The Model Risk Manager's and Model Validator's Toolbox

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MathWorks helps you manage model risk with a platform and technology for your entire organization.

Model Governance

Model Validation

Model DevOps
Many teams, users and stakeholders collaborate to bring a model from research to production.

The 1\textsuperscript{st} and 2\textsuperscript{nd} lines of defence have well defined roles and responsibilities.

The business, quants and IT are involved throughout.
It is difficult to reach a sustainable and cost-effective MRM strategy if tools and processes are not coordinated.

- Poor quality models
- Regulatory scrutiny
- High cost
- Inconsistency
- Frustrated users
- Low automation
Risk Management is a complex system with interconnected parts.
The MathWorks Model Risk Management Solution supports all users and every step of a model’s lifecycle.

**Model Inventory & Repository (MIR)**
- Centralized access to models, lineage, audit trail, risk scoring, and model risk reporting

**Model Development Environment (MDE)**
- Explore, develop, back-test, and document models and methodologies
- Improve transparency and reproducibility of model development process
- Create reusable model templates
- Auto-generate model documentation

**Model Review Environment (MRE)**
- Perform independent model reviews
- Perform interactive what-if and sensitivity analysis on model parameters
- Comment and flag various aspects for response and resolution
Model Inventory
The Model Inventory is the point of entry, showing the complete model landscape across business lines.

Centralized access to model risk management data and processes through MATLAB Online Server.

Customizable views, providing aggregated and drill-down information.
Every model is tracked, linked to code and documentation, and information is maintained as the model evolves.

Customizable fields and links to external databases.

Workflows for model creation, review and deployment.

Integrated with code and document control systems.
The Model Inventory is the centralized application to perform all model risk management activities.
Model Development Environment
The Model Development Environment produces documentation as you explore data and build models.

Richly annotated code as a basis for documentation.

Interactive controls and visualizations promoting model insight and challenge.
We provide reusable and customizable templates for every step of the model development process.

Script Snippets and Live Tasks covering every step.

Project structure and Word templates.

Automation, consistency, reusability of model artefacts.
Candidate models are trained, compared and calibrated in the Experiment Manager.

Reproducibility of model builds.

Tracking of validation metrics and annotation of results for documentation.

Encompass existing workflows around learner and modelling Apps.
Model Review Environment
Developed models are submitted through the Model Review Environment to be assessed and approved.

Access to up-to-date model code and documentation through a browser (MATLAB Online Server).

Model analysis can be executed in-place to support “what-if” scenarios.

Streamline communication between 1\textsuperscript{st} and 2\textsuperscript{nd} lines of defence.
Quantitative information required for internal and regulatory documentation is automatically produced.

Information is produced by running quantitative tests automatically on models.
Supplemental information populated from inventory and model documentation.
Model Test Environment
Rigor and trust in models is established through a Model Test Environment accessible through CI/CD.

Quantitative unit and performance test suites covering regulatory reporting requirements.

Interoperability with Python and Jupyter.
Model Execution Environment
Approved and tested models are deployed to production with a REST API supporting discovery and execution.

Authorize and audit model usage.

Horizontally and vertically scalable.

Integrate with business systems with no re-coding.

Language and implementation agnostic.
Model Monitoring
Metrics used in model review and validation are monitored on production models.

Build and deploy using App Designer and MATLAB Web App Server.

Alerts when metrics fall outside of approved usage.

Dashboards, KPIs and metrics accessible to model users and stakeholders.
MATLAB seamlessly interoperates with open source and third-party technology platforms across the modeling life-cycle.
Key Benefits of MathWorks MRM Solution

- Unified system of technologies addressing key business, modeling, workflow, and governance needs
  - Manage model risk with automation and transparency

- Modeling platform integrated across 1\textsuperscript{st} & 2\textsuperscript{nd} lines of defense, covering research to production
  - Eliminate inefficiencies, reduce cost/time
  - Enhance communication
  - Accelerate regulatory approval

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Perform end-to-end modeling faster, better, cheaper