


# R<sup>3</sup>S Modeler

Simplifying the complexity of actuarial, regulatory  
and risk-based modeling.





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that reflect the way the  
company operates



# R<sup>3</sup>S Modeler

RNA Analytics R<sup>3</sup>S Modeler is a current-generation risk and actuarial software tool designed to cater for the needs of insurers when complying with regulatory and reporting requirements, undertaking product development or investigating their risk exposure.

With many regulations and reporting standards taking a principles-based approach, flexibility is paramount in deciding what tool to use. Flexibility was central to the design of R<sup>3</sup>S Modeler when it was initially developed and this continues to be the case.

It enables users to build models to perform many types of calculations and is most commonly used for product pricing and design, budgeting, statutory valuations, market-consistent embedded value valuations, IFRS 17, asset and liability management (ALM), RBC approach, economic capital and Solvency II calculations.

R<sup>3</sup>S Modeler enables users to build reusable components covering:

- Accessing external data from multiple sources
- Multidimensional tables of assumptions stored and managed internally or externally
- Programs that define the calculations, which can include interactions between different programs
- Granularity of output necessary to populate required reports

Users can bring these components for data, assumptions, programs and reports together to build models to meet different risk and actuarial requirements. Once built R<sup>3</sup>S Modeler generates highly-optimized executable files that users can run locally or in the cloud to give results that can be accessed using R<sup>3</sup>S Modeler, Microsoft Excel® or other third-party reporting tools.



# Data in R<sup>3</sup>S Modeler

R<sup>3</sup>S Modeler can read individual data records or representative summary model points from a variety of sources. These include:

- User-specified values
- Fixed-width text files
- Delimited text files (for example .csv)
- Microsoft Excel spreadsheets
- Databases (for example, Microsoft Access® and Microsoft SQL Server®)

The data can be used to calculate other required values to define the initial start position of a projection as well as create and process grouped model points from existing data sources. The software deals with all these tasks efficiently within the same system, so there are no separate preparation stages or manual processes necessary to adjust the data once it has initially been prepared by IT.

## How is this useful?

- For statutory valuations, R<sup>3</sup>S Modeler can access extracts or databases containing details of all contracts on the policy administration systems as well as data from previous runs and reporting periods
- For “what if” asset-liability modeling work, there is a facility to compress the company’s investments and contractual liabilities into representative model points to allow faster runs and more scenarios to be considered





# Assumptions in R<sup>3</sup>S Modeler

R<sup>3</sup>S Modeler assumptions reflect business information, such as:

- The results of analysis into the company's recent experience, such as the share of expenses attributed to policies
- Future predictions, such as investment yields and future mortality rates
- Shared product information, such as the commission scales paid to sales representatives

The software treats assumptions independently of a program, model or run so users can amend the assumptions without having to alter any corresponding programs as well as use the same assumptions for multiple purposes.

Assumptions in R<sup>3</sup>S Modeler are simple to manage and can be referenced, easily amended or re-used in multiple locations. Also assumptions can be stored and managed in a single assumption file to reduce management and storage requirements.

R<sup>3</sup>S Modeler can handle multiple assumptions in a wide range of formats, allowing for:

- Easy differentiation of percentages, rates and decimals, which reduces set-up errors
- Inputs as either scalars or multidimensional arrays (which enable multiple parallel calculations)
- Mortality tables that include ultimate and select rates (and can also depend upon other factors, such as calendar year) that can be accessed directly or through commutation and standard actuarial functions

R<sup>3</sup>S Modeler is built using standard Microsoft Windows® technologies, so that users can easily copy data ranges directly from MS Excel®, to save time in the set-up process.

# Programming in R<sup>3</sup>S Modeler

Creating calculation routines within R<sup>3</sup>S Modeler requires no prior programming knowledge or experience as the syntax is intuitive to use when defining and referencing variables, calculations and components.

When creating models the user is assisted in this by:

- Color-coded syntax highlighting to help make formulas easier to understand
- Built-in mathematical functions, including commutation functions, such as  $qx$  and  $Ax:n$
- Event formulas to model features that may repeat many times in a projection step, such as premium payments
- An Analyzer view showing the precedents and dependents of the current variable
- Ability to define data types and display formats for the variables, such as dates, characters, indicators and currencies
- Extensive library of standard code for a wide range of assets, liabilities and processes

The R<sup>3</sup>S Modeler user-friendly working environment facilitates easy development of the code through:

- Simple intuitive Windows interface
- Drag-and-drop facility to aid programming
- Sharing object code between programs
- Code analysis tools that allow users to track precedents and dependents of variables
- Full on-screen help and documentation



# Models in R<sup>3</sup>S Modeler

The graphical user interface of the software enables users to see the relationships between variables, programs and projection layers visually, which can help with the development and comprehension of complex relationships between various parts of the model. R<sup>3</sup>S Modeler enables users to build calculations that reflect the way the company operates, including allowing for hierarchical structures when aggregating values and making dynamic feedback decisions.


R<sup>3</sup>S Modeler enables users to:

- Build programs by combining ready-made code for standard products and calculations
- Build ALM models of the company by linking programs in a hierarchical structure
- Expose key parameters so that they can be specified at runtime, allowing the user to build greater flexibility into the model so that, for example, the number of scenarios, the data files, the portfolio date and the projection step lengths can be specified at runtime without editing the model

An abstract geometric pattern consisting of numerous small black dots of varying sizes connected by thin grey lines. Some lines form larger, irregular polygons, some of which are filled with a light grey color. The pattern is scattered across the entire page, with a higher density of lines and dots in the upper and lower portions.

## Results in R<sup>3</sup>S Modeler:

- R<sup>3</sup>S Modeler caters for a wide range of output options, including:
- Optimized output where only the calculations necessary for the specified output are completed
- Individual output for obtaining values for each data record
- Results that can be accessed in Microsoft Excel using the provided add-in tool or using other reporting tools via their ODBC drivers

An abstract geometric pattern consisting of numerous black dots of varying sizes connected by thin grey lines, forming a complex network of triangles and polygons. Some areas are filled with a light grey color. The pattern is scattered across the entire page, with a higher density in the top and bottom corners.

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