

A NEW ERA FOR MODEL RISK

THE ANALYTICS BOUTIQUE'S SERVICE OFFERING AND
PLATFORM FOR MODEL RISK GOVERNANCE

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APRIL 2020

THE ANALYTICS BOUTIQUE
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True North Partners - unique consulting approach to the financial services industry

- True North Partners LLP is an independent consulting firm based in London, Frankfurt, Zurich and Johannesburg. We specialise in finance, risk and strategy and have extensive global experience and industry recognition in the financial services, risk management and finance communities
- We have a track record as an independent partnership since 2006. Our clients are leading financial institutions, predominantly in Europe, Middle East and Africa
- Our distinctive value proposition includes four key elements
 - Leading practice expertise and experience in risk and finance to develop, tailor and communicate superior solutions
 - Strong analytical grounding of our work, be that through financial, economic or statistical modelling
 - Senior on-the-ground presence to drive change at our clients, which ensures that we deliver real impact rather than just “PowerPoint concepts”
 - Tailored and award-winning advanced analytical software tools provided by our subsidiary firm THE ANALYTICS BOUTIQUE

The combination of leading expertise in risk consulting and award winning software tools TNP and TAB create in-house solutions that are holistic and market-leading

TRUE NORTH PARTNERS
FINANCE | RISK | STRATEGY

- Independent consulting firm
- Focused on risk, strategy and finance themes
- Harnesses power of TAB software solutions with dedicated consulting expertise in banking

True North
Partners

THE ANALYTICS BOUTIQUE
Analytics made friendly
A TRUE NORTH PARTNERS company

The Analytics Boutique

- A wholly owned subsidiary of TNP
- Works closely with TNP to develop software solutions
- Focused on risk management and pricing software solutions

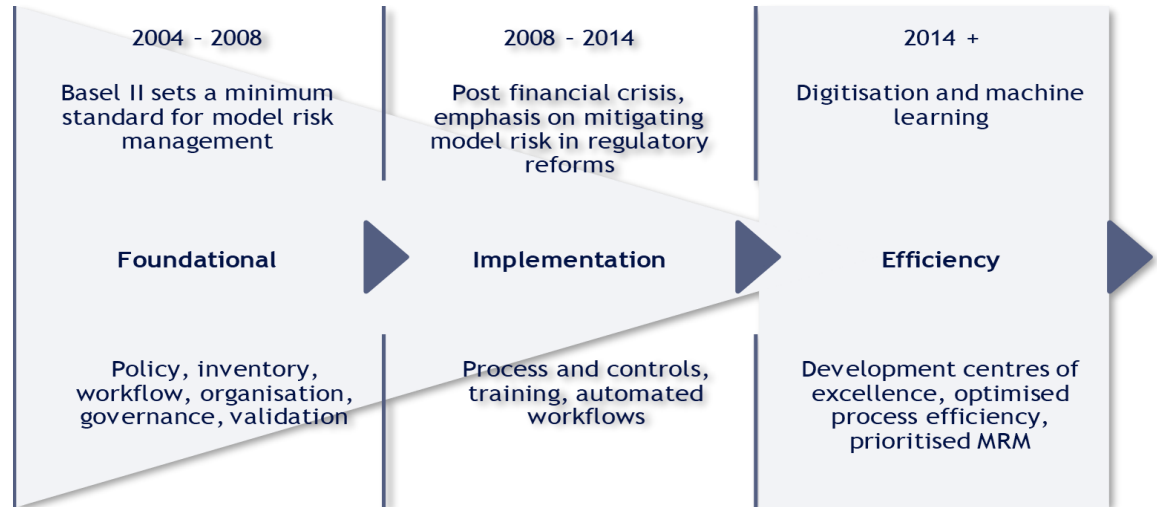
Purpose of this presentation

- Provide overview of **the current status of model risk management practices** in the financial industry
- Present TNP's service offering including approaches and tools to overcome these challenges
- Introduces our Model Risk Platform and selected functionality
 - Model risk workflow
 - Reminders and alerts
 - Security and access control
 - Model evaluation capabilities
 - Forms for data capture
 - Model identification and document repositories
 - Materiality assessment
 - Risk scoring
 - Reporting functionality
 - Audit trail and governance
 - Model dependencies

Model risk - why now?

External drivers

- From as early as the 2000's, Model Risk Management (MRM) has featured on the regulatory agenda across the world; more recently, there has been an increased focus on model risk across the industry
- This is partly driven by current regulatory focus and the increased standardisation of Pillar 1 models which places a higher model risk for the industry as a whole



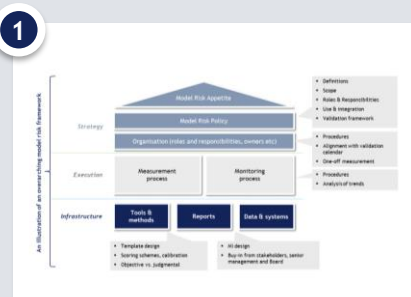
Internal drivers

- Internally, FIs rely heavily on the results of models over and above the 'usual suspects' as e.g. regulatory capital
- Further internal model uses include pricing based on allocated economic capital, forecasting models, ...
- More recently, IFRS 9 has significantly increased the model landscape
- The progression to machine learning types of models - to name just one new technology - add to the complexity of the models in use

Hence, there is an increased need to control model risk, manage the costs of its management and – given limited resources – to prioritise and route efforts if not 'streamline' the model landscape

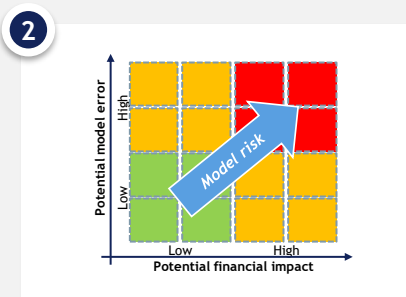
As model risk management enters a new era, financial institutions - heavily relying on models - work on a broad range of aspects of model risk management

Model risk management framework



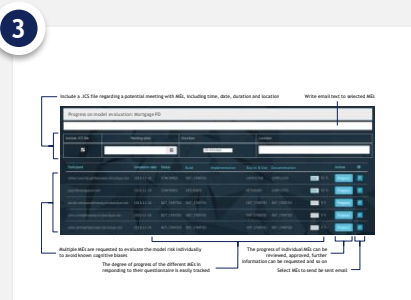
- A model risk management framework sets the scene for and coordinates all aspects of model risk management clearly assigning roles and responsibilities
- In addition to defining the relevant governance such framework has a normative effect e.g. as to support prioritising the required effort for model risk management, setting incentives for an adequate model landscape, allocating costs of model risk management as well as model risk capital to model owners

Model risk assessment & model risk MI



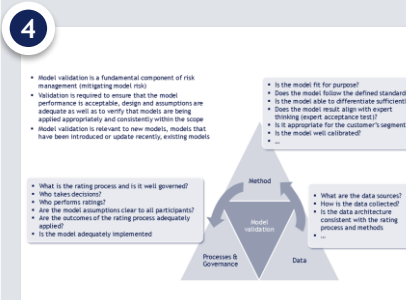
- A relative ranking of models according to model risk supports the organisation to prioritise the effort of model risk management and to implement 'proportionate' model validation
- Model risk is typically driven by two aspects: The likelihood of a model being erroneous as well as the materiality of a model
- The capitalisation / quantification of model risk is a second order question which we support clients in: Calculation of overall capital and allocation

Model risk management & workflow tool



- A model inventory should be more than just a list of models
- It constitutes a tool to manage the lifecycle of each model as well as to manage the entire model landscape and support the MRM workflow
- Hereto, TNP provides clients with a tool for model risk assessment and model risk management
- In contrast to other commercial offering, the organisation has not to adapt to the tool: The tool will be tailored to the specific needs of and infrastructure at your organisation

Automation of model validation



- Model validation constitutes a primary tool of model risk management and - to prioritise efforts in a world of constrained resources - needs to be proportionate to the relative risk and materiality inherent in a model
- TNP provides end-to-end validation frameworks as well as validation tools and conducts actual model validations
- Recently, automation of validation is one major enhancement of banks' validation approaches

We have successfully designed and implemented robust frameworks for model risk management: TNP's proposition in model risk management (MRM)

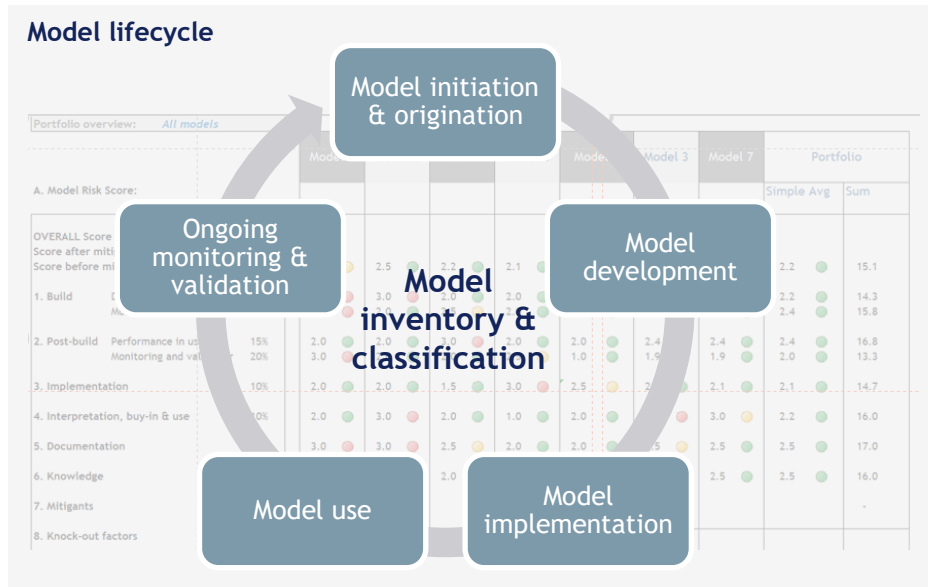
Step 1: Get the 'basics' right and obtain buy-in

- **Objective** is to build the foundation for modern model risk management i.e. a model risk management framework coordinating required tasks and allocating roles and responsibilities
- **Deliverables:** 'Model' and 'model risk' definition, model risk appetite / tolerance, model universe and landscape, MRM scope, MRM policy and model inventory (web-based, bcbs239 compliant), MRM workflow, target operating model (TOM) for model risk management (governance team vs. validation team, organisation, remit, activities, interfaces to other functions, people and skill-set required)



Step 2: Put model risk management into practice

- **Objective** is to implement and roll-out robust MRM (incl. communication and training at group and BU level across jurisdictions)
- **Deliverables:** More detailed MRM policies, set-up of controls and check-points, definition of (sub-) processes, training of all stakeholders and (where required) automation of work-flows



Step 3: Deriving value out of model risk management

- **Objective** is to extract value from the implemented MRM to increase comfort and trust in models relied upon in decision making and reporting as well as route / prioritise efforts
- **Deliverables:** Support in the establishment of centre of excellence in model development and validation (also across Group and jurisdictions), optimised resources management, full transparency on model quality and management actions



The ModelRisk View platform from The Analytics Boutique (TAB)

TAB is a wholly owned subsidiary of True North Partners. TAB has industry recognition in developing software solutions for risk management and pricing

We are well recognised in the analytics industry for our award winning offerings in the operational risk management and stress testing space

2016 industry award recognition with 5 awards...and 5 awards in 2018/19

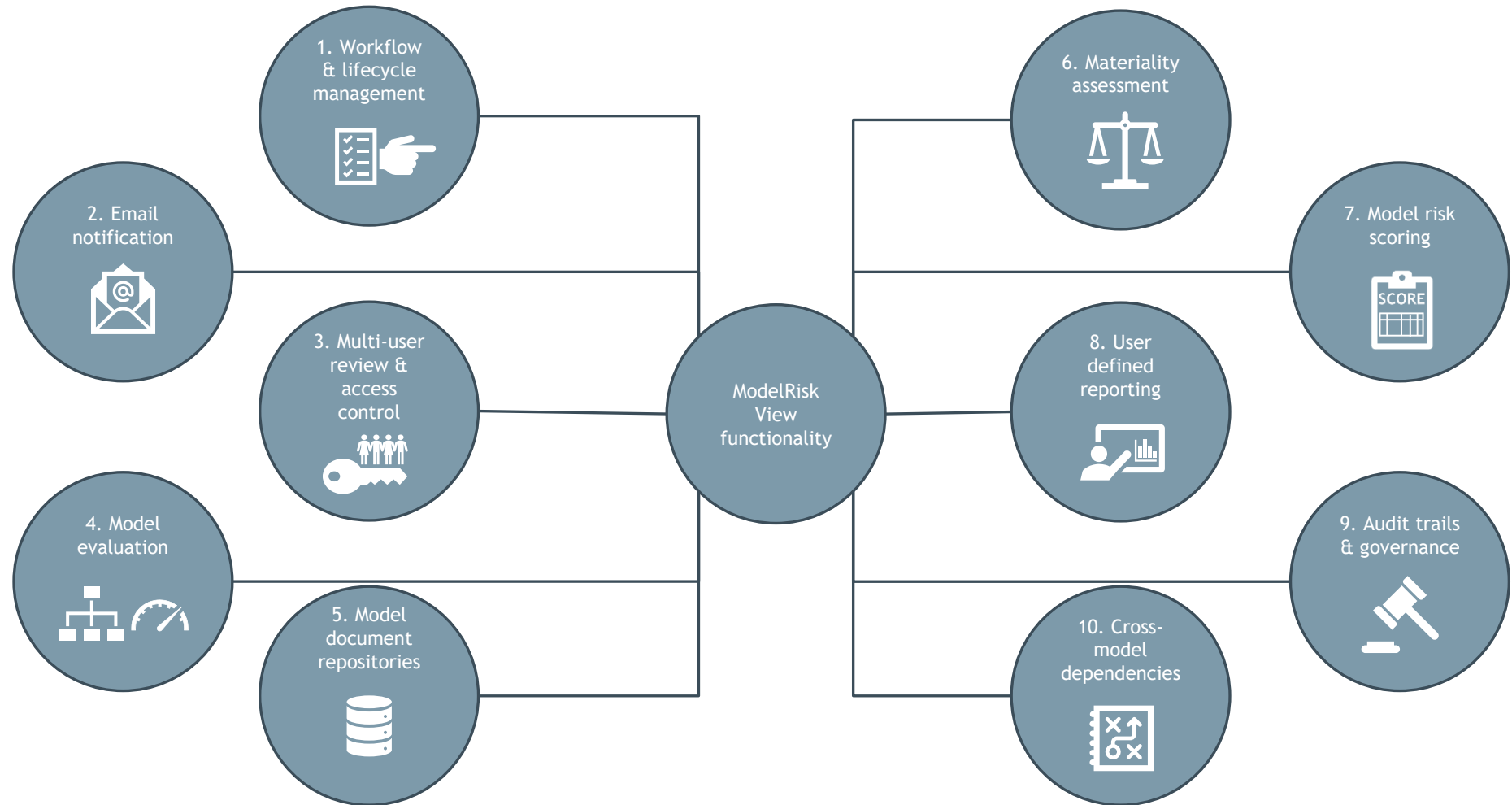


By Risk.Net (Risk Magazine)



By InsuranceERM

Model RiskView has a comprehensive range of functionality that caters for holistic and efficient model risk management



With the 'ModelRisk View' solution by The Analytics Boutique we provide a model inventory and workflow with high level MI dashboard and drill-down capabilities

The screenshot shows the 'ModelRisk View' dashboard. At the top, there's a header for 'THE ANALYTICS BOUTIQUE' with the tagline 'Analytics made friendly' and 'Powered by The Analytics Boutique V26.0'. Below this is a 'Model filtering' section with various filters: Scenario line (Active cyber threats), Creation date (2019-04-11), Status (All), Modelling period, Division, Segment, BU, and Risk type levels (1, 2, 3). A 'Search' button and a 'Create scenario' button are also present.

The main part of the dashboard is a table titled 'Models' with columns: Status, Overall, Build, Post build, Implement, Buy-in&use, Document, Knowledge, Mitigants, Knock-outs, and a set of small icons (F, D, W). The table is categorized into 'Various', 'Market risk', 'Credit risk', and 'Operational risk'.

	Status	Overall	Build	Post build	Implement	Buy-in&use	Document	Knowledge	Mitigants	Knock-outs			
Various													
Unquoted	WIP	1,7	0,3	1,0	2,5	1,0	2,0	3,0	2,0	2,0	F	D	W
Motor leasing	CLOSED	1,3	0,3	4,3	1,3	0,2	0,2	0,0	3,0	3,0	F	D	W
HPI Internal	APPROVED	3,1	0,2	2,6	3,7	3,4	4,0	3,9	4,0	4,0	F	D	W
HPI External	APPROVED	2,4	2,0	1,9	2,7	3,7	0,7	1,9	4,0	4,0	F	D	W
RAROC	WIP	3,0	3,7	3,0	3,2	3,4	3,5	1,0	3,0	3,0	F	D	W
Market risk													
VaR	WIP	4,3	4,0	3,0	4,3	5,0	4,0	5,0	5,0	5,0	F	D	W
ALM	CLOSED	3,9	4,0	4,0	5,0	4,0	3,5	3,1	5,0	4,0	F	D	W
BSM	APPROVED	3,0	2,0	3,0	4,0	2,0	5,0	2,0	3,0	2,0	F	D	W
Volatilities	APPROVED	4,0	5,0	4,0	3,1	4,0	3,0	4,0	5,0	4,5	F	D	W
Valuation	APPROVED	4,6	4,0	5,0	5,0	4,0	4,9	4,1	5,0	4,3	F	D	W
Correlations	APPROVED	1,7	2,0	1,0	2,0	2,1	2,0	1,0	2,0	1,0	F	D	W
Credit risk													
Retail scores	WIP	4,3	4,3	4,0	5,0	3,0	5,0	4,0	5,0	4,7	F	D	W
Rating	CLOSED	3,9	4,0	3,0	4,0	5,0	4,0	3,0	4,0	4,2	F	D	W
Mortgage pricing	APPROVED	4,6	5,0	4,0	4,0	5,0	5,0	4,0	5,0	4,8	F	D	W
Other pricing	APPROVED	3,7	4,0	3,2	3,2	4,0	4,0	3,2	4,0	3,8	F	D	W
Collective impairments	WIP	3,9	4,1	2,7	3,3	5,0	4,0	4,7	3,5	4,1	F	D	W
Stress testing	APPROVED	4,1	4,5	3,6	3,6	4,5	4,5	3,6	4,5	4,3	F	D	W
Operational risk													
LDA	WIP	4,4	4,5	4,2	5,0	3,2	5,0	4,2	5,0	4,9	F	D	W
Scenario analysis	CLOSED	4,6	4,7	4,4	4,9	4,0	5,0	4,4	5,0	4,8	F	D	W
Loss forecasting	APPROVED	4,7	5,0	4,6	4,8	4,2	5,0	4,6	5,0	4,5	F	D	W

Objectives: To evaluate and manage model risk (rating, capital) in an integrated solution supporting the MRM workflow. This includes the storage of model performance results, model documentation, automated reporting of model risk position and status of model in workflow.

Value-add: To obtain both, a high level understanding and detailed view of model risk in aggregate (e.g. capital) and individually (e.g. ranking), identifying drivers of model risk for active model risk management.

Market advantage: Flexible tool at low costs which adapts to your organisation, responsive support team.

Key features

Web based platform



Multiple users across model lifecycle with access controls



Audit trails & governance



Model inventory



Model workflow management



Captures cross model dependencies



Enable model risk evaluation



User defined reporting



‘Model Risk’ Solution integrates the end-to-end model risk workflow management and allows effective management of the model life cycle

Definition of user-specific workflow(s) with different permissions to manage process end-to-end

Selected features

Progress of evaluation: Market Risk - Test

Model Development | Model performance validation | Model risk evaluation | Loss estimates | Mitigation analysis

Please, respond to the following requests

Data sample used development

Please, describe how was the data sample created and attach the methodology document

No file chosen

Please, describe weaknesses and strengths of the data sample used. Also, attach the sample data used

No file chosen

Development methodology

Please, briefly explain the model development methodology and attach the methodology document

No file chosen

Model development validation

What method and metrics were used for the model development validation? Please, attach validation methodology

No file chosen

Please, attach model validation report

No file chosen

F2

The solution captures all required information for (e.g. criteria) and results of model performance monitoring and validation as e.g. reports, findings, remedy actions, responsibilities, ...

F1

The tool provides a structured repository and audit trail for user requirements (e.g. by model owners, businesses), decisions made and information applied during model development (e.g. judgemental input) as well as model approval capturing all necessary material in a single repository which - in turn - can directly be assessed by validation team rather than ‘sending around emails’

F3

Includes the capability for model risk assessment (ranking, capital) which can be tailored to the model risk assessment approach of the organisation: Model score and model materiality updated periodically based on drivers integrated in the required reporting of model risk e.g. vis-à-vis model risk tolerance on aggregate and individual level

F4

Further workflow capabilities included:

- Model use: Sign-off for business to start model usage,
- Model training: Model training repository
- Model change requests: Log for observed challenges with model and business requests to modelling team

‘ModelRisk View’ solution assists the running of processes i.e. create reminders for model maintenance and model management tasks

F5

- The tool permits to create reminders for specific tasks in model maintenance and management
- Tasks can be directed to specific stakeholders in the model risk management chain
- These may include regular tasks as re-parameterization, re-calibration, validation...
- ... but also specific tasks as e.g. mitigation actions from validations to the responsible stakeholders, ...

Selected features

The screenshot displays the 'Reminder' configuration interface in the ModelRisk View solution. The interface is divided into three sections, each for creating a different type of reminder.

Section 1: IFRS9 Model validation reminder

- Number of daily reminders: 3
- Subject: IFRS9 Model validation reminder
- Start/End date: 09/01/2018 - 12/31/2020
- Periodicity: 6 months
- Number of daily reminders: 5
- Message: By now you should have started the IFRS 9 model validation
- Sent to: P, Dinesh Kumar <Dinesh Kumar.P@sc.com>; Radhakrishnan, Gokulakrishnan <Gokulakrishnan.Radhakrishnan@sc.com>; Wang 3, Qing <Qing.Wang3@sc.com>; S1, Kumar <Kumar.S1@sc.com>

Section 2: IFRS9 Model recalibration reminder

- Subject: IFRS9 Model recalibration reminder
- Start/End date: (Calendar widget showing September 2018, with the 21st highlighted)
- Periodicity: 1 year
- Number of daily reminders: 5
- Message: By now you should have started the IFRS 9 model recalibration
- Sent to: P, Dinesh Kumar <Dinesh Kumar.P@sc.com>; Radhakrishnan, Gokulakrishnan <Gokulakrishnan.Radhakrishnan@sc.com>; Wang 3, Qing <Qing.Wang3@sc.com>; S1, Kumar <Kumar.S1@sc.com>

Section 3: IFRS9 documentation reminder

- Subject: IFRS9 documentation reminder
- Start/End date: (Empty field)
- Periodicity: (Empty dropdown)
- Number of daily reminders: (Empty field)
- Message: (Empty text area)
- Sent to: P, Dinesh Kumar <Dinesh Kumar.P@sc.com>; Radhakrishnan, Gokulakrishnan <Gokulakrishnan.Radhakrishnan@sc.com>; Wang 3, Qing <Qing.Wang3@sc.com>; S1, Kumar <Kumar.S1@sc.com>

Access rights assist with the management and security of workflows and documentation where only selected users

Selected features

Description | Score | Other 1 | Other 2 | Other 3 | Other 4 | Other 5 | Findings

Tab main configuration

Tab name: Number of questions: Access rights:

Model evaluation

Question order: Section: Tooltip: ☐ Type: IDB Exposure Classes: Attachment: ☐

Question text:

Question order: Section: Tooltip: ☐ Type: Credit risk component: Attachment: ☐ Allow multiple selection: ☐

Question text:

F6

- The tool permits to create access rights to different groups and individuals
- Access can be differentiated into:
 - Developer / admin rights
 - Read and write
 - Read only
- Access rights can be varied to include write access at selected points in the model workflow and/or life cycle
- Email notifications are sent to new users with the associated access rights highlighted

Flexible creation of questionnaires for a detailed model risk evaluation as defined by the user

Questionnaire as seen by expert

THE ANALYTICS BOUTIQUE
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INDEX SCENARIO LINE: BLACKOUT

PROGRESS OF SCENARIO: BLACKOUT

Chat with SSA team Save

DESCRIPTION Support data Loss estimates Mitigation analysis Risk and reward analysis

SCENARIO MAIN CHARACTERISTICS

SCENARIO NAME	DESCRIPTION	THEMES
Blackout	Provider had a blackout and the bank had no access internet and neither the clients could access internet banking, cash machines and POS and so on.	Internet failure

BU	COUNTRY/REGION	PATH	REQUEST
London	UK		Regulatory Management

REGULATOR NAME	SCENARIO TYPE	STRESS TEST TYPE	STRESS TEST PURPOSE
Others	Risk management scenarios	Group OR Specific	Risk Management

INCLUDES **EXCLUDES**

SCENARIO QUALITATIVE INFORMATION

INTRODUCTION

Last month there was a big blackout and for three hours there was no internet in any banking product and channel which caused a reputational impact and decrease in the service quality.

Last month there was a big blackout and for three hours there was no internet in any banking product and channel which caused a reputational impact and decrease in the service quality.

Please provide a sequence of events required for this scenario to happen

WRITE A LIST OF ANSWERS

MITIGATION PORPOSAL

Please propose mitigation action that would decrease the impact of this scenario.

Please evaluate the effectiveness of existing controls.

CASE STUDY

TABMKT Structured SA 20180109.pdf
Case study of Street Bank in New York

ORX_Com_Client.xlsx
Similar external issues

Questionnaire definition functionalities

Section title:

Type answer:

Question:

Text that does not allow for an answer

Question requiring a text answer

Question requiring list

Question requiring selecting from a combo

Write here question of text

Write section title

Click on Add to add question to questionnaire

Title	Type answer	Question	Actions
Instructions	Without answer	Please, answer all questions in the questionnaire before the provided deadline	Edit Delete
Basic information	text	Describe the causal pathway of the risk scenario	Edit Delete
Basic information	list	Please, provide the list of required independent events for the risk to materialise	Edit Delete
High level evaluation	High / Low	Evaluate the risk scenario under the provided risk scale	Edit Delete

Case study

Attach a case study

Add case study title

Explore for case study file

‘Model Risk’ allows also multiple model experts (MEs) to assess the same model in terms of risk and provides progress of responses of participating expert

Include a .ICS file regarding a potential meeting with MEs, including time, date, duration and location

Write email text to selected MEs

Progress on model evaluation: Mortgage PD

Include .ICS file	Meeting date	Duration	Location
<input checked="" type="checkbox"/>	<input type="text" value=""/>	30 minutes	<input type="text" value=""/>

Participant	Completion date	Status	Build	Implementation	Buy-in & Use	Documentation		Progress	Actions
rafael.cavestany@theanalyticsboutique.com	2016-11-30	CONFIRMED	NOT_STARTED		COMPLETED	COMPLETED	<div><div></div></div> 62 %	Progress	<input checked="" type="checkbox"/>
pepinferrari@gmail.com	2016-11-30	CONFIRMED	RETURNED		RETURNED	COMPLETED	<div><div></div></div> 62 %	Progress	<input checked="" type="checkbox"/>
daniel.rodriquez@theanalyticsboutique.com	2016-11-30	NOT_STARTED	NOT_STARTED		NOT_STARTED	NOT_STARTED	<div><div></div></div> 0 %	Progress	<input checked="" type="checkbox"/>
john.smith@theanalyticsboutique.com	2016-11-30	NOT_STARTED	NOT_STARTED		NOT_STARTED	NOT_STARTED	<div><div></div></div> 0 %	Progress	<input checked="" type="checkbox"/>
peter.white@theanalyticsboutique.com	2016-11-30	NOT_STARTED	NOT_STARTED		NOT_STARTED	NOT_STARTED	<div><div></div></div> 0 %	Progress	<input checked="" type="checkbox"/>

Multiple MEs are requested to evaluate the model risk individually to avoid known cognitive biases

The degree of progress of the different MEs in responding to their questionnaire is easily tracked

The progress of individual MEs can be reviewed, approved, further information can be requested and so on

Select MEs to send email

User-defined model identification functionality allows for demarcating models from ‘non-model’ calculations

Selected features

Model categories

Show 10 entries

	Model name	Creation date
<input type="checkbox"/>	Market Risk	2018-08-18
<input type="checkbox"/>	Credit Risk	2018-08-22
<input type="checkbox"/>	Operational Risk	2018-08-22
<input type="checkbox"/>	Liquidity risk	2018-10-15

F7

- ModelRisk View allows for users to upload model documents for all models in the organisations universe
- Different versions of the same model document can exist with the latest version always on top
- The document repository is has search capability making it easy for users to find documents associated with a certain portfolio, model type etc.

F8

- The solution has the capability to identify whether a calculation can be tagged as a model
- Model identification can be defined by the user according to the organisation's model risk policies, standards and definitions
- Non-models are kept in a different repository where they can be assessed if they qualify to be defined as a model at subsequent evaluation periods

User-defined model identification functionality allows for demarcating models from ‘non-model’ calculations

Selected features

It contains a decision tree to determine whether a model can be really consider a model or just a minor local calculation process

Please enter all models in your business area. Models are defines as: "...a quantitative method, system, or approach that applies statistical, economic, financial, or mathematical theories, techniques, and assumptions to process input data into quantitative estimates. A model consists of three components: □ an information input component, which delivers assumptions and data to the model; □ a processing component, which transforms inputs into estimates; □ and a reporting component, which translates the estimates into useful business information. The definition of model also covers quantitative approaches whose inputs are partially or wholly qualitative or based on expert judgment, provided that the output is quantitative in nature."

Divisions: [SME Banking]

Model name	Severity	Frequency	Is this a model?
1 - Correlation calculation model			<input checked="" type="checkbox"/> : Yes

Has the calculation been categorised by this decision tree during the current review period?
☒ Yes ☐ No

Are the outputs used directly in business decision-making and/or used for reporting OR used as input(s) in models directly used for decision-making and or/reporting?
☒ Yes ☐ No

Can a person without specialist skills apply simple logic and/or computation to accurately state the outcome in one or two steps when viewing the inputs?
☒ Yes ☐ No

Is there uncertainty around the accuracy of the inputs and outputs of the model?
☒ Yes ☐ No

Is the calculation used regularly / repeatedly?
☒ Yes ☐ No

Are the outputs quantitative in nature and not wholly expert driven?
☒ Yes ☐ No

All documents used or captured such as methodology documents, validation reports, etc. are consolidated into a document repository report

Main document characteristics are automatically documented, including model category, model name, document version, document date, etc.

Model categories													
Show <input type="text" value="10"/> entries										Search: <input type="text"/>			
#	Model id	Version	Document Status	Category	Model name	Date	Risk type level 1	Model type	Materiality	Region	Name	Description	Actions
1	161	1	Final	Market Risk	Balance Sheet Management	2019-02-28					Risk scoring factors v1.xlsx	Risk scoring	Download
2	160	3	Final	Market Risk	VaR	2019-02-28					Model Data v4.xlsx		Download
3	162	3	Final	Credit Risk	Retail credit cards IRB PD model	2019-04-05		IRB models	Medium		Model Document Inventory v2.xlsx		Download
4	163	3	Final	Credit Risk	Retail credit cards IRB PD model	2019-04-05		IRB models	Medium		Guide scenarios.docx		Download
Showing 1 to 4 of 4 entries												Previous	1 Next

User-defined model materiality evaluation allows to classify models based on their materiality and potential impact

Selected features

Model materiality evaluation

Model type: Economic capital ▼

Financial exposure: 30000000

Scope of use: Yes ▼

Reliance: No ▼

Materiality: Medium

F9

- The tool allows for integration of a model materiality framework as defined by the organisation
- A user can complete a set of questions and the defined model materiality algorithm (may be a simple set of questions containing thresholds and categories) will assess the associated materiality rating

User defined scores can be defined based on different aspects of the model such model complexity, model maturity, overall model riskness

Selected features

It is possible to define as many scores as required with the weight of each question with in the score and report such score in a specific dashboard

The screenshot displays a web interface for defining model risk scores. At the top, a navigation bar includes tabs for 'Description', 'Score' (which is active), 'Other 1', 'Other 2', 'Other 3', 'Other 4', 'Other 5', 'Other 6', and 'Findings'. Below the navigation bar, the 'Score' section is divided into two main areas. The first area is for a score with 'Number: 2'. It contains a 'Score title' field with the text 'Overall model complexity', an 'Order' field with the value '1', and three input fields for 'Exposure class' (value 2), 'Credit risk component' (value 3), and 'Approach used in the own funds calculation' (value 4). The second area is for a score with 'Number: 1'. It contains a 'Score title' field with the text 'Model maturity', an 'Order' field with the value '2', and three input fields for 'Exposure class' (value 1), 'Credit risk component' (value 1), and 'Approach used in the own funds calculation' (value 1).

The MRM platform is able to provide user defined reports and dashboards in an easy and intuitive way so that the organisation can track both model risk and efficiency across the model lifecycle



MRM Reporting functionality



User-defined charts



Drag and drop configuration of charts



No programming required



Updates dynamically as new data is added



Ability to have multiple dashboards for different user-types



Ability to download to Excel



Reporting on the model process and efficiency - time taken to develop, validate and approve models, costs per model etc



Multiple chart / table options



Track model risk and model efficiency

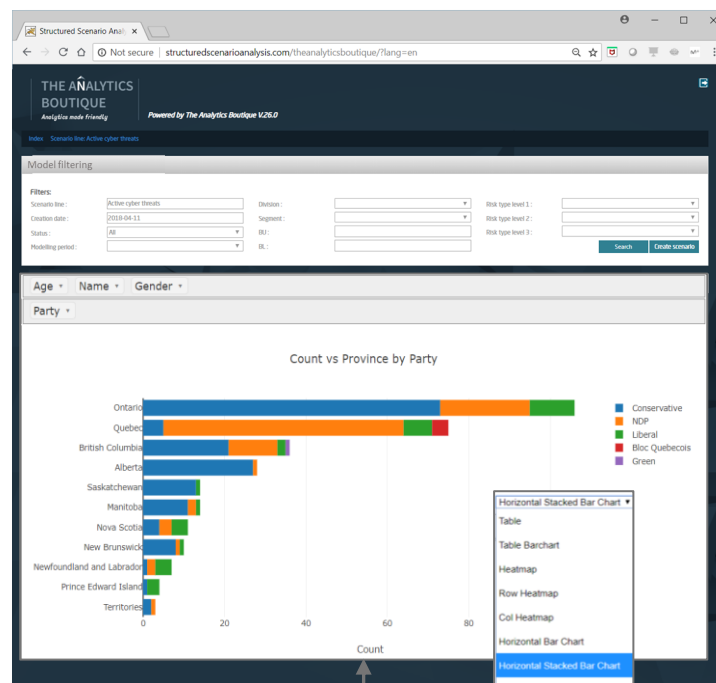
SSA provides a flexible dashboarding functionality that permits multiple dashboards defined by users

1 Information is captured by users on MRM forms and stored in a database

2 Pull information from database and create tables and charts as required using integrated reporting module

3 Graphs are grouped into dashboards

4 Multiple dashboards can be created



Multiple options available for representation

Extensive information about which user activity gained accessed / created / altered workflows and their components provides comfort for audit and governance structures

ScenarioAudit F10				
Agent	Category	Model name		
theanalyticsboutique@gmail.com				
niru.govender@tnp.eu				
niru.govender@tnp.eu	Market Risk		2019-04-05 04:08:17.864	Scenario line consultation
theanalyticsboutique@gmail.com			2019-04-05 10:57:14.447	The user has logged in
theanalyticsboutique@gmail.com	Credit Risk		2019-04-05 10:58:29.475	Scenario line consultation
theanalyticsboutique@gmail.com	Credit Risk	Specialised Lending - Income Producing Real Estate	2019-04-05 12:54:34.057	Scenario consultation
theanalyticsboutique@gmail.com			2019-04-05 13:58:33.762	The user has logged in
theanalyticsboutique@gmail.com	Credit Risk		2019-04-05 13:58:36.596	Scenario line consultation
theanalyticsboutique@gmail.com	Credit Risk	Retail credit cards IRB PD model	2019-04-05 13:59:42.182	Scenario edited
theanalyticsboutique@gmail.com	Credit Risk		2019-04-05 13:59:42.272	Scenario line consultation

- Each creation, deletion or alteration of workflows and different components in the model life cycle is logged for audit purposes
- All users who gained access to the system are also logged and user activity is tracked

It shows the workflow of model dependencies such as other models calculating parameters for the actual model, in a visual format

F11

- Other models calculating input parameters for the analysed model are depicted in a workflow format
- The colour code shows how many previous steps are the input parameters calculated

Refresh

Description

Model dependency

Description

3 of 18 selected

Market Risk - Balance Sheet Management

Market Risk - VaR

Market Risk - VaR trading desk

Market Risk - Valuation models

Market Risk - Volatilities and correlations

Market Risk - ALM

Credit Risk - Behavioral model

Credit Risk - Score model

Credit Risk - Credit Portfolio Model Analyser

Credit Risk - Retail credit cards IRB PD model

Credit Risk - Specialised Lending - Income Producing Real Estate

Operational Risk - Loss forecasting

Operational Risk - Structured Scenario Analysis

Operational Risk - Loss Distribution Approach

Testing - Model link 2

Testing - Model link

Testing - Model link 4

Testing - Model link 3

```

graph TD
    A[Specialised Lending - Income Producing Real Estate] --> B[Credit Portfolio Model Analyser]
    C[Retail credit cards IRB PD model] --> B
    D[Behavioral model] --> C
    E[Score model] --> C
    
```



Thank you.

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