

# STRESS RELIEF

ARE VENDED SYSTEMS THE ANSWER?



1

# INTRODUCTION

Stress testing is here to stay. Since the start of the downturn, it has moved from being a secondary element of Pillar 2 frameworks to a central means of determining capital needs for banks. As a consequence of regulatory mandated exercises, banks have been required to raise billions in capital and stress tests will continue to drive capital actions by banks including dividend restrictions. The industry response to this new paradigm has been a frantic development of capabilities, focussed primarily on the methodological techniques that underpin robust financial projections. However, more limited progress has been made in industrializing stress testing processes and infrastructure.

As a consequence, stress tests are often agonizing exercises to undertake, requiring large numbers of highly skilled employees to solve what appear to be basic data quality and consistency issues. Despite significant resource being allocated, often too little time is spent on important interpretation questions and insufficient senior management involvement is obtained. The result of this approach is a lack of transparency in outcomes, and limited integration of stress testing in strategic planning and capital allocation processes. The status quo for most banks is untenable, both from an internal perspective and from the perspective of their regulators.

In response, the market for vended stress testing systems has developed quickly. There are now a host of systems which aspire to provide solutions to the problems banks face and it is theoretically intuitive that they could provide significant benefits. For example, considering only efficiency, these could include:

- Centralizing and publishing a “master” version of models and data used across the institution
- Quickly running and aggregating stress tests with less manual work in co-ordination of different units and geographies

These efficiency benefits could lead to many benefits, including greater confidence in results and deeper insights on the bank.

In this report we see that vended solutions are part of the answer to the challenges banks face, but their use will require careful thought and implementation. We address the following questions:

- What do vended stress testing systems actually do?
- What can’t or shouldn’t be supplied by vendors?
- What underlying principles should drive development?

There is a useful role for “off-the-peg” stress testing systems, but their integration into the process will be a long term effort involving staged implementations. Development plans will need to be carefully managed to reflect the current capabilities of the bank (in particular, data availability and the robustness of the strategic planning process), the lack of clarity about future requirements and evolving regulatory expectations.

In developing this report, Oliver Wyman met with nine major providers of stress testing solutions and went through a structured process of evaluating their offerings, supplemented by interviews of users of the systems. A separate document provides more detail on stress testing systems in general and evaluates the propositions at a vendor level. This can be accessed on request via our webpage: [www.oliverwyman.com/stress-testing.html](http://www.oliverwyman.com/stress-testing.html)



2

WHAT  
DO VENDED  
STRESS TESTING  
SYSTEMS  
ACTUALLY DO?

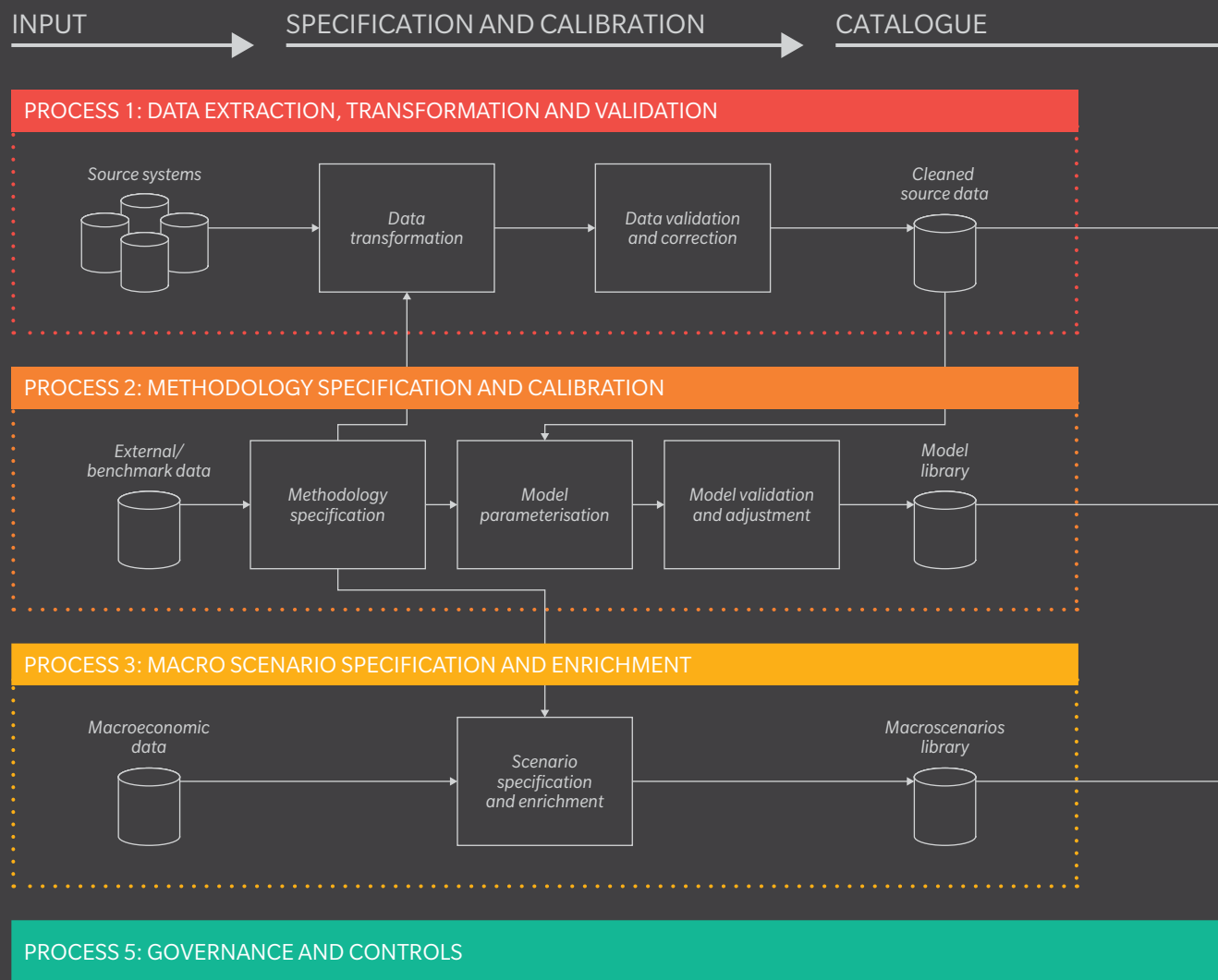
A number of trends in stress testing requirements lead us to the conclusion that dedicated systems will play an increasing role in the process, and that ad-hoc spreadsheet based solutions are not appropriate in the long term. Boards and senior management need more confidence in results, which implies that the governance, control and auditability of estimates will have to improve. The increasing demands for multiple views of results (business vs. legal entity, static vs. dynamic balance sheet) imply a more structured approach to data management will be necessary. Developments in the granularity and complexity of estimates put further pressures on the existing infrastructure.

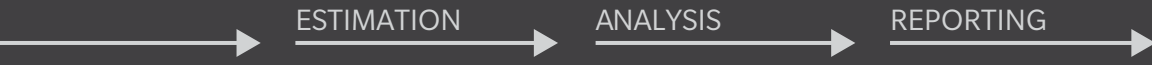
In order to give an idea of what stress testing systems actually deliver, we discuss standard vended system capabilities against the process steps required to complete a stress test. Exhibit 1 overleaf gives a high-level overview of the process of a stress test, and most vendors have offerings across the majority of the process map. As a further dimension alongside these main processes, different risk types<sup>1</sup> and functional entities of a bank could be added. We have specifically focussed on *enterprise level capital stress testing*, rather than risk-type specific offerings or business unit level uses.

<sup>1</sup> Risk types refers to elements such as credit risk, pre-provision net revenue (PPNR), operational risk, conduct risk and traded risk.

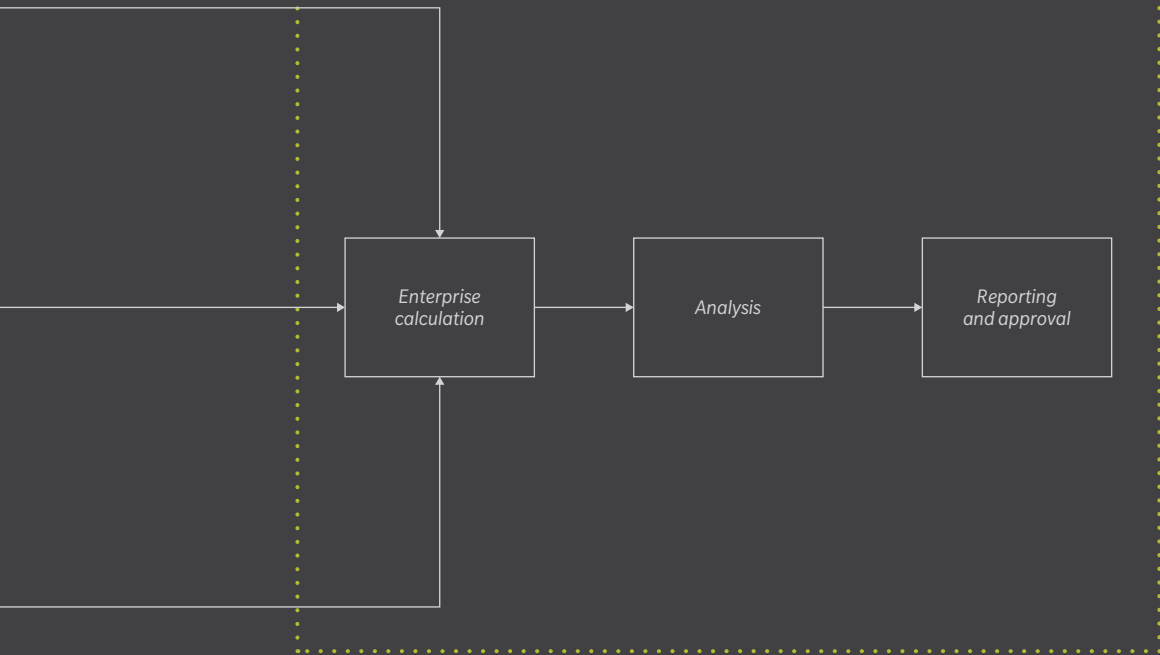
EXHIBIT 1

# PROCESSES IN AN ENTERPRISE WIDE CAPITAL STRESS TEST





PROCESS 4: ESTIMATION, ANALYSIS AND REPORTING



## PROCESS 1

# DATA EXTRACTION, TRANSFORMATION AND VALIDATION

An enterprise wide stress testing calculator requires data in a standardized format, consistent with a “data model”. Choosing a system also involves aligning to the system’s data model. Each vendor offers their own and differentiated data model to which internal data can be aligned, and in some cases tools to support data extraction (Extraction, Transformation, Load [ETL]). The data model is aligned with the vendor’s calculator and is largely fixed, but there are material differences in these and a key question for any bank in choice of vendor is the associated choice of data model. Decisions need to be made about the granularity of the data that will be extracted, and where portfolio level data will meet requirements and whether this level of granularity is supported by the vendor model.

Selecting a common data model for the purposes of stress testing necessitates a compromise between accuracy and usability. A common data model across all business lines is necessary to industrialise the stress testing process.

Most vendors offer standard error checking and validation in their extraction and transformation software. These offerings are generally of a high quality, and are largely commoditized. Some systems offer data lineage tools that show the user the origins of a data point within the source systems, and the various transformations and calculations it has gone through. Significant implementation investment will be required to tailor any data extraction / ETL tool to the specifics of the bank’s systems and the vendor’s data model. There are no shortcuts or easy fixes to this process.

Bank need to determine the extent to which the stress testing data preparation can be integrated with other data extraction routines (e.g. collection of data from a credit data warehouse), versus a substantially “new” extraction from the underlying systems. This is a process often linked to broader data upgrade programs to meet new regulatory requirements such as BCBS 239<sup>2</sup>.

<sup>2</sup> Bank for International Settlements, Basel Committee on Banking Supervision, <http://www.bis.org/bcbs/publ/d308.pdf>, *Progress in adopting the principles for effective risk data aggregation and risk report*, January 2015.



## PROCESS 2

# METHODOLOGY SPECIFICATION AND CALIBRATION

There are three broad categories of offerings to support banks set up the algorithms to project profit and loss (P&L) and balance sheet line items in a given scenario:

### OFF-THE-SHELF FUNCTIONALITY

Methodological frameworks for developing models and/or models themselves. These sometimes give a bank access to data and benchmarks, and the extent to which this is useful will depend on the existing level of sophistication.

### SANDPIT DEVELOPMENT ENVIRONMENTS

Statistical packages to facilitate banks in developing their own algorithms. Most banks already use these packages and they are often not specific to stress testing.

### MODEL MANAGEMENT AND GOVERNANCE

Environments where meta information on models (e.g. documentation, validation status and so on) can be stored to ensure the model library is well governed. This is obviously of critical importance and an area where banks often struggle, however we see this as being principally a management discipline issue rather than a systems challenge.

### PROCESS 3

# MACRO-ECONOMIC SCENARIO SPECIFICATION AND ENRICHMENT

For the most part, the vendors' offering in this area is providing a database for scenarios (regulatory or internal) to be stored and audited. Banks also require internal scenario specification capabilities linked to the strategic planning process, and in most cases vended systems do not provide support with this (or do so as a consulting service). We expect the development of the scenarios themselves to remain with economics departments and their respective model sets.

Scenario enrichment is the capability to take scenario factors (e.g. an equity index drop) and return consistent shocks to further risk

factors (e.g. an individual equity price change or currency fluctuation). This is particularly important for market risk, where scenarios generally do not provide a sufficient set of risk factors to populate a stress test model. Market risk scenario enrichment is offered by a subset of the vendors, and can be automated to a degree.

There are further areas where the scenario being considered may underspecify the inputs to a stress test model, for example, a stress test model for a car leasing portfolio may take used car prices as an input. The line between scenario enrichment and model build is a matter of definition to some extent.

## PROCESS 4

# ESTIMATION OF THE IMPACT OF THE STRESS TEST AND REPORTING OF THE RESULT

The actual projection of the future financial position of the bank involves a combination of the data, models and scenarios previously discussed.

A core role of a system is to maintain consistency and tractability of stress test outcomes, while providing additional capabilities to include management actions and plans in a dynamic scenario and to optimize the result of a stress test, or apply restrictions to certain values. This can be useful in determining strategy, in imposing “real world” regulatory limits or regulator-defined restrictions on methodology. There is a real trade-off for banks in this area between simplicity of data inputs and system installation, versus flexibility and use for insightful business analysis. The vendor’s offerings differ materially in this area.

As we would expect, all systems can report results of the stress test in a reasonably flexible manner. The user, either through the vendor’s customized Graphical User Interface (GUI) or using a spreadsheet front end, can drill down into the results and build comparisons between scenario and assumption sets. The reports can then be produced using different segmentations. Management reporting is not a space in which vendors offerings have a great deal of differentiation, but the provision and updating of regulatory report templates (i.e. the ability to output results directly into a regulatory submission format) is a useful feature for banks as the formats are standardized. However, not all systems offer this, and those that do often focus on the US Comprehensive Capital Analysis and Review (CCAR) requirements.

## PROCESS 5

# GOVERNANCE AND CONTROLS

The primary contribution of systems here is to control (and provide an audit trail of) the data and methodologies used. If the process can be broken down into the underlying steps and the system configured to reflect this, then they can build a record of the steps being taken and the assumptions/decisions made. Systems in this area offer forms of workflow control,

allowing the user to assign tasks to others, monitor preceding steps, track completion and require sign off. This is a useful capability to help monitor and control the process, and one currently lacking in most banks. However, for many institutions the issue is the maturity of the operating model and processes, not a lack of systems sophistication.

“Stress testing infrastructure has been a major headache for my team. We’ve struggled to break the challenge into pieces that can be effectively managed.

A lot of effort has been put in, but with little to show for it.

I’m looking for partners who can help me deliver an effective process and infrastructure”



3

WHAT CAN'T  
OR SHOULDN'T  
BE SUPPLIED  
BY VENDORS?

We view systems integration as a core component of the overall stress testing operating model build. This said, it may be tempting to believe that a system can “fix” the challenges of running the process. This is far from the truth. Some elements of stress testing that cannot be, or should not be, supplied by vendors are:

## DATA COHERENCE

Although vendors require that banks conform to their data models, and can assist in the process of implementing them, the fact remains that significant work must be done to create a consistent and coherent data set. This work is a result of the desire for effective stress testing and relatively agnostic with respect to systems choice.

## STRATEGIC PLANNING PROCESS COHERENCE

A stress test is often considered a deviation from the base case financial plan, and to the extent that there are process challenges (e.g. ongoing changes to the financial plan after a lock-down) or conceptual challenges

(e.g. is the base case a best estimate or a stretch target?) the ability to undertake a robust stress test will be undermined. We see integration of strategic planning with stress testing as an inevitable end state, but one that will take time to reach; however, we believe regulatory expectations will significantly accelerate developments in this area and leading banks have already moved down this path.

## METHODOLOGY

Vendors sometimes supply standardized methodologies, but in most cases and for most risk types (with market risk for simpler portfolios being the exception) banks will need to develop their own, essentially from scratch. We expect stress testing methodology to continue to evolve and the necessity to fully own and show the appropriateness of the approaches chosen to be maintained.

Does this imply banks should abandon industrializing stress testing until the nirvana of process and data perfection has been achieved? No, but we do think careful planning and understanding of some key principles is required.



4

WHAT  
UNDERLYING  
PRINCIPLES  
SHOULD DRIVE  
DEVELOPMENT?



Delivering a stress testing system is hard. Banks will be investing in stress testing systems capabilities over a number of years. They are unlikely to ever reach a moment when a system can be “turned on” and development cease. Instead a series of phased deliveries of solutions which improve specific parts of the process will be required. We see the principles for these developments as:

## 1. BE REALISTIC

It is not possible to design a stress testing system that will meet your stress testing requirements for multiple years given the evolving regulatory landscape, especially in Europe. While many components of the long term infrastructure solution may be decided in the short term, banks cannot wait for the stress testing operating model to fully crystalize before they start to make investments or improvements. Incremental improvements and tactical solutions are both valuable and inevitable.

## 2. STANDARDIZE WHAT YOU CAN

There is often a desire amongst the modelling community to refine bespoke and complex methodologies beyond the point where this is useful. In many areas a relatively standardized approach is sufficient, and some elements of a stress test (e.g. capital roll-forward and reporting in regulator-specified formats), are the same across banks. Here it is possible to save time and eliminate errors by essentially sharing the workload via vendors’ products.

## 3. CLARIFY YOUR PROJECTION

At many institutions there remains ambiguity over whether base case financial projections are budgets, estimates or stretch targets. Future stress tests are likely to be based on

dynamic balance sheets and will thus require business plans and management actions as inputs. Without a discipline around what projections represent, it will be impossible to encode the results in a system.

## 4. THINK MODULAR

A number of vendors offer a complete solution across the landscape of capabilities. However, we see even the end state systems landscape as including a range of vended and in-house solutions, not a single system. This should be embraced, and a development strategy developed that reflects this reality.

## 5. FOCUS ON CONTROLS

The focus of many banks to date has been on methodology for projection, and we see a shift going towards governance, controls and transparency of results. This is an area where systems could be extremely valuable, and development planning should consider these capabilities as well as “pure” stress testing features.

## 6. EMBRACE CUSTOMIZATION

No system is a “stress test in a box” and a high degree of customization will be required to marry with internal data and processes, as well as to meet institution specific required capabilities. Therefore, although some vendors do also provide an element of methodology, banks will need to continue to own the methodology and evolve this with the requirements of regulatory exercises. We therefore see the ability of vendors to offer off-the-shelf models as relatively low value add versus their ability to integrate models already in place. Budget and resource are needed to manage and deliver the required customization.

Banks have a long road ahead of them to upgrade the data, processes and systems in stress testing, and the success of this will depend both on the coordination between many different areas of development. Tactical “fixes” that meet pressing timelines will remain the norm in many areas for years to come, but systems solutions will play an increasingly important role. Most banks are not clear on the right role for vended solutions. We believe that this report lays out the areas in which they can provide useful services and some clear principles as to how banks should work with vendors to develop and integrate solutions.

## AUTHORS

JAMES MACKINTOSH

Partner

[james.mackintosh@oliverwyman.com](mailto:james.mackintosh@oliverwyman.com)

MATTHEW SEBAG-MONTEFIORE

Partner

[matthew.sebagmontefiore@oliverwyman.com](mailto:matthew.sebagmontefiore@oliverwyman.com)

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For more information please contact the marketing department by email at [info-FS@oliverwyman.com](mailto:info-FS@oliverwyman.com) or by phone at one of the following locations:

AMERICAS

+1 212 541 8100

EMEA

+44 20 7333 8333

ASIA PACIFIC

+65 6510 9700

[www.oliverwyman.com](http://www.oliverwyman.com)

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