



Mining for Rules – How machine learning helps to identify data quality rules with SAP MDG in SAP S/4HANA

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Andreas Seifried

Product Manager
SAP Master Data Management



SAP SE

Dietmar-Hopp-Allee 16
69190 Walldorf, Germany

E andreas.seifried@sap.com

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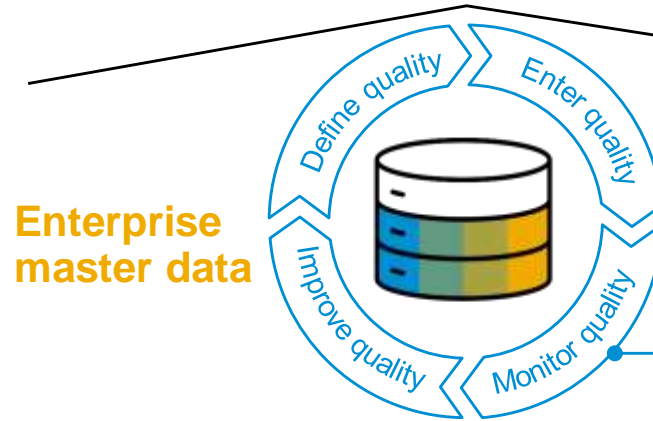
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SAP Master Data Governance on S/4HANA

In the master data management product portfolio



Systems under central governance



SAP Master Data Governance – central governance

Create master data in line with business processes (such as integrated product development or supplier management)

SAP Master Data Governance – data quality management

Manage master data quality by defining, enforcing, monitoring, and improving quality

SAP Master Data Governance – consolidation

Consolidate master data into a single view for accurate analytics and operational insight (continuously or on request, such as for initial load or mergers and acquisitions)

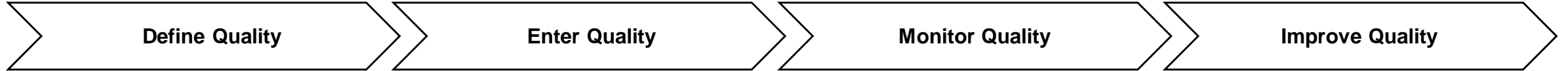
Systems not under central governance



All typical approaches are supported: central governance with distribution, decentralized ownership with consolidation, data quality monitoring with remediation

SAP Master Data Governance, Data Quality Management

Process flow



Requirements are defined based on your company's business processes

Priorities are set according to value, impact, and quality evolution

- ▶ Experts collaborate to define needed quality level and required checks

- ▶ The system helps to identify additional meaningful rules

Rule Mining

Ensure quality at point of entry

Consider all entry-points: single changes, mass changes, load scenarios, in daily business, projects, ...

- ▶ Rule-based checks in all processes of SAP MDG

Operational motivation: detect issues before processes fail

Tactical: ensure progress and performance of current activities

Strategic: enable achievements, define new initiatives

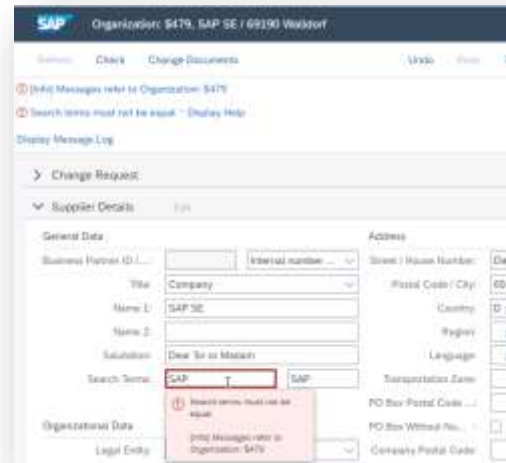
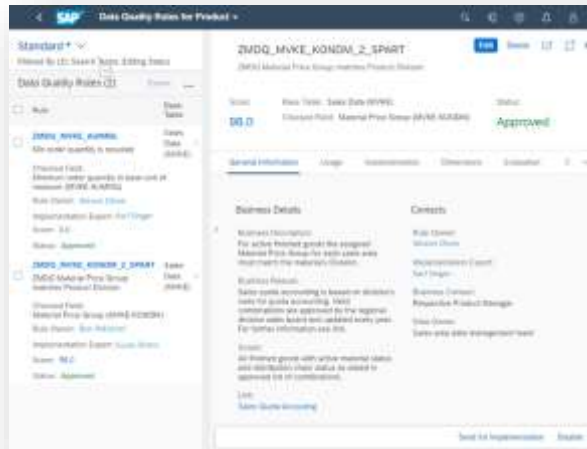
- ▶ Easy to consume monitoring and trend reporting

Correct data and drive the correction process

Fix data entry processes

Evolve the definition of quality

- ▶ Tools to fix data and to improve checks at point of entry



DQM with SAP Master Data Governance – Rule Management

Managing data quality rules in one single place for multiple purposes

Innovations

With SAP S/4HANA you can manage your rules for master data quality in one single place

- Repository to catalog and define data-quality rules
- Comprehensive description of rules, including business aspects, ownership, and rule implementations
- Collaboration and status handling during the lifecycle of rules, from creation to sunset

Business value

- Central place for master data quality rules
- Transparency on business aspects, usages and technical implementations of rules

The screenshot displays the SAP Data Quality Rules for Product interface. The top navigation bar shows the SAP logo and the title 'Data Quality Rules for Product'. Below the navigation bar, there is a filter section with 'Standard' and 'Filtered By (2): Search Terms, Editing Status'. A table lists two data quality rules:

Rule	Base Table
<input type="checkbox"/> ZMDQ_MVKE_AUMNG Min order quantity is required	Sales Data (MVKE)
<input type="checkbox"/> ZMDQ_MVKE_KONDM_2_SPART ZMDQ Material Price Group matches Product Division	Sales Data (MVKE)

The detailed view for the rule 'ZMDQ_MVKE_KONDM_2_SPART' is shown on the right. It includes the following information:

- Score:** 98.0
- Base Table:** Sales Data (MVKE)
- Checked Field:** Material Price Group (MVKE-KONDM)
- Status:** Approved
- Business Description:** For active finished goods the assigned Material Price Group for each sales area must match the material's Division.
- Business Reason:** Sales quota accounting is based on division's rules for quota accounting. Valid combinations are approved by the regional division sales board and updated every year. For further information see link.
- Scope:** All finished goods with active material status and distribution chain status as stated in approved list of combinations.
- Link:** Sales Quota Accounting
- Rule Owner:** Steven Olsen
- Implementation Expert:** Karl Singer
- Business Contact:** Respective Product Manager
- Data Owner:** Sales area data management team

At the bottom right, there are buttons for 'Send for Implementation' and 'Disable'.

DQM with SAP Master Data Governance – Rule Mining

Apply machine learning to discover rules in existing master data

Innovations

With SAP S/4HANA you can use rule mining to discover rules in existing master data

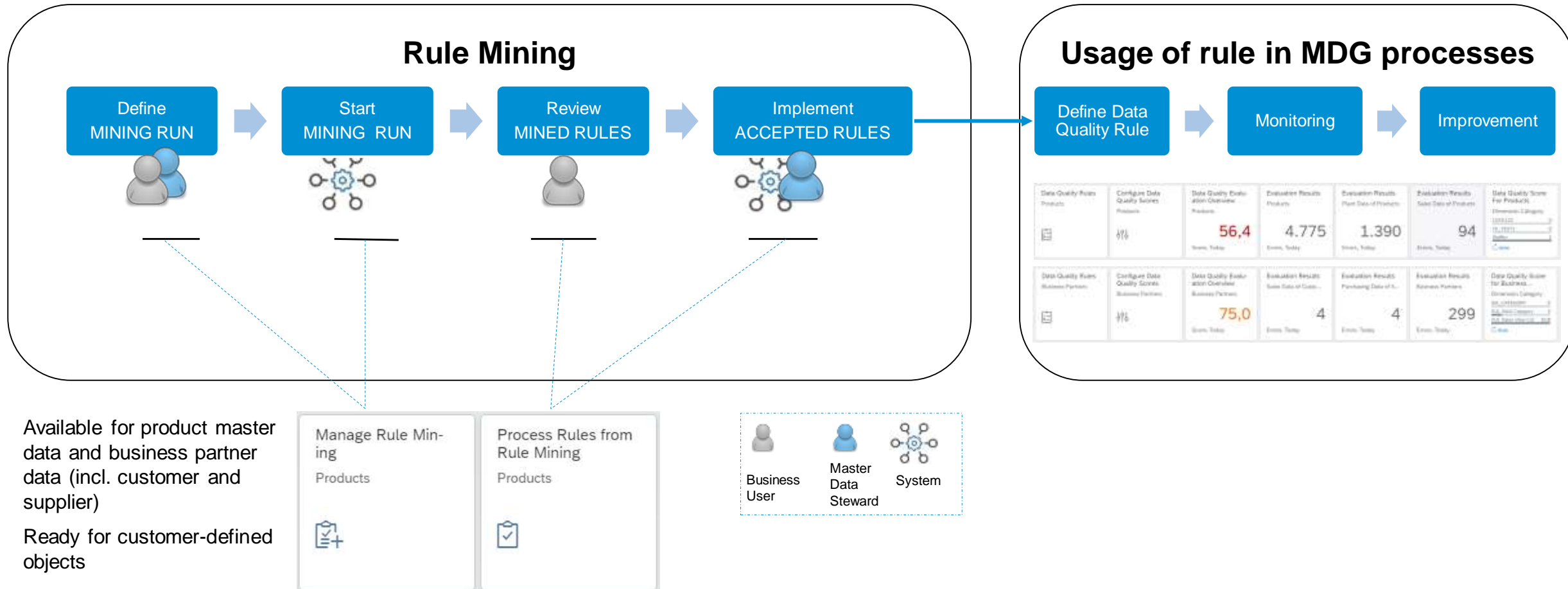
- Use mining runs to analyze existing master data
- Collaboratively decide on business relevancy of proposed rules from rule mining
- Create and link data quality rule from accepted rules
- Information from rule mining used in implementation of data quality rule

Business value

- Ease and shorten the discovery of rules with machine learning
- Efficiently qualify and implement discovered rules as data quality rules

The screenshot displays the SAP Mining Run interface. At the top, it shows 'Mining Rules for MRP Data' with 122 rules. The status is 'Completed', with 100 total rules, 3 accepted rules, and 0 set to review. A green notification bar states 'Mining run successfully completed. Details'. Below this, a goal is defined: 'Workshop planned next week for Production Planning efficiency. Master Data Owner and Steward need to give proposal how to make quality better. Let's see any proposal from system by joining product header and plant data together.' The 'Tables' section shows 'Selected Tables (2)' including 'Basic Data' and 'MARA'. A table lists mining results with columns for Focus Area, Data Evaluation, Checked Field, and Checked Field Value. A row shows 'Material type = FERT, Plant = 0001' with a 52.2% success rate and a 47.3% failure rate. A context menu is open over the 'Link' button, offering options: 'Link to New Data Quality Rule', 'Link to Existing Data Quality Rule', and 'Remove Link'. The rule is marked as 'Accepted'.

Master Data Rule Mining Process



Define Mining Run

The mining run defines the data to analyze and the fields to consider for rules.

- Goal – describes the purpose of the mining run
- Tables – list of tables that provide the data to be analyzed
 - Focus Area – filters to be applied to restrict the data to be analyzed.
For example, *Product Type = Finished Goods (FERT)*
 - Fields – fields to be considered for proposed rules
 - Condition of Rule: the IF part of the rule.
 - Checked by Rule: the THEN part of the rule.
- Parameters
 - Maximum Number of Rules: top N best rules proposed by the system

Discovering rules for MRP Data

193

General

Goal:

Data Quality Camping workshop is scheduled in Sep, propose rules from system how to improve data consistence definition for MRP

Tables

Selected Tables (2)

Table
<input type="checkbox"/> Table
<input checked="" type="checkbox"/> Basic Data (MARA)
<input type="checkbox"/> Plant Data (MARC)

Parameters

Maximum Number of Rules: 100

Administrative Data

Save Cancel

Basic Data MARA

Focus Area Fields

Filters (1)

Table	Field	Operator	Value
<input type="checkbox"/> Basic Data (MARA)	Material type (MTART)	is	FERT

Fields

Selected Fields (2)

Table	Field	Condition of Rule	Checked by Rule
<input checked="" type="checkbox"/> Basic Data (MARA)	Material Group (MATKL)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> Basic Data (MARA)	Base Unit of Measure (MEINS)	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Apply

Review Mined Rules

Collaboratively decide on the business relevancy of the proposed rules

- Review the rule from business perspective
- Bring expertise from others, e.g. via CoPilot
- Data Evaluation indicates the fit of proposed rules to actual data
- Accept the rule to proceed with
- Reject or delete the rules that are not relevant

ID	Description	Technical Focus Area	Data Evaluation	Checked Field	Checked Field Value	Status	Linked Data Quality Rule
25	IF Batch management indicator (internal) = X AND MRP Type = PD THEN MRP Controller = 001	MARA-MTART = FERT	86.5%	MRP Controller (DISPO)	001	In Review	
1436	IF MRP Type = M0 THEN MRP Controller = 001	MARA-MTART = FERT	86.7%	MRP Controller (DISPO)	001	In Review	
1437	IF MRP Group = 0000 THEN MRP Controller = 001	MARA-MTART = FERT	81.3%	MRP Controller (DISPO)	001	In Review	
26	IF Batch Management Requirement Indicator for Plant = X AND MRP Type = PD THEN MRP Controller = 001	MARA-MTART = FERT	86.5%	MRP Controller (DISPO)	001	Initial	

Rule Description

IF MRP Group = In-hse prod. w/o indpt reqts (initial) AND MRP Type = MRP, fixing type -1 THEN MRP Controller = 001

MARA-MTART = FERT | MRP Controller (DISPO) 001

Data Evaluation

- Violates Rule: 1 (0.8%)
- Complies with Rule: 16 (12.7%)
- Not Relevant: 109 (86.5%)
- Evaluated On: 08.05.2019, 12:02:08

Review system proposed rules

Review system proposed rules

- IF Batch management indicator (intern... Mined Rule 25
- IF MRP Type = M0 THEN MRP Control... Mined Rule 1436
- IF MRP Group = 0000 THEN MRP Com... Mined Rule 1437

Hi Bing!, can you please have to review the above rules?

Implement Accepted Rules

Enable a new data quality rule in just a few clicks.

- Create a new data quality rule with *Link to New Data Quality Rule*
- Or: complement existing data quality rule
- Multiple accepted rules can be merged into one data quality rule
- Automatic rule implementation considers information from mined rules (fields, values)

The process is shown through several SAP screenshots:

- Rules List:** A screenshot of the 'Process Rules from Master Data Rule Mining for Product' interface. A rule is selected, and the 'Link to New Rule' option is highlighted in a blue box.
- Link Dialog:** A 'Link to New Data Quality Rule' dialog box is shown. The ID 'MRPCTR_CHECK01' and description 'Check MRP Controllers 01' are entered.
- Linked Rules Table:** A table showing the relationship between mined rules and the new data quality rule. The 'Linked Data Quality Rule' column lists 'MRPCTR_CHECK01' for multiple entries.
- Data Quality Rule Configuration:** A screenshot of the 'Data Quality Rule' configuration page for 'MRPCTR_CHECK01'. The 'Usage' section shows 'Data Quality Evaluation' selected, and the 'Prepare' button is highlighted.
- Implementation:** A screenshot of the 'Implementation' section, where the 'Approve' button is highlighted.
- Decision Table:** A screenshot of the 'Decision Table' configuration for 'MRPCTR_CHECK01_CDT', showing the logic derived from the linked rules.
- Rules from Rule Mining:** A final screenshot showing the 'Rules from Rule Mining' section, listing the original rules that were linked to the data quality rule.

Demo

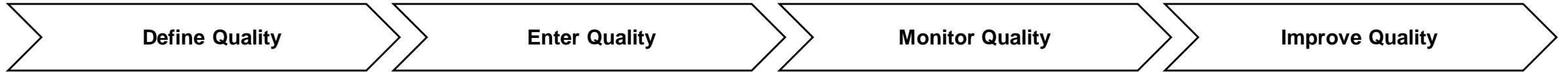
Mining for Rules - Apply Machine Learning to Identify Data Quality Rules

ID	Description	Focus Area	Data Evaluation	Checked Field	Checked Field Value	Status	Linked Data Quality Rule
20 97	IF MRP Type = ND THEN Lot Sizing Procedure within Materials Planning = EX	Material type = FERT, Plant = 0001	77.3%	Lot Sizing Procedure within Materials Planning (DISLS)	EX	Rejected	
20 80	IF MRP Type = M0 THEN Lot Sizing Procedure within Materials Planning = EX	Material type = FERT, Plant = 0001	91.0%	Lot Sizing Procedure within Materials Planning (DISLS)	EX	Accepted	lot size rule (MRP_LOT_SIZE)
20 81	IF MRP Group = 0000 THEN Lot Sizing Procedure within Materials Planning = EX	Material type = FERT, Plant = 0001	64.8%	Lot Sizing Procedure within Materials Planning (DISLS)	EX	Initial	
20 82	IF MRP Group = 0000 AND MRP Type = M0 THEN Lot Sizing Procedure within Materials Planning = EX	Material type = FERT, Plant = 0001	95.7%	Lot Sizing Procedure within Materials Planning (DISLS)	EX	Initial	
20 96	IF MRP Type = ND THEN Lot Sizing Procedure within Materials Planning = FX	Material type = FERT, Plant = 0001	82.8%	Lot Sizing Procedure within Materials Planning (DISLS)	FX	Initial	
20 83	IF MRP Type = PD THEN Lot Sizing Procedure within Materials Planning = EX	Material type = FERT, Plant = 0001	88.4%	Lot Sizing Procedure within Materials Planning (DISLS)	EX	Accepted	lot size rule (MRP_LOT_SIZE)
20 84	IF MRP Type = M2 THEN Lot Sizing Procedure within Materials Planning = EX	Material type = FERT, Plant = 0001	98.0%	Lot Sizing Procedure within Materials Planning (DISLS)	FX	Accepted	lot size rule (MRP_LOT_SIZE)

SAP Master Data Governance on SAP S/4HANA 1909

SAP Master Data Governance, Data Quality Management

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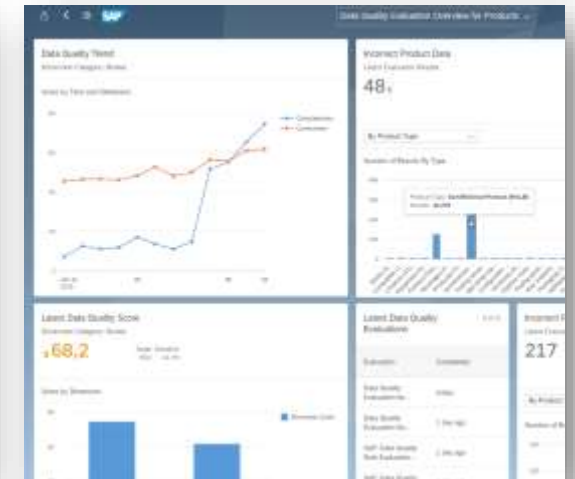
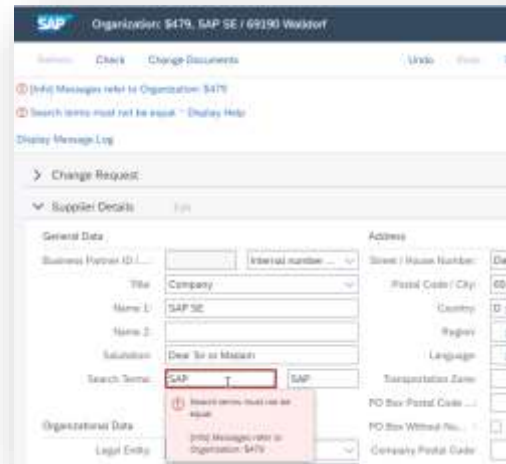
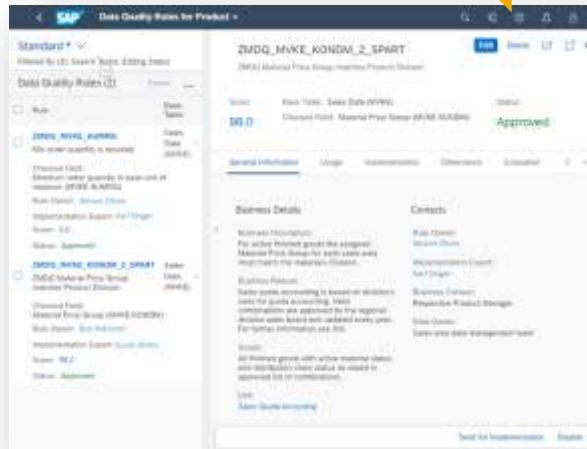
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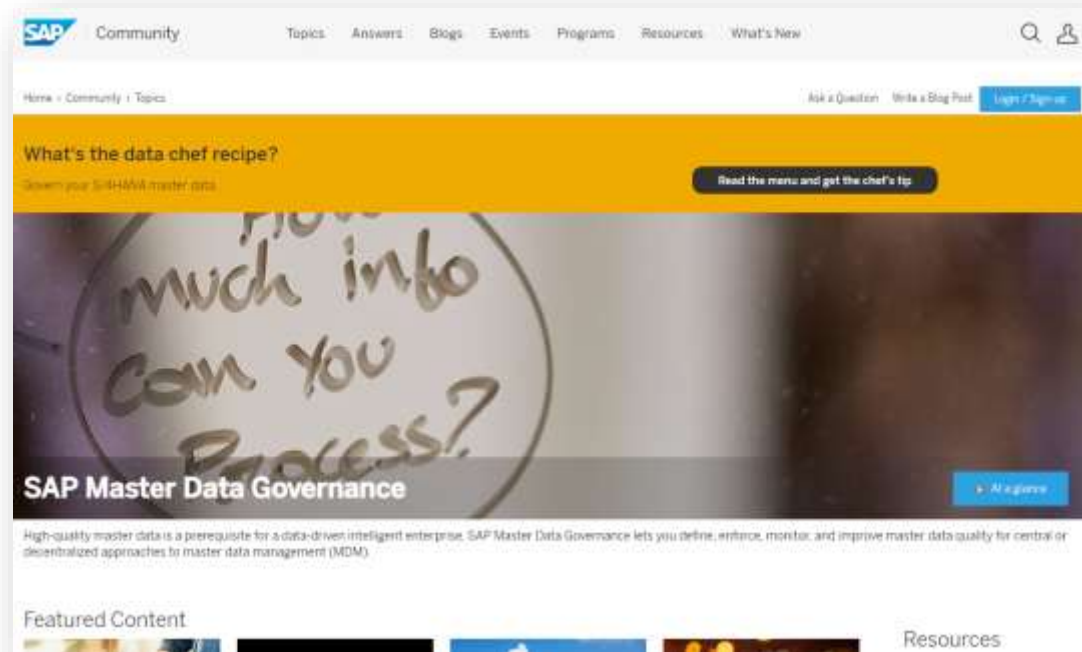
- ▶ Tools to fix data and to improve checks at point of entry



Summary

- Rule mining helps to discover data quality rules with machine learning
- Efficiently qualify and implement discovered rules as data quality rules
- Integrated in master data quality management of SAP Master Data Governance
- Delivered with SAP S/4HANA 1909 – no further components or installations required
- Included in the license for SAP Master Data Governance

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<https://answers.sap.com/tags/67837800100800004488>

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Community <https://www.sap.com/community/topics/master-data-governance.html>

Blogs <https://blogs.sap.com/tag/mdgdqm/>

Thank you!

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