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RISK CONTROL

A Centralised Software Application for EBA Stress Testing

1. Introduction

European banks face significant challenges in implementing the EBA's 2016 stress tests in an efficient and timely manner. The challenges include devising suitable methodologies, mobilising and controlling the quality of input data, performing calculations and generating reports consistent with the demands of the EBA, ECB and national regulators.

A major step forward in the efficiency and timeliness of the stress testing exercise may be achieved by instituting a well-organised central software solution. Such a solution can:

1. Draw information from existing bank systems,
2. Perform data checks,
3. Manage scenarios,
4. Host the models used in the calculations and
5. Generate reports customised to regulatory needs.

Working with clients, Risk Control has over a number of years created *Stress Controller*, a powerful software framework designed for stress testing calculations. A light-weight JEE application, this software can connect to existing bank infrastructure using flexible Web Services protocols. The application is built around a high specification relational database. It makes extensive use of scripting, permitting users to modify the logic of financial calculations without reprogramming the underlying framework.

Using *Stress Controller*'s components one may put in place the functionalities necessary for a particular stress testing exercise like those required by the EBA. In preparation for the upcoming 2016 stress testing exercises, Risk Control is producing an EBA edition of *Stress Controller*. This edition will support banks in meeting the EBA's requirements, module by module, and will produce outputs presented as the regulator demands.

The use of existing components radically reduces the time and resources required to institute a centralised, coordinating software framework for stress testing. Risk Control's long experience of constructing stress testing applications means that many challenges that a bank would face in building such an application have already been addressed.By adopting *Stress Controller*a bank may achieve a step change in the efficiency and cost effectiveness of its stress testing activities without engaging in a long and uncertain internal development project.

This document is organised as follows. Sections 2 and 3 respectively summarise the EBA's past requirements and describe our solution. Section 4 concludes.

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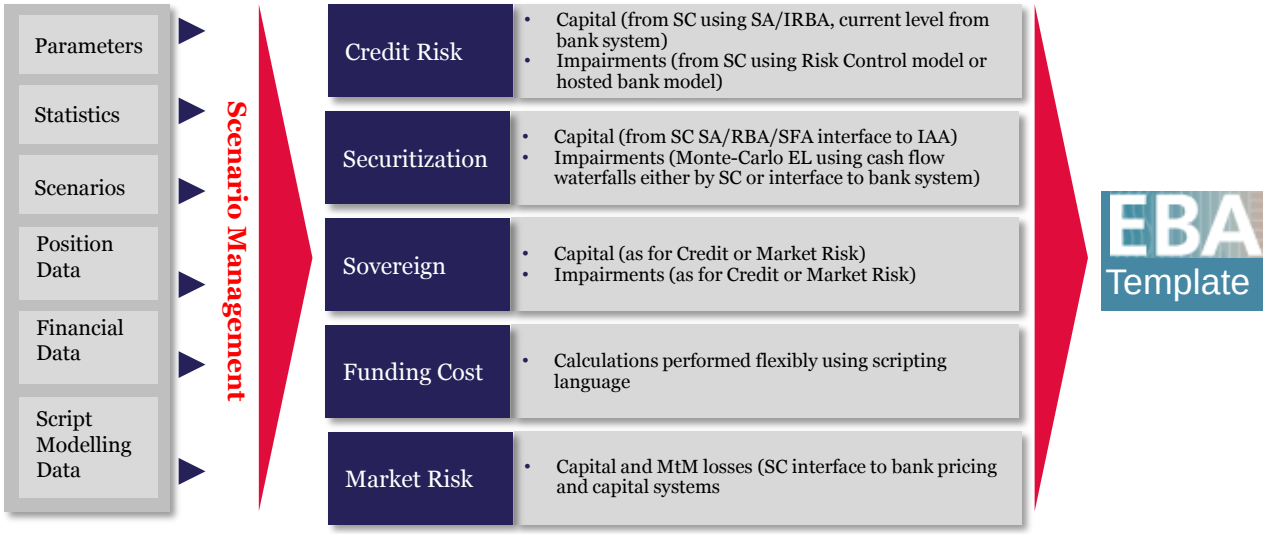
2. Requirements

The EBA is yet to announce details of the methodologies it will require banks to use in 2016; but it is likely to build rather directly on the methodologies published in 2014. We describe this approach below.

The main output of the EBA's stress testing exercise is consolidated group level CET1 for the coming 3 years including off-balance sheet exposures. Projections of Profit and Loss (P&L), Risk Weighted Assets (RWA), Expected Losses (ELs), provisions and other intermediate quantities are also required.

Scenarios are defined from (i) a macroeconomic and (ii) a market perspective. For the macroeconomic perspective, projections are provided for macroeconomic variables, for a baseline scenario and a stress scenario. For the market perspective, shocks on market risk parameters are provided for the baseline scenario and stress scenario, as well as four historical scenarios.

Figure 1: Structure of *Stress Controller* EBA Edition



The primary risk types covered in the risk calculations are:

1. Credit risk
2. Market risk
3. Sovereign risk
4. Securitisation
5. Cost of funding

A simplified approach is used to calculate operational risk capital. Regulators may require other risks to be calculated but those listed above (plus operational risk calculated in a simple fashion) are the risks required for the EBA reports common to different jurisdictions. Results from risk calculations are used in projection of P&L, RWAs and capital.

Output from the calculations, including results from risk calculations as well as projections of P&L and capital, are used to populate the templates provided by the EBA. The populated templates are then used by the EBA to perform quality assurance processes and to compile information required for the disclosure of stress test results on a bank-by-bank basis.

3. Solutions

To assist banks performing EBA stress testing, Risk Control has combined different modules of *Stress Controller* to generate an EBA Edition. The structure of the EBA Edition is shown in Figure 1.

Here, we describe the modules that will be deployed for performing EBA stress testing.

3.1 Macro Module

The Macro module provides facilities for managing, formulating and completing scenarios. The completion of scenarios is accomplished by calculating mean time paths for additional risk factors not specified in the original

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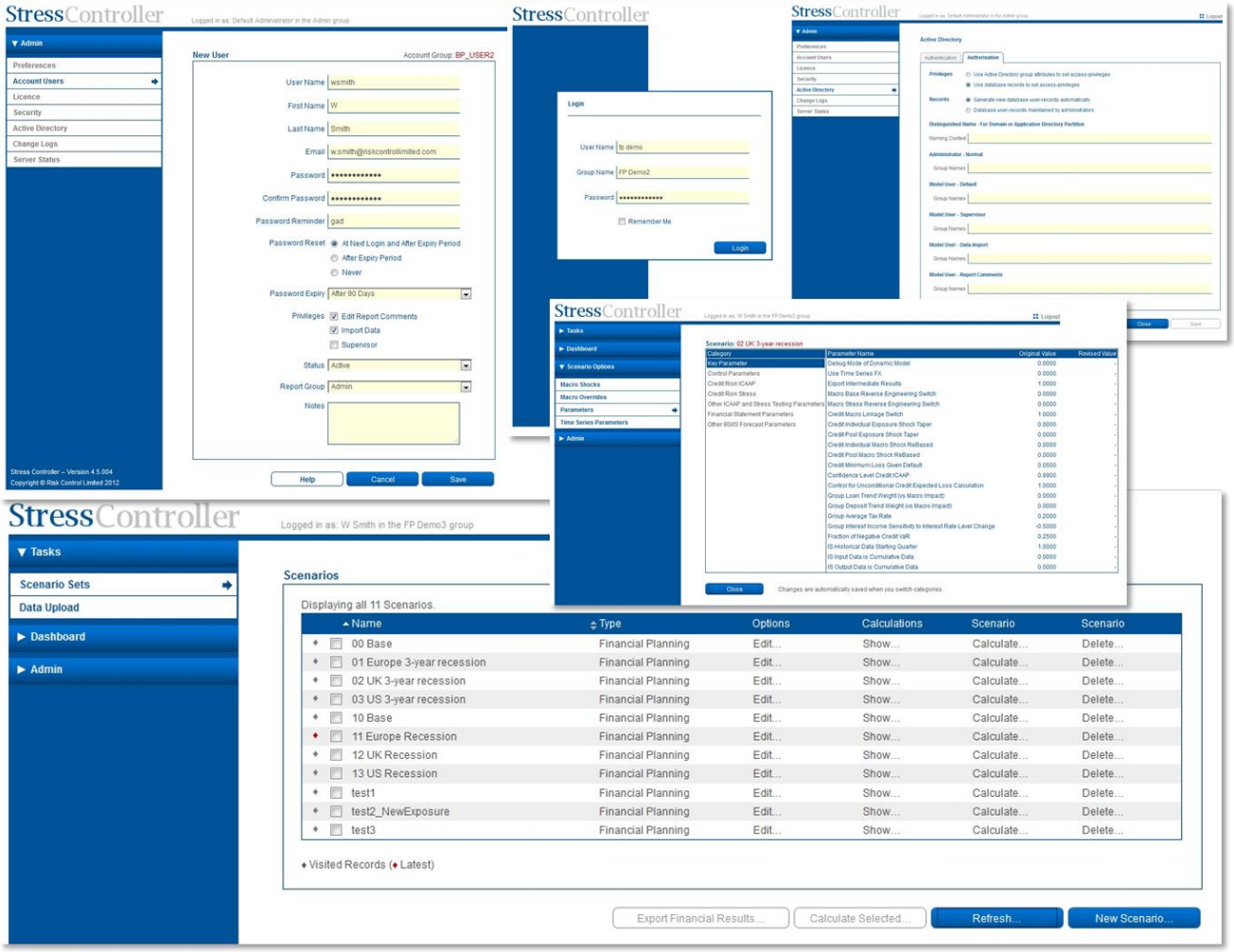
scenario using an embedded macroeconomic model. (Additional market factors may be forecast using regression approaches within the Market Risk module.)

3.2 Credit Risk Module

The EBA's Credit Risk category covers all counterparties and all positions exposed to default risk (aside from counterparty credit riskwhich is included in Market Risk.) The credit risk module produces (i) stressed Point in Time (PIT) Default Probabilities (PDs) and Loss Given Defaults (LGDs) which are used to forecast impairments and (ii) forecast rating migrations that may be employed along with PDs in forecasting stressed RWAs. The calculations are forward looking, and results are available at multiple levels of aggregation.

Figure 2: *Stress Controller* – A Centralised JEE Application for Stress Testing



3.3 Market Risk Module

The EBA's methodology presumes two approaches to Market Risk stress testing:

1. Simplified Approach - bank-specific predictions of reductions in Net Trading Income (NTI) based on historical variation
2. Comprehensive Approach –forecast losses based on revaluation of positions using stressed market risk parameters, CVA haircuts for OTC and the effects of default by the bank's largest counterparty.

For the comprehensive approach, banks must measure the impact via gains and losses for positions valued at fair value using internal pricing and risk management models and assuming a set of instantaneous shocks to certain key variables provided by the EBA as market scenarios. These key variables will typically be insufficient to calculate the full impact on a bank's trading book, the value of which will depend on many additional factors. The Market Risk Module of *Stress Controller* can produce expanded scenarios covering all the relevant risk factors which can then be used in bank's existing systems to generate stress testing calculations.

3.4 Securitisation Module

The EBA requires banks to calculate impairments to banking book securitisation positions using appropriate cash flow waterfall models. *Stress Controller*'s Securitisation Module allows the user either to generate stressed

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inputs that can be exported via an interface to existing bank systems or to perform cash flow waterfall calculations directly. Waterfalls are coded using scripts and, hence, may be flexibly altered as necessary. Capital calculations are performed by *Stress Controller* either by directly modelling inputs to the SFA or to the bank's IAA or by scaling RWAs based on broad categories of securitisation exposure.

3.5 Sovereign Module

While details differ, Sovereign Risk is handled in *Stress Controller* using methods similar to those applied for Credit Risk and Market Risk exposures.

3.6 Cost of Funding Risk

Funding cost calculations are highly bank specific. Through its convenient and flexible scripting language, *Stress Controller* allows the user to create completely bespoke funding cost calculations or to host methodologies already developed.

3.7 Outputs

Stress Controller also have an embedded reporting facility that consists of a set of reports. The reports allow users to view analysis results in a comprehensive, consistent and dynamic manor. In order to automate the EBA stress testing process in banks, *Stress Controller* can be configured to export calculation results into the EBA templates.

4. Conclusion

The 2016 EBA exercise will involve (i) the provision of initial information in Q4 2015, (ii) publication of detailed templates in Q1 2016 and (iii) the requirement that banks deliver results in Q3 2016. It is currently envisaged that the EBA stress testing will follow a two year cycle. But, regulators are likely to expect banks to use somewhat consistent approaches in their regular ICAAP exercises.

For many banks, enhancing their stress testing infrastructure is a major priority. Automating the completion of EBA stress tests can cut costs, reduce execution risks and facilitate timely and smooth interactions between banks and regulators.

Risk Control is working with clients to put in place automated processes in the autumn of 2015 based on our current understanding of the 2016 stress testing exercises. Upon the publication of the detailed templates, we will update the automated processes appropriately.

About Risk Control

Risk Control is an independent firm of risk specialists assisting major international institutions in developing and implementing effective and rigorous risk management.

Risk Control is unique in combining high level quantitative consulting for finance and risk with software tools and applications. We offer bespoke solutions precisely matching client needs, built within our flexible software platforms.

We aim to increase the transparency of the business environment our clients face and to assist them in reducing the likelihood and costs of potential adverse events.

To achieve these objectives, we deploy multi-disciplinary teams of risk and finance specialists, statistical and mathematical modellers and experts in strategy and financial planning.

Our software is used by leading banks, asset managers, funds and public institutions around the world. Our public sector clients include central banks, multilateral institutions and government bodies including financial regulators and national Treasuries. Risk Control's private sector clients comprise some of the world's largest banks and asset managers, major insurance firms and globally known industrial companies.

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