to use a model that goes down to the individual asset level, rather than using less accurate short-cut techniques, the robustness and scalability of the solution were the top priorities,” says Jamieson. “Large, complex calculation runs are exactly what the IBM Algorithmics solution is designed for, and we felt it would be a better fit for our requirements than some of the other options that we looked at.

“We also needed a solution that could bring advanced modelling techniques into play to address the far more complex issue of modelling our liabilities. Getting down to a level where we could model each liability individually is simply not practical with today’s technology, so we had to find a faster approach that would still give us an accurate understanding of the liability side of our balance sheet. The IBM Algorithmics solution’s support for curve-fitting techniques gave us an ideal tool to address this need.”

## Staged implementation

Working closely with a team from Algorithmics (now IBM Business Analytics Software Services), Legal & General built a set of successful prototypes to prove that the IBM Algorithmics Economic Capital, Enterprise Risk Management and Solvency II solution could meet its requirements on both sides of the balance sheet.

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— Robert Jamieson, Director of Risk Solutions & Analytics, Legal & General

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Next, the team deployed the solution into production to model the entire balance sheet and compute the values of all the assets, liabilities, risk margin, SCR, own funds and excess own funds. Capital fungibility rules were implemented to aggregate capital from the solo product level to the group level. These rules account for ring-fencing, taxes, and other constraints that prevent capital from being 100 percent fungible.

In addition to using the IBM Algorithmics solution for Solvency II, Legal & General also implemented IBM Algo Asset Liability Management for its ALM processes; and in a later phase of the project, the team designed a strategic asset database and a repeatable asset data acquisition process that would provide accurate, high-quality data to feed into the new models.

“We have built a strong relationship with the IBM team; we have worked together closely over a long period to build a solution that really meets the needs of the business,” says Jamieson. “Solvency II has been a moving target as the regulatory requirements have continued to evolve, and building a solution that is the one of the first of its kind has been challenging, but IBM’s experience in the insurance and banking industries has played a vital role in the success of the engagement. We continue to work with the IBM team on an ongoing basis to support and extend our solution.”

### **Big Data analytics**

Legal & General uses the IBM Algorithmic solutions to model its assets at an individual level and uses curve-fitting techniques to value the company’s liabilities. The asset and liability valuation calculations run on a 500-core grid computing architecture which is hosted and managed by IBM. During a single economic capital processing run, the IBM Algorithmics solution simulates between 200,000 and 500,000 different scenarios, and values each asset and liability 58.8 million times. The output of each run consists of more than 8,500 files, each of which is 3.5 TB – a total of just over 30 petabytes of data.

“The scenario modelling capabilities are very valuable, because they allow us to see the effects of different possible risks on each area of the business,” says Jamieson. “We run a set of standard scenarios that show the value of our modelled balance sheet at business unit level under a variety of pre-defined market conditions, business contexts, and asset positions.”

The modelled balance sheet gives Legal & General accurate insight into its potential solvency in many economic scenarios (including hundreds of thousands of possible eventualities, ranging from a sudden rise in interest rates to a natural disaster hitting a major city).

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— Robert Jamieson, Director of Risk Solutions & Analytics, Legal & General

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Jamieson comments: “From a capital management perspective, we can see what we need to reserve to remain solvent in each scenario, which helps us ensure that we are covered for all reasonable eventualities.”

### **Increasing agility**

Moving beyond compliance, Legal & General uses the system to perform “what-if” calculations. Users can interactively adjust holdings on assets and liabilities, or adjust model inputs/assumptions and then re-compute economic capital and other risk measures.

Furthermore, three main types of “what-if” questions can be addressed:

- What would the value of the modelled balance sheet be under 45 pre-defined market conditions?
- What would the value of the group/solo economic capital change to if some business was grown or shrunk?
- What would the value of the group/solo economic capital change to if various asset positions were added or removed?

Considering the IBM Algorithmics solution as a whole, Jamieson is impressed with the breadth of its capabilities.

“Having a single platform for calculations and a single source of reliable data enables us to take a consistent approach to risk measurement in many different contexts, and analyse many different types of risks,” he explains. “The great advantage of the IBM Algorithmics solution is that it can handle everything – from regulatory capital and economic capital through asset and liability management to market risk, credit risk and liquidity risk.”

### **Looking to the future**

Development of the solution is still on-going, as Legal & General continues to extend its risk modelling capabilities. For example, the company is about to launch a replicating portfolios solution that uses the IBM Algorithmics platform to predict the behaviour and changing value of its liabilities over time and in different scenarios.

Jamieson concludes: “Above all, the IBM Algorithmics platform helps our business understand risk more quickly and more comprehensively, so we can see very accurately which parts of the business are subject to which kinds of risks in different scenarios.”

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### **About IBM Algorithmics Economic Capital, Enterprise Risk Management and Solvency II**

The IBM Algorithmics Economic Capital, Enterprise Risk Management and Solvency II solution is specifically designed to meet the needs of insurers, irrespective of their size, complexity and level of sophistication.

The solution comes in two editions which are complete end-to-end solutions that cover the three pillars of Solvency II by addressing the calculation of solvency capital, governance and reporting. This is a best practice solution for Solvency II, built from IBM's experience of working with leading insurers worldwide.

The solution is pre-configured to help to reduce project risk and give insurers more confidence to meet their Solvency II deadlines. Each edition provides IBM clients with the flexibility to incorporate liability cash flows generated either by a third party actuarial system or by IBM Algo Financial Modeler. Looking beyond the regulatory deadlines, as needs change, insurers have the option to scale up to more powerful and complex analytics on the award-winning IBM Algorithmics platform.

### **About IBM Business Analytics**

IBM Business Analytics software delivers data-driven insights that help organisations work smarter and outperform their peers. This comprehensive portfolio includes solutions for business intelligence, predictive analytics and decision management, performance management, and risk management.

Business Analytics solutions enable companies to identify and visualise trends and patterns in areas, such as customer analytics, that can have a profound effect on business performance. They can compare scenarios, anticipate potential threats and opportunities, better plan, budget and forecast resources, balance risks against expected returns and work to meet regulatory requirements. By making analytics widely available, organisations can align tactical and strategic decision-making to achieve business goals.

### **For more information**

For further information please visit [ibm.com/business-analytics](https://ibm.com/business-analytics)



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