



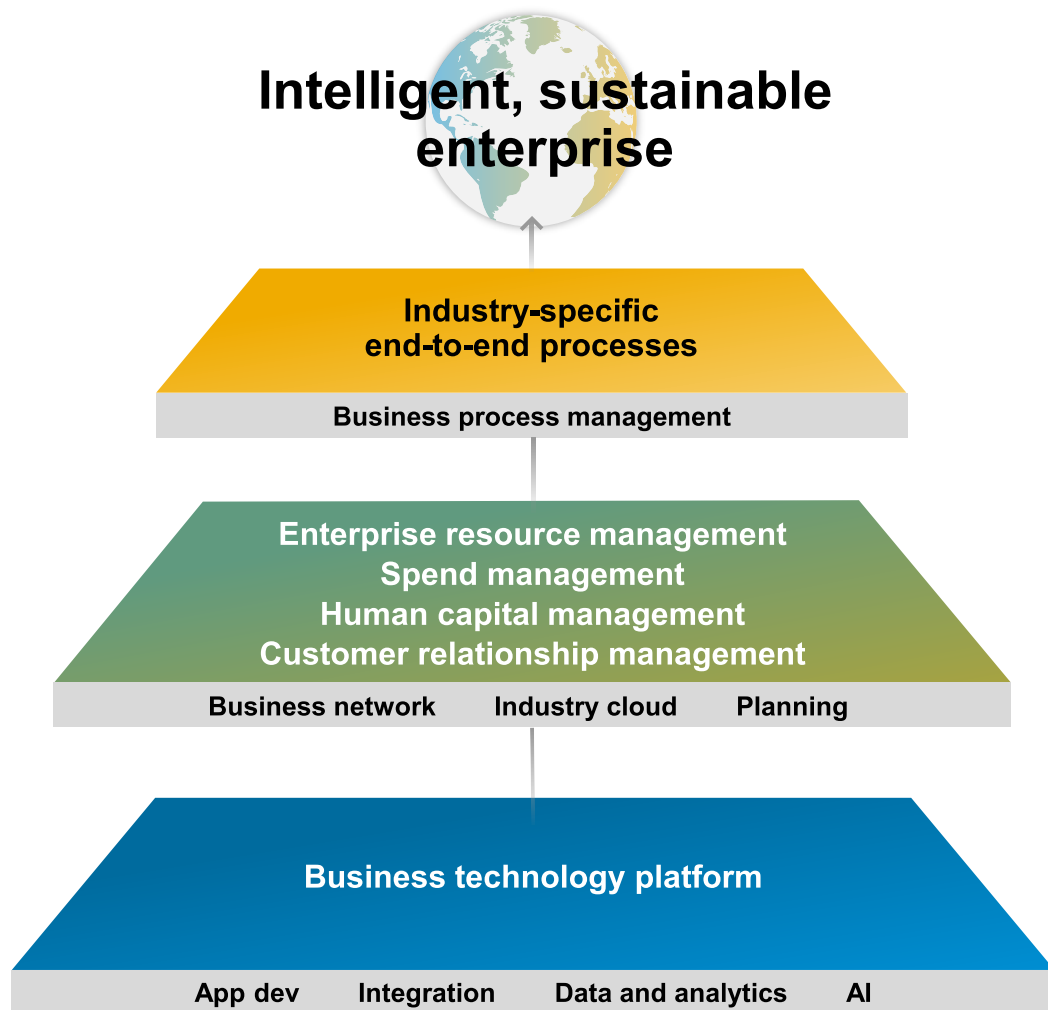
SAP BTP – AI Business Services for Master Data

Andreas Kerger, SAP
June 01, 2022

Public



SAP Business Technology Platform



Our Mission:
Enable every enterprise
to become an **intelligent,
sustainable enterprise**

SAP Business Technology Platform - The Base of Intelligent Technologies

Intelligent, sustainable
enterprise

Industry-specific
end-to-end processes

Business process management

Enterprise resource management
Spend management
Human capital management
Customer relationship management

Business network Industry cloud Planning

Business technology platform

App dev Integration Data and analytics AI

Migrate and maintain relevant data, deliver trusted master data, and keep the core clean by decoupling custom code

Integrate, optimize, and automate processes with 2,000+ prebuilt integrations and comprehensive tools

Innovate to gain a sustained competitive advantage with high value SAP BTP solutions including analytics and intelligent technologies embedded in SAP S/4HANA

Database & Data Management

- Data Storage
- Data Processing
- Data Integration
- Data Orchestration
- Information Governance
- Master Data Management

Analytics

- Business Intelligence
- Augmented Analytics
- Predictive Analytics
- Collaborative Planning
- Data Warehousing

Apps Dev. & Integration

- Integration
- Extensibility
- Business Process Optimization
- Business Services
- User Experience

Intelligent Technologies

- SAP Process Automation
- SAP Conversational AI
- SAP AI Business Services
- ...

SAP AI Business Services help deliver the Intelligent Enterprise

SAP AI Business Services are **reusable** services based on AI that directly **solve business problems**

- ✓ They facilitate use of **Artificial Intelligence** to solve business problems, optimize business processes & make them intelligent.
- ✓ They are **easy to consume** using **REST APIs**.
- ✓ They help **extend any business process** or **application** with lowest total cost of ownership.

Business outcomes



Faster time-to-value



Reimagined processes



Quality time at work

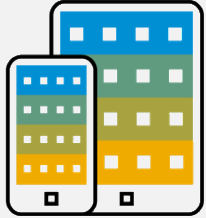


Customer satisfaction



Enabling innovations

Optimize Existing Processes with SAP AI Business Services



[SAP AI Business Services](#) provide strategic machine learning capabilities that help you automate and optimize processes while enriching the customer experience. These reusable services are available on SAP Business Technology Platform.

Business document processing



Business Entity Recognition

Detects and highlights named entities in unstructured text



Document Information Extraction

Automatically extracts information from unstructured documents



Document Classification

Classifies unstructured documents



Personalized Recommendation

Provides product recommendations and improved search results in web shop scenarios



Data Attribute Recommendation

Automates creation, maintenance, and management of structured data
Invoice Object Recommendation now integrated

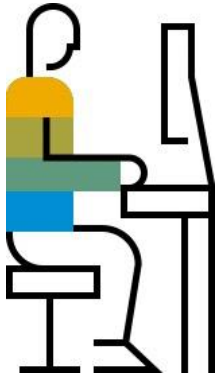


Service Ticket Intelligence

Classifies and recommends tickets automatically

Available via CPEA and SAP Store

Business Challenge - Matching Information done Manually

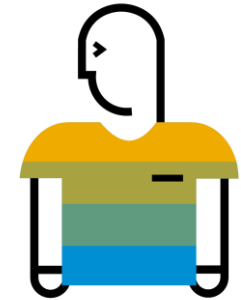


Bob,
Master Data
Team

Material Table

Description	Manufacturer	Price	Category	Subcategory
1875 W Conair Hair Dryer	Conair	19.99	Health, Fitness & Beauty	Personal Care & Beauty
40x to 1000x - LED Illumination - Monocular Head	Celestron	369.99	Cameras & Camcorders	Binoculars, Telescopes & Optics
Amazons 6" Paperwhite display	Amazon	289.99	Computers & Tablets	E-Readers & Accessories
Yellow - Laser - 1500 Page - 1 Each	Brother	50.99	Connected Home & Housewares	Office & School Supplies
Take the fight to the next level	Activision	19.99	Video Games	Xbox 360
Compatible with select electronic devices	alkaline chemistry	7.99	Connected Home & Housewares	Housewares
From our expanded online assortment; compatible with most 1989-2000 Ford, Lincoln and Mercury vehicles	Metra	16.99	Car Electronics & GPS	Car Installation Parts & Accessories

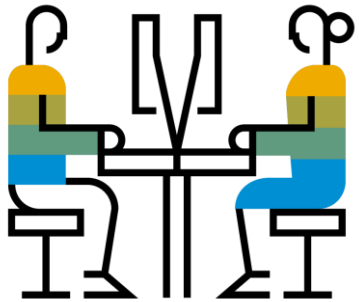
Manual
matching
and
insertion of
information



Bob,
spends much time
on repetitive
tasks



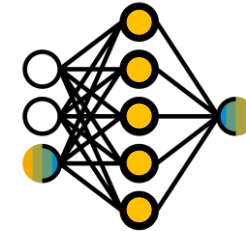
AI Approach - Train a model with historical / labelled data



Material Table

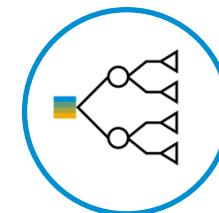
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Training data

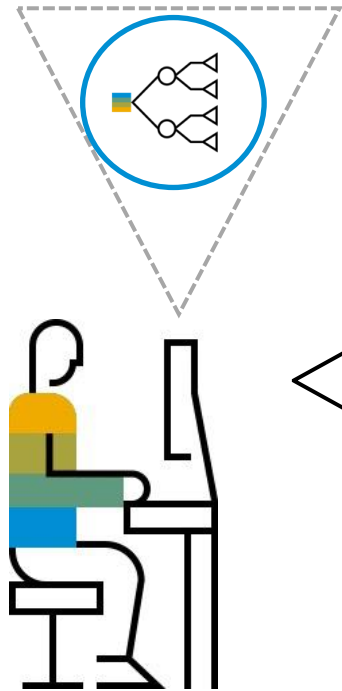


Data Attribute Recommendation

model trained



Solution – Automation with Data Attribute Recommendation

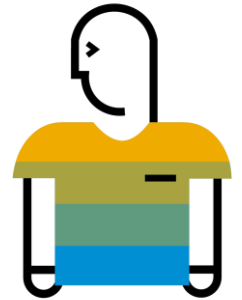


Bob,
Master Data
Team

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Predictions
for
customer
specific
fields

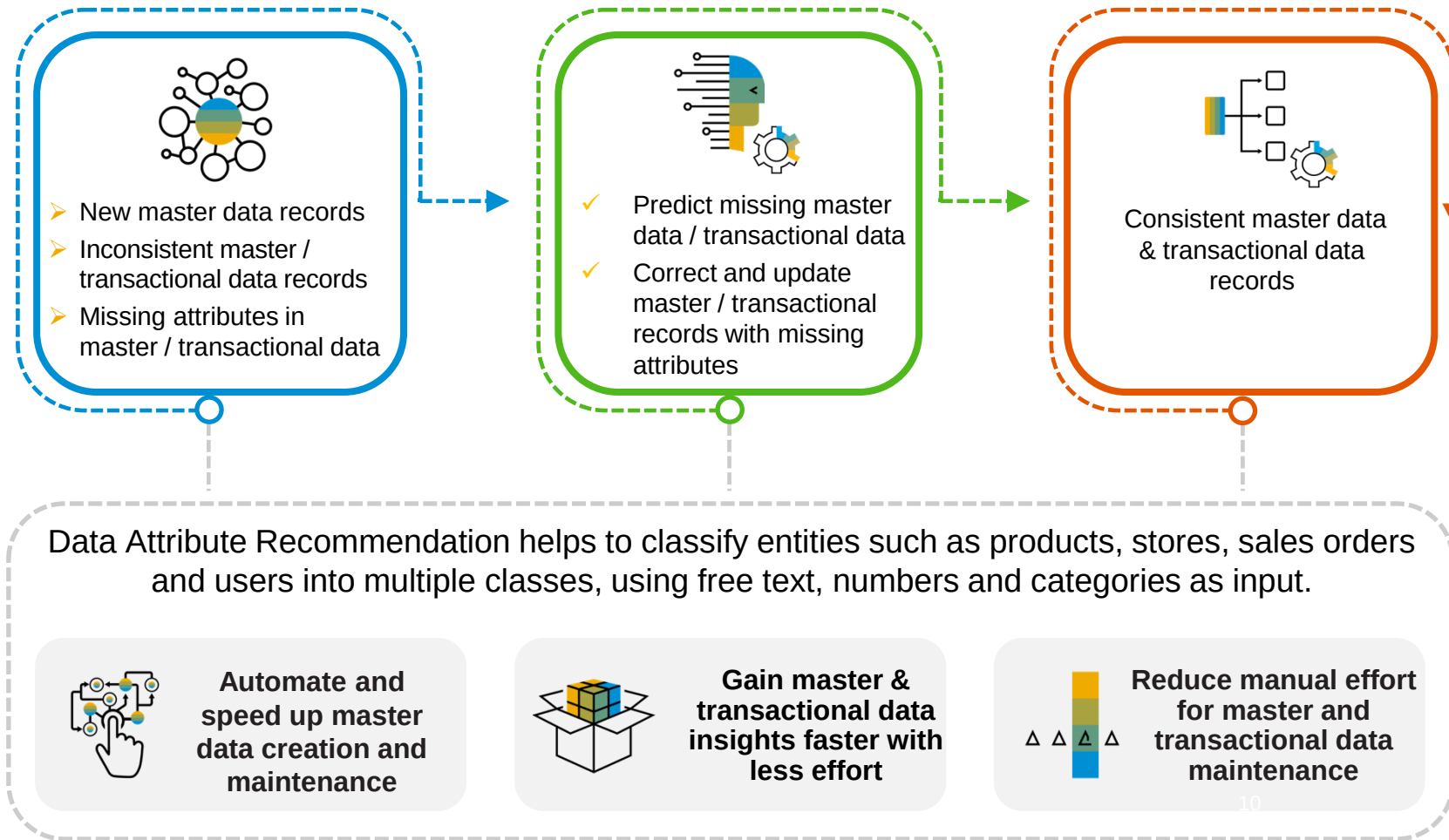


Bob,
Can now do more
value creative
tasks

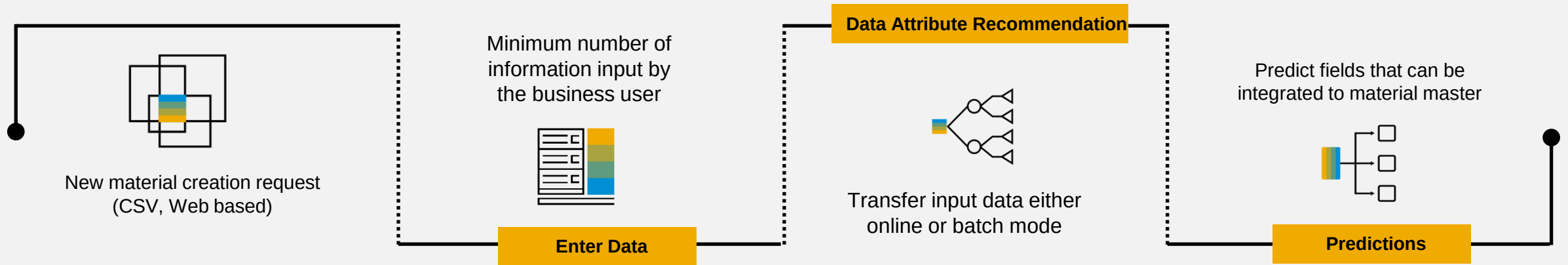


Data Attribute Recommendation

Automate master data & transactional data management tasks



Automatic Prediction of missing Master Data fields for New Product Introduction



Business Challenge

- Constant new product release to the market
- **Lack of holistic view** of the master data needed by **different business functions**
- **Inconsistent representation** of master data across the entire organization



Solution

Data Attribute Recommendation

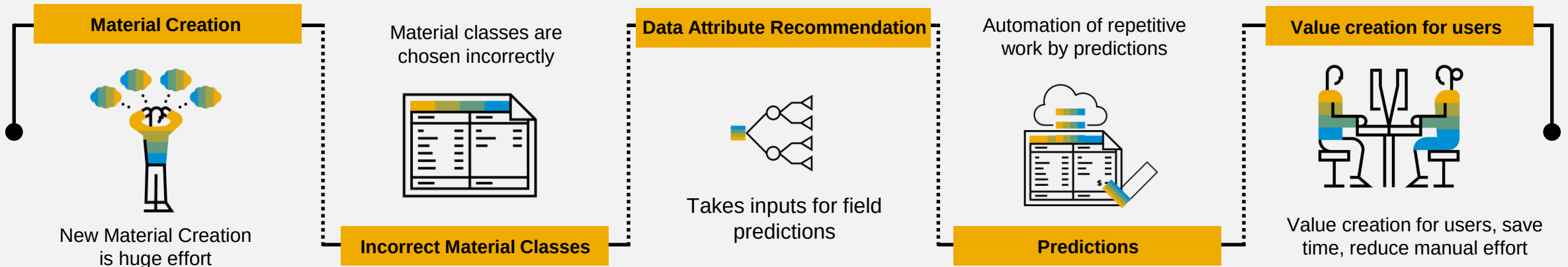
- Provides master data field prediction to the business user
- **Retrainable Machine learning** models that can be retrained at frequent intervals
- Can be used for business partner maintenance, work center and asset maintenance, custom field **value prediction**



Benefits and Value

- ✓ **Reducing** the manual maintenance and verification
- ✓ **One voice of master data** across the organization
- ✓ **Improve quality of master data** to facilitate more efficient planning and execution

Inbound Master Data Replication and Prediction (3rd party PLM integration)



Business Challenge

Creating new material requests:

- Big, time consuming effort
- **Many requests coming back** due to incorrectly chosen material class
- **Multiple material code** created for the same part in Retail and Fashion leading to overstocking



Solution

Data Attribute Recommendation:

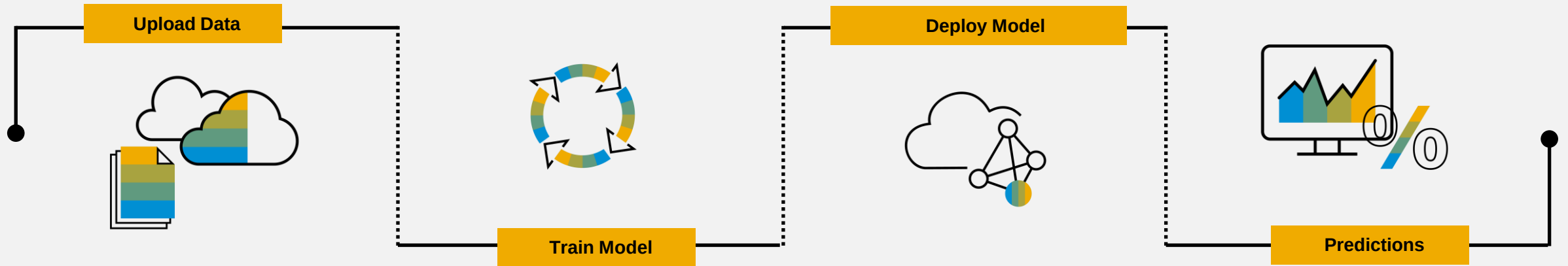
- ✓ Can be used for a **prediction performance**: bulk and individual classifications of materials and its characteristics are done online
- ✓ **Enables intelligent master data governance** at companies struggling with the creation of new material requests



Benefits and Value

- ✓ **Acceleration** of the process
- ✓ Reduction of more **than 20% of the effort** for new material creation
- ✓ **Automation** of the repetitive work and use labor hours on high value tasks

Data Attribute Recommendation Data Flow



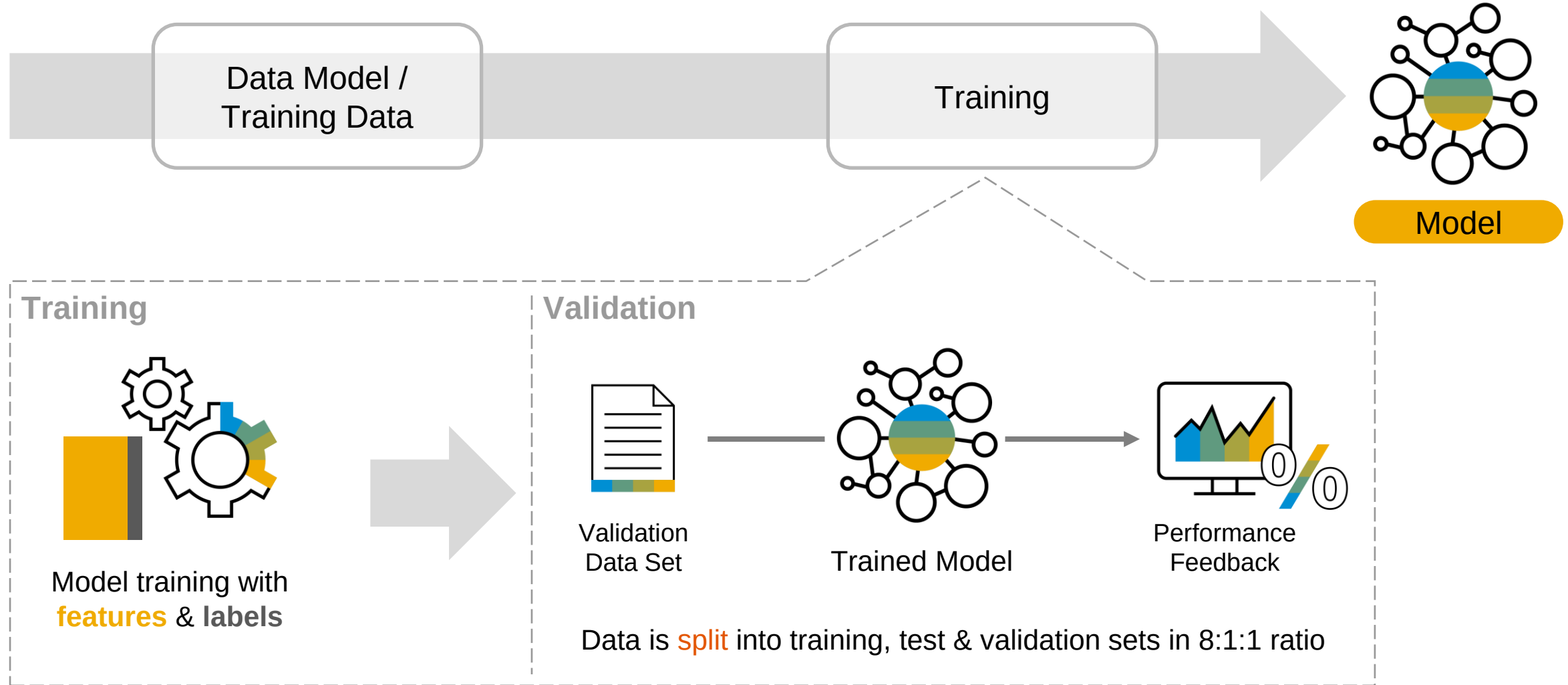
- ✓ Upload training data set via data set schema
- ✓ Training Data is saved in object storage

- ✓ Training Data is sent to Data Attribute Recommendation for validation
- ✓ Trained model is saved in the model repository

- ✓ Activate trained model for prediction
- ✓ Deactivate model when necessary

- ✓ Provide data for classification
- ✓ Validate provided data via Data Attribute Recommendation

Model training



Sample Use Case

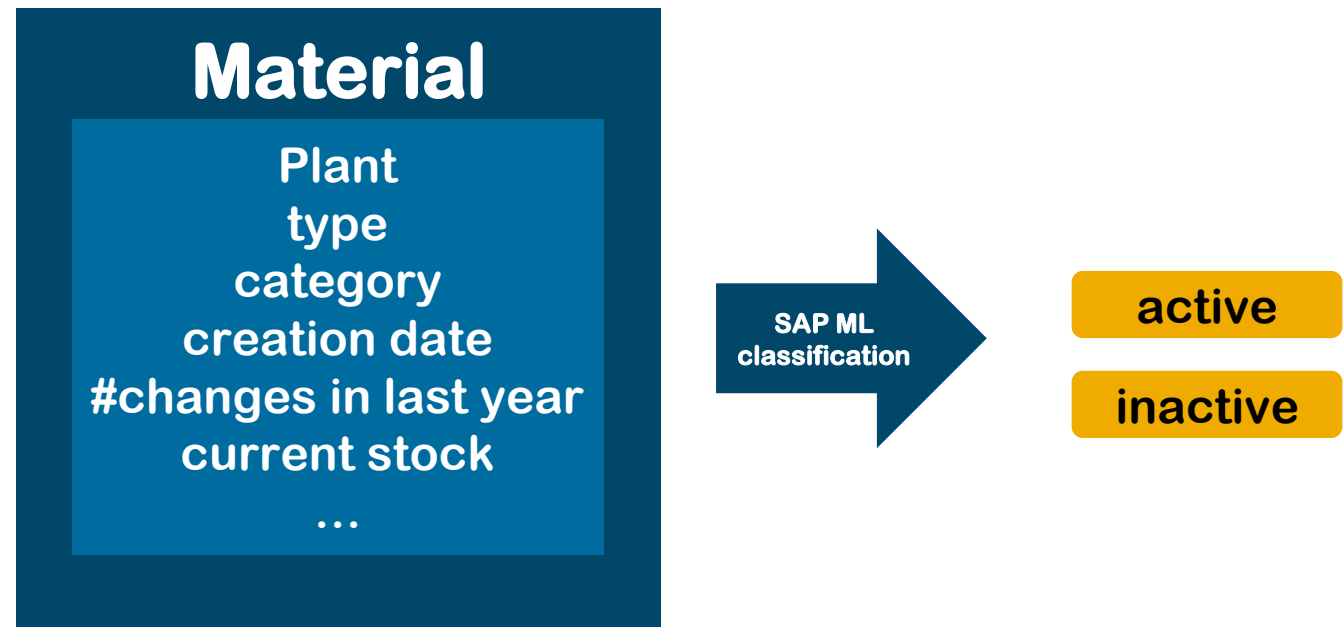
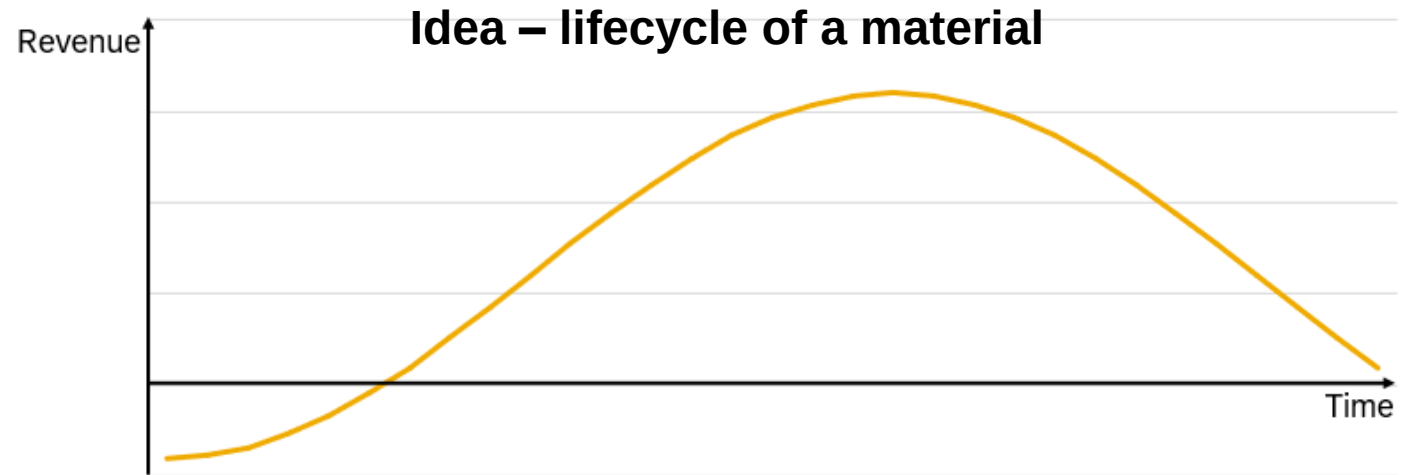
Use Case – Material Status

Material master data (example figures):

- 500k materials (MARA)
- 1200k plant-specific material data (S032)

Many of those materials are no longer used and should be deleted/blocked.

- Customers might order “no longer available” material
- Maintenance of outdated material is an unnecessary effort
- Cleaning up master data increase data quality for other follow-up ML projects



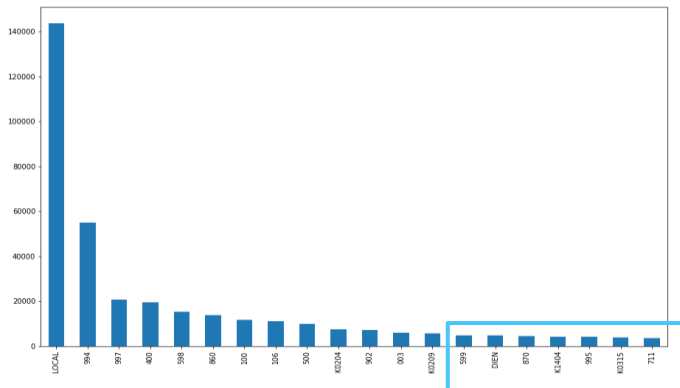
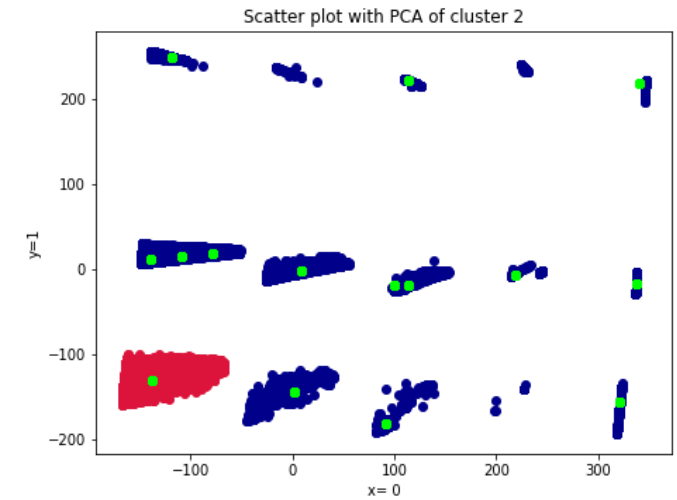
Data Analysis

Data Sources:

- MARA
- MARC
- S032
- Custom views to aggregate the number of changes for various time periods.
- In addition, many derived features were added

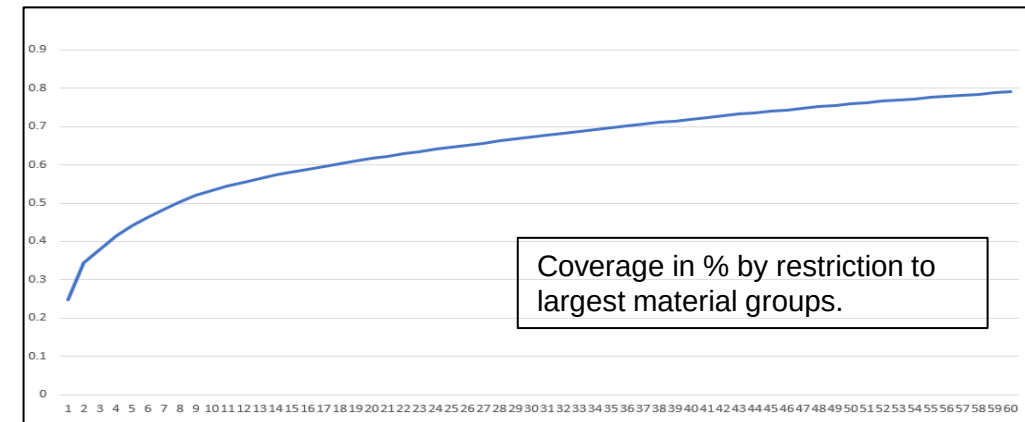
Clustering to find important features.

Careful: Clustering uses no input of the business problem and might give a wrong hint.

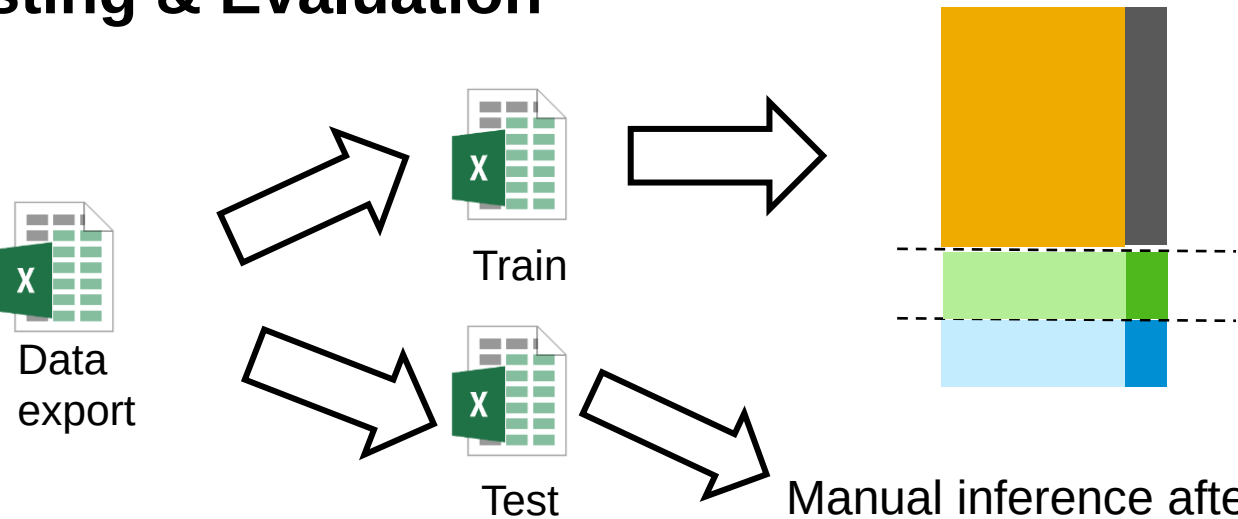


Data distribution – what is over/underrepresented?

Can we **group** rare material types or even exclude them?



Testing & Evaluation



Used to train the ML algorithm.

Split into train, test, validation sets.

Manual inference after training:

Manual inference induces cost to our customer.
Don't do this for every iteration.

Key	Input dimensions/features															Label	Conf.	Correct
7.3399.00000	FERT	0	51	6	51	45	1	0	51	51	247	51	0	0	4	N	0.98154	1
1.3919.00000	EINF	0	42	1	42	41	1	2	40	38	40	38	0	0	6	N	0.98793	1
1.9019.00000	FERT	0	53	6	47	47	1	0	52	52	247	52	0	0	6	N	0.98154	1
1.4010.0	EINK	0	57	19	247	38	1	9	49	40	48	40	0	0	3	N	0.97302	1
7.6040.1	ELKA	0	23	1	8	22	100	0	0	0	0	0	2	4	21	A	0.99988	0
1.3801.00000	FERT	0	37	1	19	36	1	0	34	34	34	34	1	1	19	N	0.98286	1
20000011	EINF	0	21	0	21	21	100	0	18	18	18	18	0	0	57	N	0.50933	0
9.4017.0	HAWA	0	57	0	14	57	1	1	1	0	0	0	3	5	44	A	0.99972	1
6.1100.0	EINF	0	57	1	28	57	100	0	30	29	29	29	0	0	35	N	0.91751	1
9.4001.00000	HAWA	0	45	14	247	32	1	0	247	247	247	247	0	0	7	N	0.96922	0
1.7801.00000	FERT	0	49	6	49	43	1	0	48	48	48	48	0	0	4	N	0.99001	1
200017	EINK	0	53	25	247	28	1	0	247	247	247	247	0	0	3	N	0.96752	1
1.3000.20000	HALB	0	57	11	45	46	1	3	47	44	44	44	0	0	9	N	0.99122	1
1.7721.00000	FERT	0	57	28	44	29	1	0	247	247	247	247	0	0	5	N	0.98015	1
1.3000.20000	FERT	0	57	28	44	29	1	0	56	56	247	56	0	0	5	N	0.98015	0
1.3000.20000	FERT	0	57	28	44	29	1	0	56	56	247	56	0	0	5	N	0.98015	0

Result

Reported by the AI Business Service – Data Attribute Recommendation

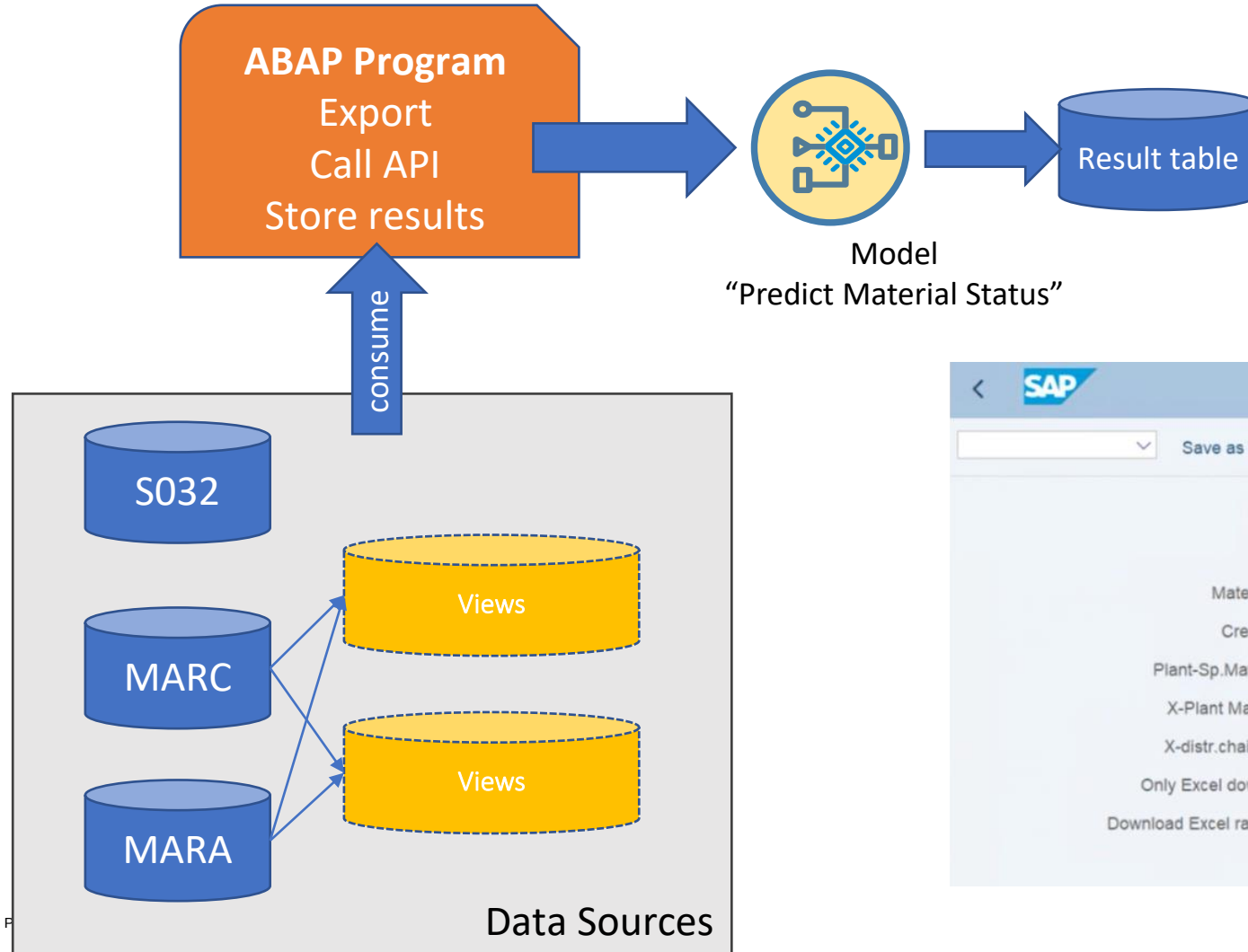
```
"validationResult": {  
  "accuracy": 0.9882,  
  "f1Score": 0.9880748544645447,  
  "precision": 0.9881287913982822,  
  "recall": 0.9882  
}
```

Confusion Matrix for separate test set with 5718 entries.

	True Active	True Inactive
Pred Active	699	155
Pred Inactive	30	4834
	95.9%	96.9%

Integration 1/2

A custom report can be scheduled to call the API endpoint and store the AI prediction into a separate result table.



The screenshot shows the SAP Material Status report interface. At the top, there is a search bar and buttons for "Save as Variant..." and "More". Below this, there are several input fields for search criteria: "Material:", "Plant:", "Material type:", "Created On:", "Plant-Sp.Matl Status:", "X-Plant Mat.Status:", and "X-distr.chain status:". Each field has a corresponding "to:" field for date ranges. To the right of each "to:" field is a small icon for selecting a date. At the bottom, there are two checkboxes: "Only Excel download:" and "Download Excel raw data:". A mouse cursor is visible near the bottom right.

Integration 2/3

If an inactive material was detected with high confidence, it can be deactivated automatically. If the confidence is low, it will appear in a report where the user can decide to deactivate the material or ignore the prediction.

MatArt	Material	Materialkurztext	MatStatus	St	Erstellt am	Werk	MS	Progn.	% Sicherh
		Sicherungsring Bohrung 50x2 eckig						N	0.984
		Sicherungsring Bohrung 50x2 eckig						N	0.984
		Sicherungsring Bohrung 50x2 eckig						N	0.515
		Spannstift 8,0x 80-A						N	0.982
		Spannstift 8,0x 80-A						N	0.687
		Sechskantschraube M6x16						N	0.984
		Sechskantschraube M6x16						N	0.532
		Sechskantschraube M6x16						N	0.911
		Sechskantschraube M6x16						A	0.561
		Sechskantschraube M6x16						N	0.536
		Sechskantschraube M6x16						N	0.952
		Sechskantschraube M6x16						N	0.984
		Sechskantschraube M6x16						N	0.713
		Sechskantschraube M8x140						N	0.984
		Sechskantschraube M8x140						A	0.579
		Sechskantschraube M8x140						N	0.902
		Sechskantschraube M8x140						N	0.525
		Sechskantschraube M8x140						A	0.668
		Sechskantschraube M8x140						A	0.605
		Sechskantschraube M8x140						A	0.579
		Sechskantschraube M5x16						N	0.980
		Sechskantschraube M5x16						A	0.661
		Sechskantschraube M5x16						N	0.516
		Zylinderschraube M5x8						N	0.984
		Zylinderschraube M5x8						A	0.557
		Zylinderschraube M5x8						A	0.716

Prediction:

- A active
- N not active

Confidence:

- Numerical representation how reliable the prediction might be.



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SAP Cloud Success Services – DTS

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