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WHITEPAPER

Automating the Solvency Capital Requirement Calculation Process

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Overview

This Whitepaper explores how the Solvency II Solvency Capital Requirement (SCR) calculation process can be automated to facilitate efficient and timely regulatory reporting. The SCR calculation process is complex, requiring significant data consolidation, cleansing and transformation to produce accurate and consistent results. Insurers must calculate the SCR both on a quarterly and annual basis; however their current manual, spreadsheet-based processes are often unable to manage the increased scale and scope of the reporting requirements. Consequently many insurers are exploring how best to automate their SCR calculation process.

Introduction

The Solvency II regime requires insurers to submit more reports to their regulators, in greater detail, than ever before. These enhanced requirements place significant pressure on constrained internal resources from the actuarial, finance, investment and risk departments.

This paper examines the different streams of the SCR calculation process that are resource-intensive, and suggests technology that can help insurers reduce the calculation of the SCR from months to days. It also highlights how an efficient, automated solution can provide wider benefits to the business. These benefits include improvements to overall actuarial, asset and liability modeling, dynamic financial analysis and wider enterprise risk management processes.

The Challenge: Consolidating Data and Calculating Results

The calculation of the SCR is highly complex. Insurers must evaluate the main risks they carry, determining the level of capital that must be held to meet their liabilities over the following 12 months with a probability of at least 99.5%. The following diagram shows a simplified view of the components of the SCR calculation. The capital for each individual risk factor must be calculated for every type of product, correlated, and then aggregated.
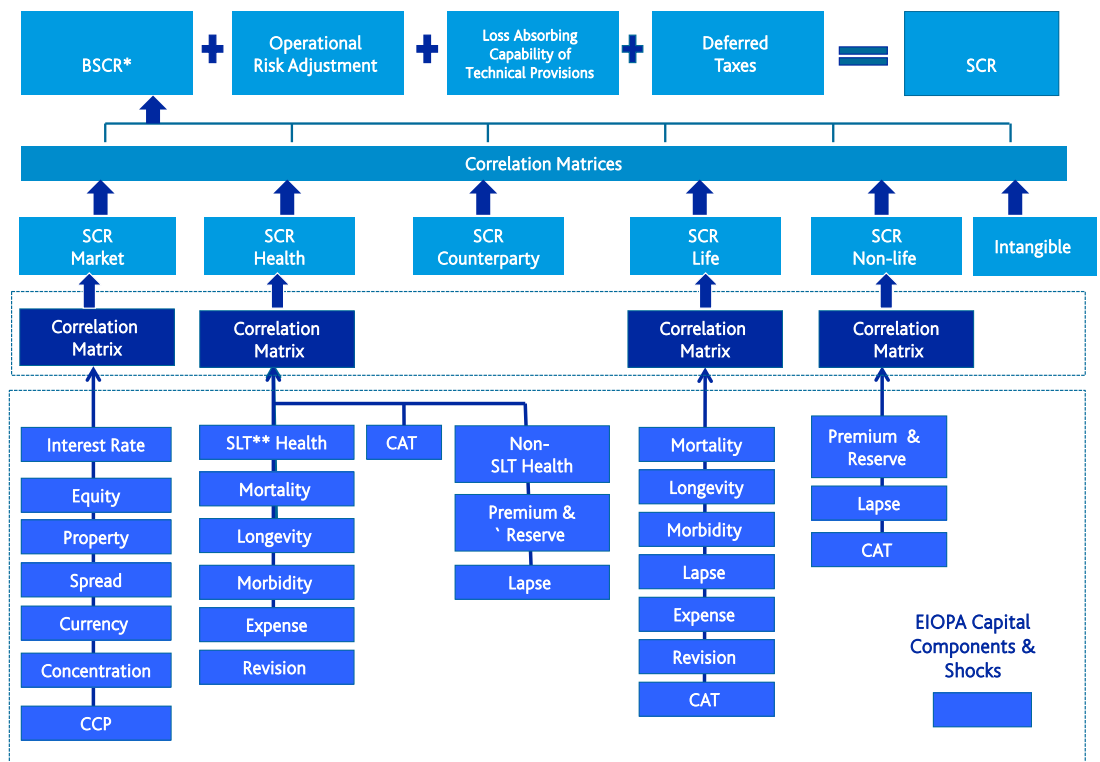
* BSCR – Basic Solvency Capital Requirement
** SLT – Similar to Life Techniques

Many insurers use spreadsheets and manual processes to calculate their SCR numbers for QIS 5 or for internal testing purposes. This approach is effective for calculating results on a one-off basis, however in the longer term, it creates issues around repeatability, auditability and accuracy. Manual processes are inherently error-prone and lacking effective management and audit control. There is also the issue of whether mundane, repetitive tasks are the best use of valuable internal resources.

Each of the European Insurance and Occupation Insurance Authority (EIOPA) capital and shock calculations requires a significant amount of risk, finance, actuarial and asset data. The data is extracted from many back-end systems, and then transformed into a specific format, ready for use in the calculation process. While this process appears straightforward, there are several complexities that insurers need to consider:

» **Group and Solo Results**
The SCR calculation applies at solo entity and group levels. Each solo entity has to calculate its SCR individually. The group entity then aggregates all its solo SCR results, and incorporates them with its own, if it also transacts insurance business. Each solo entity will report to its local regulator, as well as providing data to its group headquarters, which must in turn report its consolidated results to its own regulator. The enhanced reporting requirement leads to a greater volume of reports that must be prepared and submitted. These reports need to be accurate, consistent and submitted in the correct format for each national regulator. The group entity must also address issues such as equity elimination and intra-group transactions. Ensuring the accuracy and consistency of results across the business to the levels demanded by Solvency II, with largely manual processes and resources would challenge the best organized insurer. The enhanced scale and granularity of reporting demanded by regulators is a significant driver for automation.

» **Different Data Models**
The sheer scale and scope of modern insurers means that data is widely dispersed across a range of source systems – actuarial, finance, investment and risk systems, for example. These systems will encompass multiple databases, with multiple formats, and spreadsheets, as well as other systems. Extracting, transforming and validating this data manually is no longer sustainable even at the small scale. Automation, in one form, or another is essential.

» **Credit Ratings**
Credit Ratings are an integral part in the calculations of the spread and default risk capital charges in relation to the SCR. Under the Standard Formula, the spread risk capital charge calculation depends on Credit Quality Steps (CQS). EIOPA has defined a mapping table to associate the ratings of external Credit Rating Agencies to Credit Quality Steps and their respective capital charges:

Credit Quality Step	0	1	2	3	4	5	6
Moody's Rating	Aaa	Aa	A	Baa	Ba	Lower than Ba, unrated	
Other Rating Providers	AAA	AA	A	BBB	BB	Lower than BB, unrated	
Capital Charge	0.9%	1.1%	1.4%	2.5%	4.5%	7.5%	

In cases where several ratings are available for a given credit exposure, the second-best rating should be applied. To avoid mechanistic reliance on external ratings EIOPA proposes that "if an item is part of the larger or more complex exposures of the insurance or reinsurance undertaking, the undertaking shall have its own internal credit assessment of the item and allocate it to one of the seven steps in a credit quality assessment scale ('reassessment')".

In order to automate the SCR process credit risk ratings can be accessed via secure electronic data feeds, which can be fed systematically as an input into internal models. This reduces both manual intervention and operational risk.

» **Actuarial Data**
The SCR calculation is heavily dependent on the output of actuarial modeling engines for the SCR calculation. For life risks, the technical provisions are typically generated from an insurer's Asset and Liability models (ALM). For non-life risks, Dynamic Financial Analysis (DFA) models are typically used.

This approach presents two key challenges;

» Generating the ALM/DFA results requires inputs such as policy data, claims data, assumption tables, and run parameters as illustrated in the following diagram. If these data sets are flawed, the SCR results will necessarily be inaccurate.

» Many insurers will have multiple ALM/DFA models, covering their various product lines, countries and commercial entities. These models will leverage many actuarial processes, assumptions, systems and outputs. Combining these complex models into a single SCR calculation engine, without losing any accuracy, consistency and relevance is a non-trivial challenge for any insurer.

The following diagram illustrates the various types of input data required to be fed into an actuarial model at run time:
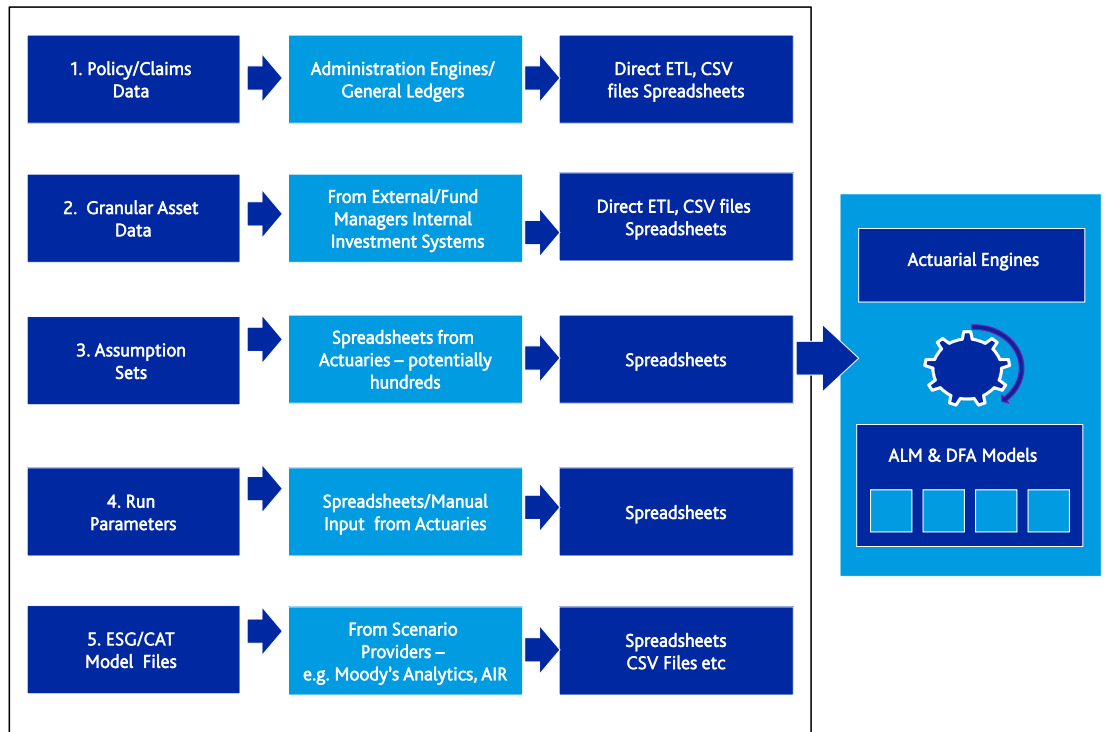
» **Managing External Data Sources**
The SCR results will likely leverage data sourced from external fund managers. Capturing, consolidating, cleansing and formatting this data is a significant challenge, best suited to automation. The need to assess investment concentration risk is an additional driver for automation.

» **The Ending of Solvency II Transition Arrangements**
As the deadline for Solvency II approaches, EIOPA is removing many transitional features available in the quantitative reporting templates (QRT), such as the helper tabs. Many insurers currently use these tabs as a short- cut to calculate the results, as they become familiar with the requirements. Replacing this functionality with manual processes will prove exceptionally difficult, again driving insurers towards greater automation of the SCR calculation process to deliver accurate and consistent results.

» **Quarterly Reporting Cycles**
To date, the QIS exercises and dry runs have been based on producing annual SCR numbers, but the move into quarterly reporting creates issues. Clearly, producing the calculations four times a year is an issue. More importantly, using annual data for a quarterly purpose may create anomalies such as contract boundaries. Thus care must be taken in translating annual data to quarterly data

The Solution - Leveraging Automation to Deliver Accurate and Consistent Results

The scale and scope of change in Solvency II drives insurers to automate Solvency II compliance, which in turn enables insurers to deliver the SCR results accurately and cost-effectively. Many aspects of automated Solvency II compliance also drive clear business value, including enhanced management insight that supports better-informed management decision making.

Automation in the context of the SCR calculation encompasses several aspects:

Automating the ALM/ DFA Production Process	It is critical to automate the ALM or DFA model run to produce the technical provisions aspects of the SCR process, like cash flow or loss triangle results. This process is part of the SCR process workflow, which, in turn, is based on an automated Solvency II reporting calendar.
Feeding the Data into the SCR Calculation Process	The SCR calculation process requires data from multiple sources to be loaded into the SCR calculation engine in a defined format. The quality of this data must be checked and validated to ensure accurate and consistent results. In addition, there must be full audit trails for compliance and governance purposes.
Driving the SCR Calculation Process	The SCR calculation process is a series of steps, executed in a specific order. The combination of data, algorithms and shocks must be fully maintained to reflect the reality of the business and regulatory developments.
Report Generation	A significant challenge of Solvency II and SCR reporting is the complex and diverse reporting requirements of national regulators. While EIOPA drives the requirements of national regulators using the QRTs, each regulator is free to interpret the implementation of the EIOPA requirements. As a result, insurers often face complex reporting regimes incorporating a variety of national requirements. Automating the process that populates data into reporting templates per each regulator's requirements will ensure a high level of accuracy and consistency. Automating the reporting process allows insurers to leverage workflow approval processes. Managers are able to review, amend, approve and audit changes to the SCR results before they are submitted to the regulator. This process improves managers' confidence, allowing them to apply expert judgment to their reports.
Solvency II Reporting Calendar	In order to drive the SCR calculation and Solvency II reporting processes, an insurer must develop a Solvency II calendar which breaks down the process into tasks, time steps and responsibilities. These elements, in turn, must be embedded in workflow technology to drive and monitor the process.

Leverage Technology to deliver SCR Automation.

Different firms will select different technology solutions to achieve Solvency II compliance. However there are some key components that must be implemented and integrated into the existing infrastructure to help deliver SCR results and Solvency II compliance.
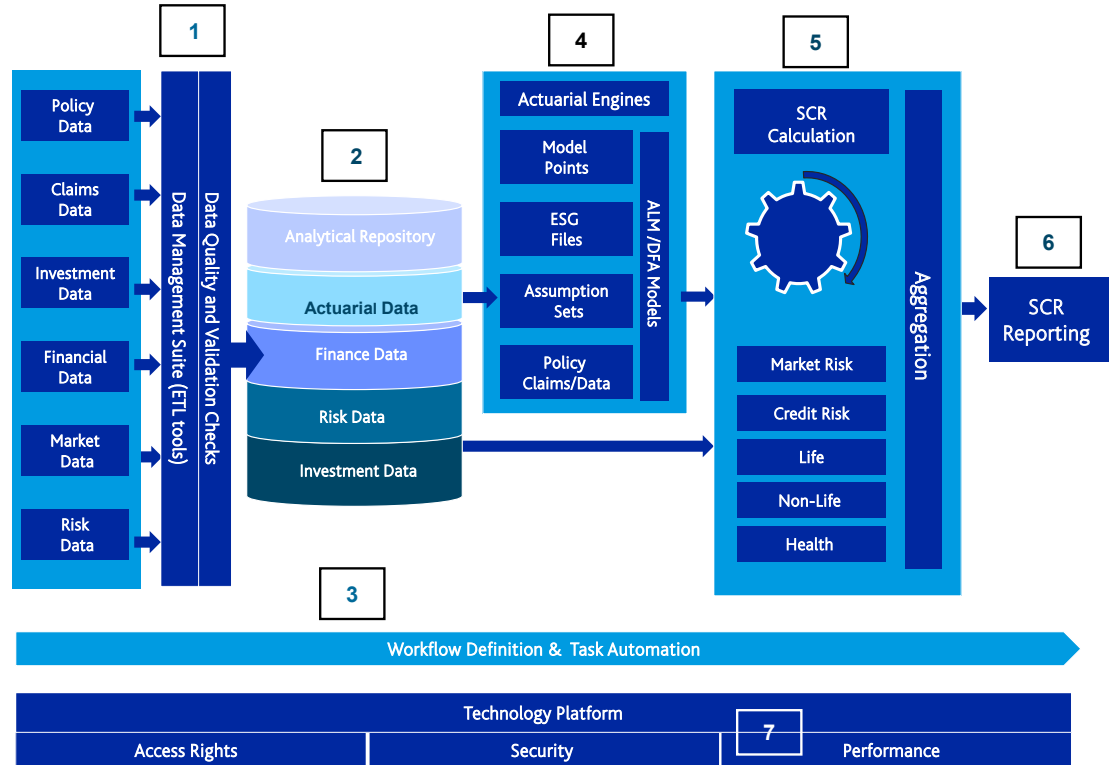
An optimal model for SCR results generation and Solvency II compliance

A solution for SCR results calculation and Solvency II compliance must include these key components:

1. **Powerful Data Management Tools**
   These tools automate the data extraction process; transform data into a standardized format, and then load it into the actuarial engines and the SCR calculation engine. Data quality and validation rules should be applied to identify and correct data quality issues that can compromise results later in the process.

2. **A Centralized Data Repository**
   A single, centralized data source is key to accurate and consistent SCR results and regulatory reports. It ensures that all the data required to calculate the results can be cleansed, validated and audited. As well as enhancing accuracy, this approach is the least disruptive to the business, as it leverages data from existing back-end systems. Developing a compliance system that runs in parallel to the existing environment reduces the impact and risk of introducing new systems and processes. This consolidated data approach also enables enhanced audit and change control functionality that assures the integrity of the final results.
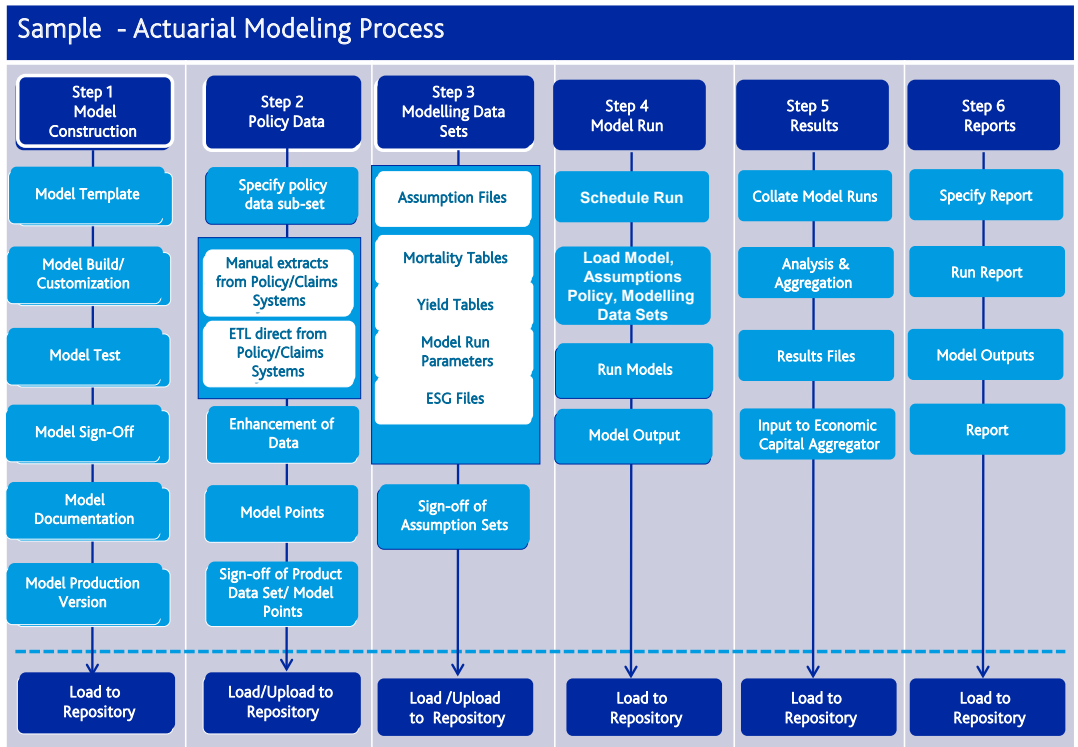
3. **Automated Workflow Processes**
   Central to automation are effective workflow capabilities that drive and monitor the end-to-end data consolidation, calculation and reporting processes. This workflow process can drive a Solvency II calendar for all calculations and reporting with defined tasks, timelines and dependencies. This approach can help streamline the complexities of SCR calculations and Solvency II reporting.

The following diagram is an example of a simplified workflow. It covers production of technical provisions QRT, starting six weeks before submission. Similar processes can be developed for all aspects of QRTs including group consolidation.

Technical Provisions (TP) QRT Process

Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Initiate Process	Approve Input Data	Review Results	Technical Provisions	Load to QRT Engine	
ALM/DFA Models	Load Data & Assumption Files	Approve Results	Load to SII Data Mart	Generate TP QRT Templates	Run EIOPA Validation Checks	Generate XBRL
Approve	Run Models	SCR Calculation Process	Run Quality Checks	Integrate with other QRT Templates	Sign-Off	Submit to Regulator
	Results		Correct Errors			Process Complete
			Map Data For TP QRTs			

4. **Actuarial Calculation Engines**

These engines are used to provide the liability elements of the SCR calculation. To maximize the value of full SCR automation, the actuarial modeling process itself should be automated as shown in the following example.

Sample - Actuarial Modeling Process

Step 1 Model Construction	Step 2 Policy Data	Step 3 Modelling Data Sets	Step 4 Model Run	Step 5 Results	Step 6 Reports
Model Template	Specify policy data sub-set	Assumption Files	Schedule Run	Collate Model Runs	Specify Report
Model Build/ Customization	Manual extracts from Policy/Claims Systems	Mortality Tables	Load Model, Assumptions Policy, Modelling Data Sets	Analysis & Aggregation	Run Report
Model Test	ETL direct from Policy/Claims Systems	Yield Tables / Model Run Parameters	Run Models	Results Files	Model Outputs
Model Sign-Off	Enhancement of Data	ESG Files	Model Output	Input to Economic Capital Aggregator	Report
Model Documentation	Model Points	Sign-off of Assumption Sets			
Model Production Version	Sign-off of Product Data Set/ Model Points				
Load to Repository	Load/Upload to Repository	Load /Upload to Repository	Load to Repository	Load to Repository	Load to Repository

5. **The SCR Calculation Engine**

At the core of the process is the SCR calculation engine, which leverages the data in the repository to calculate the SCR results. The engine should contain all the formulas necessary to calculate the results. These formulas are best built-in the application to reduce the time and risks of implementing a Solvency II compliance solution. This built-in approach has the added advantage that the vendor maintains the formulas, which can be costly and time-consuming for an insurer to maintain. Furthermore, accurately maintained formulas ensure that the business and the regulations are always fully aligned.

6. **Regulatory Reporting Engines**

The final stage of the SCR calculation process is reporting the results to regulators. Populating the QRT templates is complex, due to the large number of reporting points required. The use of the extensible business reporting language (XBRL) as the reporting format is also a complexity for many insurers. Automating this complex area will drive greater accuracy and consistency. Consolidating the reporting data by leveraging a dedicated reporting system, as shown in the following diagram, will enable managers to review the results. This can enhance their insight into the business, providing opportunities to enhance business performance, as well as regulatory compliance.

7. **End-to-end Capabilities**

However insurers approach the task of calculating their SCR results and submitting their reports, their infrastructure must be seamlessly integrated end-to-end. This structure ensures that the data consolidation, calculation and reporting process is accurate, consistent, streamlined and cost effective.

The Benefits of Automation

There are significant benefits to automating the SCR calculation and regulatory reporting process:

1. Automated Data Management	» Provide an accurate and reliable process for integrating data from multiple systems, in different formats, and transforming it into a unified data set. These data can then be used in the calculation and reporting process.
	» Enhance accuracy and consistency by applying data quality checks that identify and eliminate poor quality data. These checks can improve the overall quality of the results.
	» Leverage automated workflow processes to allow management to audit and approve changes to regulatory reports. Apply user access controls to control the users' ability to change to core regulatory data.
2. Analytical Data Repository	» Provide a unified, consolidated source of data for data cleansing, calculation and regulatory reporting. Ensure consistency and accuracy, and deliver a coherent view of the business.
3. Workflow Engine	» All actuarial, SCR and reporting processes can be defined and broken down into a number of tasks with associated time steps, approved users and rules. Processing can be automated or semi-automated, depending on requirements.
	» Automation streamlines SCR calculations, delivering a structured, robust and fully auditable process. Task monitoring, reporting and exception handling are all effectively enabled.
4. SCR Calculation Engines	» There are various options as to where the SCR calculation can be performed – in the actuarial engines or in a dedicated SCR engine. Either way, automating the SCR calculation process improves efficiency and aids compliance.
5. Reporting Engine	» Raw data stored in the repository can be transformed into meaningful business information for both regulatory and business purposes.
	» Users can define their own reports.
	» Reports can be scheduled or run automatically on a set date, time or occurrence.
6. Technology Platform	» By using industry standard components, an insurer can reuse existing skills and underlying technology components. This approach helps reduce both initial and ongoing costs of the project.

Regulatory Capital Management and Reporting for Insurance Companies

Moody's Analytics offers a comprehensive solution for managing insurance regulatory capital calculation and reporting. The solution encompasses data consolidation, ratio calculations, as well as regulatory reporting. It helps insurance companies comply with all facets of the Solvency II directive while providing the foundation for improved strategy and performance.

To learn more visit moodysanalytics.com/riskintegrity.