



Risk Framework
Management



Integrated Credit Risk Management

February 2017

Our Mission

Take advantage of new technologies to create risk management solutions that are simple to operate, easy to customise, out-perform “existing-bank-systems”, at a very cost effective price due to improved software technologies.



Why use software designed and priced to run on these...

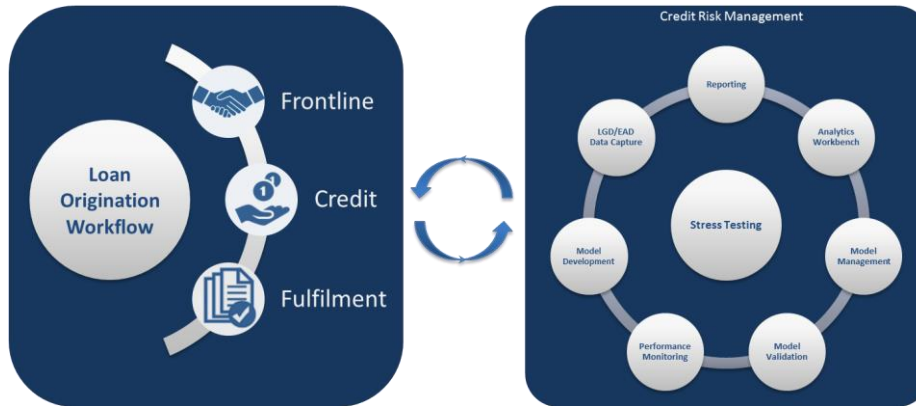


... when there's software that harnesses the power and cost-effectiveness of these?

Who We Are

- Business established by Financial Services practitioners to address gaps in current industry solutions
- Experience driven out of the global best practice standards in Australia's banks
- Complementary solutions and teams
- Based in Melbourne, Australia and Silicon Valley in Mountain View, California

- Modular, flexible origination solution for complex Non Retail lending.
- Used across an organization by Lenders & Credit; or
- Customers, Brokers and others for direct lending approvals



- Advanced risk modelling capability to highest regulatory standard for lenders
- Technology able to seamlessly deploy into bank environment

Many 'big' Problems Solved

THE PROBLEM



Slower approvals causing opportunity costs to borrowers through delayed time to market.



Demand for higher productivity and automation in banks in high-wage countries to reduce operation costs.



Model changes slow, costly to test. High regulatory cost overhead



Client data still maintained through hard copies. This data has enormous value in establishing credit worthiness of borrowers and is underutilized.

OUR SOLUTION

Achieve Faster Turnaround Time



Lower Cost to Income



Increase Net Interest Margins and Fee Income



Support introduction of Basel standard Risk processes



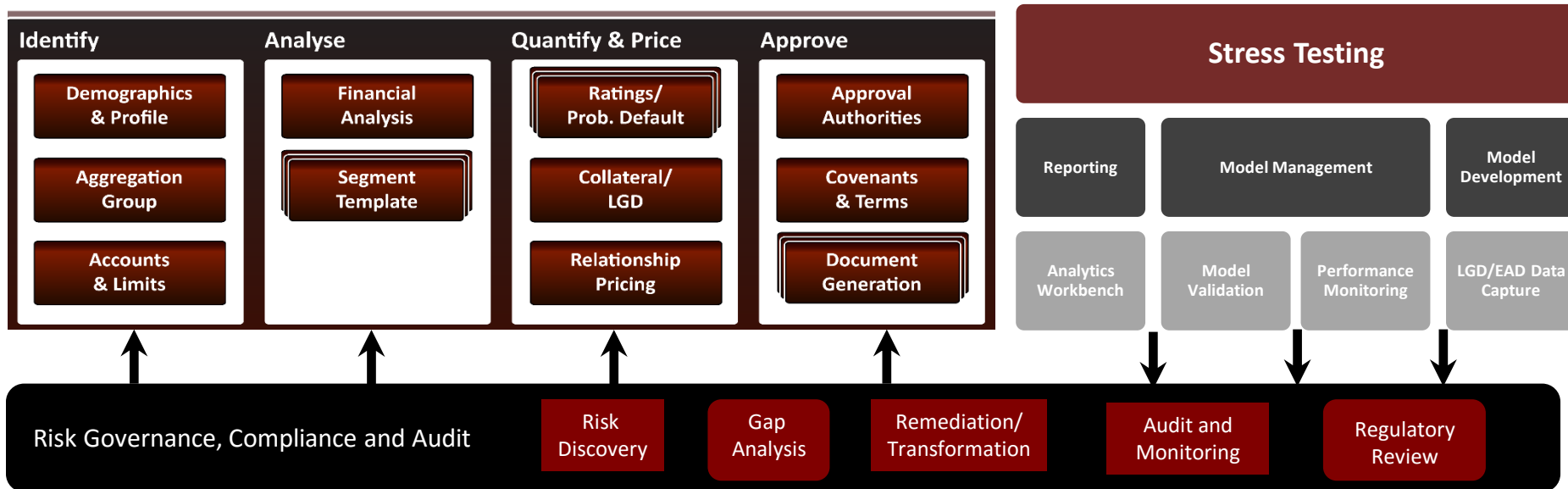
Maximise advanced data and analytic processes



What We Do

– Loan Origination Integrated with Advanced Risk Management

- Front line bankers use our solution to capture data for the credit process
- Our framework supports an SME front end UX accessible by borrowers, brokers or others for direct approvals.
- Complex Risk models can be applied and managed seamlessly
- Analytics and model development, monitoring and validation all in the same environment



Key Solution Capabilities – Flexibility

- RFM is designed to be flexible and underpinned by a strong modular philosophy
 - All modules can integrate seamlessly together as a complete end-to-end Commercial Credit Origination and Risk Decision System OR;
 - Integrate with Bank's own Origination systems in a seamless fashion
- This ensures that all aspects of model assisted commercial credit decision making is integrated.
- Leading to productivity enhancements, better risk management and regulatory credibility.

Key Solution Capabilities – Agility

- RFM is designed to integrate all data sources required for non-retail credit in one environment.
- The data binding interface allows data to be accessed from any internal relational, multi-dimensional, text-based or web-service-based data source and even spreadsheets.
- A visual decision modelling engine that allows objects and cause-and-effect relationships of any kind between them to be modelled and quantified.
- A what-if simulator that allows users to “drag and drop” proposed plan changes, and while dragging, impact and outcomes are updated. This reduces in-flight change impact analysis from weeks to hours.
- An “over the horizon” risk analyser that uses the rules base and simulation to provide managers with early warning of potential risks.
- Highly customizable visualisations to provide the clearest information in the most intuitive way.

The background features a dark blue gradient with a subtle pattern of white dots. On the left side, there are several circular elements: a large scale with numerical markings from 140 to 260, and several smaller circles with arrows indicating clockwise or counter-clockwise rotation. The main title is centered on the right side.

MODEL MANAGEMENT

RFM

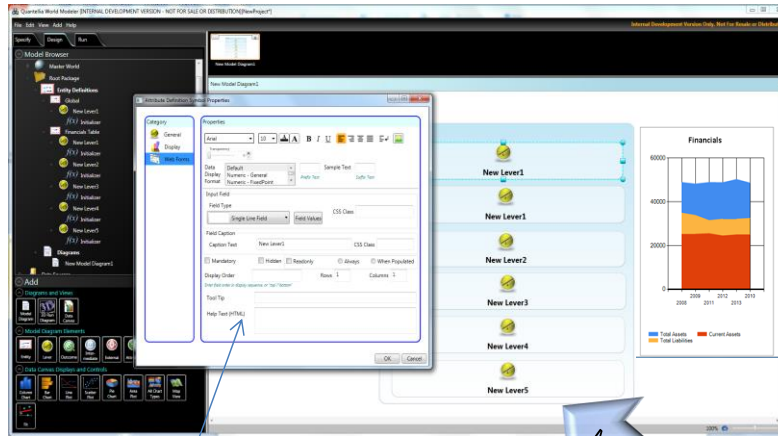
Model Management – Efficiency

Model Development

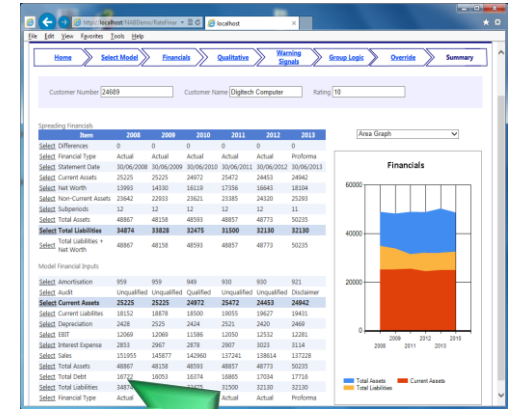
Web Application for Enterprise Users

RFM is underpinned by a revolutionary new architecture that allows:

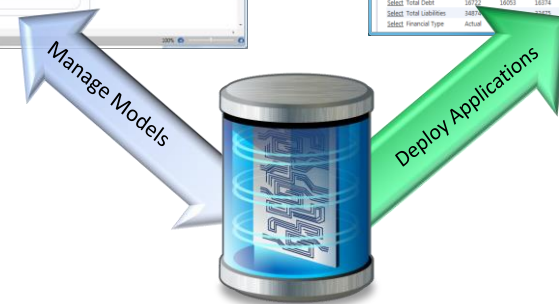
- Credit models to be developed in a powerful visual environment.
- Validation and stress/unit testing to be carried out in the same environment.
- When production ready and following internal and regulatory approvals, **new models can be brought online extremely quickly.**



Property panels capture enterprise application configuration and functions within the model.



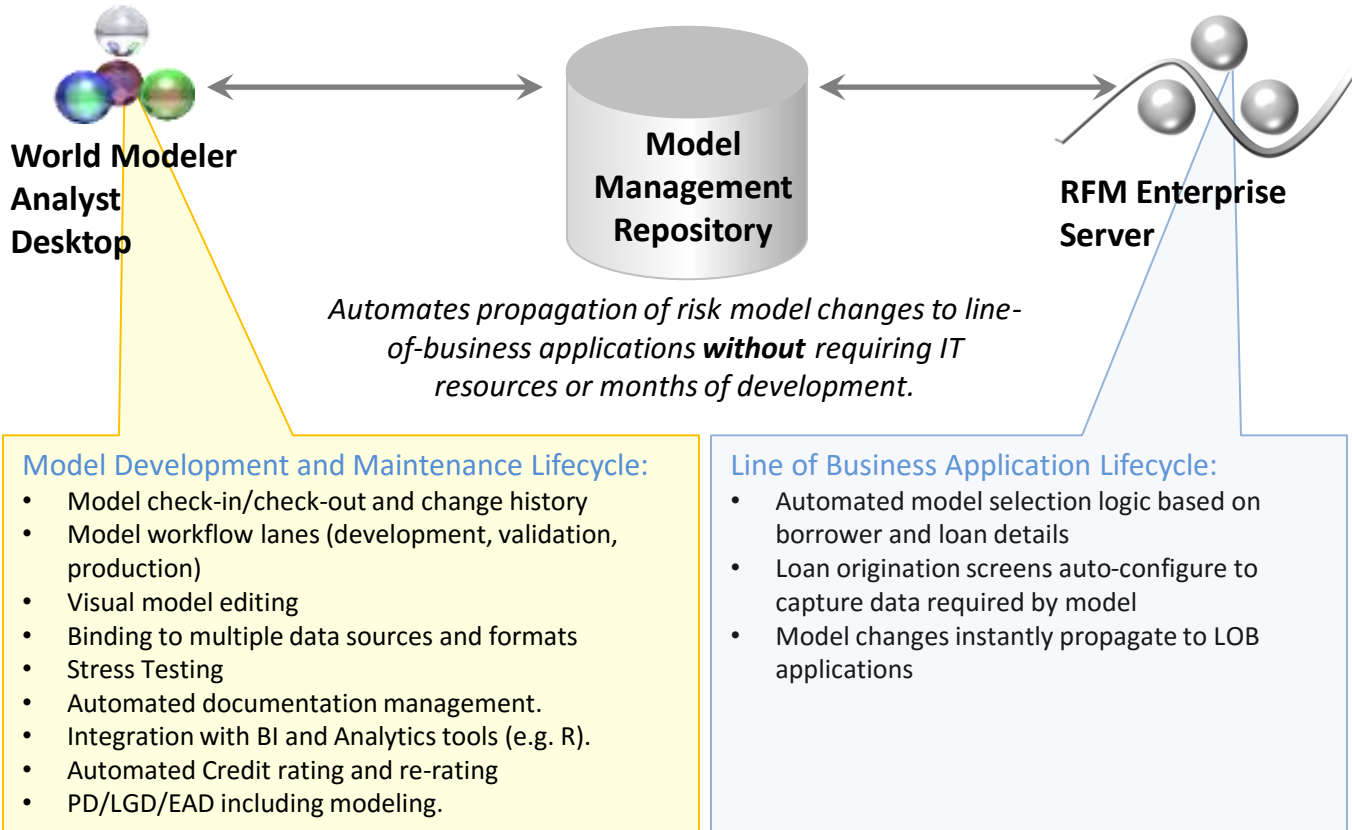
Application panels built by enterprise server by reading configuration information from model.



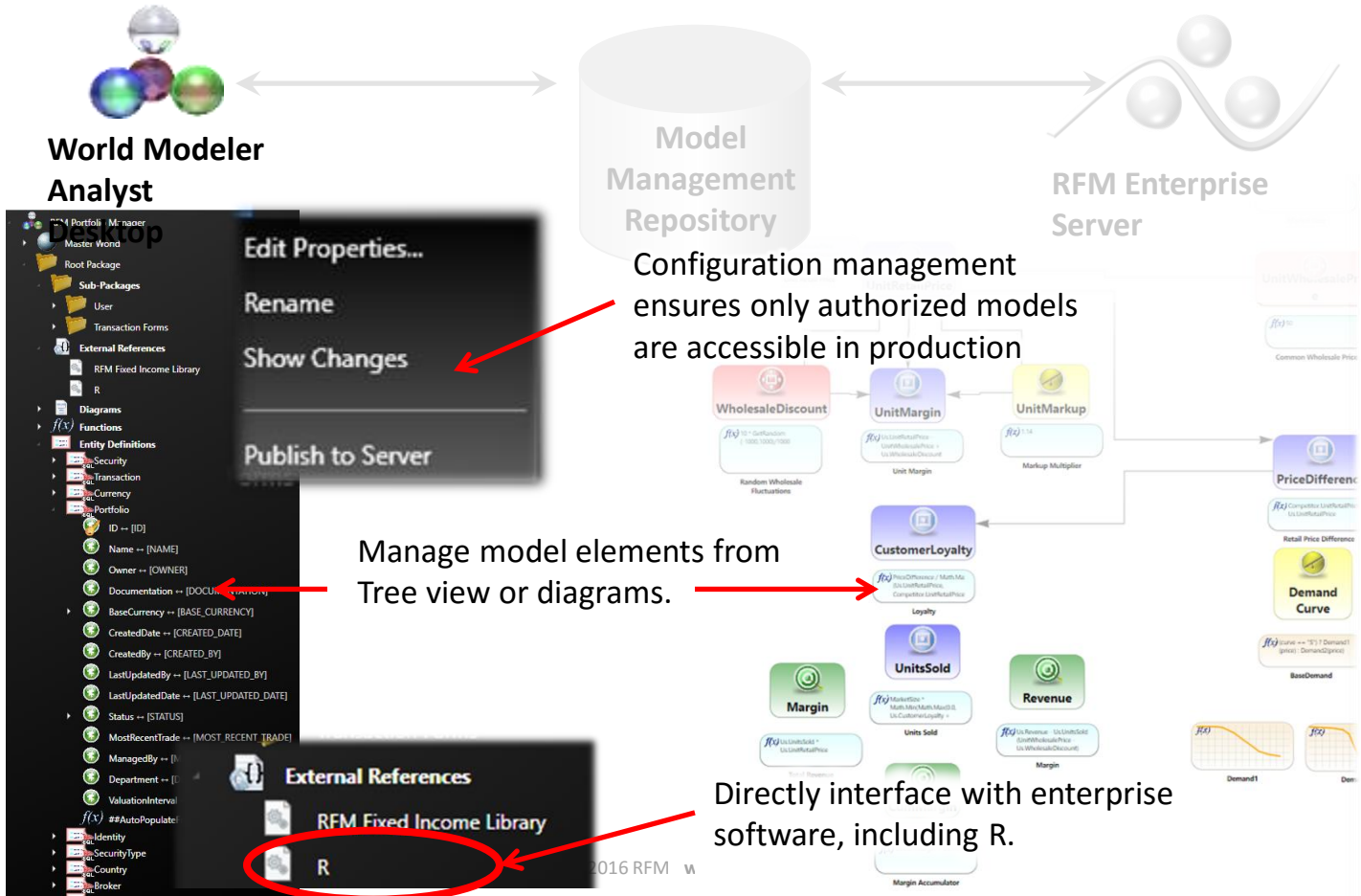
Enterprise Model Repository



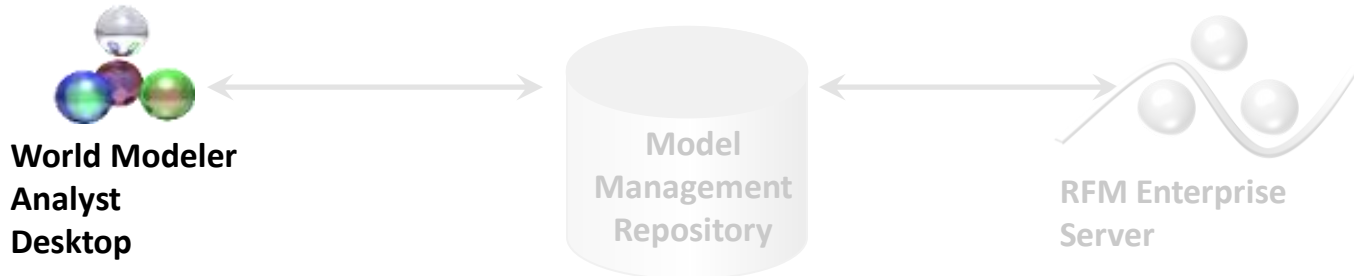
Integrated Model Management / Line of Business Operations



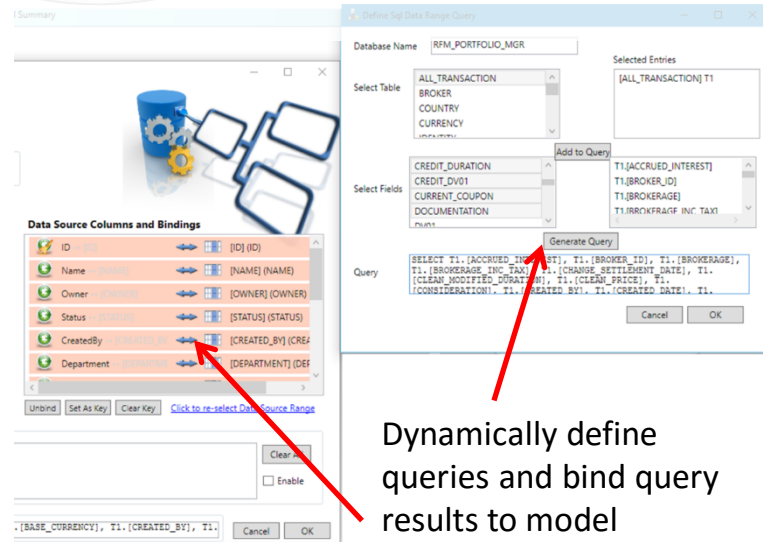
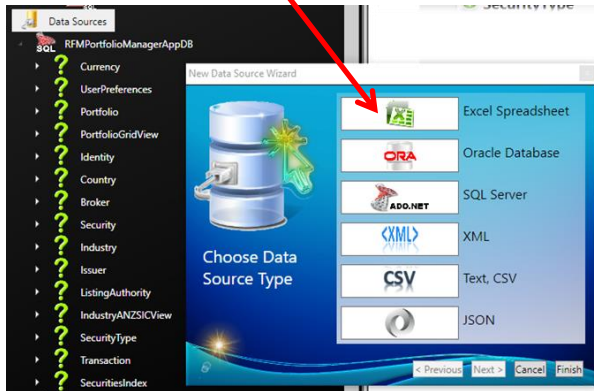
Model Authoring



Data Integration



Integrate with enterprise data sources



Dynamically define queries and bind query results to model elements.

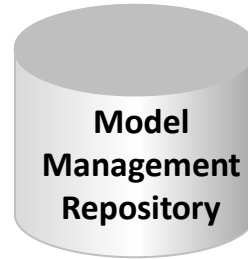
Automated Model to Application Propagation



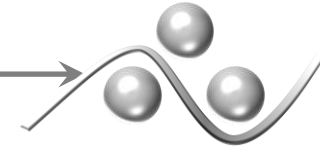
**World Modeler
Analyst
Desktop**



Model manager includes application metadata needed to run the LOB applications



**Model
Management
Repository**



**RFM Enterprise
Server**



RFM Server constructs screens and executes operations by requesting information from the model repository.

1 Changes made in the model...
2 ... are automatically reflected in all application screens and logic...
3 ... without needing IT resources and months of delay, and at a fraction of the cost.

Automated "Injection" of Model Fields Into Existing Applications

1. Personal Background

Fields marked with (*) are mandatory

a) Name in full *

b) Date of Birth *

c) Nationality *

d) Marital status *

e) No. of Dependents

f) Employment Status *

g) Employment Details :

h) Applicant's PAN No./Passport No. (if any)

i) Applicant's current address *

Phone No

j) Applicants permanent address :

k) Name of Parent/Guardian *

l) Occupation of Father/guardian *

m) Occupation of Mother/guardian *

n) Age of parent/guardian *

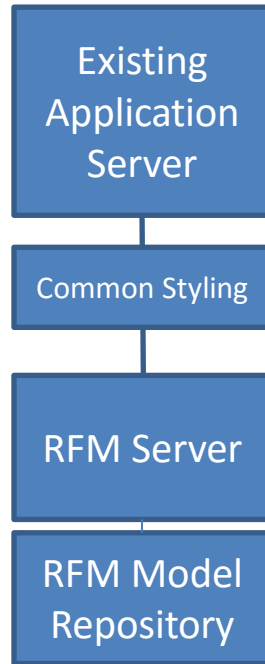
o) Annual Income of Parent/Guardian *

p) PAN No./Pass Port No. of Parent/Guardian, if any

q) Address of parent/guardian :

Phone No

1. Identify areas in existing forms that input model parameters.



2. Remove existing model input fields from forms and replace with RFM stub.

1. Personal Background

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q) Address of parent/guardian :

Phone No

RFM Code Stub

Personal Property Type

Vendor

Serial Number

Acquired Property

A/c Min-Tax Type

3. RFM Code Stub dynamically creates model input fields by reading RFM model *without* affecting the rest of the application. Allows complete model flexibility with no application impact.

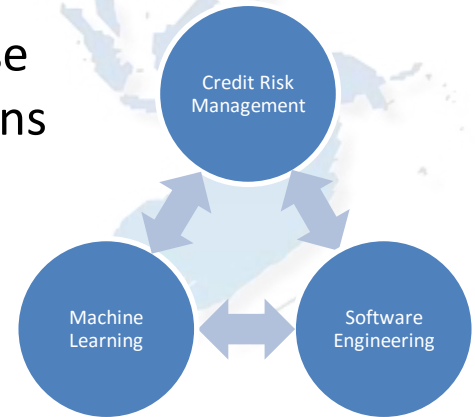
The background is a dark blue gradient with a starry, nebula-like texture. On the left side, there are several circular elements: a large scale with numerical markings from 140 to 260, and several smaller circles with dashed lines and arrows, suggesting motion or rotation. The text is positioned on the right side of the image.

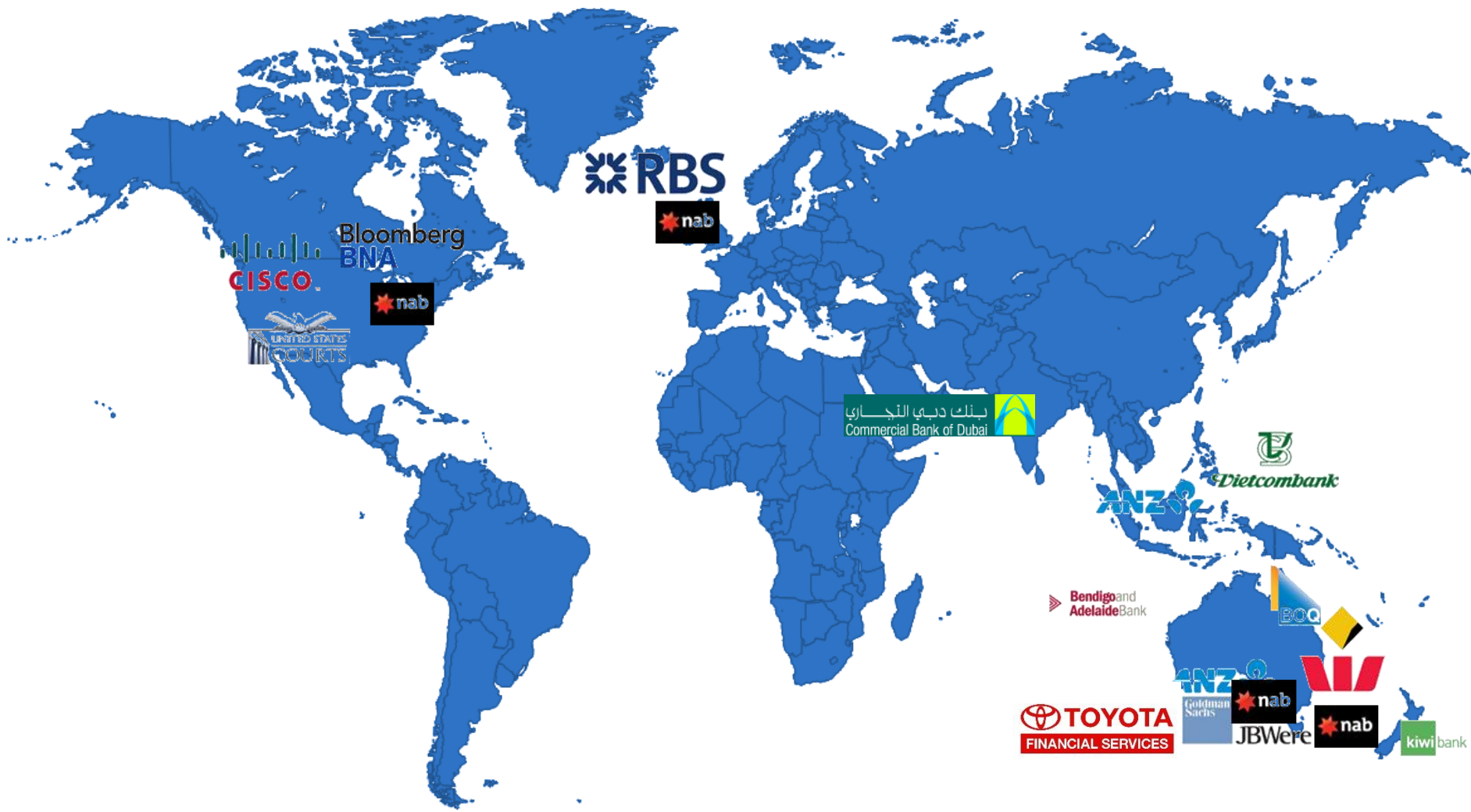
PREVIOUS EXPERIENCE

RFM

Previous Experience

- Our dual sets of experience in Commercial Credit Risk Management and Enterprise Software Engineering provides us with a unique set of advantages for assisting Banks.
- In addition we are data science pioneers, having developed key algorithms in machine learning and today, are sought-after global thought leaders in this field.
- With our successful track record of real-world enterprise solutions, our team creates practical and robust solutions for our customers' data, analytical, process and decision-support needs.





RBS



Bloomberg
BNA



بنك دبي التجاري
Commercial Bank of Dubai



Vietcombank

ANZ

Bendigo and
Adelaide Bank

BOQ

TOYOTA
FINANCIAL SERVICES

ANZ
Goldman Sachs



JBWere



kiwi bank

The background features a dark blue gradient with a starry space pattern. On the left side, there are several circular gauges or dials with white markings and numbers. The largest gauge has numbers from 140 to 260 in increments of 10. Other smaller gauges are scattered around, some with arrows indicating direction. The overall aesthetic is technical and futuristic.

LOSS DATA CAPTURE

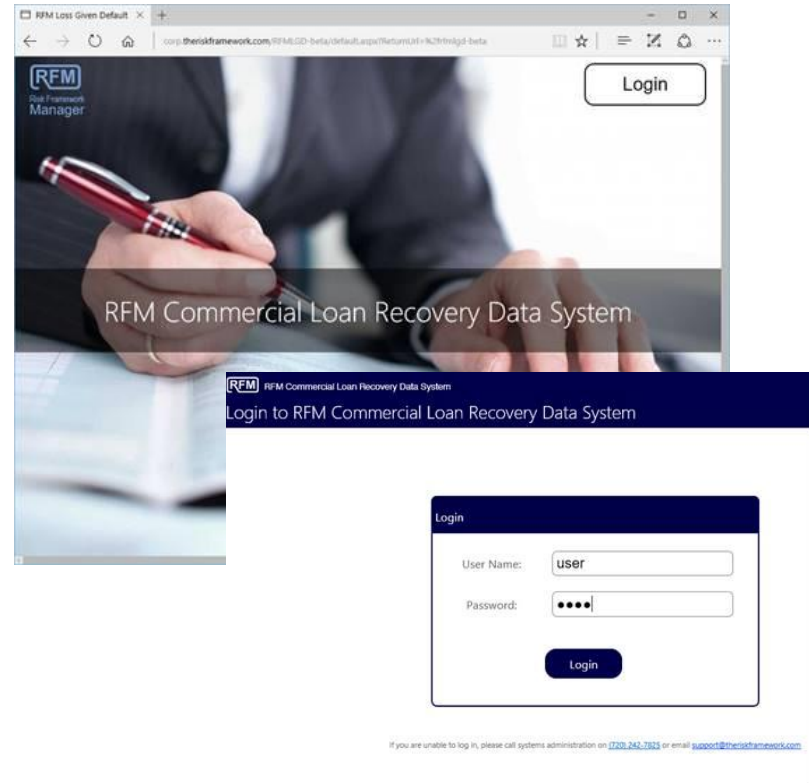
RFM

Loss Capture System Benefits and Value-add

- ❑ Loss Capture system that can adapt to a Bank's processes rather than constraining you to a pre-defined;
 - Workflow
 - Credit Culture
 - Sophistication
- ❑ Agility & Flexibility
 - Business Rules
 - Policy Rules
 - LGD Model Deployment (not just current generation)
 - Collateral Spreading Optimisation
- ❑ Integrated Development and Deployment
- ❑ Integrated Model Registry (Regulators)
- ❑ Stress Testing or more general Scenario Analysis
- ❑ Rapid ability to solicit ad-hoc manual data (For developer's)
- ❑ Performance Monitoring and Report Writing
- ❑ No Coding for model changes

Loss Given Default Module

- The RFM system is engineered to be modular and integrate seamlessly on its own.
- It has enterprise grade security and role specification to ensure that organisations get maximum operational flexibility in house or in a cloud hosted environment.
- All delivered via web optimised interactive screens.



Loss Given Default Module

- The front end displays each user's workflow so they can jump back in to the work they were doing with minimum effort
- Has all the features you would expect
 - Record locking
 - Audit trail
 - Multimodal search

The screenshot displays the RFM Commercial Loan Recovery Data System interface. The top navigation bar includes the RFM logo, the system name, and a search bar. The main content area is divided into two sections: a 'Demo User's Home Page' on the left and an 'Accounts' table on the right. The 'Accounts' table lists various accounts with columns for Status, Account Number, Customer Number, Customer Name, Original Limit, Date Funded, Date Closed, and Comments. The table is currently empty, showing a 'No Selection' message. The interface also includes a sidebar with navigation options like Customers, Groups, Accounts, Reports, and My Preferences...

Status	Account Number	Customer Number	Customer Name	Original Limit	Date Funded	Date Closed	Comments
	5	14958			2/20/1980		
	6	14816			6/12/1988		
	7	14892			02/31/1977	7/22/2010	
	8	14817			12/11/1996		
	21	14952			3/29/1999	2/22/2011	
	22	50			6/8/1992	5/28/2012	
	13	542			7/1/1990		
	23	15216			6/18/1992	11/21/2011	
	24	26			10/10/1984	11/26/2012	
Committed	25	357		1000.00	5/13/1997		
	38	15210			11/30/1977		
	39	110			11/20/1996		
Committed	42	96		2000.00	6/14/1990		MOD 17/04/2010

Loss Given Default Module

- The Group hierarchy is then exposed and the user can start to fill the required data gaps.
- The data model will preserve the hierarchy.
- It can be configured to target the Bank's processes.
- The data can be populated from core systems or binding to them as thus bringing together all the loss data.

The screenshot displays the RFM Commercial Loan Recovery Data System interface. The top navigation bar includes the RFM logo and the text 'RFM Commercial Loan Recovery Data System'. Below this, a 'Accounts' section is visible with a hamburger menu icon. A row of action buttons includes 'Save & Continue', 'Commit & Unlock', 'Assign Account', 'Unassign Account', 'Delete Account', 'New Account', and 'Analysis & Reports'. The main content area is titled 'Account 8' with 'Customers 38, 14817'. It features several input fields: 'Database Key' (8), 'Account Number' (8), 'Date Funded' (12/11/1996), 'Last Updated' (3/29/2013), 'Last Updated By' (import), 'Date Closed', and 'Data Collection Date' (3/29/2013). A 'Comments' field is also present. Below the input fields are six data entry cards: 'Transactions', 'Real Securities', 'Guaranteed Securities', 'LMI', 'Default Events', 'Individually Assessed Provision Events', and 'Write Off'. Each card has a 'New...' button and a 'None' status. The 'Default Events' card includes a table with the following data:

Date	Flag	Balance
3/31/2012 12:00:00 AM		21070.00
8/31/2010 12:00:00 AM		25136.00

On the left side of the interface, there is a 'Selected Account' summary box and a 'groups' list. The 'Selected Account' box shows: Account Number: 8, Original Limit, Date Funded: 12/11/1996, Date Closed, Branch (OSR), Last Explained: 3/29/2013, and Last Explained By: import. The 'groups' list shows a hierarchy: groups (-24), customers (38), accounts (8, 97, 185, 843, 16147), accounts (175, 97, 14817), accounts (8, 97, 185, 843, 16147), accounts (14931, 97, 14992), and accounts (97).

Loss Given Default Module

Each of the important recovery inputs can be reconstructed from the manual files in a structured manner to bridge the data gap for model development and validation.

Benefits

- Banks understand the default situation and this process while laborious initially can be migrated to the workout area.
- Cures can be accurately determined to provide the basis for the cure model.
- Other post-default paths are also better understood.
- This process also shows up any issues in the EAD estimation.
- Regulatory comfort with the process can be demonstrated thus assisting with model approvals.
- Ability to integrate with large variety of systems to capture partial data automatically, hence improve productivity

The screenshot displays the RFM Commercial Loan Recovery Data System interface. At the top, there are statistics for accounts: 14931 accounts with 843 and 16147 sub-values, and 14932 accounts with 97 sub-values. The main interface is divided into several sections:

- Accounts:** A sidebar menu with a tree view showing 'groups' (-24) and 'customers' (38) with sub-counts for accounts (97, 185, 843, 16147) and '175' (97, 14817, 8, 97, 185, 843, 16147). Below this, '14931' and '14932' account counts are shown.
- Account 8:** A central panel for 'Account 8' with 'Customers 38, 14817'. It includes fields for Database Key (8), Account Number (8), Last Updated (3/29/201), and Last Updated By (import). There is a 'Save & Continue' button.
- Transactions:** A section showing 'None' transactions.
- Default Events:** A table with columns 'Date', 'Flag', and 'Balance'. It lists two events:

Date	Flag	Balance
3/31/2012 12:00:00 AM		21070.00
8/31/2010 12:00:00 AM		25136.00
- Default Events Form:** A detailed form for editing default events with fields for Source Indicator (1), Account Number (8), Default Date (8/31/2010), Default Flag, Balance (25136.00), Limit One Year Before (25000.00), Balance One Year Before (19884.00), Date Cured, Default Type, Last Reviewer Date (12/13/2008), Prior Rating, Prior Accrued Interest, Prior Drawn Amount, Prior Limit (25000.00), Default Outcome, Data Collection Create Date (3/29/2013), Last Update Date (3/29/2013), Last Update User (import), ICBS Product Code (471), Restructured Date, Nominated Account, Restructured Terms, Maturity Date, Currency Code, Interest Rate At Default (0.07508), and Comments. At the bottom are buttons for 'Save & Continue', 'Commit & Unlock', 'Assign to Account', 'Delete Event', and 'Cancel'.

The background features a dark blue gradient with a subtle pattern of white stars. Overlaid on this are several semi-transparent, light blue circular gauges and progress indicators. One large gauge on the left has a scale from 140 to 260. Other smaller gauges are scattered across the scene, some with arrows indicating direction or progress. The overall aesthetic is technical and futuristic.

STRESS TESTING

RFM

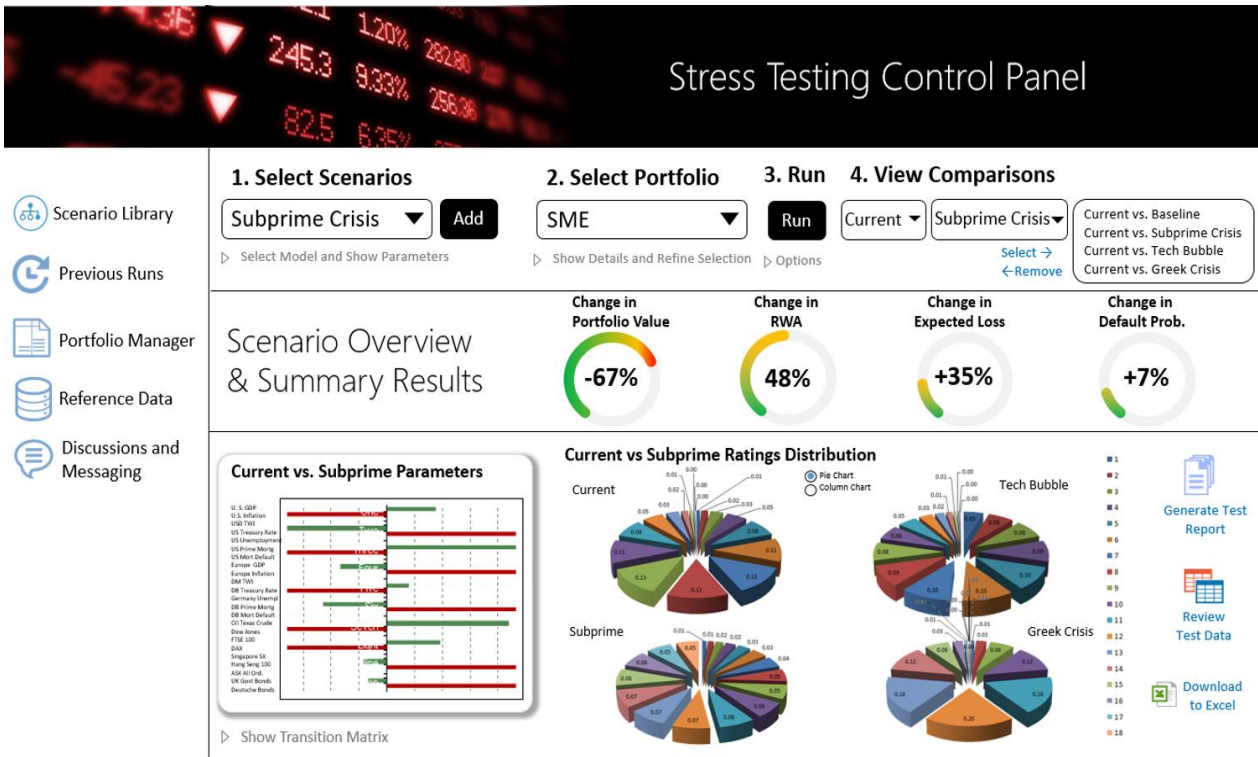
Stress testing

- This section provides highlights of the Stress Testing Module
- Demonstrating the Flexibility of the RFM framework.
- Ability to manage an unlimited number of past and future stress test scenarios and also use RFM to understand portfolio dependencies.

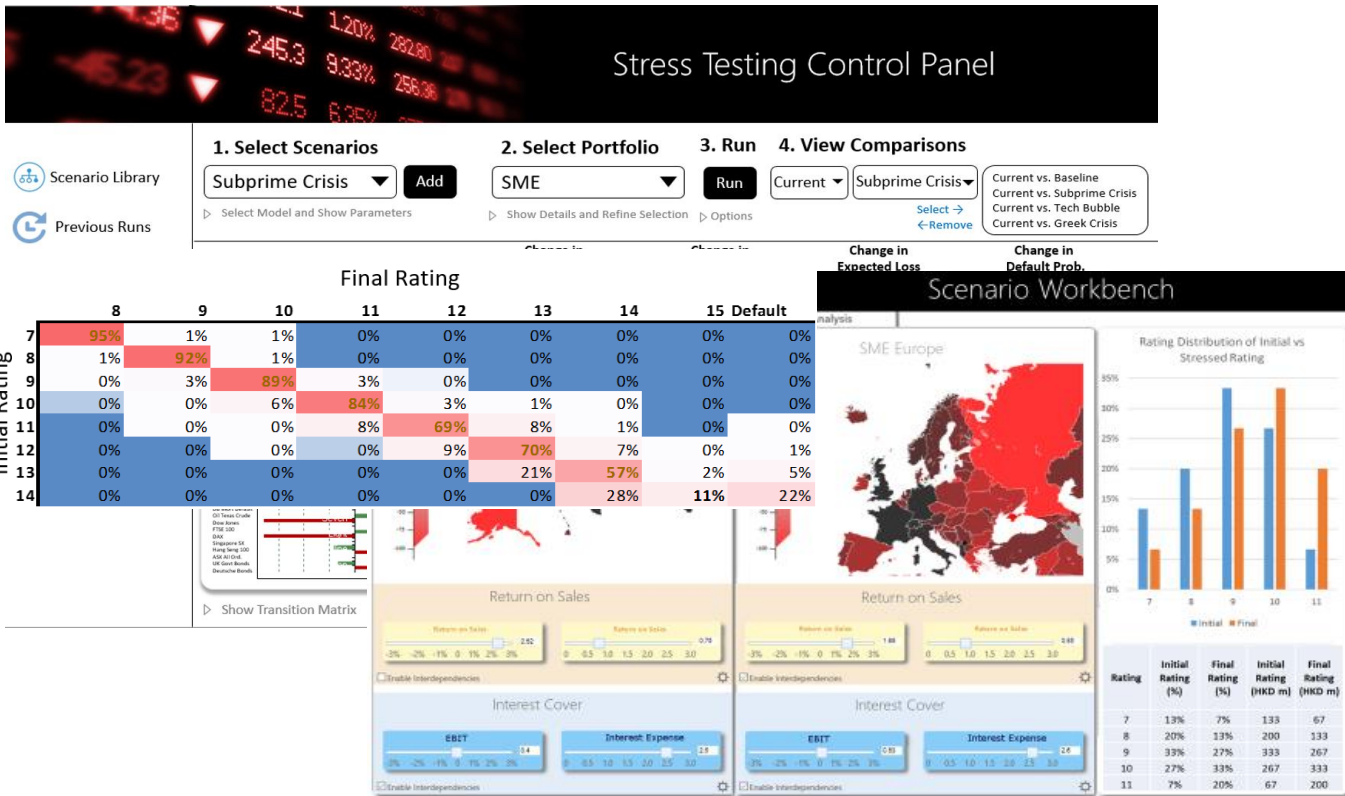
Flexibility with Stress Testing

Stress Testing Control Panel

- Example Dashboard for managing and overviewing a Stress Testing scenario.
- The user has a library of scenarios, an ability to define a portfolio (or total) to run it on – and then an overview of results before drill down.
- Stress Testing can be performed either via Transition Matrices or the Bank's PD and LGD models



Stress Testing (Continued)



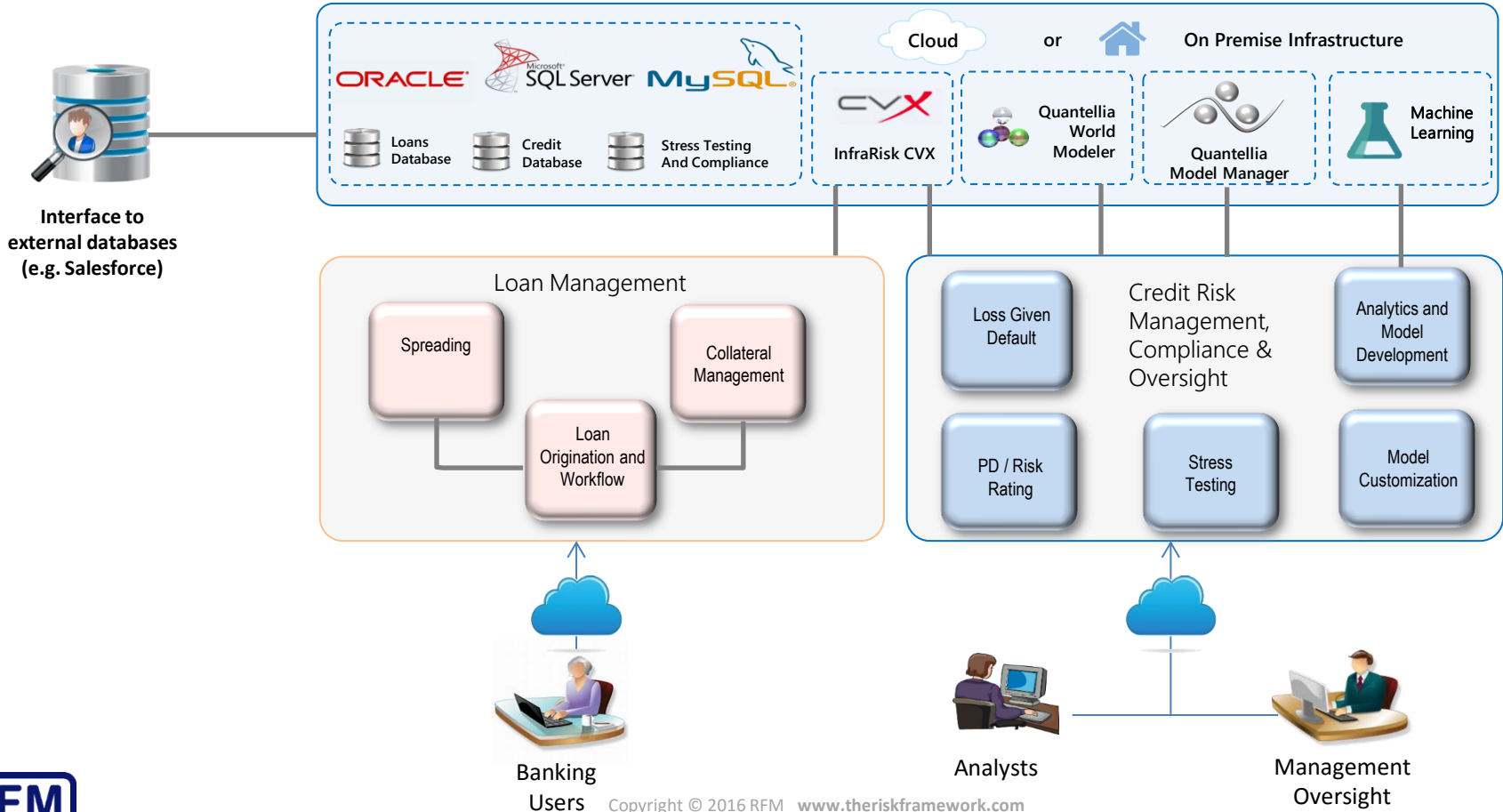
- Stress Testing can be performed either via Transition Matrices or the Bank's PD and LGD models
- Sliders can be created in a very transparent manner to also shock the whole portfolio.
- The sliders can be used to great effect when expert opinion understands the dynamics, regulators or Boards prescribe shifts.
- However we believe that their greatest utility is evident in the attempt to understand portfolio shifts in a structured way, without resorting to quant involvement.

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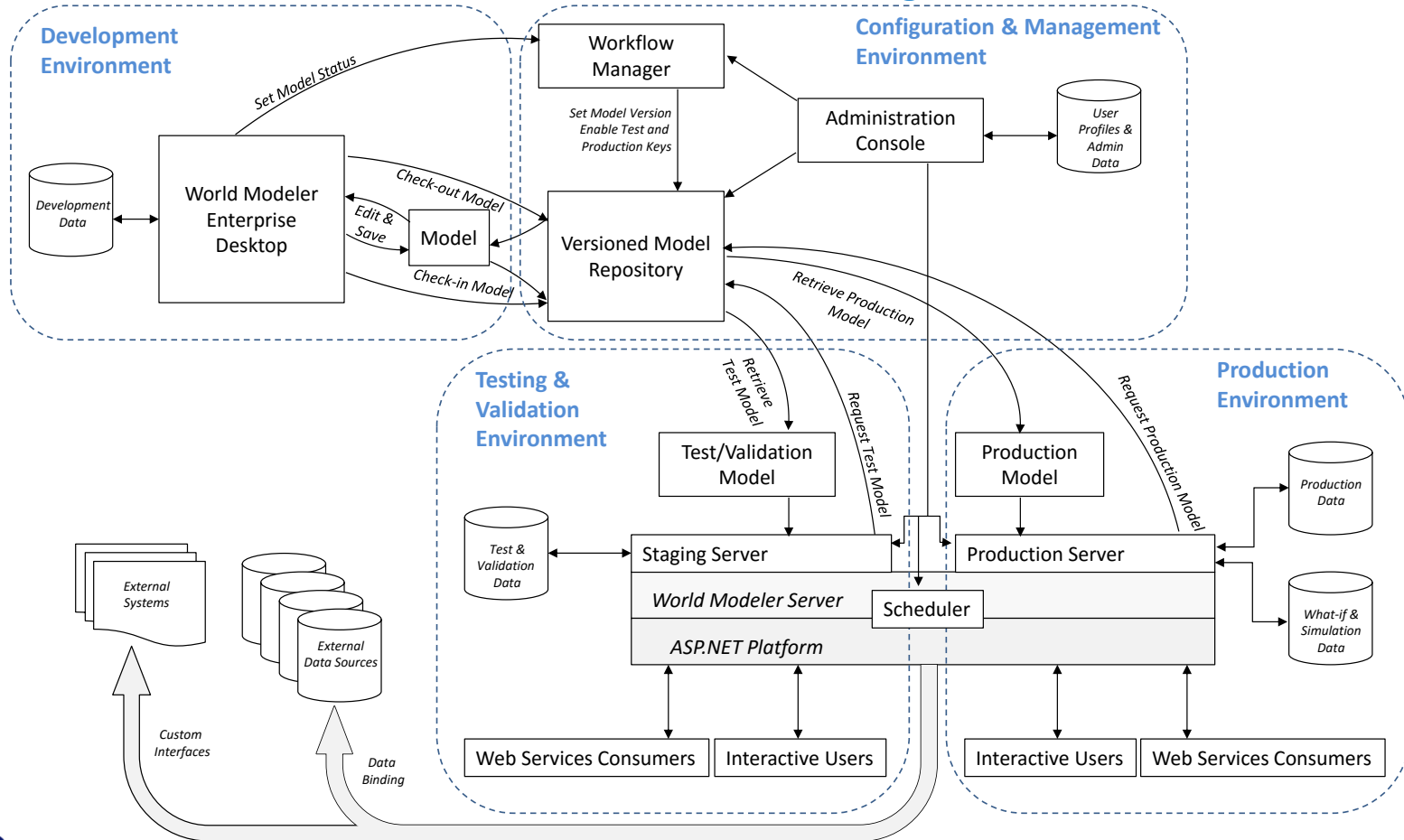
SYSTEM ARCHITECTURE

RFM

System Architecture



Architecture of Model Management



Benefits and Value-add

- Adapt to Bank's processes rather pre-defined workflow thus enhancing
 - Credit Culture
 - Execution
- Agility & Flexibility
 - Business Rules
 - Policy Rules
 - Model deployment (not just current generation)
- Integrated Development and Deployment
- Integrated Model registry (Regulatory)
- Scenario analysis and Stress testing
- Rapid ability to request manual data
- **No Coding** for deploying model changes
- Higher return on investment
 - Using the most trusted yet productivity rich framework
 - Modern data driven management is part of the DNA of the environment not a bolt on.
- Enhancements in model accuracy leads to multiple benefits
 - Enhanced P&L as model Power increases (**It has been estimated that 5% increase in model power, up to \$5m increase in P&L for \$50-60bn Bus. Portfolio**)
 - The only reliable way to improve model power is the ability to develop → monitor → fine-tune → redeploy – **This is currently a major problem for banks due to the high cost of a model release.**