Analitica RiskSuite™

Problem

Persistent low interest rates and the increasing number of payment system competitors are significantly impacting banking margins. At the same time, regulators require banks to develop capabilities to cope with sophisticated risk scenarios which are appearing in the volatile business environment.

An ALM solution should provide all the quantitative measures required to support a holistic view of balance sheet risk. Interest rate risk cannot be managed in isolation from liquidity risk and capital allocation should correlate with funds transfer pricing. The solution should also provide flexibility in setting forward-looking scenarios and provide analyses of results with reporting.

An implementation approach that looks beyond mere compliance will bring strategic advantages to a bank by establishing more proficient integrated risk management capabilities and governance of technological/data issues within the company. Simulation capabilities and a unified data layer will create a new level of analytical support for business strategy decisions, risk management, controlling and other business functions.

Our solution

RiskSuite is a **flexible integrated platform for asset liability management, liquidity risk management, funds transfer pricing, operating liquidity management and regulatory compliance**. It supports management to make better business decisions based on a scenario analysis, allowing a forward-looking view from a combined risk and financial perspective. Furthermore, it helps banks comply with increasing regulatory pressure.

The conceptual design of the solution is contract centric - it builds up the balance sheet with a forward-looking simulation based on the details of contracts, from which various risk metrics can be calculated, including risk factors, counterparty information and behavioral modeling. A clear understanding of total risk can only be obtained by assembling the total risk of the bank from individual contracts. A consistent view on earnings and economic value, including their variation under defined business strategies and risk factor scenarios, enables the effective management of capital and profitability across the enterprise.

All sensitivities are computed under a full revaluation, taking into account non-linear effects resulting from (embedded) options. The platform's extensive scenario generation capabilities allow banks to model multiple user-defined shocks and explore all cash flows, financial accruals, valuations, and net income.

International groups can benefit from a common central installation that is multitenant. Flexible balance sheet modeling and the accommodation of multiple structures on the same data allow multi-entity implementations which accommodate different user types, each having their own view of the balance sheet.

I. RiskSuite Features

Workflow

- Integrated Input Data Validator and Editor
- Several types of scenarios
- Fully configurable scenarios for each individual segment of the bank's portfolio
- Temporal validity of the configuration gives an overview of the entire configuration history and generates a complete repeatability of calculations on any historical data set
- Supported asynchronous simulations

Integrated Input Data Validator and Editor

Aggregating data of sufficient completeness, accuracy, detail, and quality from several source systems is one of the main challenges of an enterprise-wide risk system implementation. Analitica RiskSuite has a **defined input data interface** with an integrated module for input **data quality validation** with a defined set of technical and logical conditions that the input data must satisfy. A user-friendly interface enables users to drill-down to input positions' data and make **manual corrections and entries** supported with an audit trail.

Scenario configuration

RiskSuite supports several types of scenarios with fully configurable parameters through a well-structured user-friendly scenario setup process. Each scenario configuration has **temporal validity**, and it is defined for each individual **segment** of the bank's portfolio. The configuration enables the user to easily distinguish behavioral assumptions based on borrower's characteristics, instrument type, etc. The temporal validity of the configuration enables users to get an overview of the entire configuration history and recreates complete repeatability of calculations on any historical data set.

Analyses Runs

To support effective risk management work, the solution has an intuitive user interface, allowing users to quickly run ad-hoc scenarios based on changed behavioral assumptions, market risk factors or business strategy assumptions as well as stress testing various shocks. The reporting tools provide rapid visualization of the results for ad-hoc reporting, broken down by a combination of dimensions defined by the user. The included standard reports provide an easy base for presenting standard ALM metrics.

RiskSuite supports asynchronous simulations, i.e., users can start several simulations in parallel and track their progress in the user interface. To optimize computation times, only selected segments of the balance sheet can be included in the calculation.

Risk Exposures and Sensitivities

- Full revaluation of financial instruments
- Contract-level calculation of the projected cash flows and accruals (no aggregation)
- Fully compliant with the guidance IRRBB
- Interest rate risk: economic value and earnings-based measures
- foreign exchange risk
- liquidity risk
  - possible custom-made extension for regulatory reports (LCR & NSFR)
- Fully configurable time buckets for gap analysis

RiskSuite can model and value every product type available on a financial institution's balance sheets, generating cash flows on a financial events timeline for further analysis.

All financial instruments are computed under a full revaluation, taking into account non-linear effects resulting from (embedded) options. Projected cash flows / accruals are precisely calculated following financial contractual parameters and market conditions and/or are optionally fully compliant with IAS 39/IFRS 9 accounting rules, e.g., amortized cost valuation.

Interest Rate Risk

Interest rate risk management lies at the core of ALM. RiskSuite helps to analyze interest rate risk from two perspectives: economic value and earnings. Interest rate risk is analyzed in terms of the interest rate gap profile. The sensitivity of the economic value of equity (EVE) calculation includes shifts on the market or spot rate curves. Further, to model the volatility of earnings, the advanced simulation engine is used to simulate the balance sheet into the future and obtain income reports under different scenarios.

The solution supports analysis of interest rate risk is compliant with the guidance Interest Rate in the Banking Book (IRRBB) established by the Basel Committee. This guidance requires that several different sources of interest rate risk are considered in the analysis of interest rate risk, including repricing risk, yield curve risk, basis risk, and optionality risk.

Foreign Exchange Risk

Institutional assets and liabilities held in a foreign currency will be affected by changes in foreign exchange rates. RiskSuite offers an advanced currency scenario test to assess the impact a change in FX rates would have on the bank's values and earnings.

Liquidity Risk

RiskSuite provides analytical tools to model and measure liquidity risk, outlining the extent to which the bank can support its future monetary obligations and assure its solvency.

Net cash flows from financial instruments over a given future time period, together with the potential funding available from unencumbered liquid assets held in the bank's portfolio and any contingent liquidity resources available to the bank, are presented in the bank's liquidity risk analysis.

The scenario engine has been extended to manage and stress the structural liquidity gap, liquidity coverage ratio (LCR), net stable funding ratio (NSFR) and the liquidity survival horizon.

Gap Analysis

To facilitate the analysis of current risk exposure, the liquidity and interest rate gap reports provide extensive drill-down capabilities that allow users to trace the results back to a single position level. Time buckets and balance sheet structures are fully configurable. The report settings enable users to select reporting currencies on the fly, distinguish between principal and coupon flows, as well as to present the gaps in a discrete or cumulative manner.

Net Interest Income (NII) / Earnings at Risk (EaR)

- Exact contract-level calculation of accrued interest for each pre-defined time bucket under any combination of scenarios
- Supported EIR recalculation and EIR-based accruals
- Enabled credit risk scenarios with optional impairment adjustments (IFRS9 compliant)

RiskSuite enables banks to project and analyze expected net interest income and fee income under various clients' behavioral assumptions, market rate scenarios and business strategies, i.e., calculate Earnings at Risk under deterministic scenarios. Net interest income can be calculated from the financial risk point of view or as an accounting category, following the rules of IAS 39/IFRS 9. The effective interest rate (EIR) of a contract accounted for at amortized cost is calculated at each repricing date or it can be calculated just at the start of the analysis period for performance optimization.

Along with projected earnings, users can analyze the impact of hedging decisions by entering simulated transactions with hedging instruments (derivatives).

Impairment Adjustment

Alongside accounting for classical ALM risk factors, credit events which influence the ALM analytics can be considered in order to offer a truly integrated risk view. RiskSuite enables users to input the probability weighting of cash flows to simulate credit risk events. Projections of impairment adjustments can be entered or imported from external dedicated systems to support compliance with IFRS 9 (e.g., RiskSuite is integrated with Analitica IFRS 9 Impairment-Suite).

Forward-Looking Measures

- Future book scenarios: balance sheet movements follow the future business expectations defined by a scenario
- Reinvestment of matured principals from the current book (replicated original contract parameters)

Forward looking scenarios add a time dimension to risk exposures and economic value sensitivities. After having analyzed risk exposures and economic value sensitivities across the current balance sheet, the next step is to examine the impact of scenarios on future earnings under a set of user-definable assumptions about customer-specific behavior, the bank's business strategy and the market environment.

The solution uses the defined assumptions to simulate the entire balance sheet over a future time period and deliver a full set of key performance and risk indicators, including earnings, EVE sensitivities, gap reports and liquidity ratios for future points in time, based on simulated balance sheets. This offers a complete risk-return analysis, providing the necessary information for forward-looking business decisions.

RiskSuite supports three different modes of modelling the balance sheet; two of which implement the future book:

- **run-off balance sheet:** current assets and liabilities are not replaced as they mature;
- **constant balance sheet:** the current balance sheet size and structure is maintained by the reinvestment mechanism;
- **planned balance sheet:** balance sheet movement follows the future business expectations as defined by a business plan scenario or particular reinvestment mechanisms.

Future Book

The solution automatically generates new virtual contracts, i.e., future book , replacing matured real contracts from the current book . Each matured principal generates a new contract with the same amount and all other contract parameters are replicated. The default dynamic balance sheet building algorithm can be changed by applying different scenarios.

Newly generated positions can have a different interest rate structure and a alternate interest rate margin. Additional options include replicating only current book contracts from a chosen period, specific segments of contracts can follow the run-off pattern, etc.

Simulation capabilities

Simulation capabilities features:
- Flexible scenario configuration system
- Full support for all contract types and contract details (including calendars, day-count conventions, non-work day correction methods, etc.)
- Full revaluation
- Accounting-level accuracy
- Supported static and dynamic assumptions

Special features (UI):
- User-friendly graphical interface for scenarios configuration and input data overview
- Guided wizard for the whole process from the data import to the multi-run parallel calculation

RiskSuite is equipped with a flexible scenario system than can take into consideration the current regulation and forecast structures that may be imposed by the regulatory authorities, as well as providing sophisticated scenarios for answering ad-hoc management questions. This ensures that the solution is future-proof and can also cope with future regulatory requirements. The solution, fully supporting all contract details

including calendars, etc., can provide results with accounting-level accuracy.

A graphical user interface guides users through a well-structured and user-friendly scenario setup process. The user defines a set of assumptions relating to risk factors and balance sheet dynamics, to define how the balance sheet will be affected by, for example, planned new business and expected customer behavior. The system uses the defined assumptions to generate the balance sheet over a future time period and deliver a full set of key performance and risk indicators. This provides a holistic view of risk including earnings, EVE sensitivities, gap reports and liquidity ratios for future points in time.

All analytical risk and performance measures are calculated under a full revaluation, taking into account non-linear effects resulting from (embedded) options. Both static and dynamic assumptions are supported, and behavioral assumptions can range from basic to bank-specific modeling.

Sets of multiple combined scenarios can be defined for each individual segment of the bank's portfolio. The segments of the entire bank's portfolio are defined by flexible filters which act as logical conditions on the contracts' properties and parameters.

Market conditions

- interest rates yield curves twists and shocks (from implied yield curve rates)
  - floor / cap interest rate options
- changed reinvestment terms scenarios
  - changed floor / cap interest rate options
  - changed fixed interest rate terms
- FX rates scenarios

Customer behavior

- non-maturing deposits (NMD)
- prepayment / call scenarios
- bank guarantees executions
- delayed payments

Credit risk

- cash flow weighting scenario
- spread curve scenarios
- impairment plan

Contract provisions

- annex to current contracts
  - annex to current contracts with changed interest rate floor / cap values
  - fixed interest rate modification

Finally, users can analyze the effect of hypothetical transactions ('what-if' deals, such as hedging transactions, large commercial loans, or bond issues) to assess the impact of planned actions on the bank's risk and key performance indicators.

Business Planning

- In contrast to the run-off balance sheet assumption, which enables the user to analyze measures of the current balance sheet, the business plan scenario offers the inclusion of the effects of expected movement of the balance sheet in the future time periods.
- The business plan is defined for any individual segment of the bank's portfolio, which provides maximum flexibility. Based on business expectations and the bank's vision for the future, some segments may decrease, others increase and others remains constant, all being defined at the same time in a single scenario.

Once the scenario-specific balance sheet structure has been defined, different sets of new business assumptions, such as budget or growth scenarios, can be assigned to specified levels of the planning structure. The process of business planning begins with defining the granularity at which the balance sheet is being planned. Users can explicitly plan volume changes in chosen balance sheet dimensions or can define business growth scenarios for future time periods.

Using accrual accounting rules (IAS 39/IFRS 9), the projected earnings help to validate budget plans. For performance optimization effective interest income can be calculated from initial effective interest rate (EIR at simulation start date) or it can be calculated exactly by recalculating EIR on every repricing date.

Liquidity Risk Management Funds Transfer Pricing Operating Liquidity

- Possible customized extensions
- The solution provides integrated modules for
  - liquidity risk management,
  - fund transfer pricing,
  - operating liquidity.
- Additional modules are an integrated part of the solution, but due to the specific internal policies of each individual bank, they cannot be part of the out-of-the-box solution.
- All details must be coordinated in advance with the client.

Liquidity Risk Management

The solution also supports integrated liquidity risk management. The scenario engine has been extended to report on, manage and stress the structural liquidity gap, liquidity survival horizon, regulatory liquidity coverage ratio (LCR) and net stable funding ratio (NSFR).

The dynamic generation of the balance sheet provides a calculation of simulated values of risk indicators at future points of time, whereas the current balance sheet is a basis for regulatory reporting.

Funds Transfer Pricing

RiskSuite utilizes the exact projection of cash flows and dates adjusted for business day calendars and conventions to assign a cost of funds to each asset and liability cash flow. Allocation of funds' costs can further depend on the financial contract type, nominal currency, counterparty type etc. Users define which yield

curve is the basis for transfer pricing, so appropriate adjustment spreads can be applied to the underlying liquidity and credit risks of the instrument being transferred.

This enables the calculation of an interest margin at a single contract level that can be allocated to business units, products, and customers. The assignment of spreads creates flexible combinations of standard and specific spreads that give a breakdown of margin components.

Operating Liquidity

The operating liquidity module provides a controlled user-friendly workflow for the preparation of planned (daily) cash flow reports and their backtesting with realized cash-flows. The finalized cash flow plans require authorization from responsible persons and the whole process complies with the regulatory requirements for cash flow plans reporting.

The module is also a strong tool for internal liquidity management. Apart from financial instruments with amortization schedules, non-deterministic cash flows can be projected based on historical patterns (salaries, pensions, credit cards…), significant forecasted business events can be manually entered, etc. All cash flows dates are adjusted for business day calendars and conventions.

The module supports settlement and nostro accounts' balance calculation and tracking of the mandatory reserve ratio.

Results Data Repository

- All results are on the lowest level of granularity: cash flows/accruals for each contract or any other level of the input data
- Results can be transferred to the bank's data warehouse or simply written to a text file
- Denormalised table format allows further analysis with any BI tools
- Built-in pre-determined standard reports

All results from the application can be automatically transferred to the bank's data warehouse through an automated standard data interface, using the pre-defined views of the results layer. These views present results at the lowest level of granularity, e.g., a single cash flow, and across all the dimensions set up in the system (e.g. product type, business unit, entity) to enable further analysis, comparison and drill-down.

RiskSuite's results data repository structure provides multi-dimensional reporting capabilities. Users can easily create their own reporting layouts and filter results by any data field, which allows them to build custom reporting sets. The repository stores various user-specific reporting setups and sets of results over defined time periods and for separate entities . This allows for historical comparisons of results; hence enabling financial institutions to monitor the evolution of risk over time.

Reporting

To allow users to concentrate on the analysis of results, the process of loading data, running calculations and reporting can be fully automated. The solution has been optimized for performance, providing parallel computing capabilities; thus ensuring the rapid availability of results. In addition to the built-in standard reports, all calculation results are available for further analysis with the users' BI tools and provide full transparency.

Regular (regulatory and internal) reports can be run at defined time intervals. Users can explore in-depth risk factors by running sophisticated combinations of ad-hoc scenarios and obtain reporting results in the form of a flexible configurable balance sheet structure, dashboards, or other visualizations of calculated results.
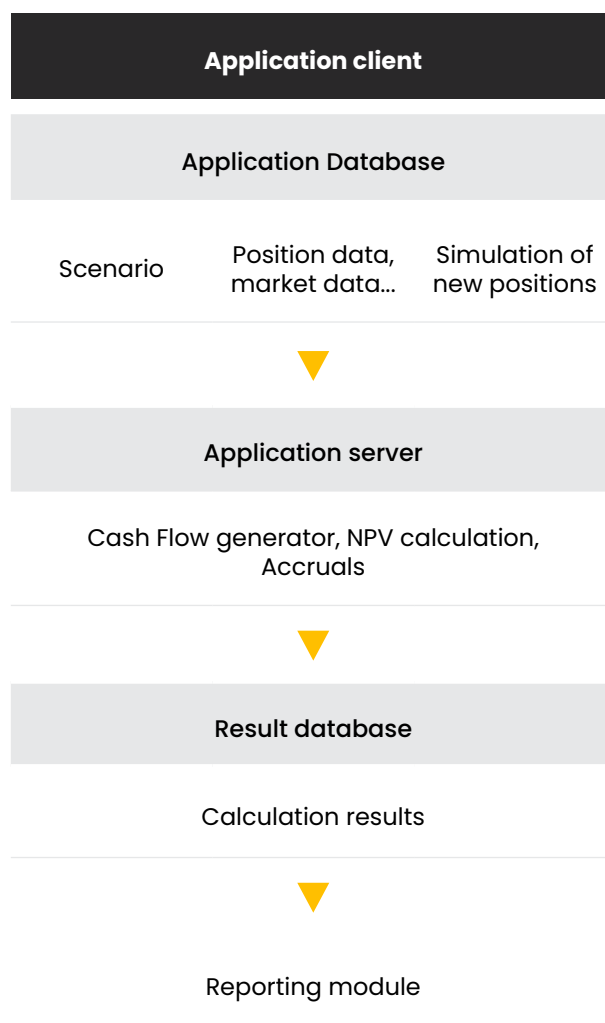
II. Solution Architecture

- Cloud and on-premise version
- Configurable integrated data validator and editor
- Fast 64-bit in-memory parallel calculation engine
- Modular structure enables flexible configuration and customization
- Flat shape of results enables multi-dimensional analysis and visualization

RiskSuite is streamlined for performance and flexibility. Its architecture is optimized for processing high volumes of data. The clients can decide between implementing a cloud version or the on-premise version of the solution.

The RiskSuite architecture consists of a well-documented input data interface with a configurable integrated input data validator and editor. The application database which stores all the history of input data, including manual entries with an audit trail, serves as a centralized data repository combining contract data, balance sheet structures, counterparty and market data.

The financial logic is implemented in a fast 64-bit in-memory parallel calculation engine leveraged with an integrated library of calculation methods and scenario simulation modules. The modular structure of the solution's architecture enables flexible configuration and the customization of calculation methods and extensions of functionality with clients' proprietary models.

A results database stores all analyses' metadata and calculation results, down to the finest detail of a single cash flow. The data can be analyzed and visualized in clients' BI environments (the implementation of reports, dashboard, etc. can be provided).

Application client

Application Database

Scenario	Position data, market data...	Simulation of new positions

▼

Application server

Cash Flow generator, NPV calculation, Accruals

▼

Result database

Calculation results

▼

Reporting module

III.
Key Advantages

A fully integrated modular asset liability and liquidity risk management platform, empowering risk measurement across different departments and ensuring regulatory compliance and economic capital management.

Support for forward-looking scenario simulations enables educated risk management decisions.

RiskSuite is a part of the integral modular platform for quantitative finance

- ALM & planning
- Interest calculations (EIR...), valuation of FI
- Optimized hedging strategies and prospective hedge effectiveness testing
- FX risk (impact on P&L, EaR...)
- Optionality – prepayment and early redemption assumptions, non-maturing products etc.
- Business risk modelling (business plan and scenarios)
- Liquidity risk
- Funds transfer pricing
- EAD (ECL)
- Profitability analysis

Support for regulatory compliance (IRRBB, LCR/NSFR).

Flexible architecture enables the extension and customization of calculation methods and scenarios.

The full revaluation approach without approximations, incorporating non-linear effects on an individual contract level, enables usage for accounting and operating liquidity.

Support for seamless **integration with existing IT environments**.

The results data set supports **multi-dimensional planning and reporting** and includes data on an individual cash flow and financial accruals level.

International groups can benefit from a centralized multitenant installation with **multi-functional-currency support**. User access rights and an audit trail are fully supported.

The high performance solution architecture supports **large volumes of data** while still enabling calculations at **the finest level of detail**.

Analitica provides an **expert team with experience** in risk management information technology projects and dedicated expertise in the fields of quantitative finance, guaranteeing a smooth project implementation.

IV.
How to Start Using RiskSuite™

Interested clients can get a basic introduction to RiskSuite functionality by accessing the free demo environment available at **www.risksuite.pro**. Users can get an overview of the functionality by exploring different analyses running pre-defined scenarios on pre-prepared data or by using an option to upload their own data.

When the client decides on the service subscription or the on-premise installation, our consultants engage in a streamlined implementation project: identifying customer requirements and potential functionality gaps as a first step. In the second step, data interface mapping is defined, together with the configuration of the calculation method matrix which defines the calculation methods used by each combination of analysis and financial instrument type. In the third optional step, the solution is prepared for going live. Our consulting and development teams can provide optional support services related to data integration.

Implementation Project Steps

GAP Analysis
Customer Requirements

▼

Prototype Platform Configuration

Calculation method matrix	Data interface definition

▼

Adaptation and Tuning

Additional calc. methods (if required)	Data integration (optional)	Data Quality (optional)

▼

GO LIVE

Calculation Matrix

COMMON GI	IRRBB/IR GAP	NII	EVE	LIQUIDITY GAP
Fixed income	1	1	1	1
CF at Maturity	2	0	2	2
Guarantee	0	0	0	4
Sight Deposit	3	1	3	4
Withdrawn limit/revolving	3	1	3	4
Expected liability	5	5	5	4

The calculation matrix is configured separately for each client. Multiple cash flow calculation methods are available for each combination of analysis type and financial instrument type. A set of supported cash flow calculation methods includes various basic ones (from cash flow exclusion from calculation, single cash flow at maturity, to cash flows following the advanced amortization schedule parameters) and advanced ones (methods for positions without an amortization schedule, with uncertain timing and amount of cash flows etc.).

This concept enables the client to run multiple analysis types on the same data set – whilst still taking into account only positions bearing a specific type of risk (e.g. guarantees can simply be excluded from IR gap analysis, but still be included in liquidity gap analysis, both calculated on the same data set).

Analitica & Microsoft work together

Analitica is a Microsoft partner and leverages Microsoft Azure cloud architecture to deliver the RiskSuite solution as a service. Only cloud computing resources with instances within the EU are utilized if not agreed otherwise.

The Microsoft Azure environment provides unlimited scalability, flexible data integration, security features and flexibility of usage/cost plans.

Contacts

Arrange your free trial by contacting **support@risksuite.pro** or **+386 1 2565 196**.
Learn more at **www.risksuite.pro** and **www.analitica.s**i Analitica Ltd.