ADDACTIS®
MODELING
SOLUTION

Modeling challenges in a continuously changing market

Because of **the pressure due to regulation** and **profitability aspect**, insurance companies are more and more asked to disclose various key indicators to the board, the regulator, risk department, and so on. A large part of those indicators (assets & liability cash flows, financial & accountings indicators, regulatory capital, risk assessment, etc.), are estimated through projection models. This implies that modeling platforms should be able to manage a large range of models, so to provide:

- A performant calculation engine whatever the model,
- A maximum of flexibility to manage various models,
- User friendly environment to design and maintain models,
- An interface to facilitate model results analyzes,

- A framework to facilitate and automate runs and reporting,
- A model library to accelerate companies' implementation.

To overcome all these increasing challenges that insurers are facing, ADDACTIS® Worldwide has developed a modeling platform, **ADDACTIS® Modeling**. The features and functionalities of this advanced and modern tool are fully described below.

ADDACTIS® Modeling solution overview

ADDACTIS® Modeling meets all ERM requirements thanks to a wide range of customizable modules: ESG, Asset projections, life and non-life liabilities, ORSA projections, SCR calculations and ALM. Our platform is fully transparent and doesn't require IT intervention to fit each company's modeling needs. It is ergonomic and user friendly for functional users.

ADDACTIS® Modeling is composed of two parts: a modeling platform and a complete models library including strategic modeling, ALM, capital requirement and internal reinsurance. **ADDACTIS® Modeling** runs huge volumes of data thanks to an efficient integrated compiler. It can performed over millions of actuarial calculations per second on a standard computer.

Essential functionalities for an advanced modeling process are included in **ADDACTIS® Modeling**. These are:

1. A very performant calculation engine;
2. A flexible modeling platform;
3. A platform to design and maintain models easily;
4. A platform to run quickly and safely models several times;
5. A tool to help analyzing results;
6. A model library.

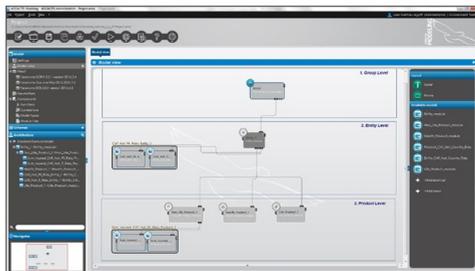The 6 essential functionalities are described in de tail below.

1) A very performant calculation engine

ADDACTIS® Modeling embeds a high performant compiler. Model compilation is an automated phase which:

- Analyzes model formulas and object dependencies;
- Determines how to run the model (object run order, distribution, memory management, dependencies, etc.);
- Re-writes the model in assembly code, the fastest object to be executed by processors.

Compilation allows designing model with a functional approach without thinking about the execution order due to dependencies, the memory management and so on. The result of this analyze is the model rewritten in assembly code which is the native language of processors, so the most efficient code to be executed by computers.

Compilation phase takes at maximum a few minutes and is necessary only if the model change.

2) A flexible modeling platform

(Re)insurance companies often need to run several models to fit their requirements and produce all various indicators and figures for internal or regulatory purposes such as liabilities cash flows valuation, economic scenarios simulations, assets and liability modeling, business plans projection, capital requirement estimation, and so on. **ADDACTIS® Modeling** is tailored to manage any kind of projection models, including stochastic calculations, but also optimization models, so insurance companies have only one platform to produce all indicators. Companies can choose to use one big model or several models or even one model to run several models.
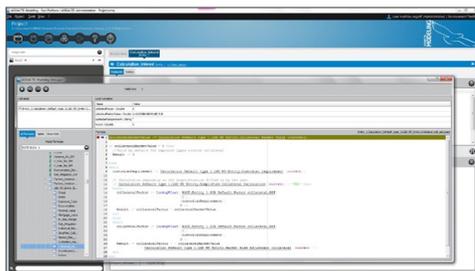

3) A platform to design and maintain models easily

We have created our platform to allow model designers focusing on their model architecture and on the functional point of view. **ADDACTIS® Modeling** embeds features to facilitate design of insurance models. For instance:

- Nested model instantiation allows splitting models in bricks that can be called as many times as required to design models and run independently for validation;
- Projections and simulations schemes are two pre-existing dimensions that can be applied to model variables;
- A debugger can run model step by step to visualize any variable value at any time;
- Scenario feature can be used to run automatically a model several times with different input parameters.

Models designed with a functional architecture are definitely easier to understand and maintain.

4) A platform to run quickly and safely models several times

It appears than more and more, insurance companies have to run their model several times for management purposes, what if analyzes, sensitivities and stress-tests, and so on. So, the challenge is not only to have performant model runs, it is also to be able to run models several time quickly and safely. **ADDACTIS® Modeling** proposes several ways to answer this requirement:
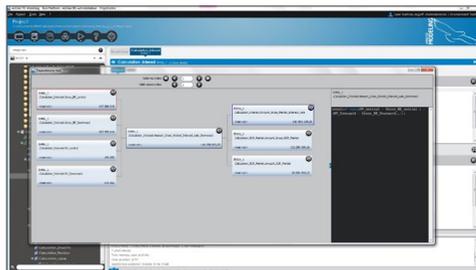
- It embeds a scenario feature to automate model runs with different input parameters;
- Integrated environment feature allows dynamically and safely changing links to input sources;
- Using Standalone instantiation mode, a model can run another model while computing and overloading its inputs, so users can do simulations within simulations, optimize model parameters, and so on;
- It can be purchased with **ADDACTIS® Workflow**, our solution to integrate and automate calculation tools in the information system;
- It is deployed with a DLL and a CLI, so users can automate runs using a third tool.

Thanks to those features, it's very easy and efficient to run a model several times for any kind of analyze.

5) A tool to help analyzing results and create reports

At the end of the run, **ADDACTIS® Modeling** proposes to visualize directly all model figures that have been used as input and calculated. Using the tree view, users can browse model results to analyze figures while using displayed graphs and tables. Moreover, the "view dependencies" feature opens a specific frame to browse model results according to calculation dependencies, so users can easily track calculations that lead to a given results. After a run, users can display pre-existing reports or create their own reporting sheets directly in **ADDACTIS® Modeling** by browsing the model, drag and dropping objects in report sheets then setup graphs and tables as in **Microsoft® Excel**. Reports can display results from different model runs and be exported as **Microsoft® Excel** spreadsheets.

6) A model library

ADDACTIS® Worldwide provides users with a model library from which model bricks can be used as a base to develop companies' specific models.
ADDACTIS® Worldwide has developed a library of actuarial models mostly focused on insurance. Models from this library can be purchased by insurance companies to accelerate implementation of their specific models or used directly if standard calculations are consistent with their modeling requirements. **ADDACTIS® Worldwide**

model library allows accelerating companies' models development and decreasing models' cost.
When **ADDACTIS® Worldwide** consultants are requested to develop models, they also use the library to decrease implementation cost, accelerate development and ensure model consistency and reliability.

ADDACTIS® Modeling solution features

Our **ADDACTIS® Modeling** platform aims to:

- **Keep a functional approach in Modeling**. Thanks to the integrated compiler, model structure has nearly no impact on calculations, so model designers can organize models according to a functional point of view. This helps a lot to understand a model and analyze results;
- **Make models easy to implement**. Designing a model is a technical job that our solution aims to bring more intuitive with an ergonomic interface and various features as the debugger, the instantiation tool, the functions, the projections/simulations schemes, the profiler, and so on, that improve model design job;
- **Facilitate IT integration**. **ADDACTIS® Modeling** is installed with a DLL and a CLI to automate runs. The platform embeds a scenario feature which manages stress-tests and scenario runs very easily. Moreover, it can be executed from our tool **ADDACTIS® Workflow** which allows a perfect integration and automation;

- **Help users analyzing results**. At the end of a run, **ADDACTIS® Modeling** proposes natively an interface to display computed figures and helps users browse results. The view dependencies feature highlights formula dependencies between variables, so users can easily understand where results come from;
- **Meet regulatory requirements**. Our tool has been designed with a particular concern about regulatory constraints, so it embeds an archive feature, an audit trail and more specifically to Solvency II, a dedicated feature for pillar 3 reporting.

ADDACTIS® Modeling solution IT requirements

ADDACTIS® Modeling is an independent software solution without any external components or dependencies. It works on any recent 32 or 64 bit Windows platform (Windows 7 or later/ Windows server 2008 or later) with standard requirements on hardware for these kind of solutions. Local and server licenses are available for the product.

All software products are **ADDACTIS® Worldwide** full property and have no external dependency.

ADDACTIS® Worldwide is a worldwide company delivering first class actuarial and strategic software for insurance and reinsurance sectors alike. The ADDACTIS software cover a large range of modeling, pricing, reporting and reserving needs.

the ADDACTIS® Way

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