# R³S Solvency II

Simplifying the complexity of the Solvency II
regulatory requirements.

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Comprehensive Standard Formula solution for insurers seeking to cost-effectively adopt  an approach to comply with Solvency II.

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Additional code library for Solvency II calculations including a mix of out-of-the-box standard code to use alongside existing models as well as template models to build upon to assist insurers to rapidly develop their full end-to-end Solvency II compliance.

# Standard Formula

The R³S Solvency II standard code package includes a comprehensive Standard Formula solution for insurers seeking to cost-effectively adopt an approach to comply with Solvency II. Designed for speed and quick deployment, this solution includes a template capital model and an out-of-the-box aggregation model that we have built in accordance with the text of the delegated acts to aggregate the risks and produce the metrics required for the Solvency II quantitative reporting templates (QRT).

The solution is regularly updated to reflect any changes in the regulations. The model has been designed so that risk metrics and underlying stress run results can be read from R³S Modeler models or from other external sources, as required. It allows users to avoid replacing existing actuarial systems, yet still supports regulatory compliance, by enabling users to aggregate results from disparate systems to perform required solvency capital calculations.

The template capital model is designed to integrate with the current R³S Modeler standard code available, but also to be used with your existing models and other systems. This enables the company to use what is already in place or to quickly implement new models, as required. The template capital model also provides out-of-the-box support for all Life and Market risks required of the Solvency II Standard Formula stresses: a dedicated batch run can run the company model several times, each time applying a different stress to produce the stressed cash flows that serve as an input for the aggregation model.

# Key Features

The aggregation model is a single model that applies the Solvency II regulations as laid out in the text of the delegated acts and produces direct output for the QRT's.

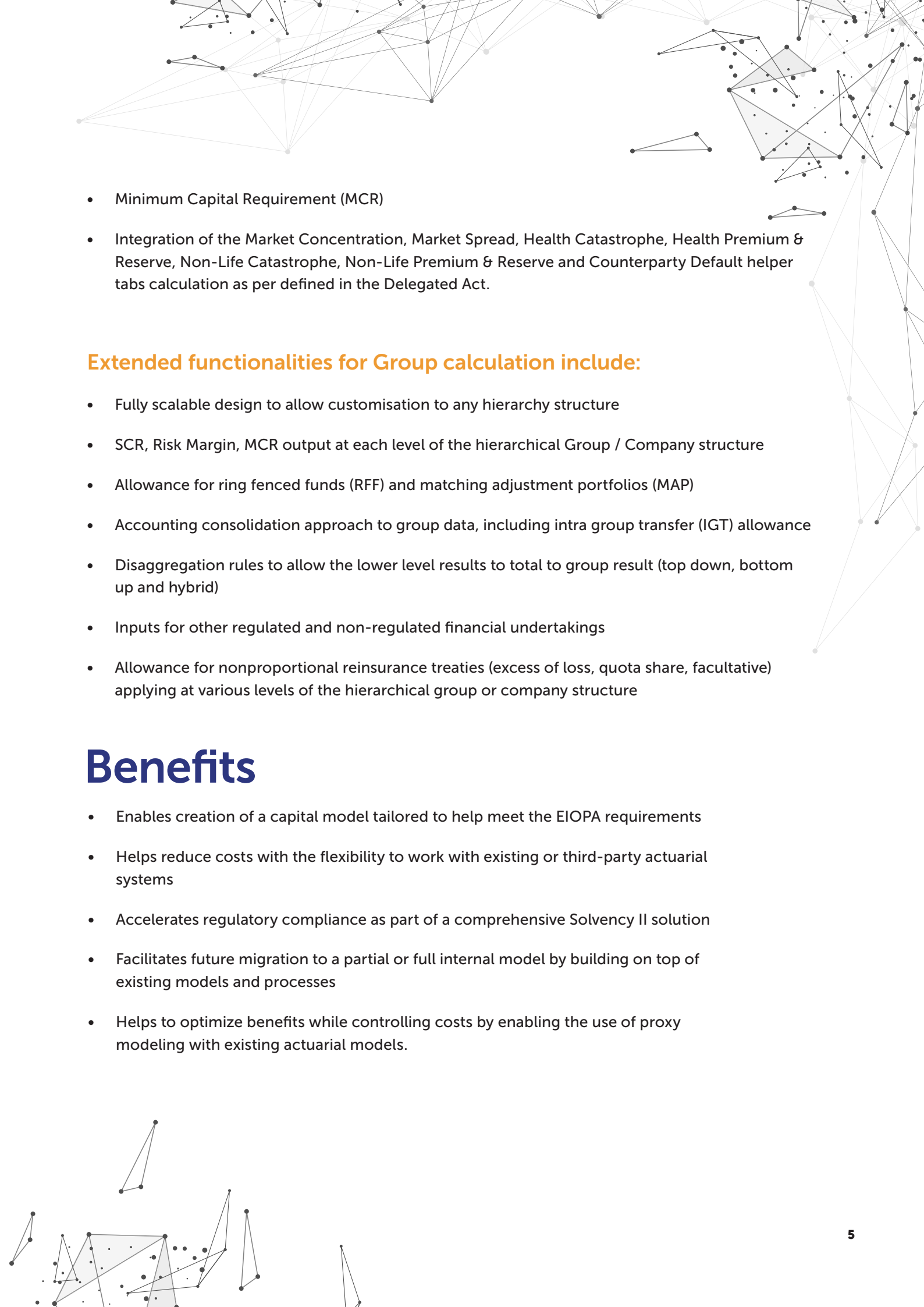## The input mapping can cater for a mixture of inputs:

- R³S Modeler results workspaces

- Microsoft Excel ® spreadsheet template (provided with the Add On package)

- Other system results, such as comma-separated value (CSV) and fixed-width text files

## The correlation calculations are as in the regulations and allow for:

- All available risks laid out in the regulations

- The possibility of users wishing to change the correlation values

- Future increases to the risks and hence the size of the correlation matrices

## As a minimum, the model produces:

- Solvency Capital Requirement (SCR)

- SCR values for all risks

- Operational Risk values

- Adjustment Values

- Basic SCR (BSCR)

- Risk Margin (RM), choice of 3 methods:

  o Using full SCR projections (hierarchy of simplifications method 1)

  o Separate run-off patterns for each risk type (hierarchy of simplifications method 2)

  o Best estimate run of current SCR (hierarchy of simplifications method 3)

- Minimum Capital Requirement (MCR)

- Integration of the Market Concentration, Market Spread, Health Catastrophe, Health Premium & Reserve, Non-Life Catastrophe, Non-Life Premium & Reserve and Counterparty Default helper tabs calculation as per defined in the Delegated Act.

## Extended functionalities for Group calculation include:

- Fully scalable design to allow customisation to any hierarchy structure

- SCR, Risk Margin, MCR output at each level of the hierarchical Group / Company structure

- Allowance for ring fenced funds (RFF) and matching adjustment portfolios (MAP)

- Accounting consolidation approach to group data, including intra group transfer (IGT) allowance

- Disaggregation rules to allow the lower level results to total to group result (top down, bottom up and hybrid)

- Inputs for other regulated and non-regulated financial undertakings

- Allowance for nonproportional reinsurance treaties (excess of loss, quota share, facultative) applying at various levels of the hierarchical group or company structure

# Benefits

- Enables creation of a capital model tailored to help meet the EIOPA requirements

- Helps reduce costs with the flexibility to work with existing or third-party actuarial systems

- Accelerates regulatory compliance as part of a comprehensive Solvency II solution

- Facilitates future migration to a partial or full internal model by building on top of existing models and processes

- Helps to optimize benefits while controlling costs by enabling the use of proxy modeling with existing actuarial models.

# Forward Looking Assessment of Own Risk (FLAOR) and Solvency Assessment and Curve Fitting

The R³S Solvency II FLAOR and proxy (curve fitting and Least-squares Monte Carlo) models offer insurers an innovative approach to improving the efficiency of full and partial internal models for projecting solvency capital requirements (SCRs). These allow clients to support Own Risk and Solvency Assessment (ORSA) calculations without investing heavily in new hardware.

By providing a flexible framework for users, clients can implement either a fully nested stochastic model or a fitting method of their choice. The sophisticated design of this model enables firms to use proxy modeling in R³S Modeler with existing actuarial models to provide the maximum benefit with the minimum effort.

The R³S Solvency II models include a template model for fully nested stochastic internal models, in addition to curve fitting and least-squares Monte Carlo (LSMC) methods for insurers that seek to adopt a proxy approach. The FLAOR template model provides a complete cash-flow projection with an asset liability management (ALM) structure allowing for the full projection of an insurer's SCR stress values over any given period. It is designed to reflect a typical organizational hierarchy that enables quick implementation and compliance with regulations.
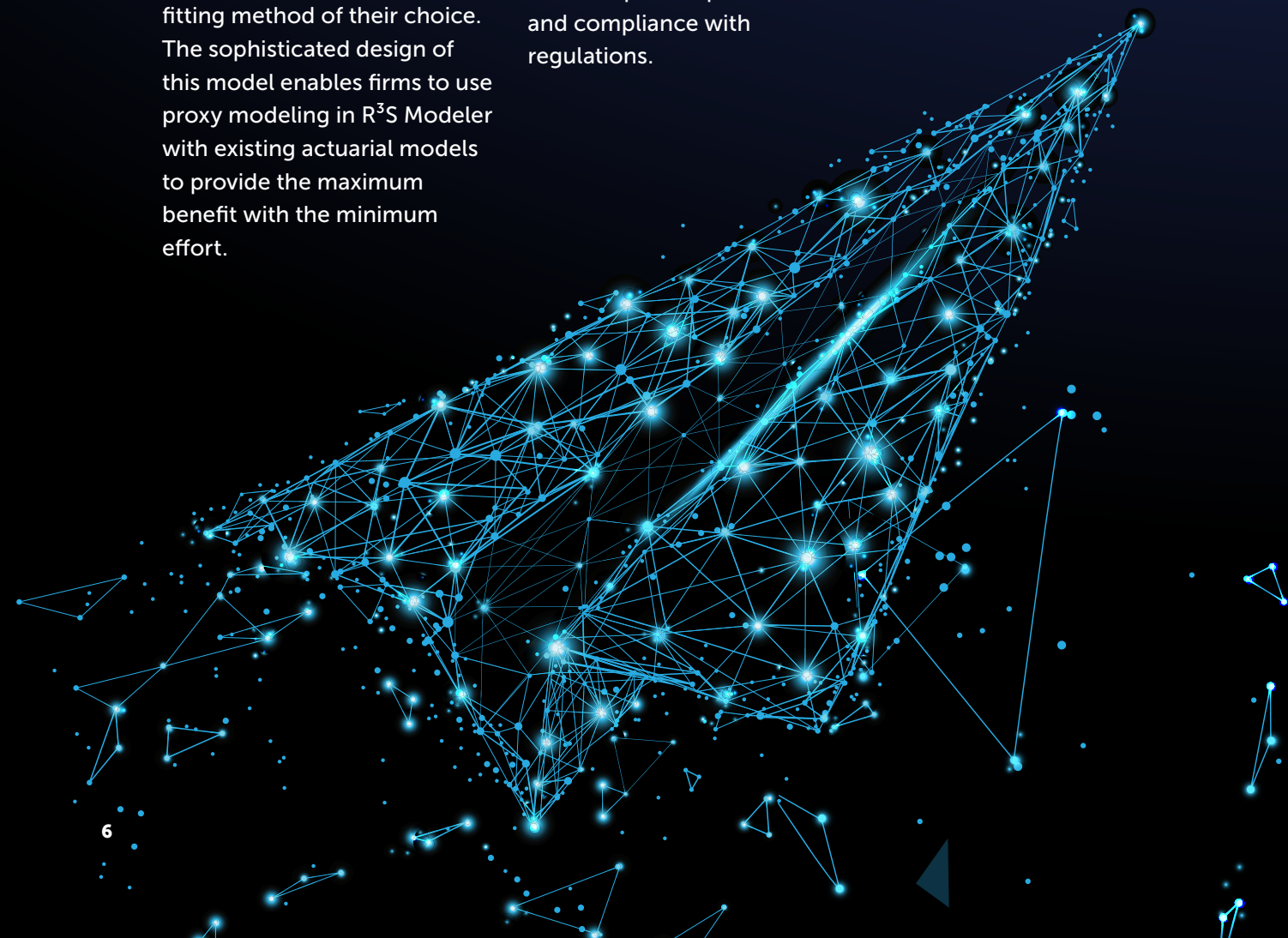
# Key features

The models are designed to support and extend the functionality of the company and aggregation models of the R³S Solvency II Standard Formula package. Each proxy template includes various features to help with modeling:

- A template ALM model projecting the business forward and explicitly calculating the individual stress values at each future time point using either deterministic or stochastic real-world scenarios around the risk-neutral scenarios as well as guidance on how to generate required data points for fitting:
  - For curve fitting, it allows users to select the in-sample and out-of-sample scenarios for determining the best fit.
  - For LSMC, it uses the nested stochastic functionality of R³S Modeler to run both real world and risk-neutral scenarios. These scenarios help produce multiple data points for the accurate fitting of a loss function.

- A template model for fitting a loss function to data points and producing fitting statistics like Estimated standard error, R-squared, Regret and Sum of square errors. Users can use these statistics to assess whether the loss function has been sufficiently fitted to meet the given criteria.

- A template to evaluate loss functions:
  - For curve fitting, this template is a full internal model that also includes a Monte Carlo scenario generator. The template uses Gaussian copulas to generate multiple correlated risk factors to evaluate the loss function.
  - For LSMC, this template is a partial internal model for market risk that also demonstrates the ability to calculate individual loss functions. This feature allows users to calculate the diversification benefits of the SCR.

# Benefits

- Enables insurers to quickly build a full or partial internal model and customize features to their specifications.

- Improves the efficiency of full and partial internal models for projecting SCRs, and enables FLAOR/ORSA calculations without costly investment in new hardware.

- Enables insurers to deploy either a fully nested stochastic model or the curve fitting model of their choice.

- Helps insurers to optimize benefits while controlling costs by enabling them to use proxy modeling in R³S Modeler with their existing actuarial models.

# Solvency II Standard
# Code Package

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