Agenda

- The Guidance & Regulatory Environment
- Components of an Effective Model Risk Management Program
- Navigating a Model Examination
- Questions
Regulatory Guidance on Model Risk Management


- The guidance articulates the elements of a sound program for effective management of risks that arise when using quantitative models in bank decision-making.

- Models can improve business decisions, but they also impose costs, including the potential for adverse consequences from decisions based on models that are either incorrect or misused.

- The potential for poor business and strategic decisions, financial losses, or damage to a bank’s reputation when models play a material role is the essence of “model risk.”
BSA/AML Regulatory Landscape

- The increase in variety and functionality of AML systems and models, as well as the increasing number of institutions using these systems, has heightened regulatory awareness of model risk management.

- Over the past 18 months, one of the most commonly cited areas of examiner AML criticism is about the concept of sound model risk management.
  - Several portions of the recent Citibank, N.A., Consent Order refer to model risk management weaknesses and point to a blueprint of OCC expectations about model risk management.
  - AML system breaks are considered a leading reason for fines, penalties, enforcement actions, and mandated look-backs.

- Regulatory agencies have shifted resources and attention to assessing how institutions model their transaction monitoring and high-risk-customer management programs.

- The leveraged examination model extends beyond simply audit – examiners are looking to leverage and evaluate model documentation when drawing conclusions about the program.
Elevated Examiner Expectations

- Increasingly focused model examination teams (such as an OCC Risk Analysis Division team)
- Increased focus on operational risk
- Clearly documented approach and consistent methodology to model risk management

Sample exam questions
- What changes in your bank profile would require an adjustment to the risk scoring or transaction monitoring methodology?
- How does your approach to model risk management align with enterprisewide model risk management policies or practices?
- What approach was taken to validate your AML models, what were the results, and how did you respond?
- What is the alert quality level that will result in a decision to lower a rule threshold?
- How do you decide a rule needs production tuning?
- What is the percentage of good alerts that you are OK leaving behind during pre-production tuning?
- Are any parameters in your AML models still set at the vendor default values?
- How did you confirm that your customer risk scoring model accurately predicts customer risk?
AML Model Risk Management Framework

An effective AML Model Risk Management Framework should capture the core requirements of the supervisory guidance and expand on key principles.

Appropriate management oversight, policies and procedures, and approval processes are necessary for managing AML model risk.

Models relied upon for AML compliance should be identified and categorized by risk level.

As new AML models are developed and implemented, the appropriate documentation around requirements, design, planning, etc. must be captured.

AML models must be validated to verify accuracy and effectiveness and confirm the model was designed and implemented in accordance with its requirements.

Targeted exam teams and examiner focus on AML system tuning is driving a lot of pressure on financial institutions.
AML Model Risk Management Framework

The four “foundational” elements will provide the necessary infrastructure for implementing effective models and meeting guidance requirements.

Because AML practices are risk-based, AML MRM practices must align with the bank’s risks and the AML regulatory requirements.

AML system/model implementations are complex 12-24 month endeavors involving AML, compliance, IT, software vendors, consultants, etc.

Regulatory expectations include maintaining documentary evidence of model risk management efforts.

Using technology facilitates managing the complex requirements of the guidance and facilitates a complex tuning process.
Model Inventory

- Compile list of all AML systems/processes that are considered models
  - Document model attributes
- Identify who is accountable for each model
- Assess the institutional risk of each model
Model Inventory: Compile Model List

But what is a model?

OCC Guidance Definition:
- The term model refers to a quantitative method, system, or approach that applies statistical, economic, financial, or mathematical theories, techniques, and assumptions to process input data into quantitative estimates.
- Models are simplified representations of real-world relationships among observed characteristics, values, and events.

3 Components to a Model:
- Information Input Component: Delivers assumptions and data to the model;
- Processing Component: Transforms inputs into estimates;
- Reporting Component: Translates estimates into useful business information.
Model Inventory: Compile Model List

**In AML/BSA:**
Focus includes automated and manual processes tied to the following:

- Transaction monitoring systems
- Customer risk rating systems
- Watchlist filtering systems
- Risk assessment scoring methodology
- Any other quantitative process?

*Currently, the highest level of focus is being placed on transaction monitoring systems*
# Model Inventory: Compile Model List

## Define Approach & Structure:

- Define “model” – broad guidance definition means opportunity for interpretation
- Define model structure – leads to consistent, documented approach for the bank
  - Model Types, Model Groups, Models, etc.
  - Systems vs. reports/rules/scenarios
- Structure impacts model inventory and risk assessment

<table>
<thead>
<tr>
<th>Model Type</th>
<th>Model Group</th>
<th>Model</th>
<th>Rule</th>
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<tbody>
<tr>
<td>AML</td>
<td>Transaction Monitoring</td>
<td>Actimize SAM</td>
<td>Burst in Beneficiary Activity</td>
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<td>Excessive Short Period ATM Withdrawals</td>
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<td>High Risk Country Wires, etc.</td>
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<td>Norkom Correspondent Banking</td>
<td>Key Word Factor Transfer</td>
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<td>List Screening</td>
<td>Bridger List Screening</td>
<td>New Accounts – Personal</td>
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<td>New Accounts – Corporate</td>
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<td>White Lists, etc.</td>
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<td>Due Diligence</td>
<td>Actimize CDD</td>
<td>HITCA/HIFCA</td>
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<td>SIC Codes, etc.</td>
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Model Inventory: Compile Model List

**Document Model Attributes:**
- Last validation date
- Inventory of inputs
- Model limitations
- Parameters and settings
- Roles and responsibilities

**Challenges with collecting information**
- Model risk management focus is new, models are old
- Information is dispersed
- Employee turnover (ex. model developer no longer at the bank)
Model Inventory: Recognize Accountability

Clear lines of responsibility & accountability are necessary for maintaining an effective model

- Identify roles and responsibilities for the “model”
  - Model Owner
  - Model User
  - Model Administrator
  - Model Governance Committee
  - Model Validator
  - Model Tuner
  - Etc.
Model Inventory: Assess Model Risk

Failure to appropriately manage AML model risks has proven to be a leading attribute of recent fines, penalties, enforcement actions, and mandated look-backs.

- Evaluate institutional risk of model – reputational, financial, operational, etc.
  - Compile list of risks
  - Develop scoring/weighting system
  - Assign risk rating (ex. high, medium, low)

- Guidance calls for a risk-based approach to model risk management
  - Risk rating drives model risk management practices
  - Transaction monitoring systems and customer risk rating systems are generally identified as high risk
Model Inventory: Assess Model Risk

- **Examples of AML model risks include:**
  - **Data**
    - Incomplete/inaccurate customer or transactional data; data mapping errors/irregularities
    - File load errors and timing issues
    - Silos of data due to mergers or acquisitions
    - Core systems designed for specific business functions without regard for AML
  - **Design**
    - A conceptual framework that is inconsistent with regulatory expectations
    - Fundamental logic errors which produce inaccurate output
    - Application of a logic/methodology not commensurate with unique AML risks of an organization
      - Failure to identify elevated risks associated with certain customers or transactions
      - Failure to identify changes in organization/market activities that have an impact on AML models
  - **Resources**
    - Unclear lines of authority and accountability
    - Reliance on unidentified models for aspects of AML compliance
    - Lack of appropriate resources/expertise to effectively manage model risk management activities
  - **Security**
    - Leaked model logic and parameters → money-laundering prevention is compromised
Model Development, Implementation & Use

- Development
  - Define requirements & design
- Implementation
  - Define plan & maintain documentation
- Use
  - Assess output & ensure feedback loop
Model Development, Implementation, and Use

- **Development and Implementation**
  - Model Definition and Requirements
    - Serves as baseline model documentation and justification
    - Detailed requirements and objectives must be documented.
  - Model Design
    - Design must meet defined business objective and requirements.
  - Data Management
    - Assess completeness, accuracy, and relevance of input data.
    - Identify and document data limitations.

- **Use**
  - Analyzing Results
    - Effective analysis of model output is necessary for effective decision making.
  - Continuous Feedback and Improvement
    - Processes must be defined to allow for enhancement through feedback.
    - Model users must be empowered to provide feedback to model developers and managers.
Model Validation

- Conceptual Design – evaluate the logic and design of the model
- System Validation – validate the system is properly designed to execute on the AML model
- Data Validation – validate that accurate and complete information is captured by a system to execute an AML model
- Process Validation – ensure the adequate design and ongoing sustainability of the processes and administration of the AML system and model
Conceptual Design: Transaction Monitoring

- **Coverage Assessment**
  - Conduct or critically evaluate a coverage assessment.
    - Inventory red flags or typologies.
    - Assess red flags in the context of the unique risks and service offerings of the organization.
    - Compare the net of coverage provided through transaction monitoring system.
    - Evaluate manual or compensating controls.
  - Developmental Evidence
    - Verify that comprehensive documentation is retained for supporting the conceptual design of the model.
  - Business and Regulatory Alignment
System Validation: Transaction Monitoring

- **System Functionality**
  - Assess underlying logic and methodology of model
    - Peer profiling, rules based, rules-based counterparty analysis, unique products/services

- **System Limitations**
  - Inability to capture certain account or transactional data
  - Lack of detection-scenario logic to identify potential red flags

- **Data Integration**
  - Inventory sources of customer and transactional data to determine whether the fees are commensurate with conceptual design
  - Evaluate specific data elements mapped within the transactional monitoring system
    - Are the right data elements captured to support research and investigative processes?
    - Are the right data elements captured to support executing on established thresholds and parameters?
    - What is not mapped and why?
  - Evaluation of whitelist or excluded activities

- **Tuning and Optimization**
  - Critically evaluates and/or tests the effectiveness of tuning approach and methodology
Data Validation: Transaction Monitoring

- Risk-based testing of accuracy and integrity of source systems
  - Comparison of transactional records from source ledgers to supporting documentation
  - Comparison of source transactions to translation within AML system
  - Generally risk-based and focused on high-risk feeds from AML risk and propensity for error
- Assessing the completeness of transactional data
- Testing of interface with case management
- Back testing
  - Manipulating source reports to identify “reportable” events and determining whether an alert was generated
  - Comparing alerted activities to source transactional information
Process Validation: Transaction Monitoring

- The effectiveness of an AML model is as good as the processes and decisioning while managing the output.
  - Evaluating Workflow and Case Management of Output
    - Who is responsible for decisioning system output? Are their decisions subject to supervisory review and approval?
    - Is output reviewed in a timely manner?
    - Are analysts aware of any data feeds or alerts that frequently result in false positives?
    - If potential unusual activities are identified, are they escalated and reviewed in a timely manner for determination of whether or not to file a SAR?
    - Risk-based sampling of a selection of alerts to verify adherence to timeliness, documentation standards, and quality assurance
  - Evaluating System Controls
    - Transaction code management
    - System balancing or benchmarking
    - System change control (supporting documentation, approval, and segregation of duties)
    - Access rights to system
  - Management Reporting
    - Metrics and system changes
Conceptual Design: Customer Risk-Scoring Model

- Conduct or critically evaluate a coverage assessment.
  - Inventory customer risk factors.
  - Assess customer risk factors in the context of the customer profile of the organization.
  - Compare net of risk factors provided through risk-scoring methodology.
- Assess weighting applied to customer risk scores.
  - Determine whether the weightings are commensurate with the AML risk assessment.
  - Determine whether the weightings should be applied to customer, geographic, product/service, and transactional risk.
- Assess transaction risk scoring considerations.
  - Tiered scoring for business vs. personal (or peer groups)
  - Statistically grounded approach in applying scores (for example, standard deviations)
- Verify that comprehensive documentation supporting the conceptual design of the model has been retained.
System Validation: Customer Risk-Scoring Model

- Inventory sources of customer data to determine whether the feeds are commensurate with conceptual design.
  - Internal system sources, account-opening dialogue, external sources (third-party information)
- Evaluate specific data elements mapped within the transactional monitoring system.
- Scenario and Boundary Testing
  - Assess the risk of selection of customers (existing and hypothetical) independent of system or model.
  - Assess anticipated score to actual score and the model’s ability to predict risk.
  - Assess the impact that changes to the model would have on representative selection.
- Process to continually tune or optimize the risk-scoring methodology.
Data Validation: Customer Risk-Scoring Model

- Risk-based testing of accuracy and integrity of KYC information
  - Comparison of KYC records from source system to risk model
  - Comparison of source transactions to translation within risk model

- Assessing the completeness of customer data

- Back testing
Process Validation: Customer Risk-Scoring Model

- Evaluating workflow and case management of output
  - Hard coded high-risk accounts vs. risk qualification process
  - Supporting documentation and workflow for risk qualification process
  - Frequency in which customers are risk rated
  - Do processes allow for high-risk customers to be identified in a timely manner?
  - Managing enhanced due diligence for identified high-risk customer accounts
  - Quality assurance and secondary review

- Evaluating System Controls
  - System change control (supporting documentation, approval, and segregation of duties)
  - Access rights to system

- Management Reporting
  - Metrics and system changes
Model Tuning and Optimization

- Gap Analysis – Conduct a coverage assessment to identify gaps/redundancies and create baseline justification for model
- Prescriptive Methodology – Define an optimization methodology founded on quantitative analysis
  - Execute on the methodology
- Documentary Evidence – Maintain documentation surrounding approvals & justification for enhancements
Model Tuning and Optimization: Gap Analysis

- BSA/AML Risk Assessment
- Business and Regulatory Factors
- Conceptual Design Documents

Model Gaps and Inefficiencies
Model Tuning and Optimization: Prescriptive Methodology

- **Tunable Parameter Assessment**
  - Identify the various parameters and thresholds in each AML model, both internally designed and vendor supplied, including an identification of which parameters can be tuned versus those that are static.

- **Quantitative Approach**
  - Define a set of repeatable, comprehensive, and defensible processes and procedures for reviewing model parameters and thresholds that will withstand the test of time through new regulations and rules, leadership changes, and employee turnover.

- **Ongoing Process**
  - Define how and when these parameters and thresholds should be adjusted, including change-control procedures or initiating events that warrant tuning and optimization, such as a change to an organization’s risk profile resulting from an acquisition.
Model Tuning and Optimization: Prescriptive Methodology

- Identify Model Requirements
  - Assess coverage and identify model parameters and rules
- Prioritize Gaps & Inefficiencies
  - Develop a tuning schedule and action plan
- Perform Analysis & Tuning
  - Conduct analysis to reduce false-positive alert generation
- Implement Model Enhancements
  - Follow documented change control procedures
- Ongoing Assessment & Optimization
  - Continuous review of model to identify enhancement opportunities
Perform Analysis and Tuning
There are three primary tuning phases to consider:

- Baseline Tuning
- Preproduction Tuning
  - Above-the-Line Testing
  - Below-the-Line Testing
- Production Tuning
  - Above-the-Line Testing
  - Below-the-Line Testing
Ongoing Assessment and Optimization

**Ongoing Fine-Tuning to Address:**
- New products and services
- Acquisitions
- Change in customer and/or geography portfolio
- Updated AML risk assessment

**Ongoing Tuning Schedule**
- Continual review and assessment of monitoring metrics for alert quality
  - Output monitoring – production tuning
  - Inputs monitoring – changes in transactional data
- Regular review of scenarios and rules
- User feedback from surveillance and investigations team
Model Tuning and Optimization: Documentary Evidence

- Increasing expectations around quantitative practices
- Without documentary evidence, a prescriptive methodology won’t hold up to scrutiny
- Documentary evidence helps track changes over a long model lifetime
  - Changing roles and responsibilities
  - Employee turnover
- Leveraged examination model means examiners are depending on documentation
Model Governance

- Senior Management and Board Involvement
- Policies and Procedures
- Roles and Responsibilities
- Enterprise Risk Management and Reporting
- Independent Audit and Testing
Model Governance: Deep Dive

- **Senior Management and Board Involvement**
  - Oversee and set direction for organizations model risk management framework
  - Establish standards on development, implementation, use, and validation of models

- **Policies and Procedures**
  - Adherence to bank-wide model risk management policies
  - Methodology consistent with strong assessment of risk
  - Acceptable model development practices, validation activities and frequency, and model controls

- **Roles and Responsibilities**
  - Clear reporting lines by ownership, controls, and compliance & oversight/governance committee
  - Maintenance of sufficient expertise

- **Enterprise Risk Management and Reporting**
  - Synergies of model performance and effectiveness to key risk indicators of an organization
  - Clear segregation of duties of model activities (development, validation, audit, and oversight)
  - Clear reporting of model development, model risks, validation, and audit results

- **Independent Audit and Testing**
  - Assess effectiveness of model risk management framework, not duplicate efforts
  - Assess conceptual design, reliability of data, and model risk management controls
Model Foundation

- Project Management
- Supporting Documentation
- Business and Regulatory Alignment
- Enabling Technology
Model Foundation: Deep Dive

- **Project Management**
  - An oversight function will ensure a consistent approach across the organization and help manage the numerous stakeholders involved with model development and use.

- **Supporting Documentation**
  - Examiner and auditor expectations call for thorough documentation at all levels and phases of model risk management.

- **Business and Regulatory Alignment**
  - Models must be aligned with business objectives and simultaneously comply with regulatory requirements and expectations.

- **Enabling Technology**
  - Technology and automation will ease the difficulty of complying with documentation expectations and maintaining audit trails.
  - Assists with application of consistent methodologies and assigning accountability.
Model Examination, Preparation, and Response

Examiner expectations are high when it comes to model risk management exams. A typical information request contains dozens of specific requests.

- Sample information requests
  - Organization charts
  - Suspicious activity monitoring process flows
  - Monitoring system documents
  - Risk-scoring model documentation (selection methodology, sampling, validation info)
  - Peer grouping logic
  - Whitelist and exception documentation
  - Internal audit reports on suspicious activity monitoring
  - Scenario/rule summary statistics (means, medians, SD, kurtosis, min, max, percentiles)
  - EDD risk-scoring summary statistics
  - Alert-quality statistics (number, NSAF, SAR, No-SAR, etc.)
  - Detailed documentation and data sets for all pre- and post-production tuning analysis
  - Results of independent model validation
RAD Examination, Preparation, and Response
RAD examiners are asking tough questions about an institution’s suspicious activity monitoring setup and tuning processes and also about the enhanced due diligence program. The focus is on decision criteria and decision analysis.

- **Sample Transaction-Monitoring System RAD Exam Questions**
  - How are alerts distributed for review and who reviews them?
  - What is the alert quality level that will result in a decision to lower a rule threshold?
  - How do you decide whether a rule needs production tuning?
  - What are the metrics for deciding to conduct delta pass tuning on a rule?
  - How do you know a scenario, rule, or business logic unit is ready for production?
  - What is the percentage of good alerts that you are OK leaving behind during pre-production tuning?
  - How do you decide the number of clusters when sampling?
  - How do you define the cluster boundaries?
  - Are there any parameters still set at the vendor default values?

- **Sample Enhanced Due Diligence RAD Exam Questions**
  - What constitutes customer risk and how is it documented?
  - How do you decide to change a risk score?
  - What changes in your bank profile would require an adjustment to the risk-scoring methodology?
  - What are the characteristics of your customers falling just under a high-risk threshold?
  - What criteria qualifies for a manual adjustment to a customer’s risk score?
Strategies for Navigating an Exam

Open lines of communication.
- Each institution is different.
- Make sure examiners understand your unique position.

Align AML model risk management with enterprise standards, policies, and procedures.
- Enlist the aid of the corporate model governance team to verify that the AML approach to system tuning, EDD scoring, and program documentation aligns with corporate standards

Develop your theme to respond to the quantitative questions.
- What quantitative analysis was done to ensure that the process is not a “rule of thumb”? 
  - To what extent can show your models leveraged the analysis of a Ph.D. “quant”?
  - How can you “show your work” to provide confidence that what you say you do has been done?
  - How do you select your sample for “below the line” testing?

Take a forward-looking approach.
- Discuss a road map and future monitoring enhancements.

Self-identify weaknesses or issues.
- Be prepared to discuss weaknesses and gaps in current staffing
- If necessary, write your own exam results.
Looking Forward

- Model risk management is good practice beyond regulatory guidance
- Continued regulatory focus on model risk management
- Extended impact across all regulatory bodies
- Expectations trickling down from largest banks to midsize and smaller institutions
- In the near future, at a minimum, institutions will need to:
  - Create a Model Governance Committee, responsible for oversight of the institution’s model risk management program
  - Define an enterprisewide governance structure that addresses AML models
  - Conduct an AML model inventory and identify the organization’s operational risks
  - Establish the prescriptive approach to model risk management
  - Validate and tune the organization’s model and document all efforts
Questions & Discussion
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