



SAS® Model Manager

Create, manage and deploy lifecycle analytics

What does SAS® Model Manager do?

SAS Model Manager, with a patented, secure model repository complemented by a rich metadata structure and project templates, streamlines the tedious and often error-prone steps of creating, managing and deploying analytical models.

Why is SAS® Model Manager important?

Analytical models are high-value assets that must be well managed for optimum performance. Because they play an increasingly important role in business processes, it is critical to reduce the likelihood of erroneous model output or incorrect interpretation of model results. The robust tracking features and detailed systems of checks and balances continually verify the accuracy and usefulness of analytical models.

For whom is SAS® Model Manager designed?

- Analysts struggling to create and manage new or existing models and provide better answers faster.
- IT professionals responsible for validating score code as it is deployed in operational environments while ensuring regulatory compliance.
- Business process owners who want to apply analytical insights to improve quality and precision of resulting decisions.
- All stakeholders concerned with the performance degradation of analytical models.

For most organizations today, managing the life cycle of analytics is largely a manual process. Moving data and models from creation to production often entails tedious programming or operating system translations as the analytics are pushed across platforms. Mistakes are made as code is cut, pasted or rewritten by different people. Rarely is there time to go back and add comments describing why a particular algorithm was used or why variables were chosen. Model deployment simply takes too long.

Model decay is another serious challenge faced by organizations. Retaining poorly performing models can result in inaccurate projections, which leads to poor business decisions. Failure to update a model frequently enough can result in loss of revenue and earnings as competitors observe and act on changing trends before you do. SAS Model Manager defends against risks associated with model degradation with capabilities that continually verify the accuracy and usefulness of models.

The lack of standardized management of analytical models through the model life cycle is also painfully evident as organizations struggle to meet deadlines from external agencies. Compliance reports are frantically prepared, and problems arise when conflicting assumptions surface. Not understanding why the champion model was chosen or how a particular score was calculated makes it difficult to meet regulatory requirements, which can result in penalties, fines and loss of reputation.

SAS Model Manager solves these problems by enabling all stakeholders to collaborate as they manage analytic

modeling workflow in a cost-effective manner to derive the most ROI.

Key benefits

- **Reduces time to manage and deploy models into production.** SAS Model Manager provides an easy-to-use graphical user interface that guides users through a repeatable process for registering, testing and validating models. Accountability metrics and version control status reports track who changes what, when control is passed from one area to another, etc. Models can be monitored from their creation to deployment into real-time or batch scoring systems until they are retired.
- **Provides an integrated environment for tracking and monitoring model performance.** With its iterative framework, SAS Model Manager ensures analytical models are functionally performing as intended throughout the model life cycle. As models are tested and compared, performance benchmarking reports are generated. As they are deployed, performance metrics are pushed over established reporting channels. Modelers can easily collaborate and reuse models, and automated alerts can be set to detect when the scoring results are changing over time indicating model decay.
- **Enables compliance with regulatory requirements.** SAS Model Manager's flexible and unique compliance and validation reporting are highly sought-after by those facing increasing regulatory requirements. Valuable best practices can be captured via the patented centralized data repository, lifecycle templates



and metadata management system. Users are guided through the difficult steps of deploying analytics from creation into the production operational environment.

Product overview

SAS Model Manager enables organizations to effectively create, manage and deploy statistical, predictive, classification and analytical scoring models in an enterprise computing environment.

Project management capabilities include documentation for both the data and the models as they are pushed to operational production with extensive tracking, validating, auditing and reports produced along the way. SAS Model Manager also provides a secure, centralized repository for storing and organizing models backed by extensive documentation templates for each model. The Lifecycle Template editor enables you to create custom templates to meet your business process needs. Testing, scoring and sharing of model lifecycle and performance data over established publishing channels is

also supported. Accountability metrics and the validation of analytical steps through model creation, deployment and the retirement stage are available. Integration with SAS Scoring Accelerator for Teradata enables the registration and validation of in-database scoring functions within the Teradata Database.

Central, secure repository for managing analytical models

The SAS Model Manager repository stores extensive documentation about the model, scoring code and associated metadata by allowing collaborative sharing of models coupled with users group authentication, version control and auditability. Analytical modeling experts for a business organization analyze historical customer data and register the predictive statistical models into the repository along with the required data structure for the deployment of these models.

Model management is organized around business structures that regularly use analytical models as integral parts of their business processes. A

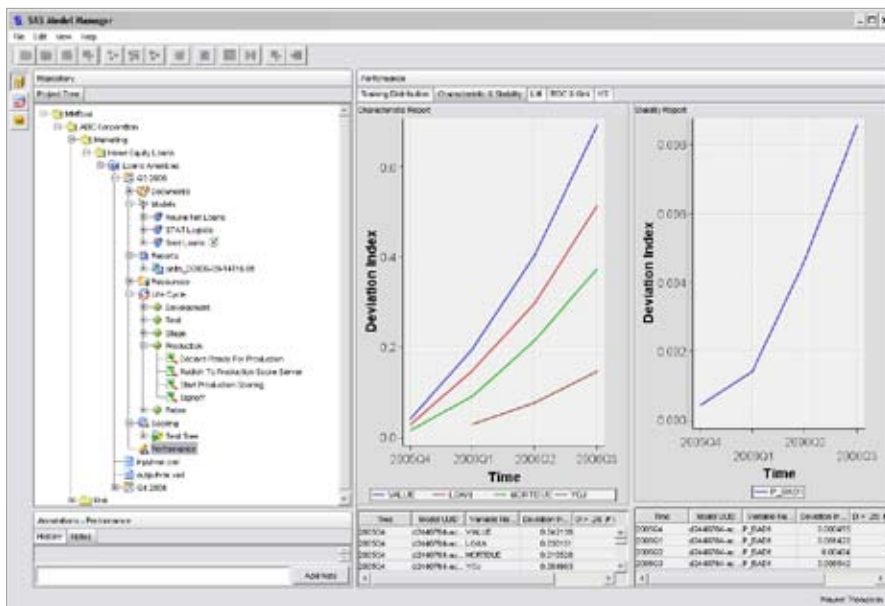
model management project collects all necessary information for model deployment and performance monitoring based on a time-phased model management life cycle. SAS Model Manager provides a collaborative secure repository for cataloging analytical models and also includes several reports for monitoring model performance.

Validate the scoring logic before exporting models to production

Scoring officers using SAS Model Manager have a template to follow and a system to record each test that the scoring engine goes through to ensure the logic embedded within the champion model is sound. A map that details each accuracy checkpoint along with the expected scoring results is captured, recorded and logged in the system. This precise method of checking and double-checking the model scoring logic reduces the risk exposure of making incorrect decisions after the model is pushed to production. Champion models can be exported for on-demand and batch scoring only after they are completely validated.

The SAS Metadata Repository can deploy the scoring engine from SAS Enterprise Data Integration Server or any other SAS components that produce analytical scoring engines. An automated publishing event is launched to notify assigned individuals (via various channels such as e-mail or Web-generated alerts) when it is their turn to act.

SAS Model Manager can be integrated with SAS Real-Time Decision Manager for scoring and managing analytical models for customer retention, acquisition or loyalty programs. The SAS Real-Time Decision Manager Scoring activity allows the user to choose any of the scoring projects (published by SAS Model Manager); whenever a decision flow that includes scoring activities is run, those activities



SAS Model Manager provides a collaborative secure repository for cataloging analytical models and also includes several reports for monitoring model performance.

execute the referenced score code in real time.

Monitoring and reporting on model performance during test and production life cycles

As the champion model reaches test, stage and production lifecycle milestones, model status and performance information is pushed to the subject experts in the organization who manage the test criteria being evaluated at each milestone. SAS Model Manager uses procedural templates to document the validation performance and the sign-off process. An audit trail is created as the champion model is phased into production and the predecessor champion model is retired. Performance benchmarks are calculated to display the champion model's scoring performance as well as to document conformance to required industry reporting standards.

Several canned reports are provided as well as the flexible user-designed reports that monitor production model performance on an ongoing basis. The production champion model remains deployed until business conditions dictate its retirement, or until a new model is created and the predictive model life cycle begins a new iteration.

Overall lifecycle management of analytical models

SAS Model Manager helps organize and track the tasks of:

- Model verification and testing.
- Comparative model performance benchmarking.
- Model deployment and scoring in a production environment.
- The publishing and sharing of model lifecycle and performance data over established reporting channels.
- The eventual retirement of a model from production status.

Key features

Central, secure repository for organizing models

- Project-based storage of models.
 - Set up and maintain separate versions of champion and challenger models within a project:
 - Freeze a version.
 - Set a default version for the project.
 - Champion challenger model promotion.
 - Map prerequisite data sources used for model reporting and score code testing:
 - Training and test tables.
 - Score input and output tables.
 - Performance tables.
 - Project input and output tables.
 - Accounting and auditability:
 - Event logging of all major actions.
 - User-defined notes.
 - Attach documents (Microsoft Word documents, Microsoft Excel spreadsheets, HTML files, etc.) and add version control.
- Prebuilt templates for registering standard data mining models:
 - Prediction.
 - Segmentation.
 - Classification.
 - Scorecards.
 - User-defined template.
 - GUI or SAS macro model registration.
 - Model Import Template editor.
 - Optional SAS macro model registration support.
- Import multiple SAS Enterprise Miner models:
 - General properties such as model name, type of algorithm, creation date, modification date, etc.
 - Model inputs required for scoring.
 - Model outputs generated by scoring.
 - Score code including preliminary transformations.
 - Associated scoring tasks.
 - Advanced view of the SAS Enterprise Miner process flow diagram.
- Import multiple SAS/STAT and Base SAS models:
 - Training code.
 - Score logic.
 - Estimate tables.
 - Target and input variable.
- Import and export PMML model code with inputs and outputs.
- Repository metadata summary report, such as:
 - Number of models; number of scoring jobs.
 - Model aging profiles.
 - Frequency counts of how often each target and input variable has been used across the model portfolio.
- Query the model repository by attributes, such as:
 - Type of algorithm.
 - An input or target variable.
 - Model creator.
 - Model ID.
 - Lifecycle assignee or approval user.
 - Combination of query attributes.
 - Ability to add user-defined query keys.

SAS® Model Manager Technical requirements

Client environment

- Microsoft Windows (x86-32):
Windows XP Professional, Windows Vista*, Windows Server 2003 family
- Microsoft Windows on x64 (EM64T/AMD64): Windows XP Professional for x64, Windows Vista* for x64, Windows Server 2003 for x64

Server environment

- AIX: Version 5.3 and Version 6.1 on POWER architectures
- HP-UX Itanium: HP-UX 11iv2 (11.23), 11iv3 (11.31)
- Linux for x64 (EM64T/AMD64):
RHEL 4 and 5, SuSE SLES 9 and 10
- Solaris on SPARC: Version 9, 10
- Microsoft Windows on x64 (EM64T/AMD64): Windows XP Professional for x64, Windows Vista* for x64, Windows Server 2003 for x64

* NOTE: Windows Vista Editions that are supported include Enterprise, Business and Ultimate

Required/not included software

- SAS Model Manager requires Base SAS and SAS/STAT® software.
- SAS Enterprise Model Management is an inclusive sales bundle containing Base SAS, SAS/STAT and SAS® Enterprise Miner™ software.

Key features (continued)

- Secure reliable model storage and access administration:
 - Backup and restore capabilities.
 - Overwrite protection.
 - Event logging.
 - User authentication/access privilege administration.

Validate the scoring logic before exporting models to production

- Define test and production score jobs:
 - Map required inputs and outputs.
 - Add pre- and post-SAS code.
 - View log and results table.
 - Create interactive graphs.
- Export models to SAS Metadata Repository.
- Production scoring:
 - Mining Results Transformation available in SAS Data Integration Studio.
 - Model Scoring Task available in SAS® Enterprise Guide®.
 - Publish models directly to SAS Real-Time Decision Manager.
- Publish model updates to different scoring channels:
 - E-mail notification sent to subscribers.
 - Store results to a file system or post to a corporate intranet.
- In-database model deployment:
 - Integrated with the SAS Scoring Accelerator for Teradata to publish and validate Teradata Scoring functions for native scoring in Teradata Database.

Monitoring and reporting on model performance during test and production life cycles

- Model Performance reports:
 - Programs for summarizing scored data.
 - Variable distribution plots.
 - Characteristic chart.
 - Stability chart.
 - Lift chart.
 - Receiver Operating Curve and Gini charts.
 - Kolmogorov-Smirnov chart.
- Model Comparison reports:
 - Model profile report.
 - Delta report.
 - Dynamic lift.
 - Model monitoring report.
 - Ad hoc SAS code report editor.
 - HTML, RTF, PDF and Microsoft Excel output formats.
- GUI for creating performance monitoring reports.

Overall lifecycle management of analytical models

- Model lifecycle templates for collaborative project management:
 - Basic, Standard, Extended and User defined.
 - Model lifecycle template editor for User defined.
 - Task-oriented milestone completion and approval signoff.
- Define start and completion dates.
- Progress completion status reports.



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POWER
TO KNOW.

SAS Institute Inc. World Headquarters +1 919 677 8000

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