

## Introducing SAS® Decision Manager 5.1 with Business Rules for SAS® Viya®

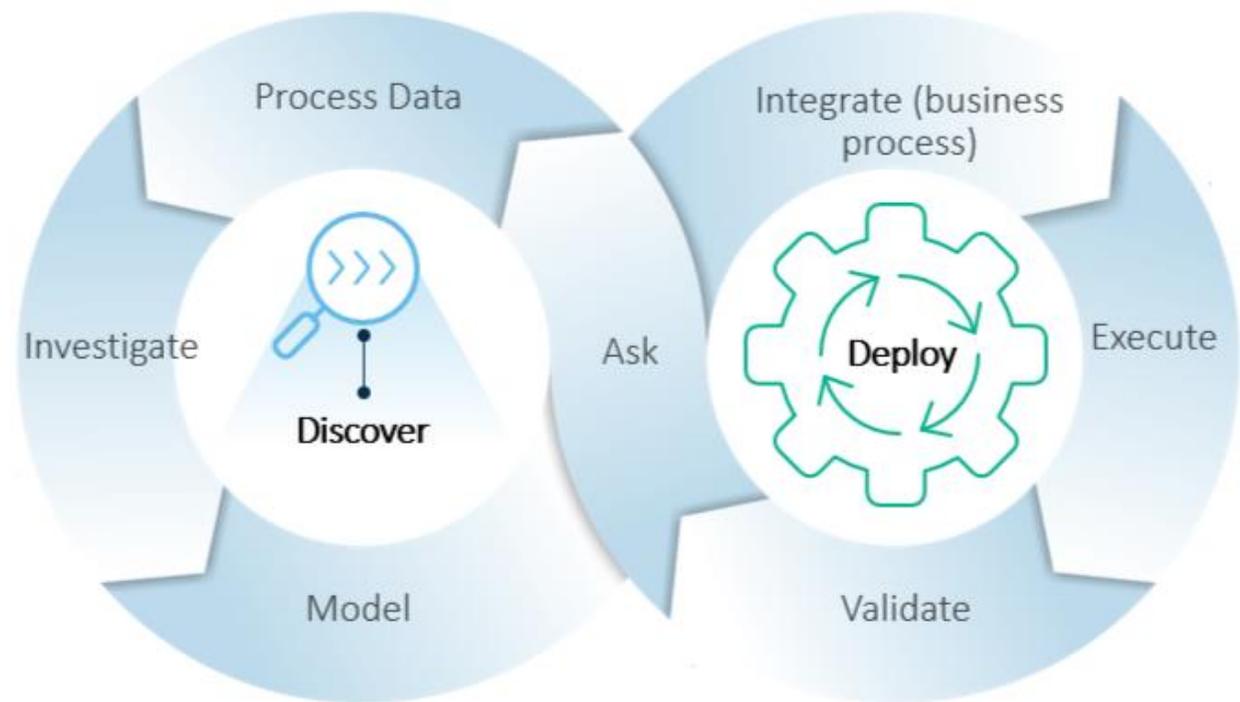
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### ABSTRACT

SAS® Business Rules Manager 1.2 was introduced in 2012 for customers who need software for building and managing their collections of valuable conditions and actions that drive business decision-making. These rules are combined with advanced analytical models and deployed into batch and real-time processing systems. SAS® Decision Manager 5.1 brings full decision processing to SAS® Viya®. This paper tours those new features, including brand new editors for interactively building business rules, graphical process flow decisions, and reference data management; integration with SAS® Visual Analytics and SAS® Model Manager; computations based on the SAS® Cloud Analytic Services (CAS) Server; model deployment to multiple operational servers; and compatibility with open-source environments such as Python. SAS® Decision Manager is now cloud-ready, multi-tenant-capable, and provides a full REST API for custom application integration.

### INTRODUCTION

Managing how your organization is able to make decisions and being able to adapt decision making processes is critical for profitability and cost control in businesses today. With SAS® Decision Manager 5.1, you can do this in the SAS® Viya® environment. The new feature set in 5.1 is not available in previous releases of SAS Decision Manager and complements the SAS® Viya® environment in its ability complete the analytics lifecycle.



**Figure 1. Analytics Lifecycle Diagram**

In Figure 1, you see the key phases to the analytics lifecycle. SAS Decision Manager is a primary player in the deployment phase. However, in many business cases, SAS Decision Manager can be leveraged in all phases.

SAS® Decision Manager 5.1 has new features in the following areas. These features are key pieces to accelerating the analytics lifecycle for your organization.

- visualizing decisions and business rules
- verification analysis and testing
- publishing
- lookups / reference data

These features enhance the visibility of your processes and reduce the time needed to deploy changes or new decision processes in the SAS Viya environment. This paper examines each area and shares the key new capabilities in the latest release.

## VISUALIZING DECISIONS AND BUSINESS RULES

The most striking new features in SAS® Decision Manager 5.1 are the new visualizations for editing both decisions and rules. A new graphical editor has been added for decisions. This new editor enables users to more easily understand, compose, and verify their decision logic. In addition, the rule set editor changed to provide a clearer display of rules and flexibility to advanced and basic users.

### Graphical Decisions

As shown in Figure 2, there is now a decision flow view (which can be edited with a graphical editor) that allows users to drag and drop elements into place.

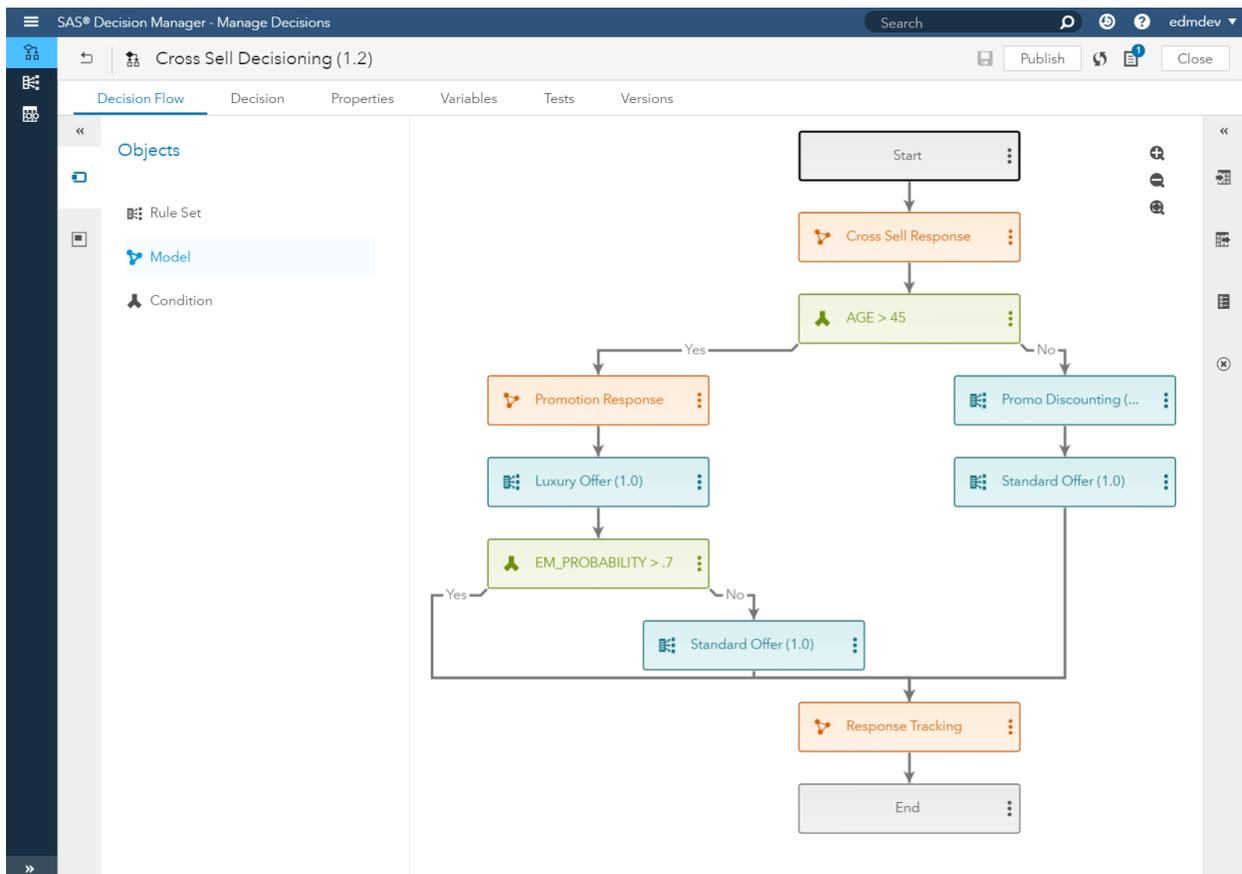


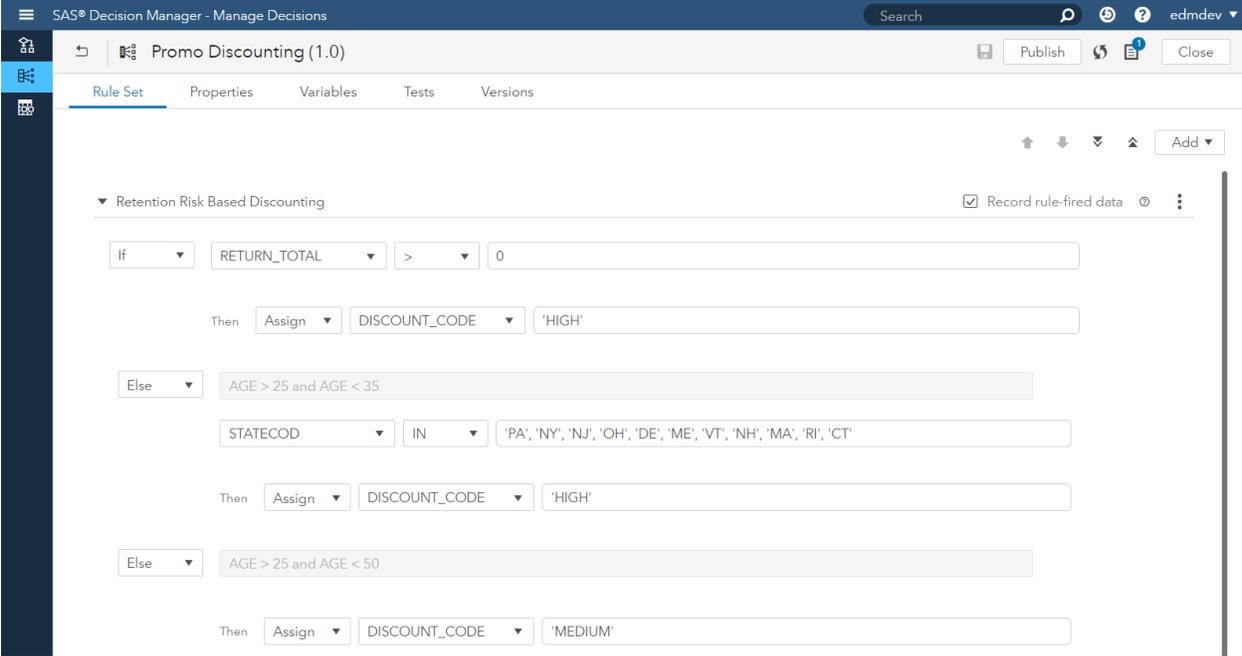
Figure 2. Graphical Decision Flow

The decision flow editor has not logically changed from SAS Decision Manager 3.2 and still supports adding model, conditions, and business rules. However, the decision flow editor was enhanced to allow for rule sets to be referenced directly (which will be a welcome addition for 3.2 users). In 3.2, decisions contained rule flows, which were a sequence of rule sets. Based on customer use cases seen with 3.2, the ability to add rule sets to decisions creates the ability to perform the rule flow construct with more functionality of conditioning and modeling.

To access the decision editor from SAS® Decision Manager 3.2 in SAS Decision Manager 5.1, open the **Decision** tab. (See Figure 2.)

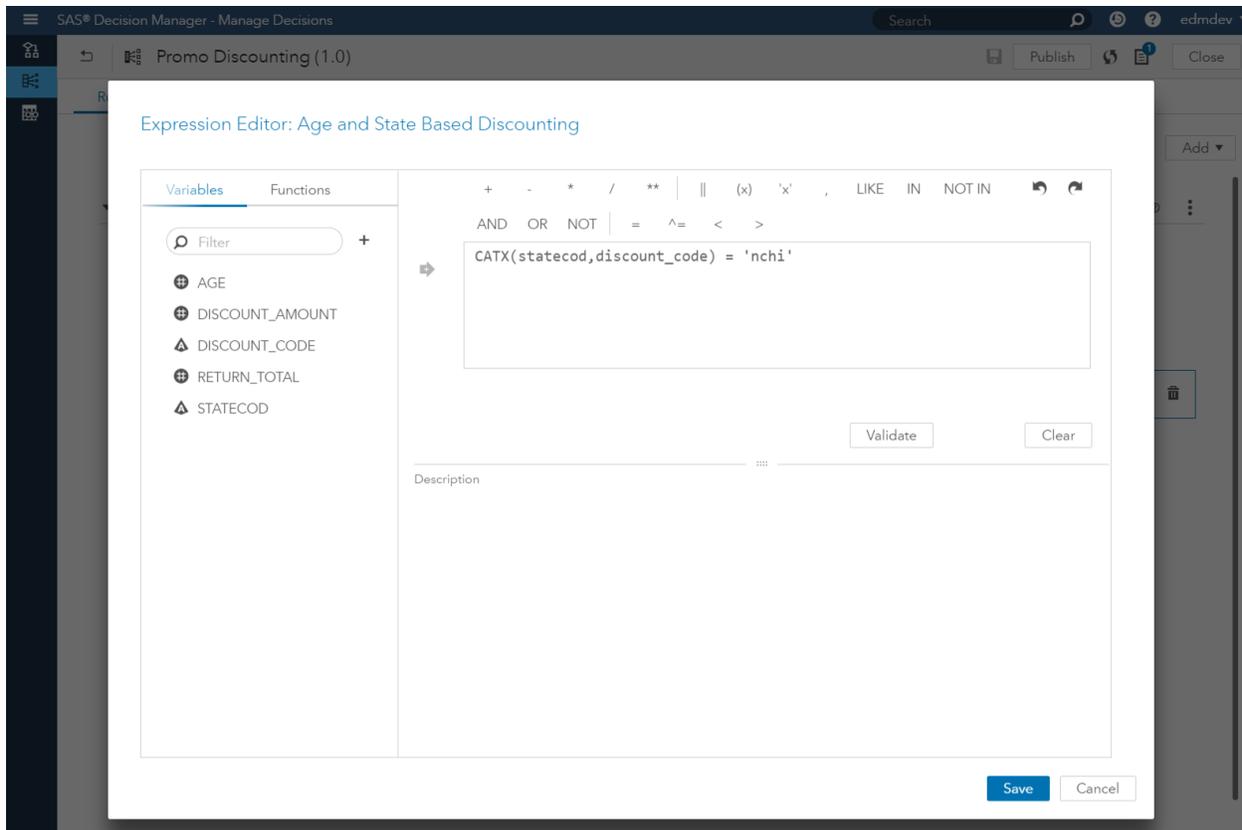
### RULE SET EDITOR

Rule sets have a new editor as well. A new vertically-oriented editor (see Figure 3) was introduced in SAS® Decision Manager 5.1. This new editor helps groups managing large numbers of rules to easily scroll through rule logic.



**Figure 3. Rule Set Editor**

In addition, the new editor allows free form rule logic in either conditions or actions. (See Figure 4.) In the new expression editor, you can create logic that is not bound to a variable and single operator, so advance users can enter conditions or actions with the combination of variables operators and functions that they wish.



**Figure 4. Complex Editor for Rule Sets**

## PUBLISHING

Business users need the ability to deploy or publish their processes to ensure that the analytics lifecycle continues. SAS® Decision Manager 5.1 offers new options and controls for publishing decision or business rule processes.

Users have the option to publish to four different destination types. SAS Decision Manager provides execution options for either a batch or real-time setting and maintains support for executing your analytics in either context.

- Batch targets
  - CAS
  - Teradata
  - Hadoop
- Real-time target
  - SAS® Micro Analytics Service (MAS)

## BATCH

Publishing to one of the batch options is similar in concept to previous versions of the software. However, SAS® Decision Manager 5.1 now leverages SAS® Scoring Accelerator technology to enable execution of the decision code inside database and Hadoop systems.

This enables users to be able to execute their analytics directly using integration options from Hadoop or Teradata, or execute via CASL code submitted through SAS® Studio, SAS® Data Studio, or Python SWAT libraries.

## REAL-TIME

Publishing to MAS existed in a previous release. However in SAS® Decision Manager 5.1, you can control the module name (available on all destination types). As seen in Figure 5, users can enter a name for their module. With this functionality, you can publish to temporary locations first and verify the results before finalizing the module. This functionality also provides greater flexibility for staging integrations as processes dictate.

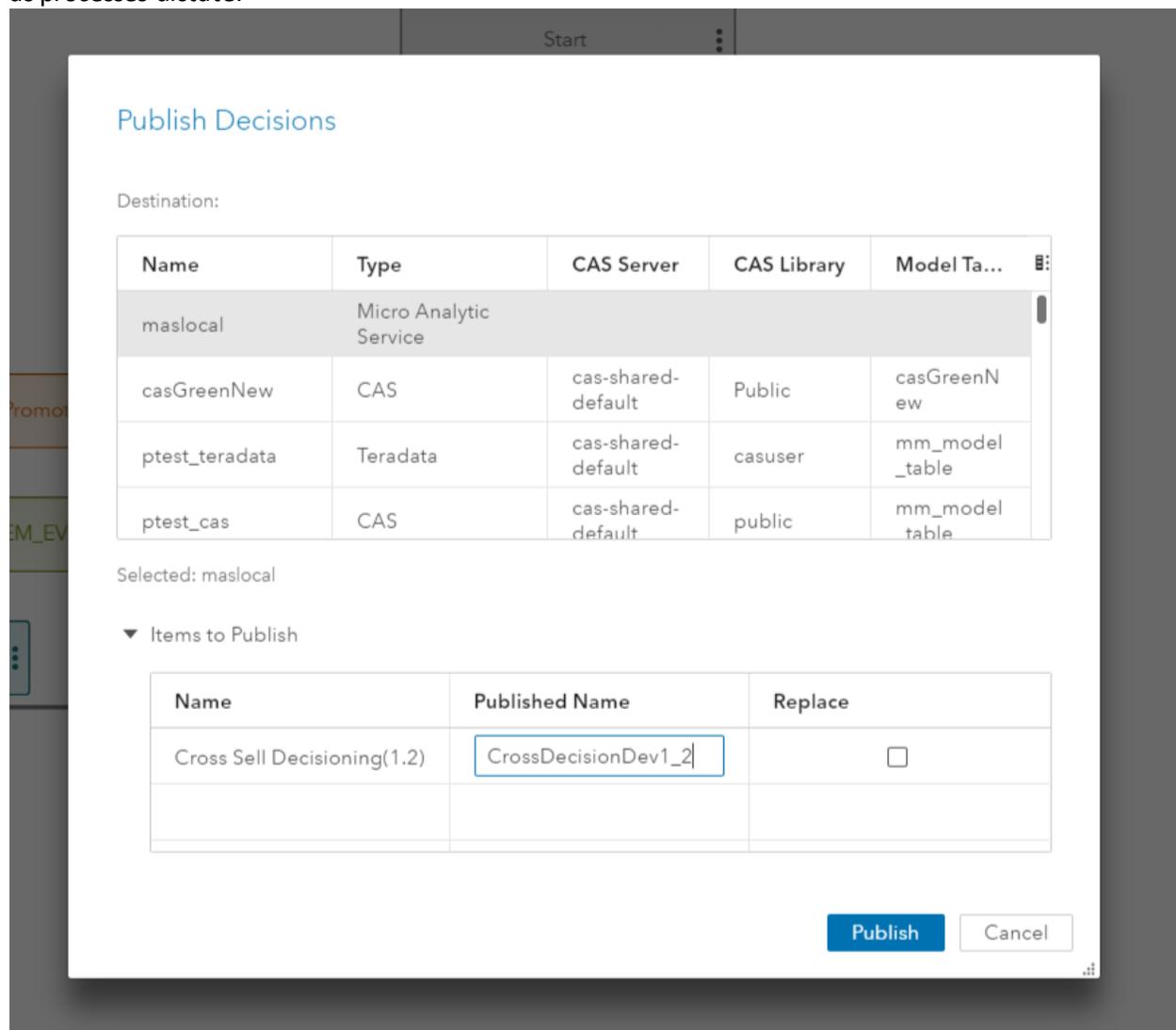


Figure 5. Rename in Publish Decisions Window

## VERIFICATION TESTING AND ANALYSIS

SAS® Decision Manager provides an easy interface for business users to publish analytics, so you can quickly hand off finalized artifacts for integration. However, the system needs to provide tools for users to verify their content before publishing as well in order to ensure a predictable process. SAS® Decision Manager 5.1 offers these tools. There are also new additions to verify or test your analytics around rule-fired analysis, path tracking analysis, and parameterization that can be leveraged before publishing to ensure precision in your process.

## RULE-FIRED TRACKING

Rule-fired tracking is the ability to report on your execution and understand how your business rules executed with respect to your data. Rule-fired tracking existed previously, but it was exclusive to executing rules independent of other analytics. Now users can perform rule-fired analysis in either context -- with rules alone in rule sets or within decisions that incorporate analytical models. Now, users have deeper insight before deploying an entire decision process.

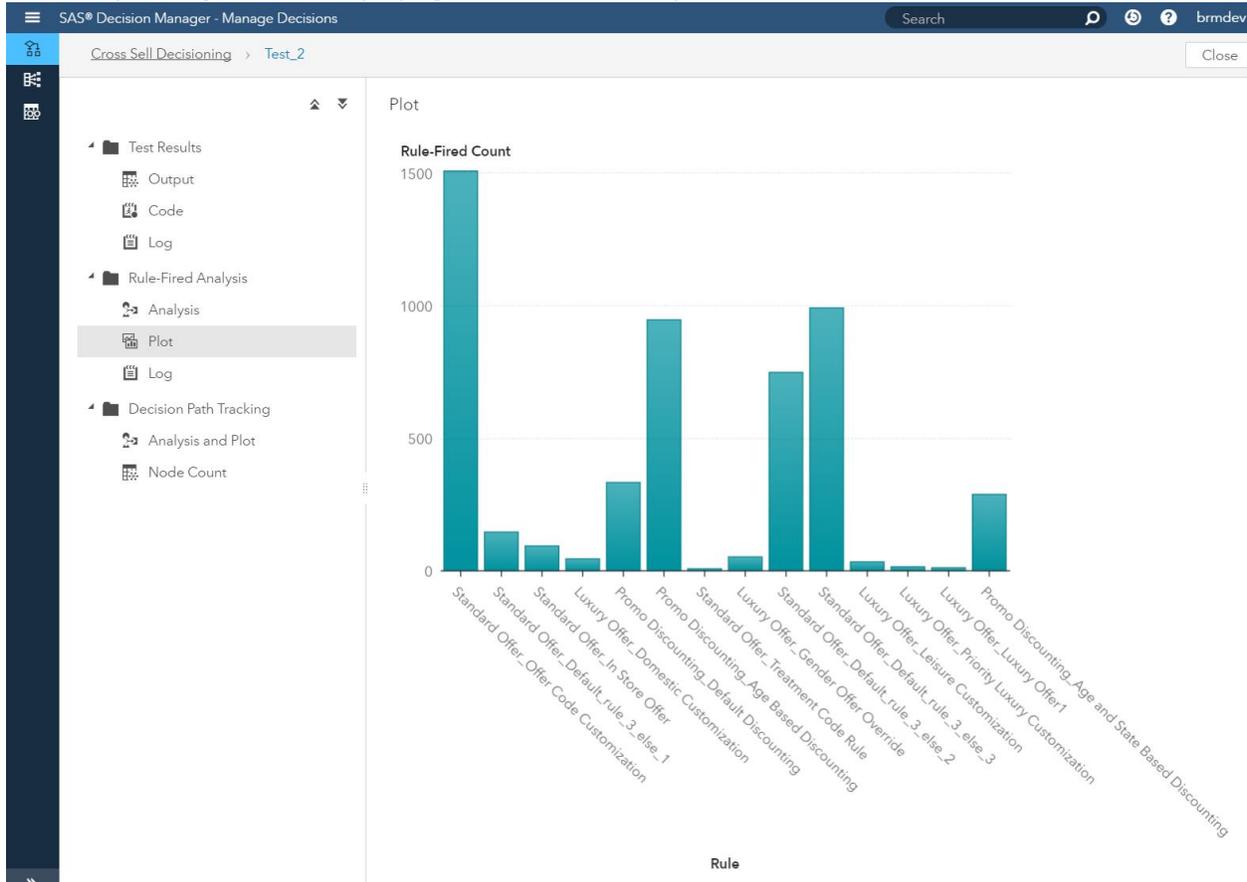
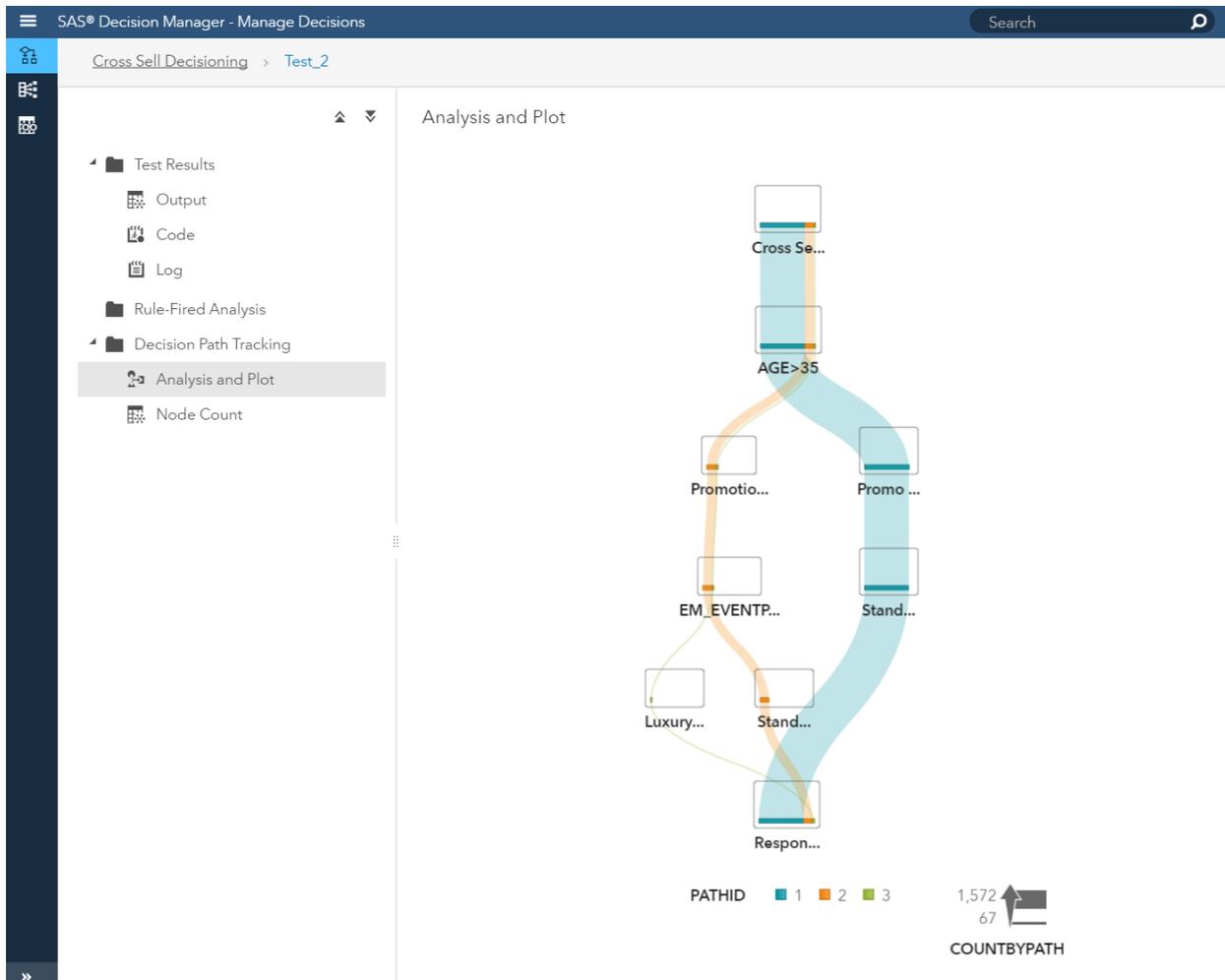


Figure 6. Rule-Fired Reporting in Decisions

## PATH TRACKING

With a new visual decision flow representation for editing, a new visual path tracking analysis has been added. This analysis can be performed on tests for decisions.

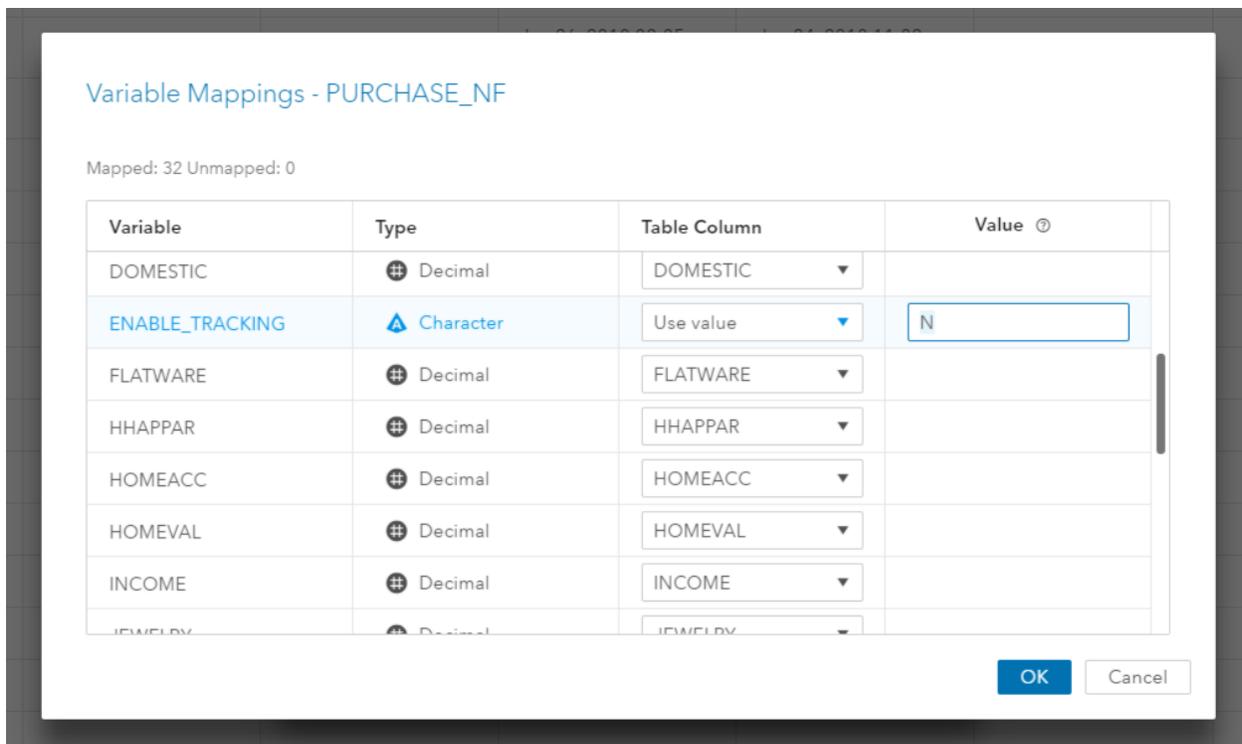


**Figure 7. Path Tracking Analysis for Decisions**

This analysis enables you understand the conditioning within a decision and analyze exactly which models and rules are scoring the data. The analysis provides critical insight to help you determine if there are unexpected problems with your decision or if you can confirm the behavior is as you expected.

## PARAMETERIZATION

When verifying logic, all possible data conditions might not be represented in the data. SAS® Decision Manager 5.1 offers users the unique ability for both decisions and rule sets to set specific data parameters during testing. Users can create tests that set a field to a specific value as requirements dictate. As a result, you have full confidence when deploying as all data conditions can be tested.



**Figure 8. Parameterizing Input for Tests of Decisions or Rule Sets**

## LOOKUPS / REFERENCE DATA

Lookups (also known as Reference Data in the REST service layer) are name / value pair lists. With SAS® Decision Manager, users can maintain and decouple their content from logic. This functionality provides critical business value by allowing businesses to design processes that can change with an update of a list of values and not a rewrite of business logic. This functionality has been maintained in SAS® Decision Manager 5.1, and it has advanced significantly with its versioning behavior and simplified access to import and export capabilities to enable better control and management.

### FULL VERSION SUPPORT AND ACTIVATION

SAS® Decision Manager 5.1 exposes historical versions of lookups and allows users access to them. Consequently, the user has a clear way to monitor and track updates of the lookup that are significant to the lookup.

With a full set of versions available, SAS® Decision Manager 5.1 has also introduced the ability to activate a lookup version, which triggers the set of values to use by any referencing object upon testing or publishing. This functionality gives users significant flexibility to create new versions within disturbing existing content and rolling back to a previous version, if deemed necessary during validation.

Version	Notes	Date Modified	Modified By
1.2		Feb 13, 2018 02:37 PM	brmdev
1.1	Dave's Modifications for June 1 project	Feb 13, 2018 02:38 PM	brmdev
1.0	Original List	Feb 13, 2018 02:38 PM	edmdev

**Figure 9. Lookup Version Page**

## FULL IMPORT AND EXPORT CAPABILITIES

In previous releases, users had limited ability to import lookups within the user interface. In 5.1, the interface has been expanded to support exporting and importing on any version. Now, users have better access to their content, so users can act more quickly without the need of intervention.

## CONCLUSION

There are many new features in SAS® Decision Manager 5.1 to help streamline and drive analytics deployment for businesses. Gaining further insights with decision visualization, different options to obtain access to your published processes, advanced verification and testing features, and enhanced governance on lookups are all reason why the latest version of SAS® Decision Manager distinguishes itself from previous releases and can provide even more value than before. Adopting SAS Decision Manager in your adaptation of the analytics lifecycle can return significant dividends with time saved and adaptability.

## ACKNOWLEDGMENTS

The authors of this paper would like to thank the members of the various teams in R&D, Product Management, Marketing, and of course, our customers.

## RECOMMENDED READING

- SAS Institute Inc. 2017. *SAS Decision Manager 5.1: Users Guide*, Cary, NC: SAS Institute Inc. Available <http://support.sas.com/documentation/onlinedoc/edm/index.html>
- SAS Institute Inc. 2017. *SAS Decision Manager 3.2: Users Guide*, Cary, NC: SAS Institute Inc. Available <http://support.sas.com/documentation/onlinedoc/edm/index.html#edm32>.
- SAS Institute Inc. 2017. *SAS Business Rules Manager: 3.2 Users Guide*, Cary, NC: SAS Institute Inc. Available <http://support.sas.com/documentation/onlinedoc/brm/index.html>.
- Sparano, Steve; Charlotte Crain and David Duling. "Introduction to SAS® Decision Manager", *Proceedings of the SAS Global Forum 2014 Conference*. Cary, NC: SAS Institute Inc. Available at <http://support.sas.com/resources/papers/proceedings14/SAS276-2014.pdf>

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