Leveraging SAP S/4HANA AI + ML capabilities to solve real world business challenges

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April 2022

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Agenda

1 **The Goal**
What are some Keys to Achieving an Intelligent Enterprise?

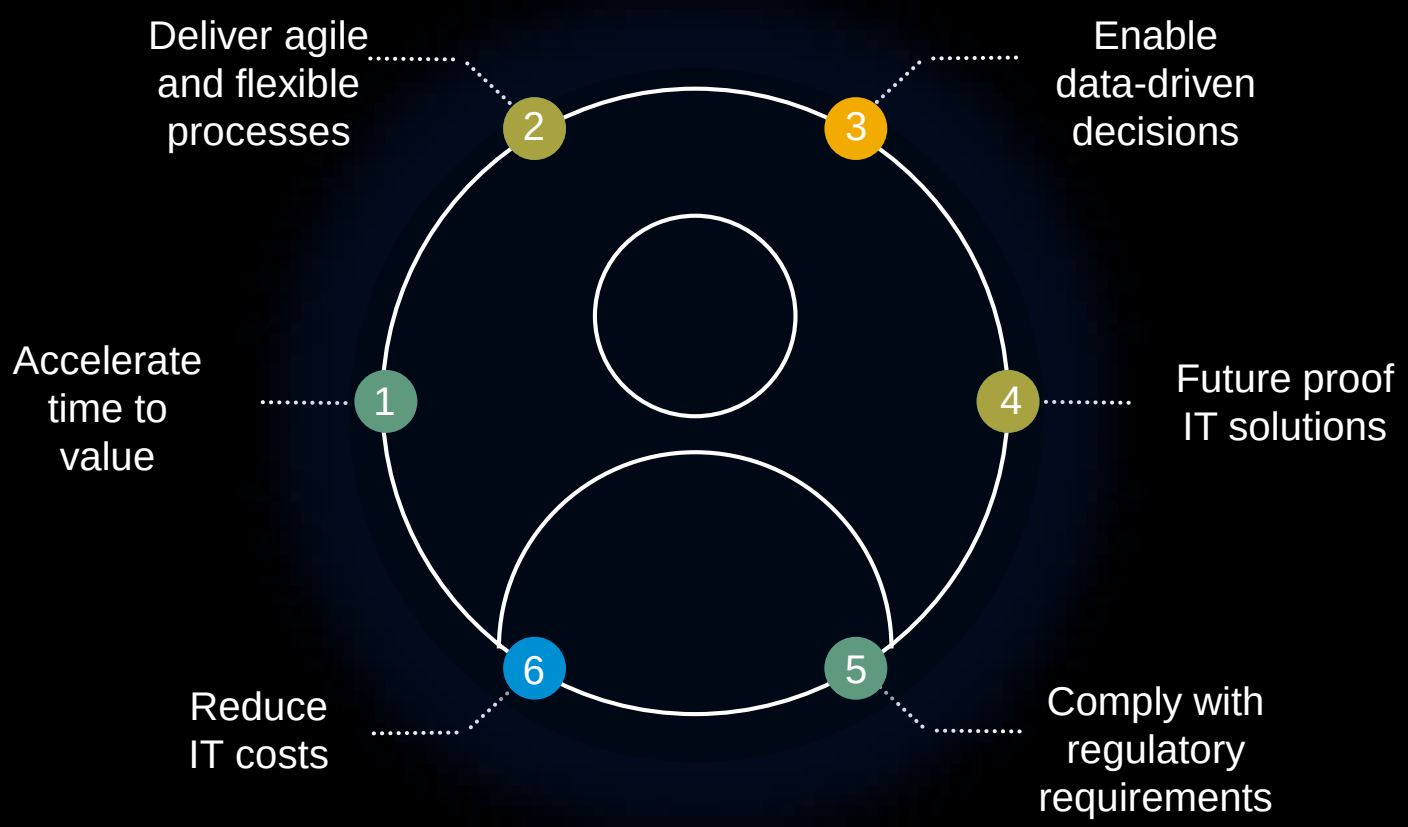
2 **A New Way of Thinking**
Solving Business Problems in a New Way with Machine Learning

3 **Intelligent ERP**
Prebuilt Embedded Machine Learning

4 **Operationalizing the Intelligent Enterprise**
Intelligent Scenario Lifecycle Management (ISLM)

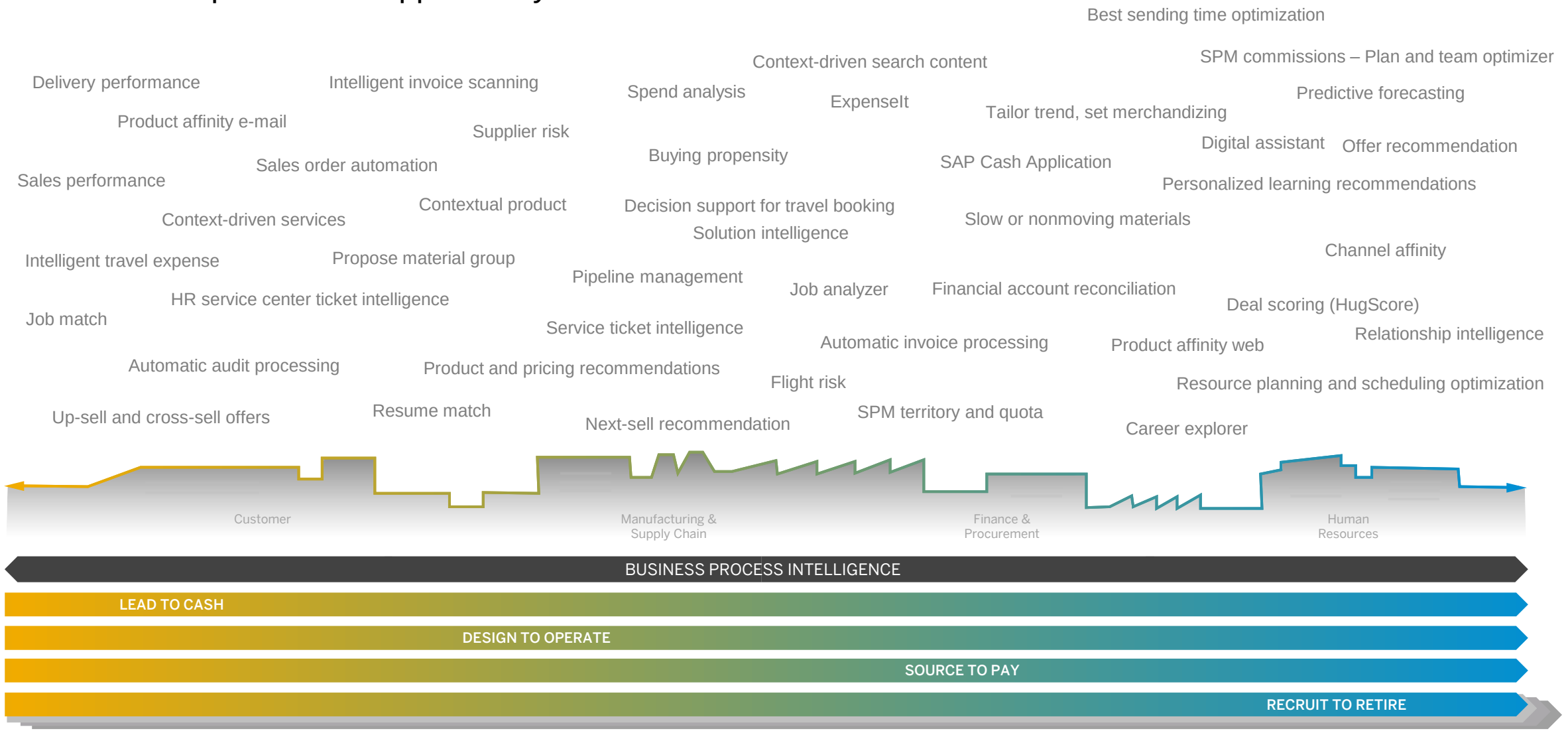
Priorities for an intelligent enterprise

The goal



Enterprise artificial intelligence

AI in business processes supported by SAP software



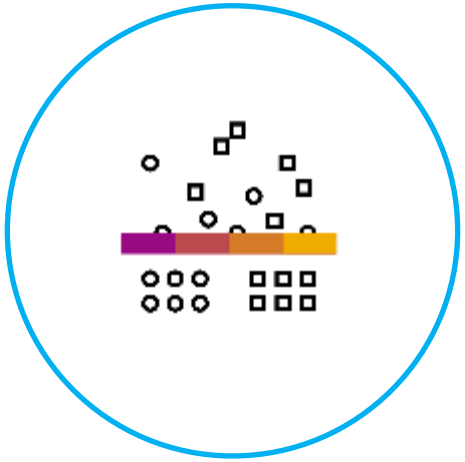
* Selection of available scenarios with embedded artificial intelligence

A New Way of Thinking

Solving Business Problems in a New Way with Machine Learning

Framing Up the Business Problem

Smart Predict & Smart Discovery Use Cases



Classification

Who will churn, commit fraud, or buy next week/next month?

Regression

How many products will a customer buy next month/next quarter? What is influencing Units Sold?

Forecasting

How much will be the monthly revenue or number of churners next year?

Employee Retention

The business challenge: Retain top talents

- Talent turnover can impact negatively the performance of any organization
- To hire and ramp up new employees cost between 90 to 200% of the departed employee's salary

The solution: SAP Analytics Cloud lets HR optimize the talent retention strategy and hiring plans

- Uncover more insights into what is causing employees to leave the company
- Reach out proactively to top talents to minimize risks of turnover
- Create more accurate hiring plans based on employee turnover predictions

The predictive scenario: a classification will address the following business questions

- What are the profiles of the employees at risk of quitting?
- How many employees are at risk per region, country, level, role?
- How to retain top talents, at what cost?

Use Case

Employee Retention (Classification Analysis)

1) Entity:  Who (Employee)

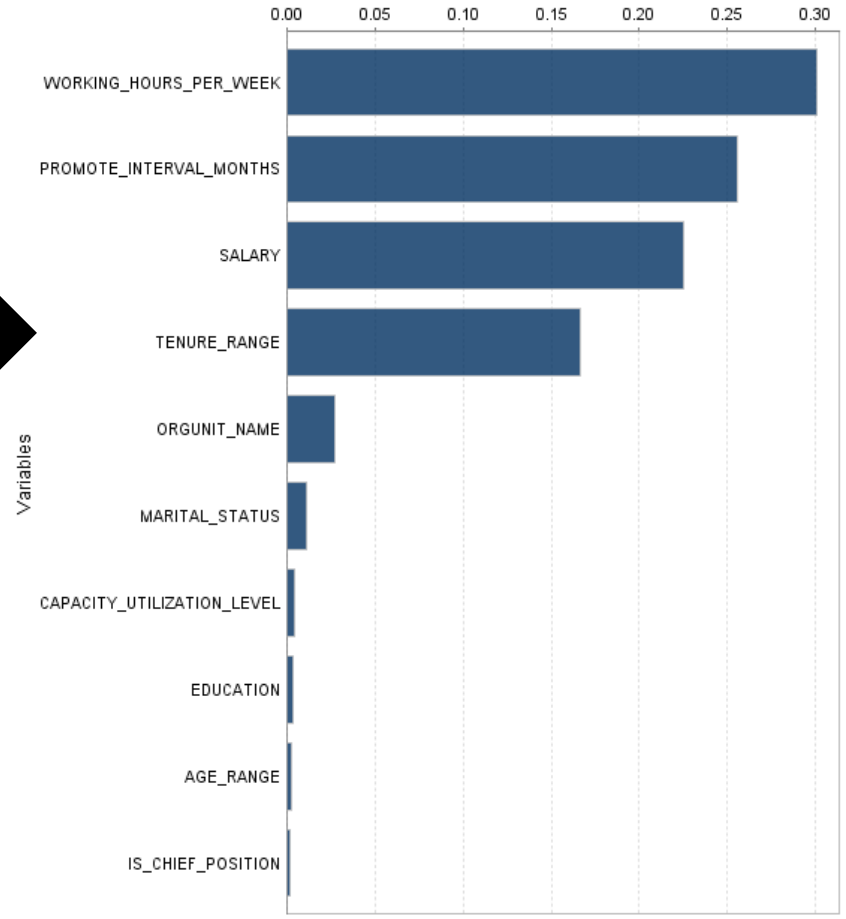
2) Target:  will Leave Company?

3) Descriptive Attributes:

- ❑ Gender
- ❑ Tenure
- ❑ Age Range
- ❑ Department
- ❑ Salary
- ❑ Last Promotion
- ❑ Marital Status
- ❑ Training Hours Per Week

Predictive Outcome

Influencing Factors



Demonstration

Customer success:

Reducing Driver Turnover and Creating a Safer Workforce.

Plagued by the same 100% driver turnover rate as their entire industry, Covenant Transport turned to SAP Predictive Analytics to improve the overall safety of their trucking operations. By better understanding their workforce and knowing why drivers leave they were able to anticipate when they might leave in the future to help keep the best staff possible.

Results.

15% Reduction in driver turnover in first year

<6 Months to ROI payoff

Use Case

Customer Retention (Classification Analysis)

1) Entity:  Who (Customer)

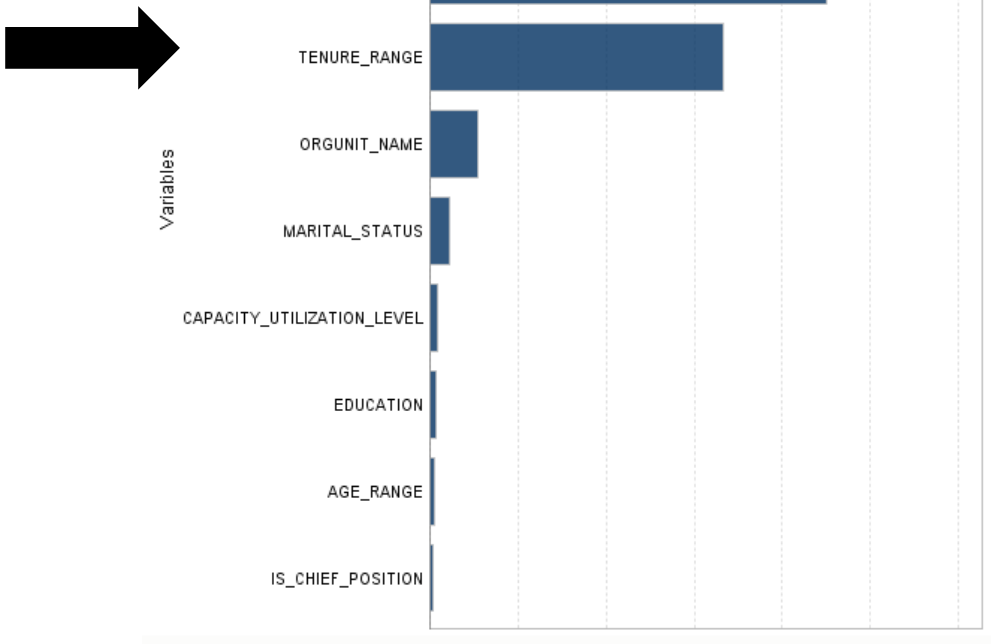
2) Target:  will stop buying from us?

3) Descriptive Attributes:

- ❑ Gender
- ❑ Tenure
- ❑ Age Range
- ❑ Salary
- ❑ Marital Status
- ❑ Spending Habit 30 days prior (by Product)
- ❑ FICA Score
- ❑ Own or Rent

Predictive Outcome

Influencing Factors



Use Case – Additional Capabilities Example

1) Entity: Shopper

2) Target: How likely will you buy product X?

3) Descriptive Attributes:

- ❑ Location
- ❑ Marital Status
- ❑ Occupation
- ❑ Has children?
- ❑ Owns pets?
- ❑ Spending Habit 30 days prior (by Product)
  - ❑ Recency
  - ❑ Frequency
  - ❑ Monetary - $
- ❑ Customer behaviors list
- ❑ …
- ❑ …
- ❑ …
- ❑ …
- ❑ …
- ❑ …
- ❑ …

Business Problem

Price Optimization (Regression Analysis)

1) Entity: Which **Pricing**

2) Target:  … is impacting Qty Sold?

3) Descriptive Attributes:

- ❑ Price
- ❑ Was Promoted
- ❑ Competition
- ❑ Seasonality
- ❑ Macro Economic Factors
- ❑ Etc.

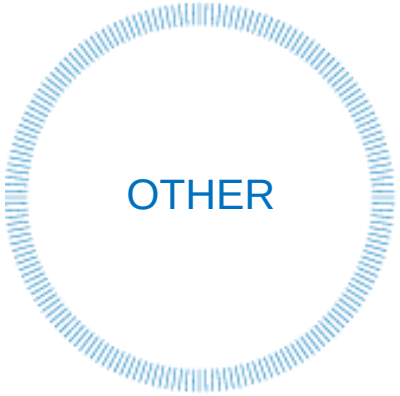
Use Case Examples – Solving Real Business Problems

- Churn Reduction
- Customer Acquisition
- Lead Scoring
- Product Recommendation
- Campaign Optimization
- Customer Segmentation
- Next Best Offer/Action

- Predictive Maintenance
- Load Forecasting
- Inventory/Demand
- Optimization
- Product Recommendation
- Price Optimization
- Manufacturing Process Opt.
- Quality Management
- Yield Management

- Fraud and Abuse Detection
- Claim Analysis
- Collection and Delinquency
- Credit Scoring
- Operational Risk Modeling
- Crime Threat
- Revenue and Loss Analysis

- Cash Flow and Forecasting
- Budgeting Simulation
- Profitability & Margin Analysis
- Financial Risk Modeling
- Employee Retention
- Modeling
- Succession Planning

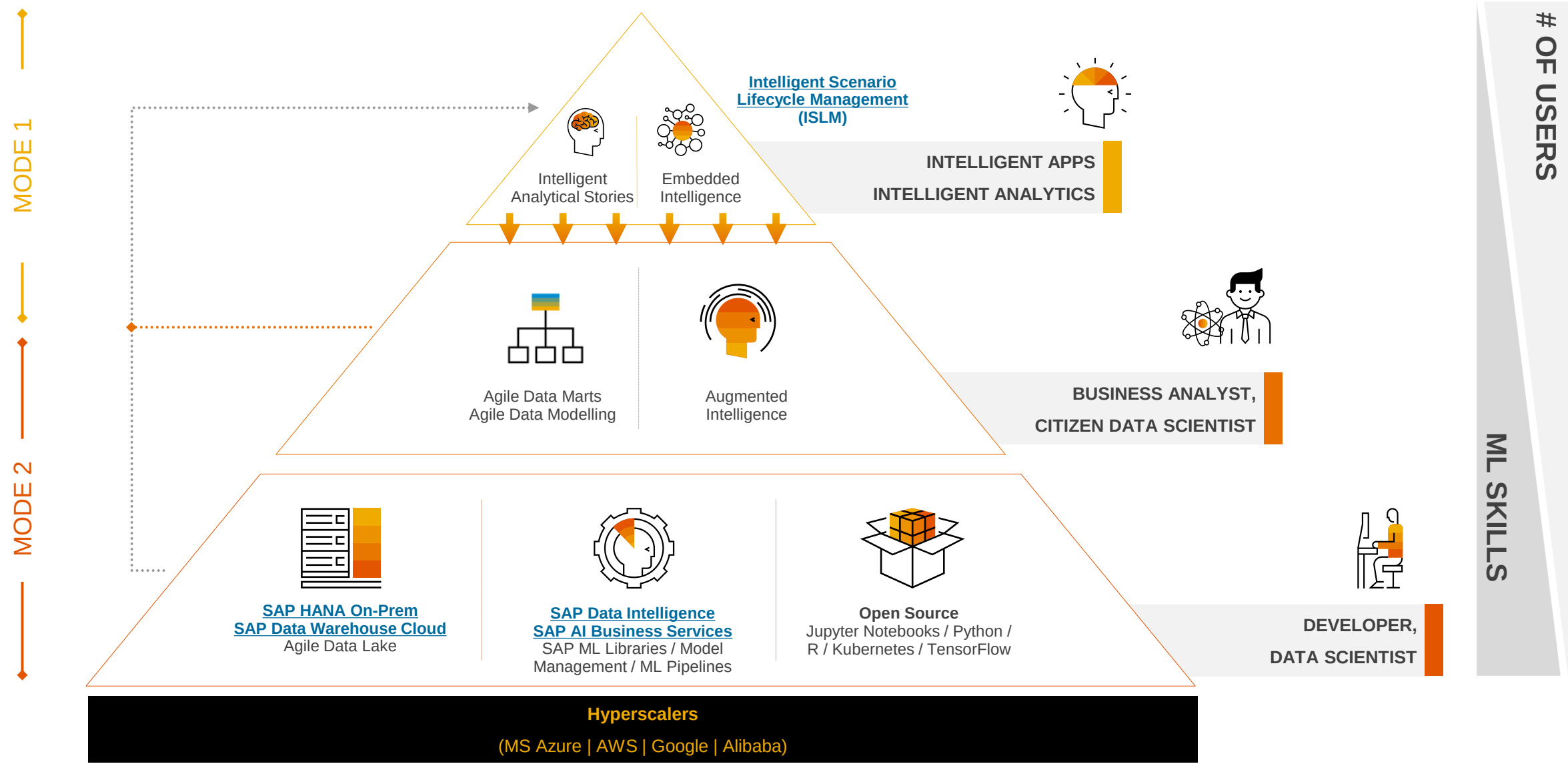


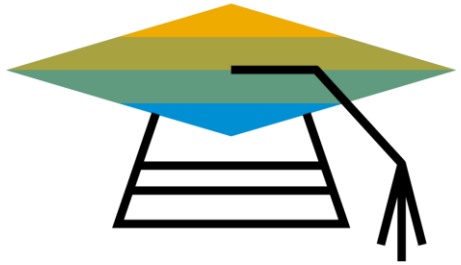
- <enter your business ? here>

Intelligent Enterprises

Machine Learning within SAP Landscapes

How Intelligent Enterprises Run





End-to-end scenario examples

Meet John Parker

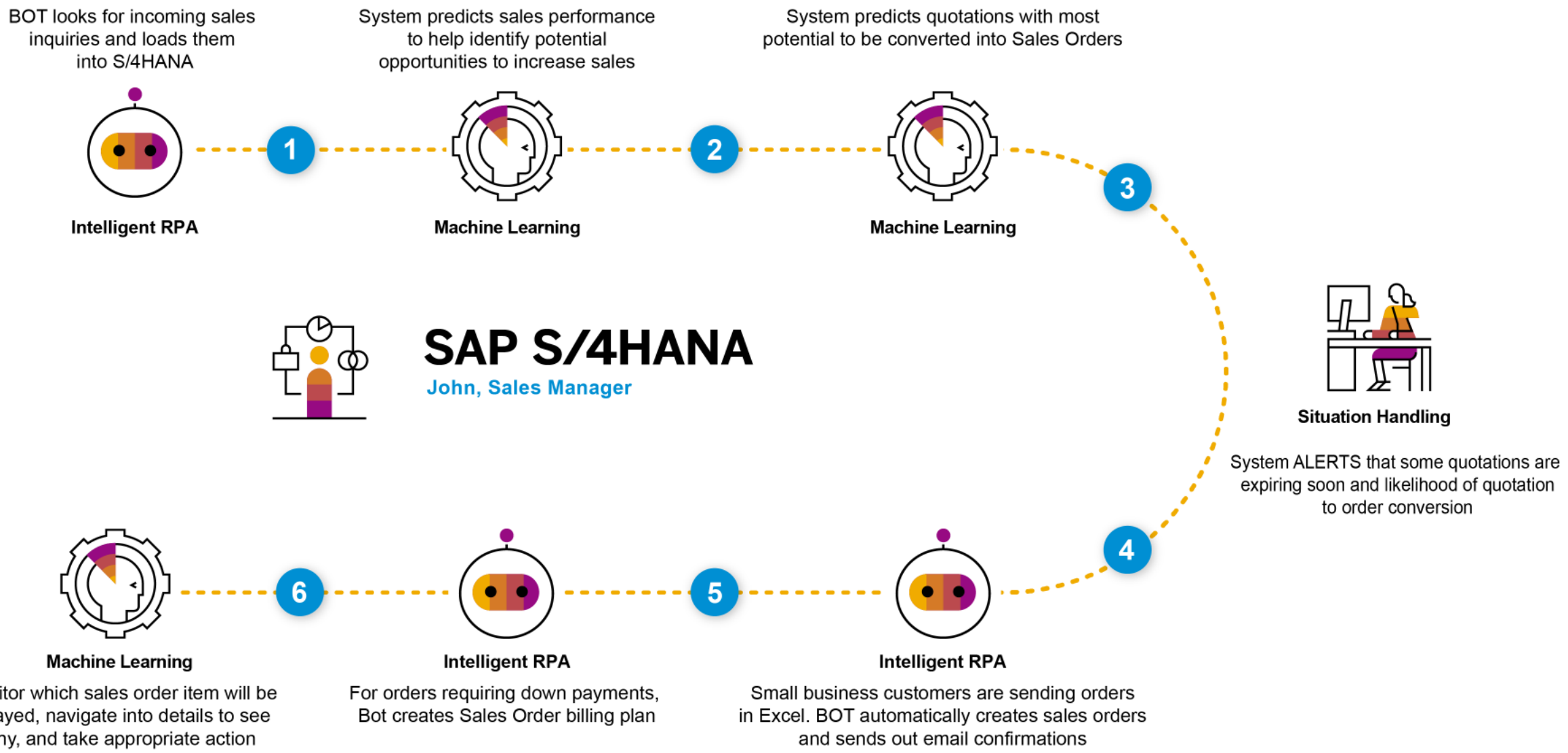
*“As a **Sales Manager**, I should be able to efficiently create sales inquiries and sales orders, improve sales volume, and anticipate and resolve delivery delays to retain strong working relationships with customers.”*

He is overwhelmed by the amount of rote tasks: sales inquiry and order, generate order payment plans, checking order status…

Automation to the Rescue

1. **Create sales inquiries**
2. **Predict sales performance**
3. **Predict quotation to order conversion rate**
4. **Alert to expiring quotation**
5. **Create sales orders**
6. **Create payment plans**
7. **Predict delivery delays**

How Intelligent Technologies Help Sales Managers [YouTube link]



Meet Sam

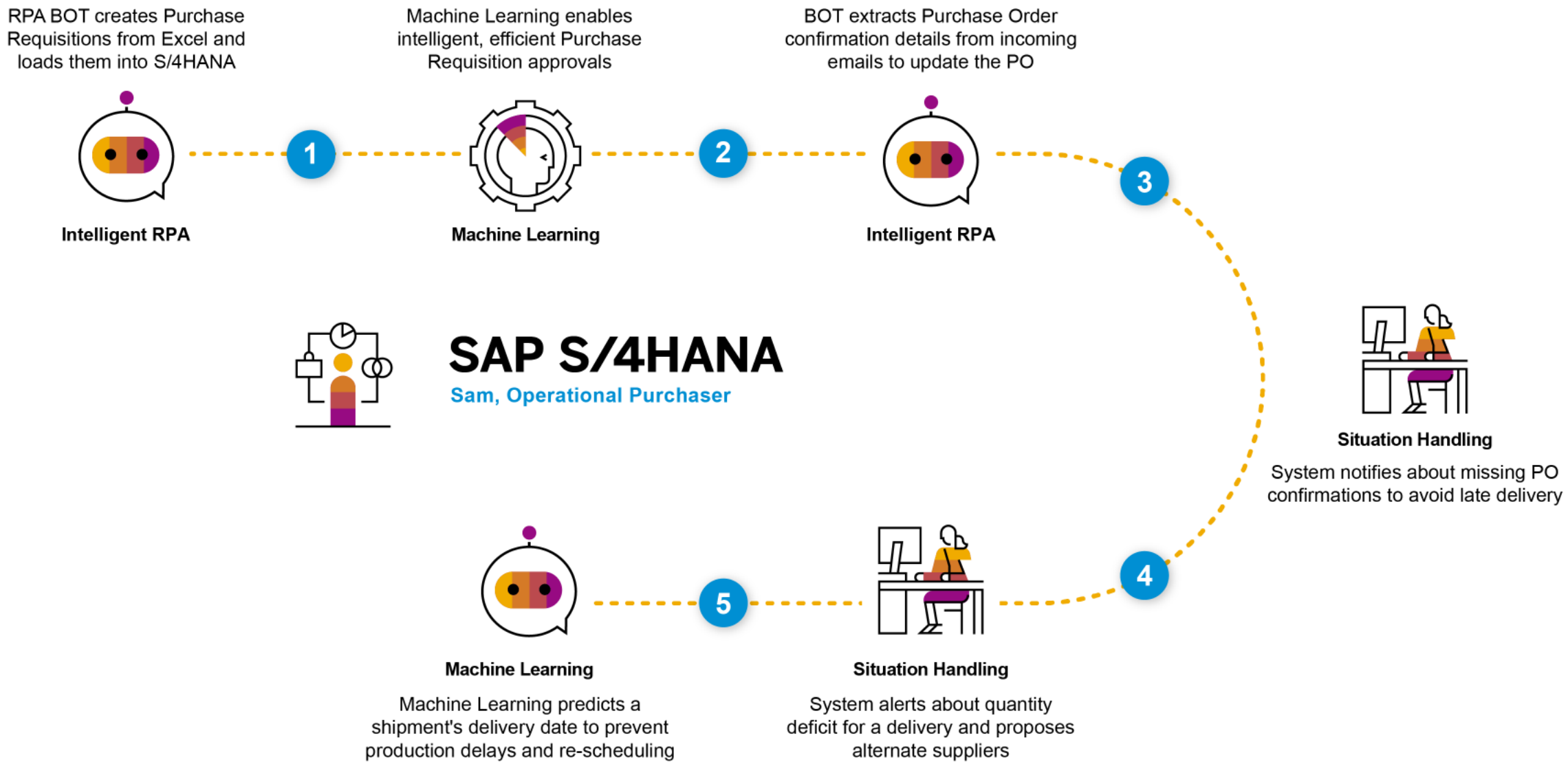
*"As an **Operational Purchaser,** I should be able to process Purchase Requisitions, monitor Purchase Orders, and manage delivery issues proactively and efficiently."*

Automation to the Rescue

1. **Create Purchase Requisitions**
2. **Approve high volume of Purchase Requisitions**
3. **Create Purchase Order Confirmations**
4. **Monitor Supplier Confirmations**
5. **Choose alternate suppliers in case of delivery quantity discrepancy**
6. **Avoid delivery shortage**
7. **Identify probability of supplier delivery delays due to various factors**

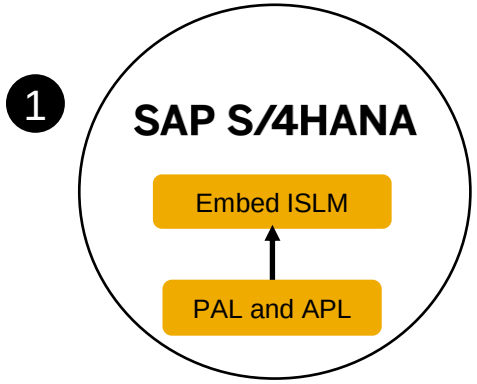
How Intelligent Technologies Help the Operational Purchaser

Demo Link

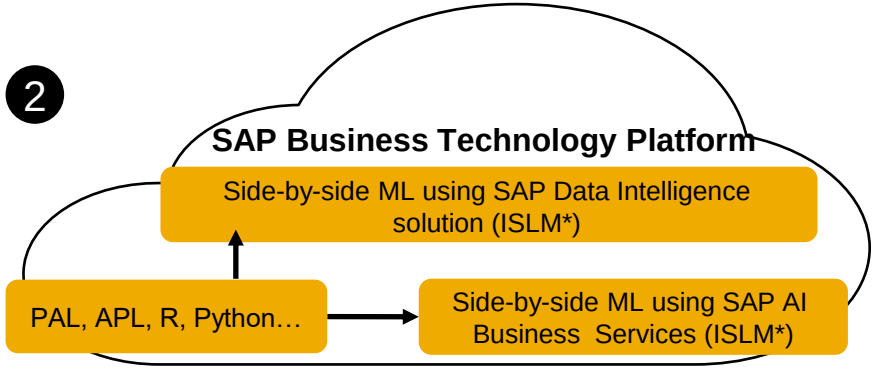


Approaches of predictive analytics and machine learning with SAP S/4HANA

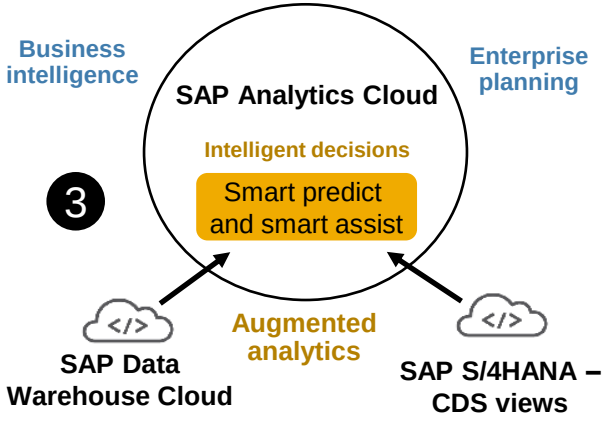
Embedding predictive algorithms in SAP S/4HANA (embedded)



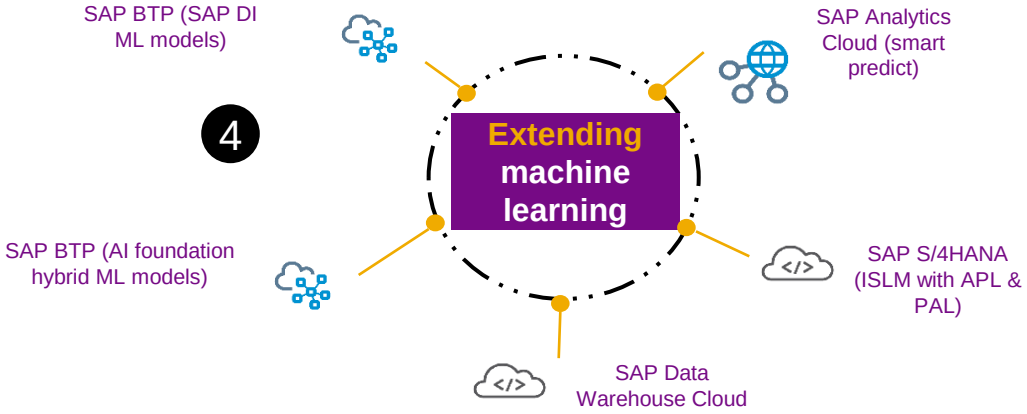
Consuming predictive and ML services from SAP Business Technology Platform (side by side)



Leveraging predictive analytics with SAP Analytics Cloud (explorative analytics with side by side)



Enhancing and extending predictive analytics and ML services (extensibility of the models with external data)



Best practices of leveraging predictive analytics and machine learning with SAP S/4HANA

ISLM – intelligent scenario lifecycle management; BTP – Business Technology Platform

PAL – predictive analysis library; APL – automated predictive library; CDS – core data services

Embedded Machine Learning with SAP S/4HANA

Released Use Cases

Detect Abnormal Liquidity Items

Scope Item 30K

Detect Trends of Purchase Contract Quantity Consumption

Scope Item 1QR

Supplier Delivery Prediction

Scope Item 3FY

Project Cost Forecast based on historical data

Scope Item 2Y7

Intelligent Staffing & Resource Management

Scope Item

Business Rule Mining

Scope Item

Business Integrity Screening / GRC

Scope Item

Tax Compliance Smart Automation / GRC

Scope Item

Predict Time-frame for Stock in Transit

Early detection of slow & non-moving stock

Demand Driven Replenishment – Dynamic buffer level adjustment

Defect Code Proposal

Scope Item 20N

Calculate the Probability Rate for Quotation Conversion

Sales Performance Prediction

S/4H Sales: Predicted Delivery Creation Delay

S/4HSales: Predicted Delivery Processing Delay

Scope Item 2YJ

Side-by-side Machine Learning with SAP S/4HANA

Released Use Cases

Propose Creation of New Catalog Items

Scope Item 2XW

Propose Material group for Freetext Items

Scope Item 2XV

Proposal of Options for materials without Purchase Contract

Scope Item 30W

Intelligent Approval Workflow

Scope Item 43E

Image based Ordering

Scope Item 3UH

(Cash Application)

Receivables Line Item Matching

Remittance Advice / Payment advice extraction

Payables Line Item Matching

Lockbox

Scope Item 1MV

Goods Receipt / Invoice receipt monitor ML status proposal

Scope Item 2ZS

Real Spend: Cost center Anomaly Alerts

Scope Item 1KU

Intelligent Accrual Recommendation

Scope Item 3NF

Create Sales Orders from Unstructured data

Scope Item 4X9

Integrated Digital Content Processing for content management

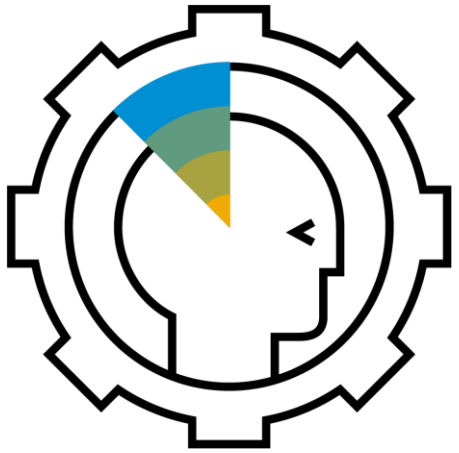
Scope Item 2YC

Intelligent Intercompany Reconciliation

Scope Item 4LG

Artificial intelligence technologies to deliver innovative and automated business processes

Data intelligence (including machine learning)



Learn from custom-specific history and exceptions to predict, support, automate, and optimize business user decisions.

Learn from history and exceptions

Deep learning

- A.k.a.: **Side-by-side machine learning**
- Resource-intensive cases like image or language processing
- Neural networks with high CPU–RAM–data demand
- Based on SAP Cloud Platform

Predictive analytics

- A.k.a.: **Embedded machine learning,** predictive analytics
- “Simple” cases like trending or forecasting
- Algorithms with low CPU–RAM–data demand
- SAP HANA, SAP Analytics Cloud

Delivered Intelligent ERP Scenarios for SAP S/4HANA

Scope ID	Scenario	Deployment	S/4HANA CLOUD		S/4HANA	
			Commercialization	available as of	Commercialization	available as of
Finance						
1MV	Receivables Line-Item Matching	BTP	SAP Cash Application (8005289)	1702	SAP Cash Application (8005289)	1709
1MV	Receivables Line-Item Matching V10	BTP	SAP Cash Application (8005289)	2002	SAP Cash Application (8005289)	2009
2ZS	Goods Receipt / Invoice Receipt Monitor ML Status Proposal (GR/IR) - Financial Account Reconciliation	BTP	SAP S/4HANA Cloud	1808	SAP S/4HANA for Goods and Invoice Receipt Reconciliation (7020103) – on-premise cockpit only	1809
1MV	Remittance Advice / Payment Advice Extraction	BTP	SAP Cash Application (8005289)	1808	SAP Cash Application (8005289)	1809
1MV	Payment Advice Extraction V8	BTP	SAP Cash Application (8005289)	1911	SAP Cash Application (8005289)	2009
N/A	Cash Application for FI-CA (Account Classification)	BTP	SAP S/4HANA Cloud	2002	SAP S/4HANA Enterprise Management	1909
1KU	Real Spend: Smart Alerts for Profit & Loss Analysis	BTP	SAP Leonardo machine learning foundation (8006312)	1805	SAP Leonardo machine learning foundation (8006312)	1809
N/A	Tax Compliance Smart Automation / GRC	embedded	n/a	n/a	SAP Tax Compliance for S/4HANA (7019072)	1610
N/A	Business Integrity Screening / GRC	embedded	n/a	n/a	SAP Business Integrity Screening for S/4HANA (7019061)	1709
1KU	Real Spend: Cost Center Anomaly Alerts	BTP	SAP RealSpend (8004615)	1808	SAP RealSpend (8004615)	1809
1MV	Payables Line Item Matching	BTP	SAP Cash Application (8005289)	1808	SAP Cash Application (8005289)	1809
1MV	Lockbox	BTP	SAP Cash Application (8005289)	1808	SAP Cash Application (8005289)	1809
30K	Detect Abnormal Liquidity Items	embedded	SAP S/4HANA Cloud	1905	SAP S/4HANA Enterprise Management	1909
3NF	Intelligent Accrual Recommendation	BTP	SAP S/4HANA Cloud	1905	open / cloud only	n/a
4LG	Intelligent Intercompany Reconciliation	BTP *	SAP S/4HANA Cloud	2108	SAP S/4HANA Enterprise Management	2021
Manufacturing						
1Y2	Demand-Driven Replenishment: Dynamic Buffer Level Adjustment	embedded	SAP S/4HANA Cloud for Advanced Supply Chain (8005593)	1808	open / cloud only	n/a
20N	Defect Code Proposal	embedded	SAP S/4HANA Cloud	1905	SAP S/4HANA Enterprise Management	1909
20N	Early Detection of Slow / Non-moving Stocks	embedded	SAP S/4HANA Cloud	1911	SAP S/4HANA Enterprise Management	1909
Research and Development						
2YC	Integrated Digital Content Processing for Content Mgt.	BTP	SAP Leonardo machine learning foundation (8006312)	1808	open / cloud only	n/a
2Y7	EPPM: Project cost forecast based on historical data	embedded	SAP S/4HANA Cloud	1805	Cloud only	n/a

* uses ISLM

embedded scenarios use SLM

Delivered Intelligent ERP Scenarios for SAP S/4HANA (2/3)

LoB / ID	Scenario	Deployment	S/4HANA CLOUD		S/4HANA	
			Commercialization	available as of	Commercialization	available as of
Supply Chain						
20N	Stock in Transit	embedded	SAP S/4HANA Cloud	1708	SAP S/4HANA Enterprise Management	1709
Procurement						
1QR	Contract Consumption	embedded	SAP S/4HANA Cloud	1705	SAP S/4HANA Enterprise Management	1709
2XW	Propose Creation of New Catalog Items	BTP	SAP S/4HANA Cloud, intelligent insights for procurement (8006258)	1805	SAP S/4HANA Cloud, intelligent insights for procurement (8006258)	1809
2XX	Payment Block - Cash Discount at Risk	embedded	SAP S/4HANA Cloud	1805	SAP S/4HANA Enterprise Management	1809
30W	Proposal of options for Materials without Purchase Contract	BTP	SAP S/4HANA Cloud, intelligent insights for procurement (8006258)	1808	SAP S/4HANA Cloud, intelligent insights for procurement (8006258)	1809
2XV	Propose Material Group for Freetext Items	BTP	SAP S/4HANA Cloud, intelligent insights for procurement (8006258)	1805	SAP S/4HANA Cloud, intelligent insights for procurement (8006258)	1809
3FY	Supplier Delivery Prediction	Embedded	SAP S/4HANA Cloud, intelligent insights for procurement (8006258)	1811	SAP S/4HANA Cloud, intelligent insights for procurement (8006258)	1909
43E	Intelligent Approval Workflow	BTP	SAP S/4HANA Cloud, intelligent insights for procurement (8006258)	1908	SAP S/4HANA Cloud, intelligent insights for procurement (8006258)	1909
3UH	Image-based Ordering	BTP	SAP S/4HANA Cloud, intelligent insights for procurement (8006258)	1905	SAP S/4HANA Cloud, intelligent insights for procurement (8006258)	1909
N/A	Quantity contract consumption based on planning and forecasting	Embedded	Sourcing and Contract Management	2202		
Sales, Service						
2YJ	Quotation Conversion Probability Rate	embedded	SAP S/4HANA Cloud	1802	SAP S/4HANA Enterprise Management	1809
2YJ	Delivery Performance / Delivery in Time	embedded	SAP S/4HANA Cloud	1808	SAP S/4HANA Enterprise Management	1809
2YJ	Delivery Performance / Delivery in Time V2	embedded	SAP S/4HANA Cloud	1905	SAP S/4HANA Enterprise Management	1909
2YJ	Sales Performance Prediction	embedded	SAP S/4HANA Cloud	1811	open / cloud only	n/a
4X9	Create Sales orders from Unstructured data	BTP	SAP S/4HANA Cloud	2011	SAP S/4HANA Enterprise Management	2011
N/A	Service Ticket Intelligence	BTP	n/a	n/a	SAP AI Business Services	1809
M/A	Intelligent Business partner creation using business scan	BTP	SAP S/4HANA Cloud	2202		
Professional Services						
ML220	Intelligent Staffing & Resource Matching	embedded	SAP S/4HANA Cloud	2008	SAP S/4HANA Enterprise Management	2009*
Master Data Management						
ML015	Business Rule Mining	embedded	n/a	n/a	SAP Enterprise Master Data Governance for SAP S/4HANA (7018852)	1909

* uses ISLM

embedded scenarios use SLM

Delivered Intelligent Scenarios beyond SAP S/4HANA (3/3)

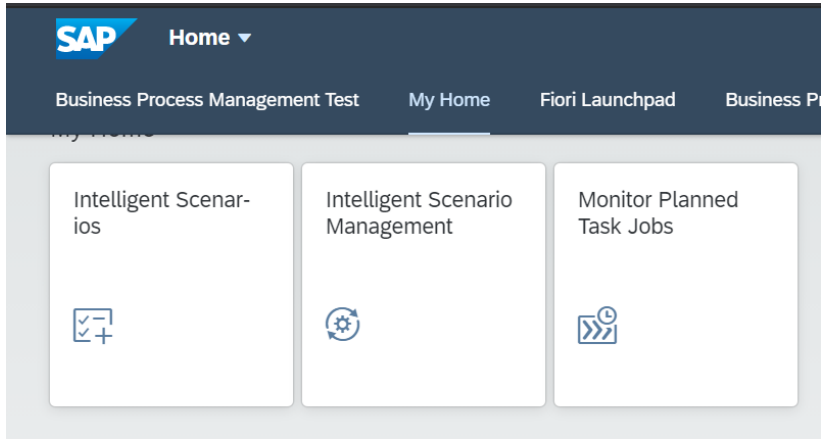
LoB / Id	Scenario	Deployment	Product	
			Solution	available as of
Finance				
N/A	Intelligent invoice object recommendation	BTP	Invoice Object Recommendation	N/A
Sourcing & Procurement				
N/A	Automatic supplier invoice processing from PDF files	BTP	SAP Central Invoice Management	Q4 2021
N/A	Strategic Procurement	BTP	Intelligent Supply Strategy App	N/A
Services				
N/A	Service Recommendation	BTP	SAP Commerce Cloud	N/A
N/A	Service Ticket Intelligence	BTP	SAP Service Cloud Enterprise Edition	N/A
Manufacturing (Quality Management)				
N/A	Visual Inspection with machine learning	BTP	SAP Digital Manufacturing Cloud	2005
EHS (Environment, Health & Safety)				
N/A	Hazard Identification with computer vision	BTP	EHS Health & Safety, EHS Incident Management	N/A
Cross Topics (Master Data)				
N/A	Propose Commodity Codes – Data Attribute Recommendation	BTP	Data Attribute Recommendation (DAR)	N/A
N/A	Propose Product Hierarchy – Data Attribute Recommendation	BTP	DAR with SAP Demand Signal Management	N/A
N/A	Propose Material Fields – Data Attribute Recommendation	BTP	Data Attribute Recommendation (DAR)	N/A
N/A	Propose Sales Order Fields – Data Attribute Recommendation	BTP	Data Attribute Recommendation (DAR)	N/A

Operationalizing the Intelligent Enterprise with Intelligent Scenario Lifecycle Management (ISLM)

ISLM: Standardized integration of AI in SAP S/4HANA

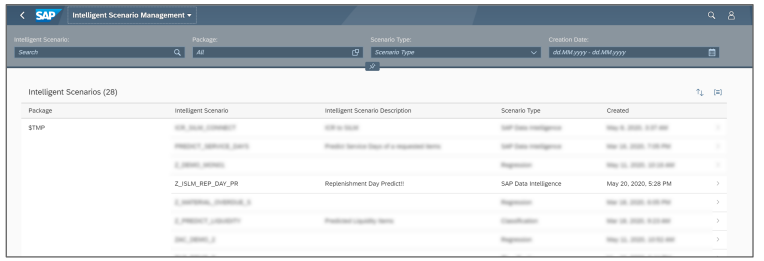
What is ISLM?

- “Intelligent Scenario Lifecycle Management”
- Generic framework in SAP BASIS
- Delivered with SAP S/4HANA (no add. license)
- Successor of Predictive Analytics integrator (PAi) for all HANA ML based scenarios (APL/PAL)



Key benefits:

- Common consumption model for application integration for SAP S/4HANA (for app developers)
- One central cockpit to operate and manage ML artefacts consumed by S/4HANA (for customers):
  - Supports train, deploy, activate (for me/for all), online/batch inference, cloud reporting, …
  - Support scheduling of training for APL, PAL & SAP DI



Intelligent Scenario Lifecycle Management (ISLM):

Standardized framework supporting end-to-end lifecycle management operations on machine learning scenarios in SAP S/4HANA & S/4HANA Cloud

Harmonized framework in basis SAP software layer

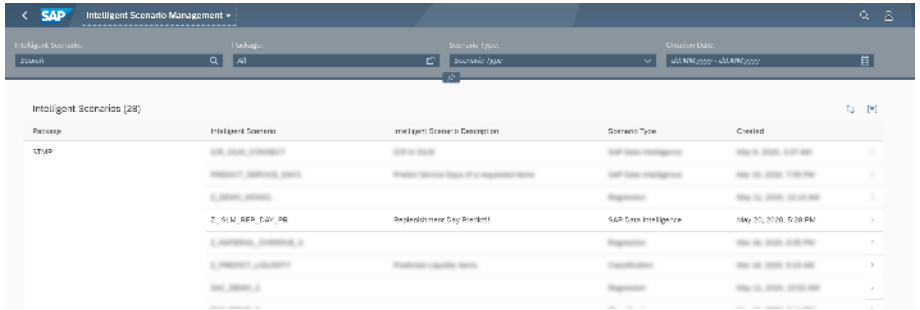
Successor of SAP Predictive Analytics integrator

Standard to train, deploy, activate even for remote ML providers

Support for all phases (readiness, first usage, lifecycle operations, deletion, decommission)

Lifecycle management for ML services provisioned as a service

Common consumption model for application integration in SAP S/4HANA Cloud



SAP Community call: Managing the lifecycle of SAP S/4HANA Cloud Machine Learning scenarios:

https://youtu.be/3DfrVyXt1Q8

Machine Learning in SAP HANA: PAL and APL

APL: Automated Predictive Library

- Exposes the data mining capabilities of the Automated Analytics engine for developing predictive modelling processes for business analysts

PAL: Predictive Analytics Library

- Advanced analytics algorithms for data scientists

Supported tasks / categories:

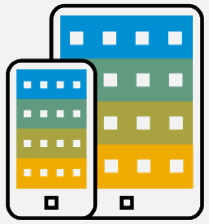
APL

- Clustering
- Classification
- Regression
- Time Series

PAL

- Clustering
- Classification
- Regression
- Time Series
- Statistics
- Data Preparation
- Social Network Analysis
- Miscellaneous
- Recommendation systems

Optimize Existing Processes with SAP AI Business Services



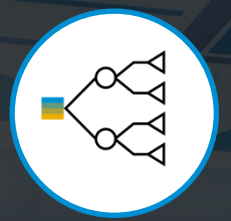
SAP AI Business Services provide strategic machine learning capabilities that help you automate and optimize processes while enriching the customer experience. These reusable services are available on SAP Business Technology Platform.

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



Data Attribute Recommendation
Automates creation, maintenance, and management of structured data

Invoice Object Recommendation
Recommends general ledger accounts and cost centers for invoices without order reference

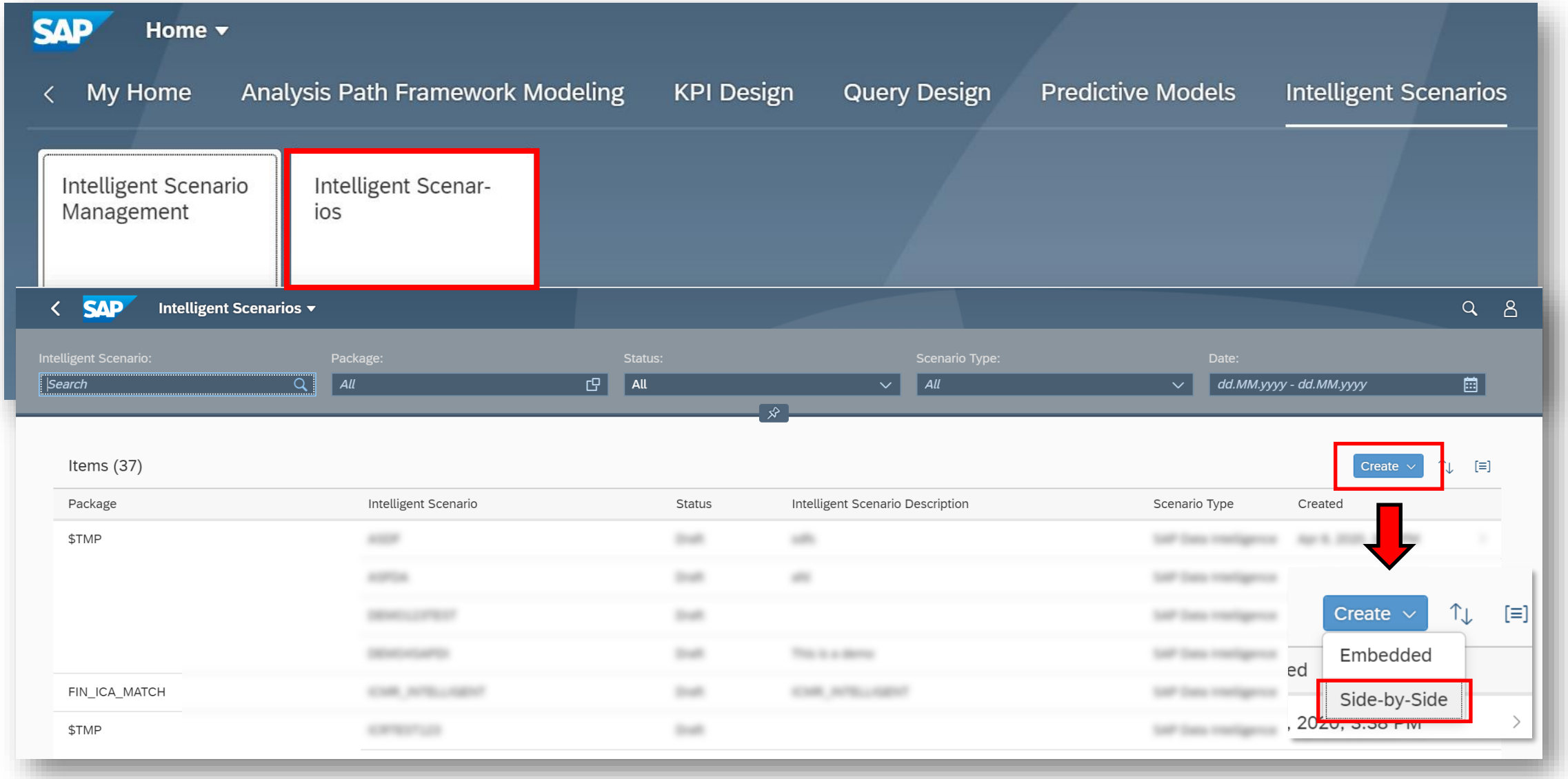
Service Ticket Intelligence
Classifies and recommends tickets automatically

Available via CPEA and SAP Store

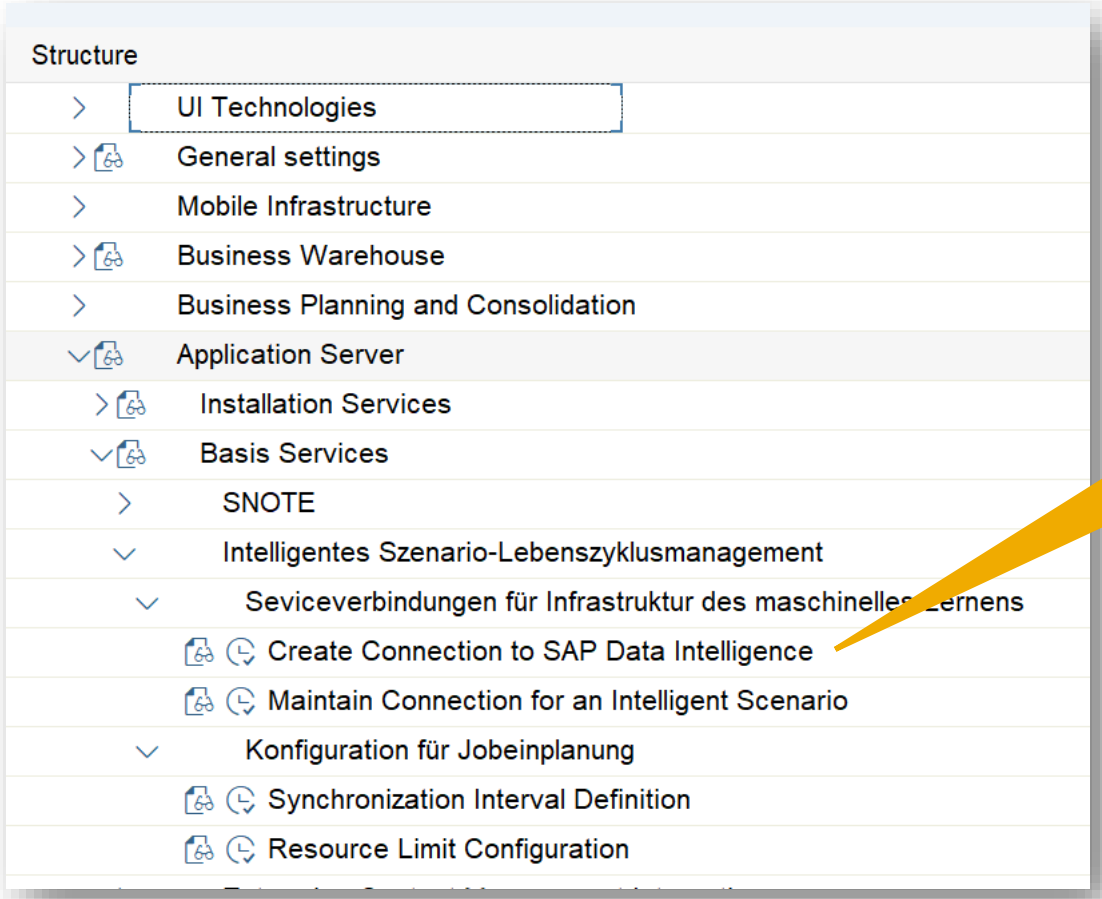
Demo

Side-by-Side
Intelligent scenario lifecycle management (ISLM)

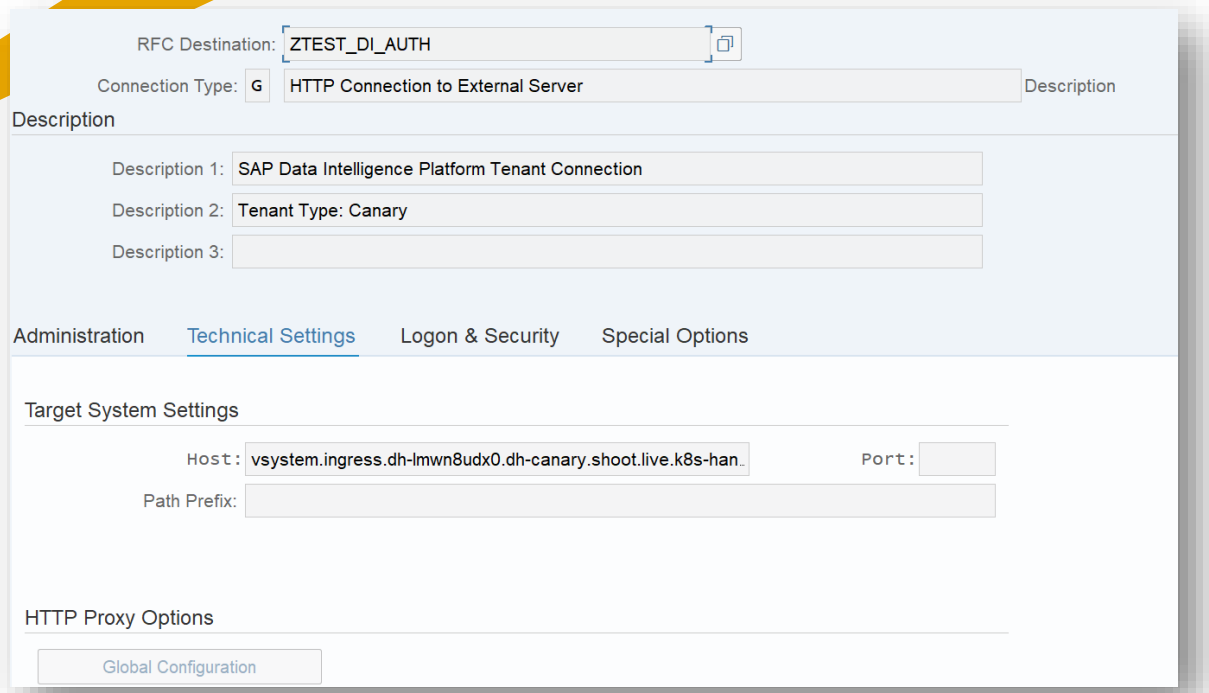
Create new intelligent scenario



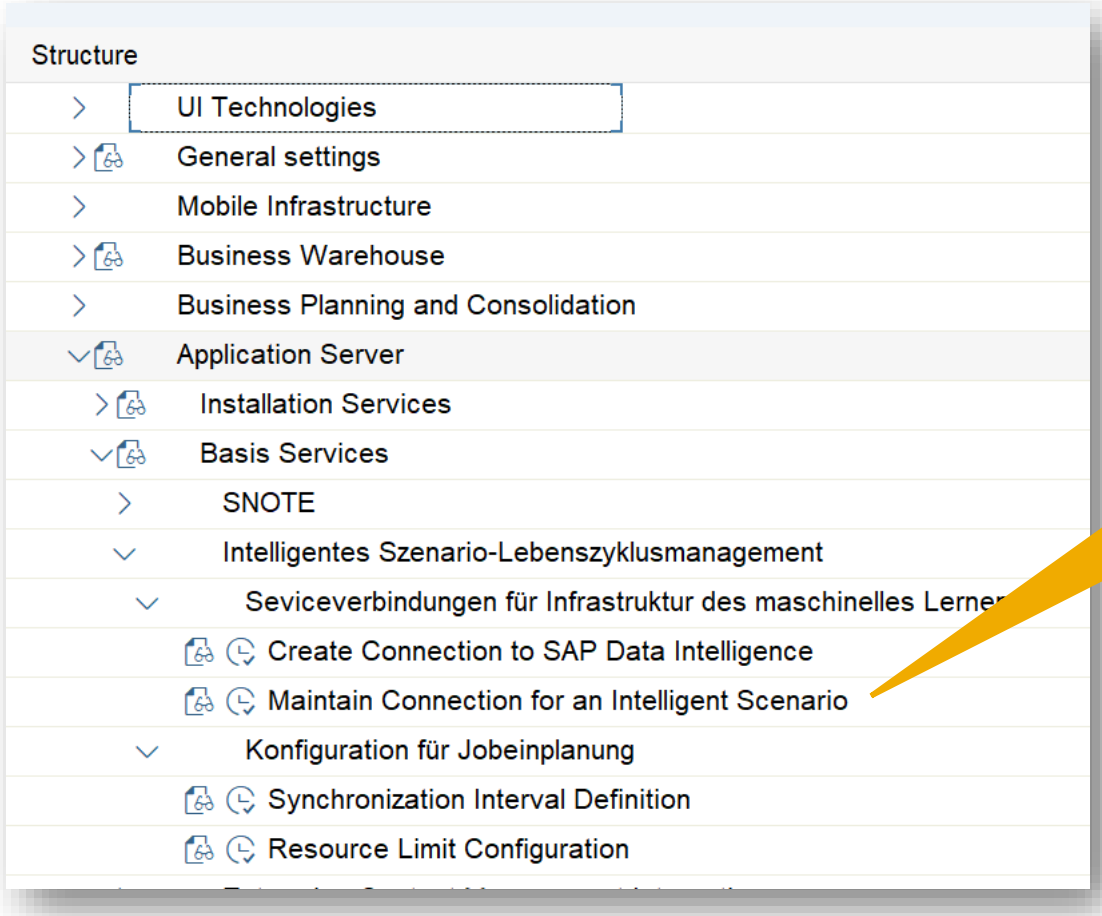
IMG configuration for ISLM: Connection to SAP Data Intelligence



Create a RFC destination to the SAP Data Intelligence tenant

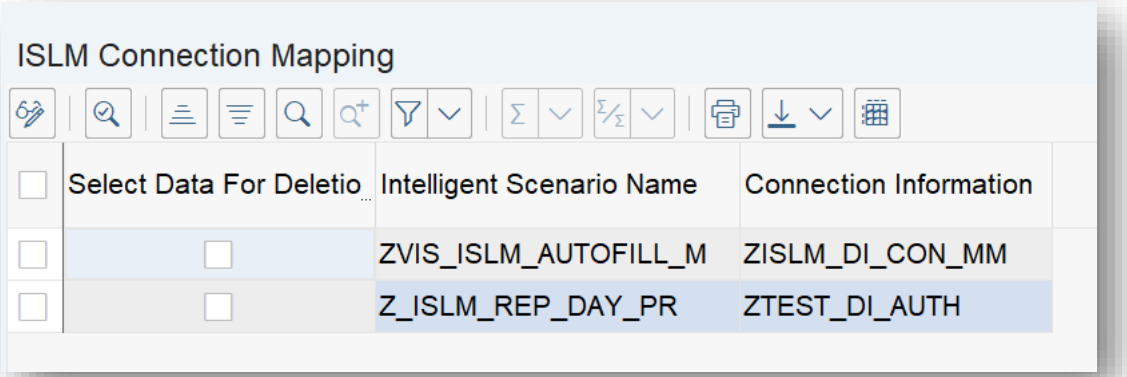


IMG configuration for ISLM: ISLM mapping table

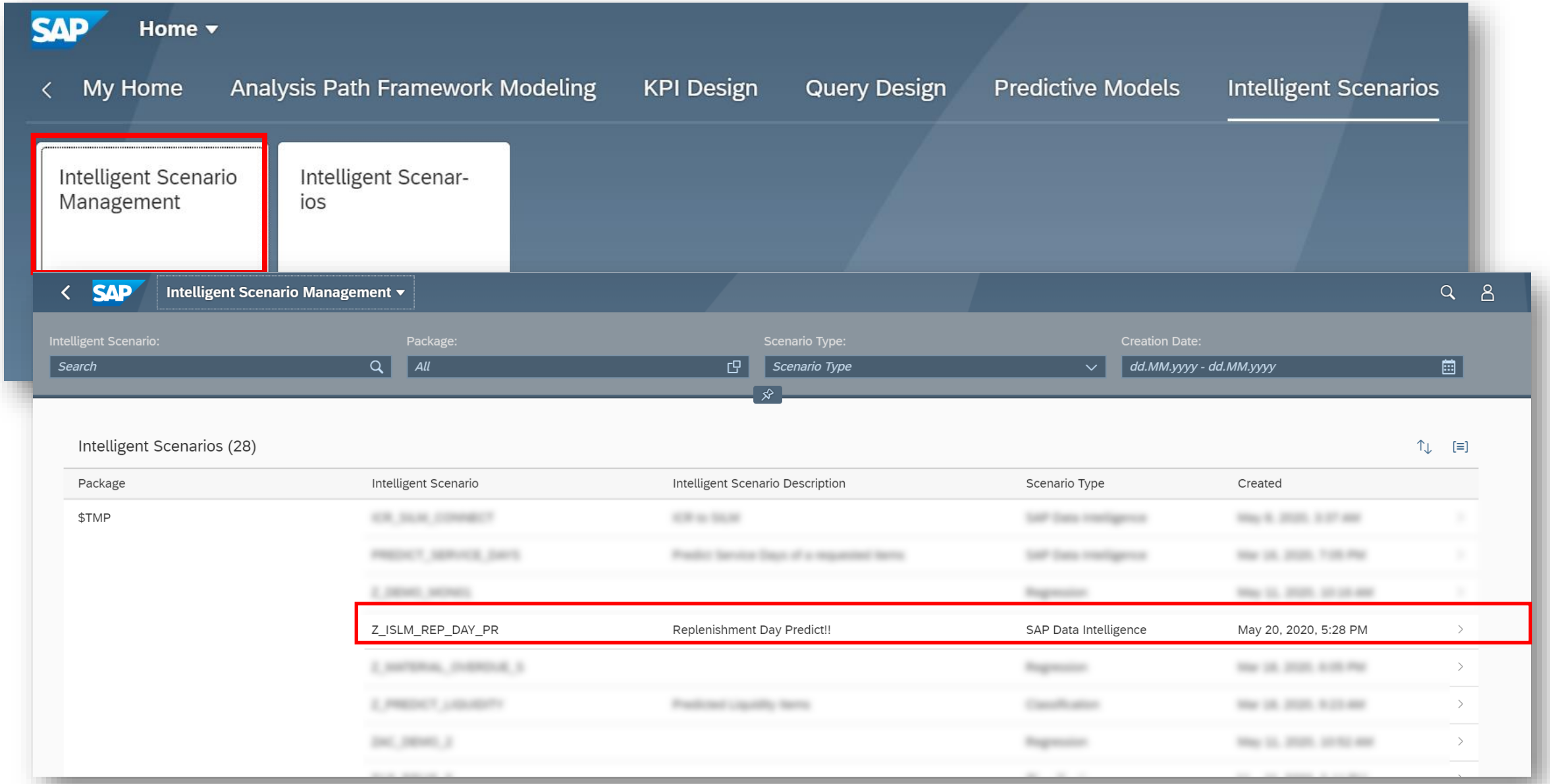


ISLM Connection Mapping:

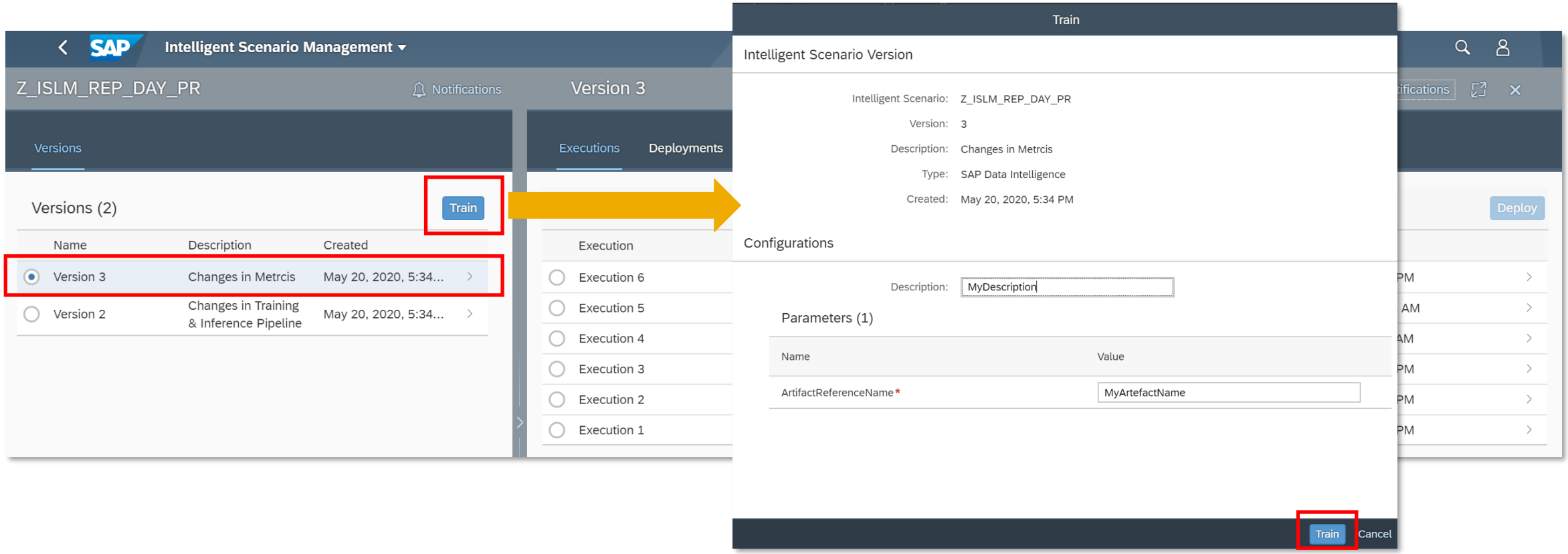
Intelligent scenario same: connection name (SAP Data Intelligence tenant)



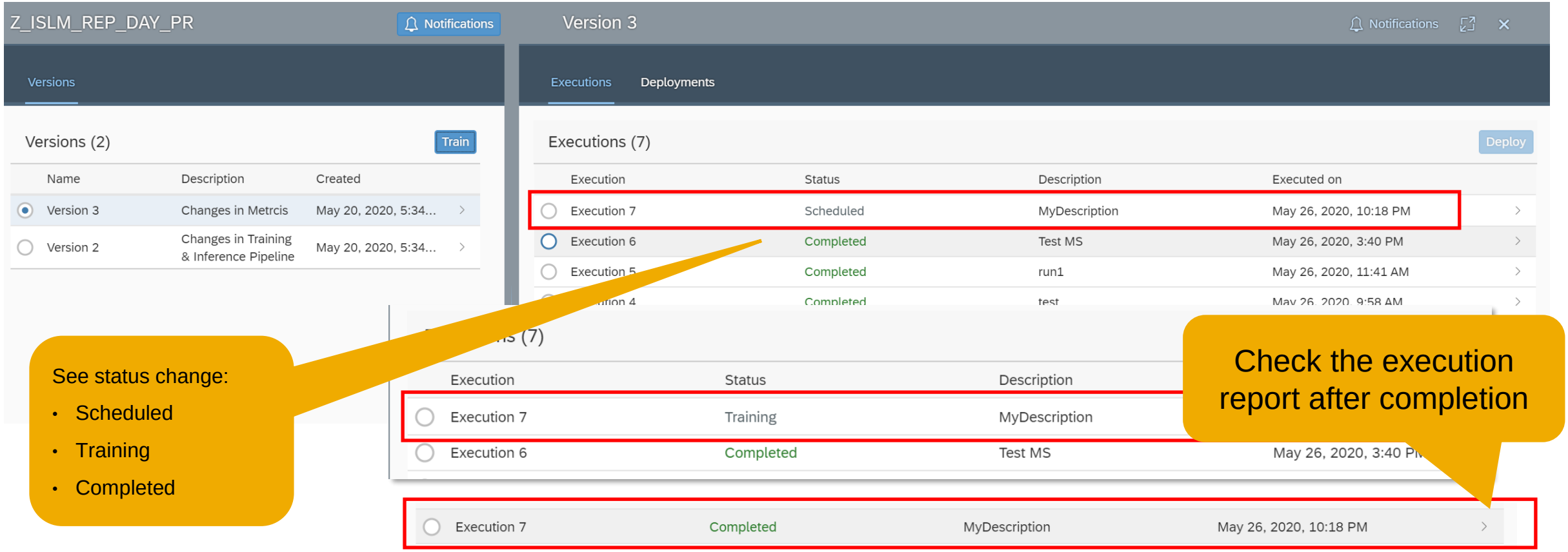
Intelligent Scenario Management app



Intelligent Scenario Management app – Train (1/3)

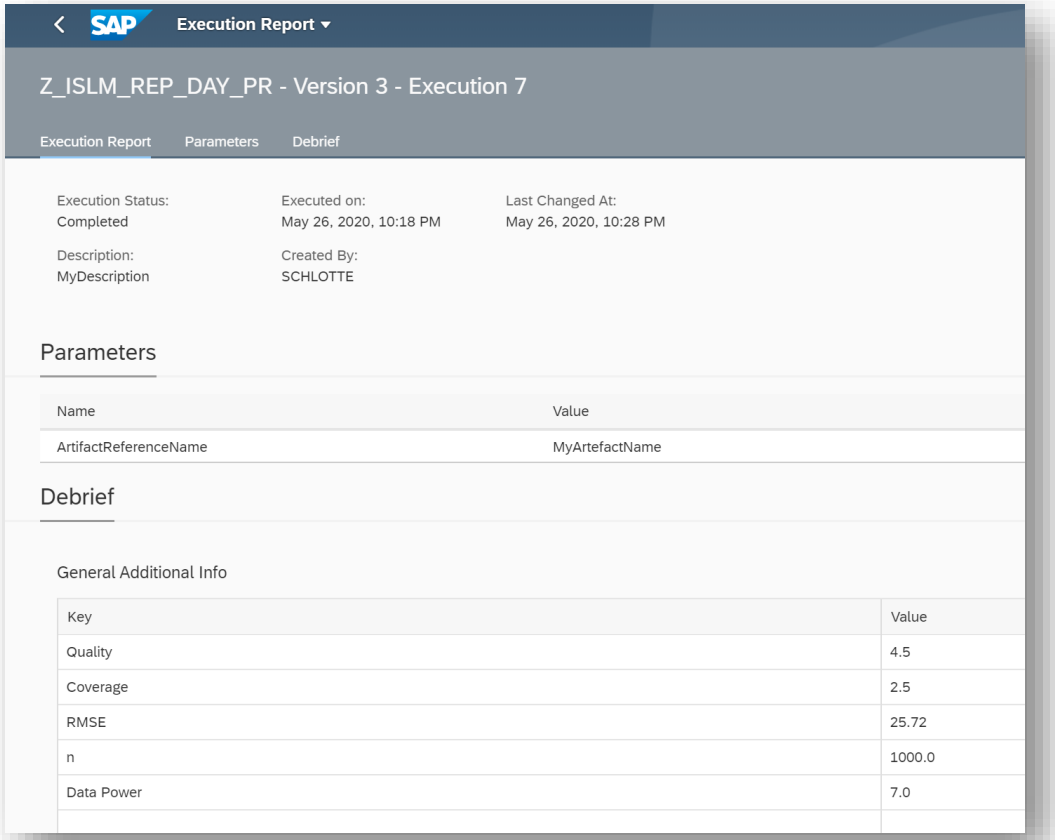


Intelligent Scenario Management app – Train (2/3)



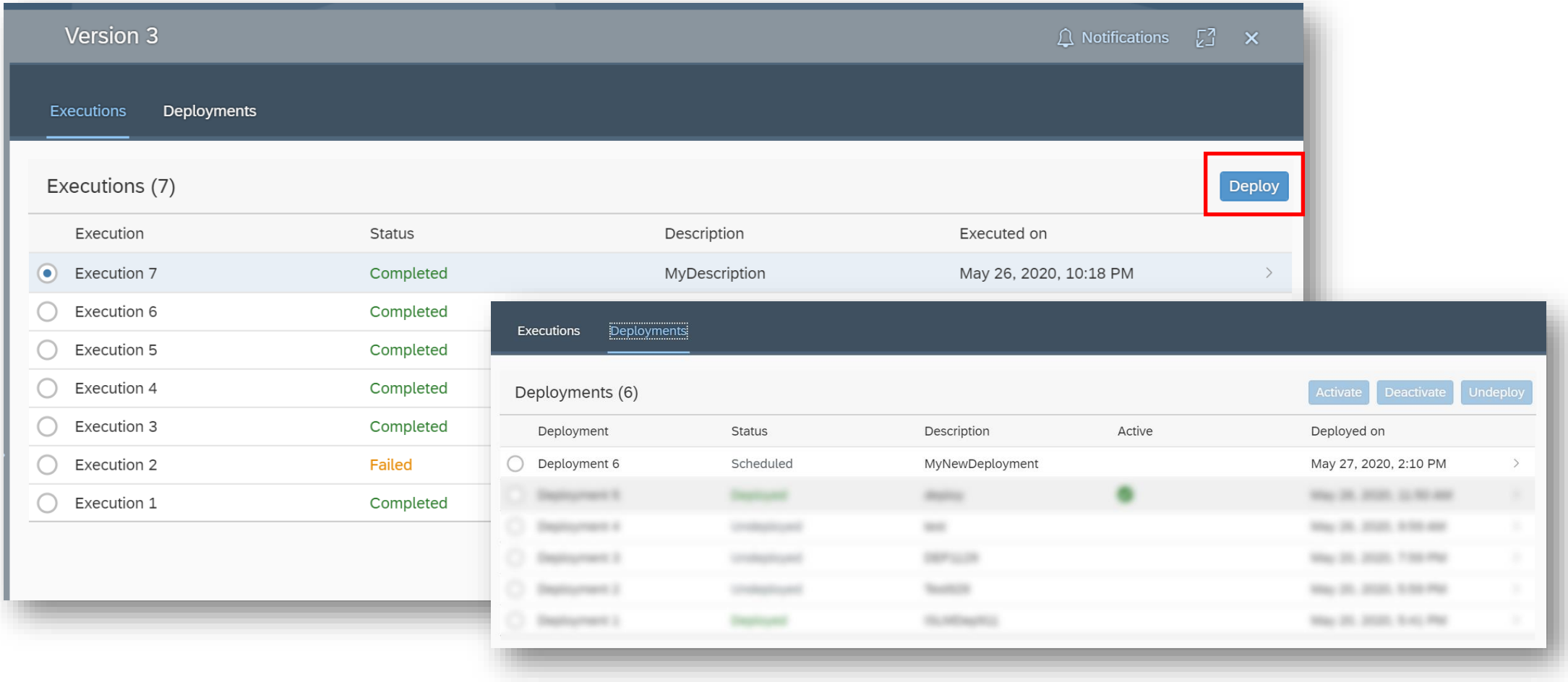
Intelligent Scenario Management app – Train (3/3)

Training Execution Result – Execution Report



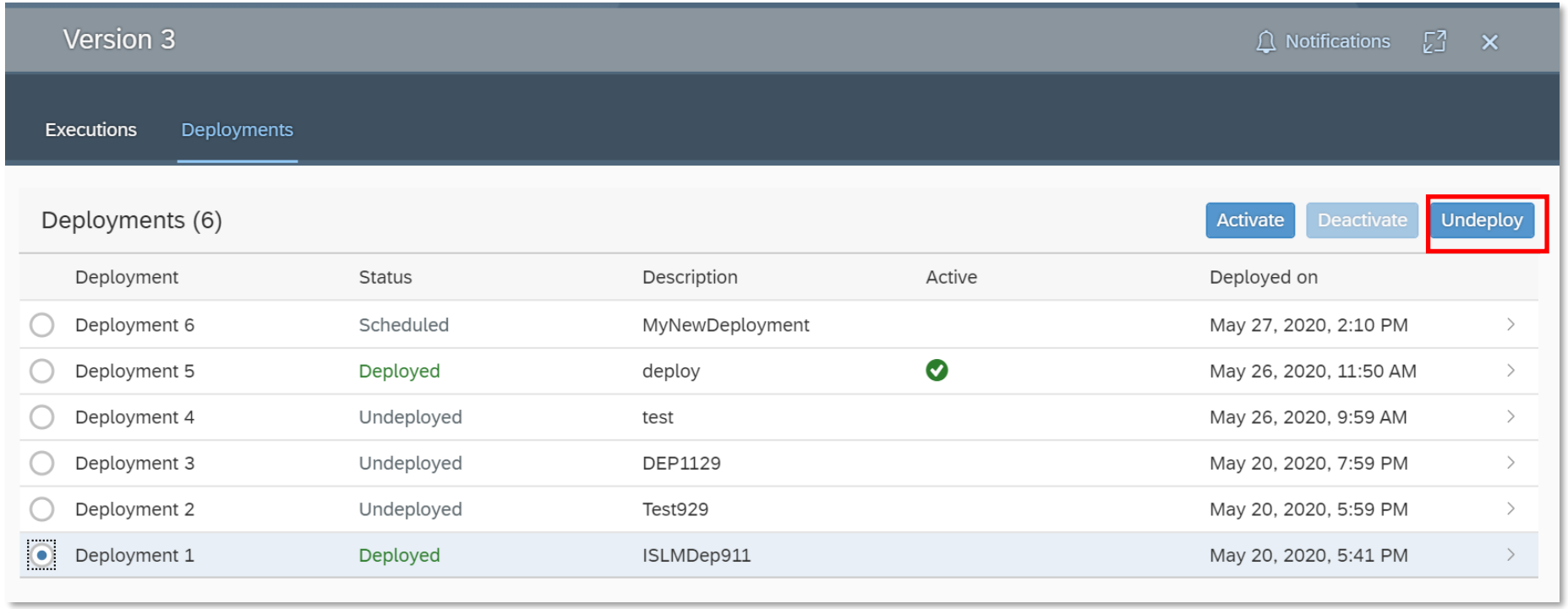
Intelligent Scenario Management app – Deploy

Select an Execution from the list that has the status „Completed“ and select „Deploy“ to trigger the deployment.



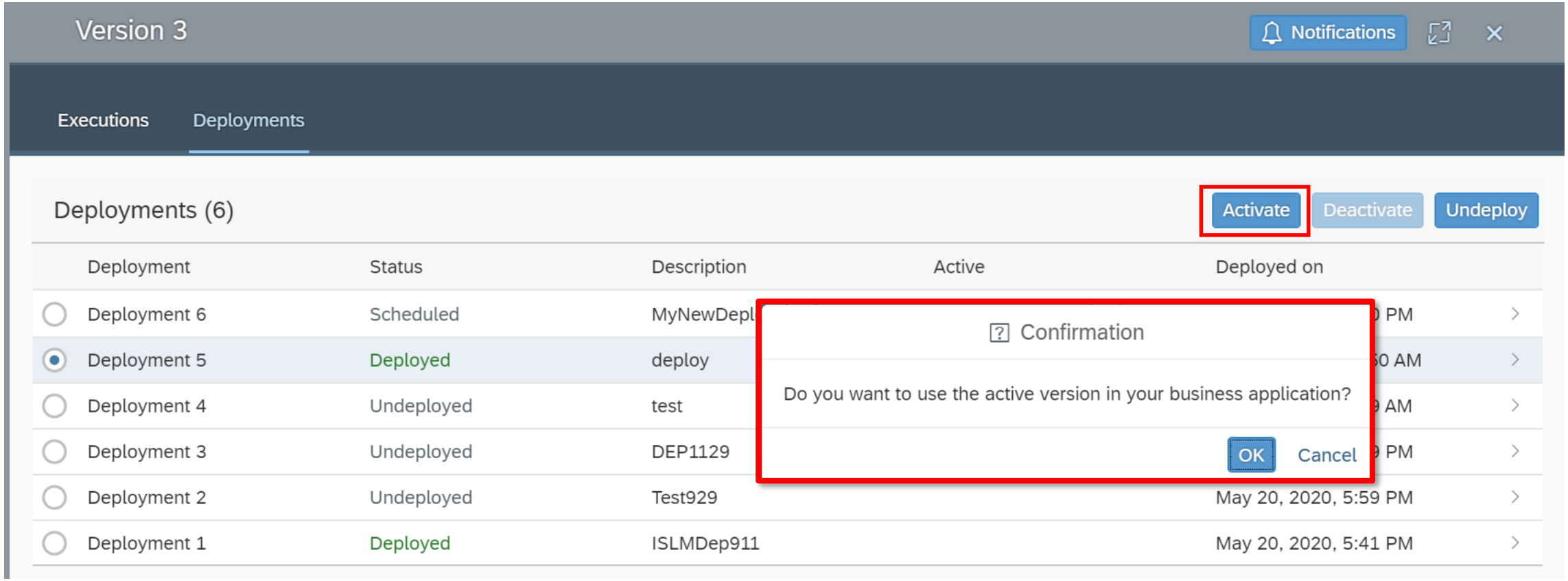
Intelligent Scenario Management app – Undeploy

Only deployments that are not "Active" can be undeployed.



Intelligent Scenario Management app – Activate

The action „Activate“ will select the Deployment version that will be used by the consuming business application. Note: Do this with care as it will change the inference call.



How to get started

Official documentation

- ISLM in SAP S/4HANA Cloud
- ISLM in SAP S/4HANA
- Implementing Machine Learning with SAP S/4HANA

Recent updates

- SAP Teched 2021 Replay: Video
- SAP Community Webinar
- ISLM Blog Series
- Andreas Welsch' Intelligence Briefing VLOG
- Venkata Raghu Banda Resources and journey to machine learning with SAP S/4HANA

Trial options:

- SAP S/4HANA Fully Activated Appliance
  (allows to pilot extended ISLM features)
  - Demo Guide Machine Learning

Social channels

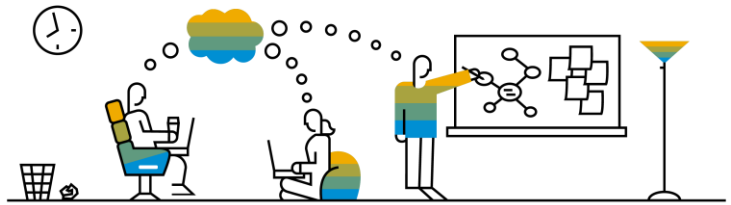
SAP S/4HANA Community

Spotify-Podcast:
Machine Learning with SAP S/4HANA


Essential

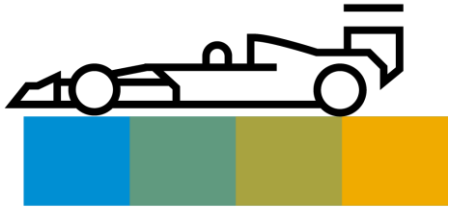

Extended

Key Points



#1 **Machine Learning Can Help Us Solve Problems Better and Faster**

#2 **Answering Business Questions with Machine Learning Requires a Different Way of Thinking**



#3 **S/4 Embedded Machine Learning and the Business Technology Platform Can Help You Get There Faster**

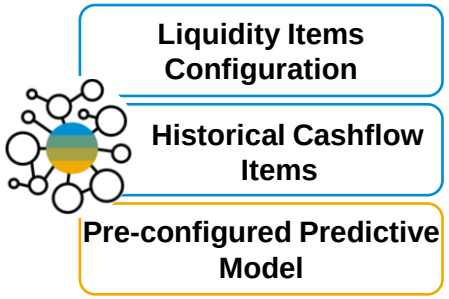
Thank you. Questions?

Contact information:

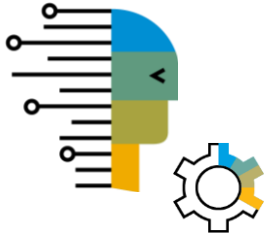
Jason White
Business Technology Platform
Global Center of Excellence
Jason.White@sap.com

Appendix

Detect Abnormal Liquidity Items



Train predictive model (30K)



Recommend Corresponding Liquidity Item

Detect abnormal and predict corresponding liquidity items

Leverage out-of-the-box predictive model

Reduce manual effort for adjustment of liquidity items

Ensure correct reporting within Advanced Cash Operations

SAP Quantity Contract Consumption

Anticipate contract renegotiations in time

Predict expiration or total consumption to enable effective negotiations with suppliers

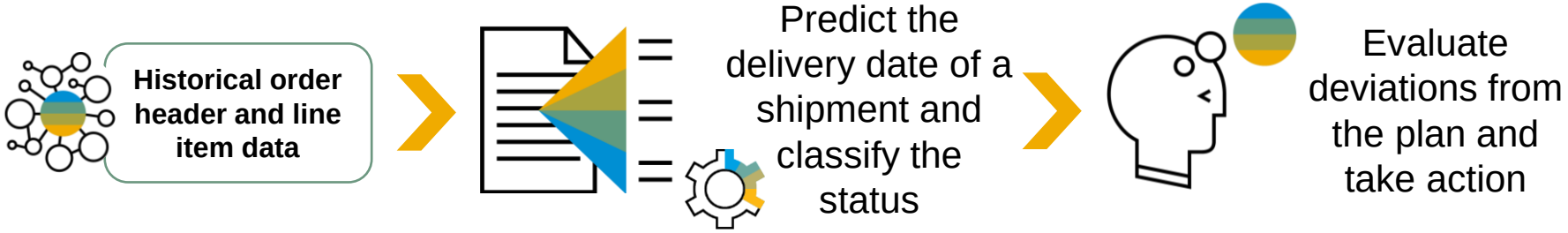
Improve efficiency of supplier renegotiation

Save costs
(better prices from the suppliers)

Enhance purchasing compliance

Supplier Delivery Prediction

Avoid delayed raw material availability or production rescheduling



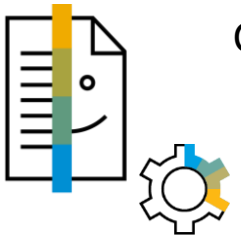
Maximize raw material availability without compromising your production planning

Improved material planning and delivery	Avoid production delays and re-scheduling	Reduce the manual effort for monitoring	Resolve issues earlier

SAP Predict Arrival of Stock in Transit

Predict and manage delivery delays

Historic time spans for stock transport orders



Classify shipments

Identify deviations in delivery dates

Predict forecast delivery date for each stock transport order item

Mitigate production or delivery risks by predicting delays for stock in transit

Higher customer satisfaction

(due to improved planning / scheduling accuracy)

Reduce stock-out of critical parts

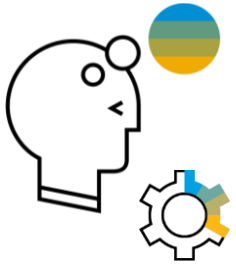
Reduce safety stock inventory

Demand-Driven Replenishment

Dynamic Buffer Level Adjustment

SAP S/4HANA Cloud only

Historic lead times of stock transfer orders and dependent factors, like transportation type, order size, etc.



Predict lead times for stock transfer materials

Adjust buffer levels based on predicted lead times

Learn from the past to optimize buffer levels and further improve the balance between customer service and bound capital

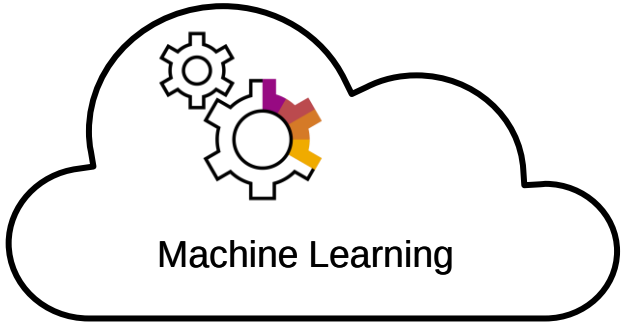
Ensure best customer service levels

Reduce bound capital

Early detection of slow moving stock

Identify and the predict the inventory that will not leave the warehouse

Goods movements
Demand history
Material master
Inventory



Slow goods

Identify and predict the inventory items that is moving slowly, or will move slowly, to help production planning and procurement.

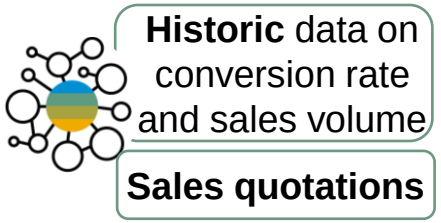
Reduce inventory carrying and warehouse management costs

Avoid/reduce scrap

Increase supply chain efficiency

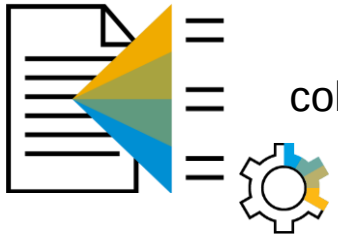
SAP Quotation Conversion Probability Rate

Improve Sales Forecasts



Historic data on conversion rate and sales volume

Sales quotations



Automatically collect and analyze sales data

Predict sales quotation conversion rate

Predict sales volume

Provide predictive insights into quotation conversion rates and accelerate sales actions leading to higher sales volume

Increase sales force efficiency

Improve quotation to order conversion rate

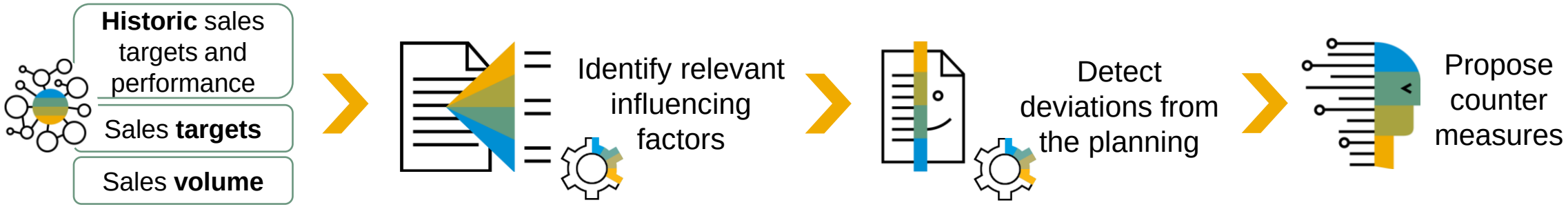
Increase achievable sales volume

Reduce sales administration costs

SAP S/4HANA
Cloud only

Sales Performance

Predict Sales Forecasts

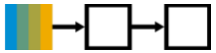


Predict sales forecasts to make faster decisions, increase sales volumes, and create more accurate sales plans

Higher revenue growth
Identify more achievable sales targets

Reduce Sales FTE Effort
on Pipeline Analysis and Reporting

Reduce sales training costs
Better support sales stuff with less work experience

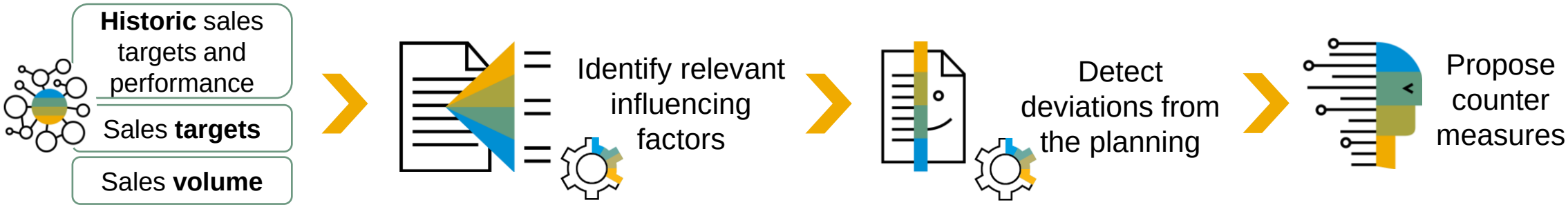


Improve consecutive processes
like Finance and Manufacturing/ Inventory with more reliable planning data

SAP S/4HANA
Cloud only

Delivery Performance

Predict Delivery Delay



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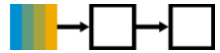
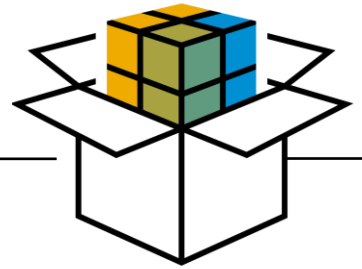


Improve consecutive processes
like Finance and Manufacturing/ Inventory with more reliable planning data

The goal: Build a harmonized solution for both worlds.

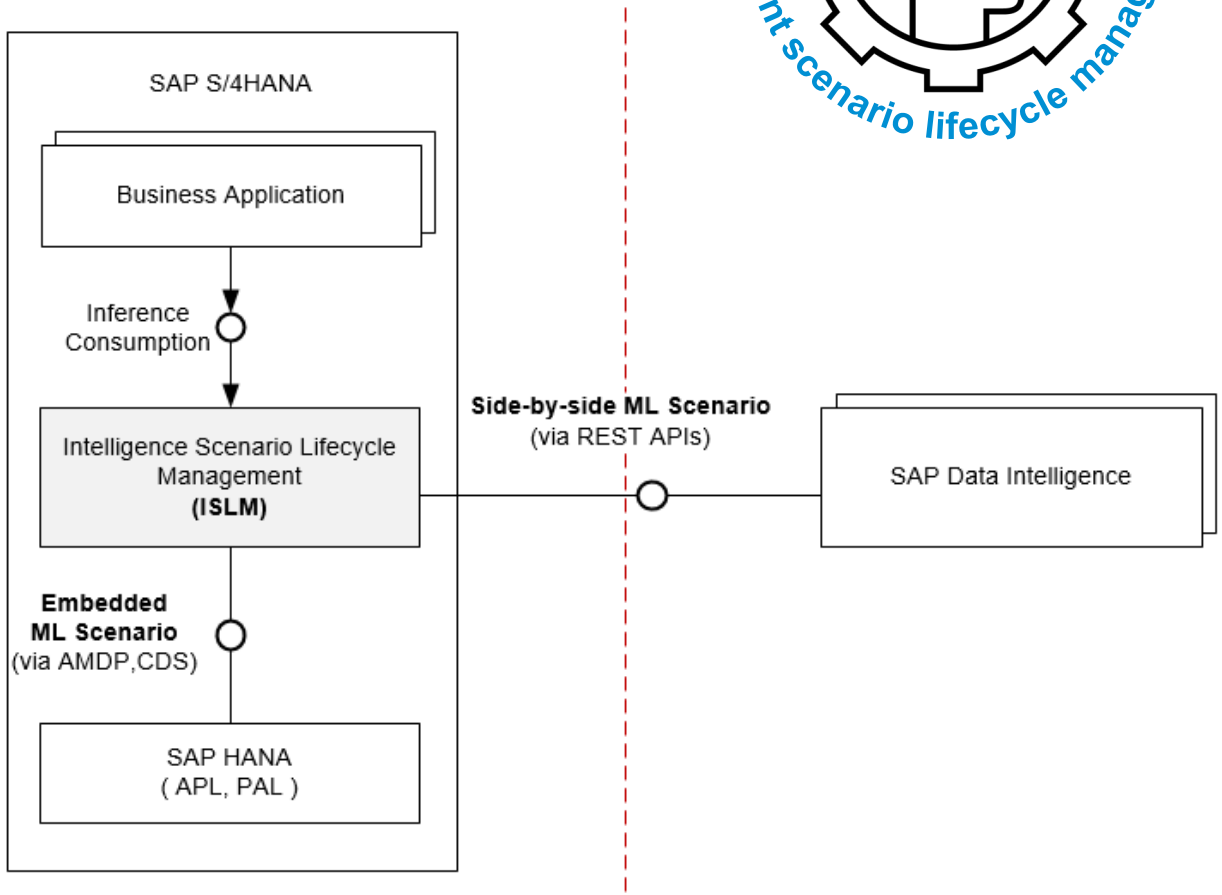


Standardized consumption and operation of machine learning scenarios for both flavors

Embedded scenario:
Machine learning provider (for example, ML with automated predictive library and predictive analysis library in SAP HANA) runs in same stack as business application (SAP S/4HANA).

Side-by-side scenario:
Machine learning provider runs in different stack (for example, the SAP Data Intelligence solution) than the business application (SAP S/4HANA).

ISLM Scope



Intelligent Scenario Lifecycle Management (ISLM) offers a harmonized solution to manage the lifecycle of the machine learning models **in the context of a business application consuming it**.

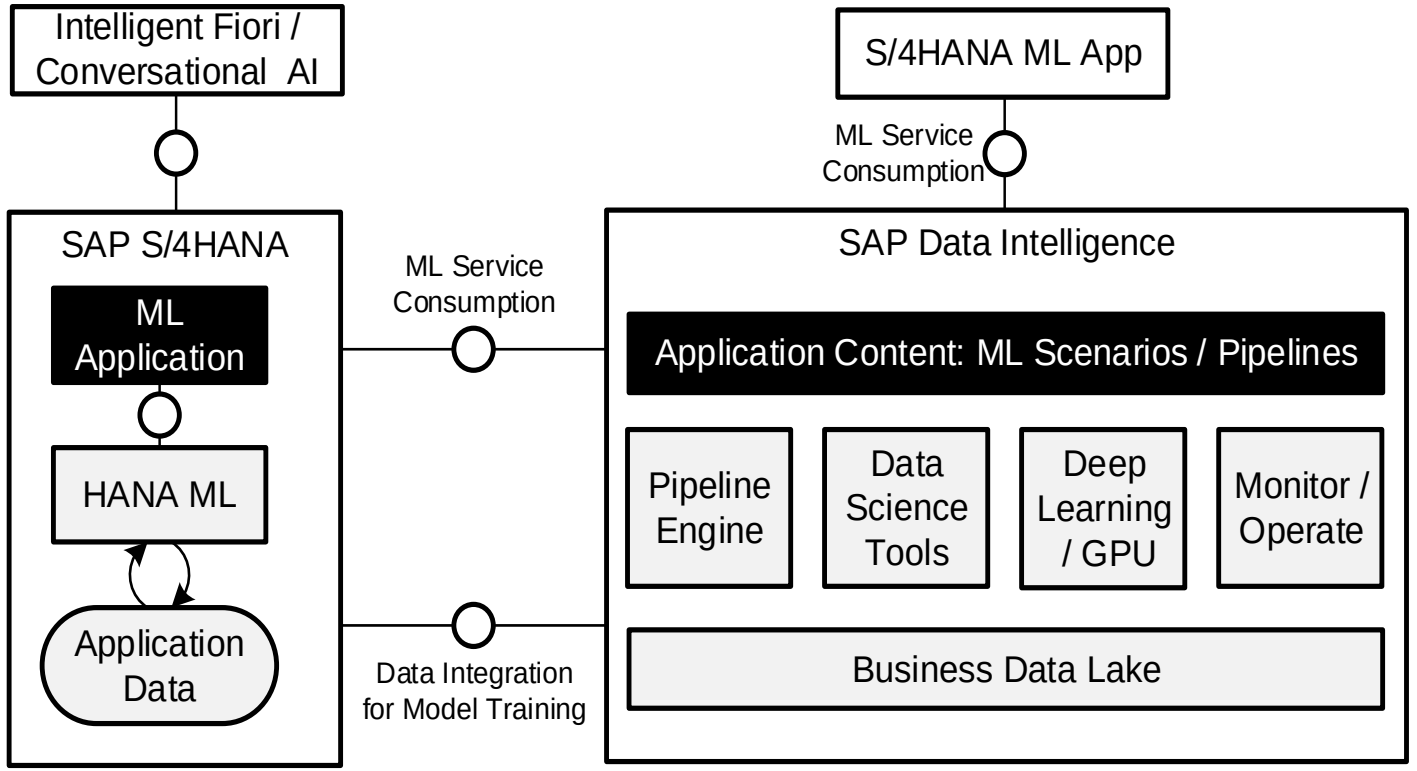
SAP Applications such as **SAP S/4HANA** create, ship (and transport) Intelligent Scenario use cases of type embedded **AND side-by-side.**

Customers can **create their own Intelligent Scenarios** to manage the model training, deployment and activation process for their intelligent business applications directly in ISLM (no SAP Analytics Cloud required).

Key values

- On same stack as consuming app (S/4HANA)
- One standardized framework and cockpit
- Lifecycle & binding consuming app and ML artefact in the context of business app integration and usage

The context: Machine Learning / Predictive Scenarios in SAP S/4HANA



EMBEDDED ML:

SIMPLE CASES LIKE TRENDING OR FORECASTING

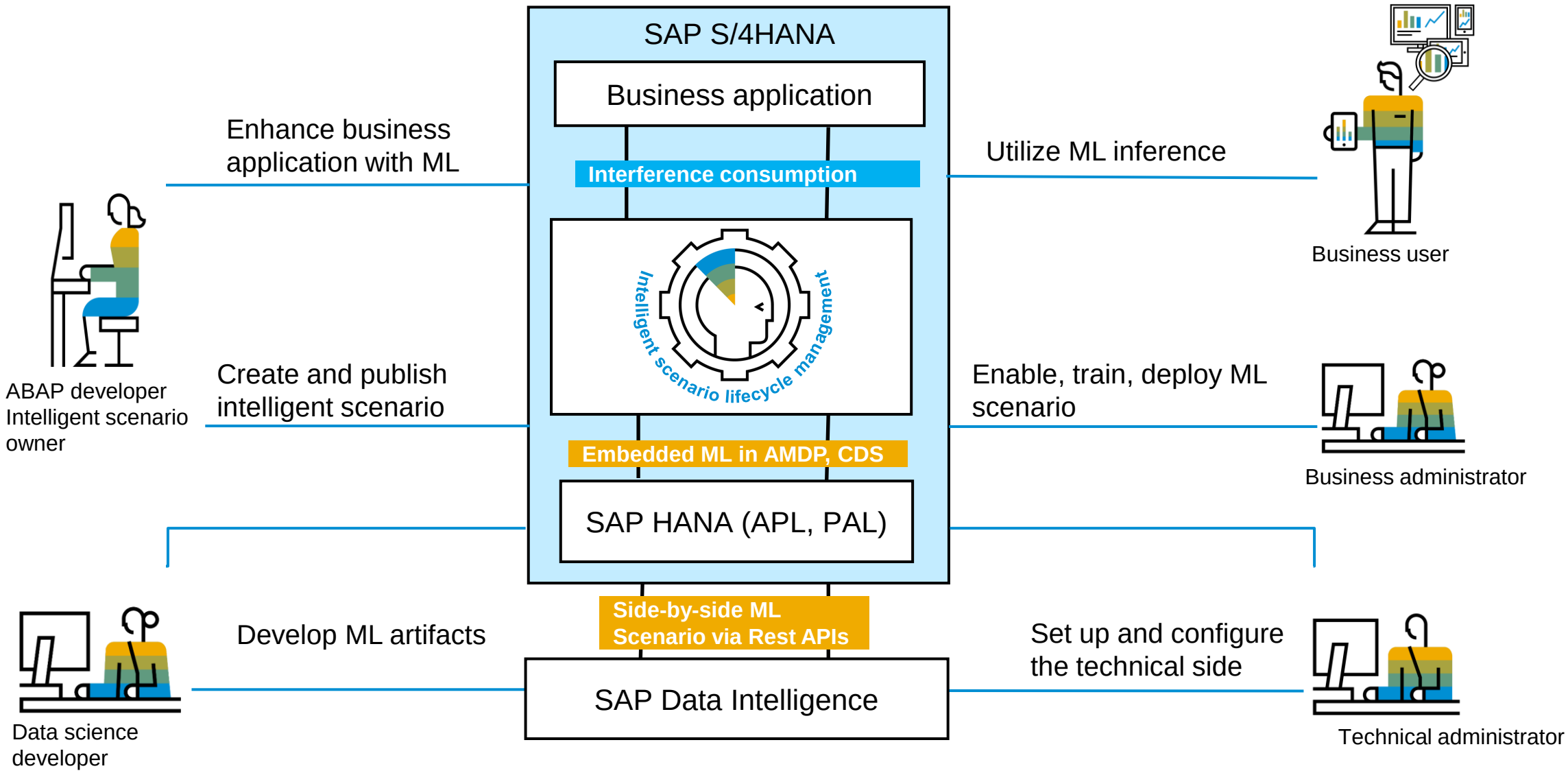
ALGORITHMS WITH LOW CPU/RAM/DATA DEMAND

SIDE-BY-SIDE ML:

DEEP LEARNING CASES LIKE IMAGE OR LANGUAGE PROC.

NEURAL NETWORKS WITH HIGH GPU/RAM/DATA DEMAND

Personas involved in development, consumption, and operation

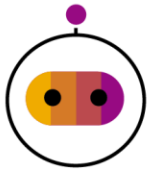


* Additional License -** Additional Installation and license – ᶜ(Partially) Compatibility Scope

Purchase Order Delays Usecase

How Intelligent Technologies Help Account Receivable Accountants YouTube Link

BOT looks for incoming remittance advices and loads them into S/4HANA



Intelligent RPA

1

Payment details are automatically extracted from PDF file and payment advices are created in S/4HANA

Machine Learning

2

Machine Learning automatically matches payments with open receivables and clears payments

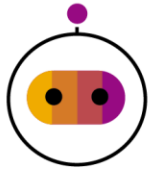
Machine Learning

3

Situation Handling

System ALERTS when invoices due are excluded from the payment advice

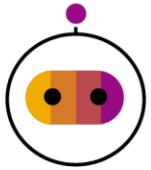
4



Intelligent RPA

After contacting the customer and creating a dispute case, BOT automatically sends out email confirmation with the case number

5



Intelligent RPA

BOT monitors inbox for customer replies and attaches these directly to the dispute case

SAP S/4HANA

Ted, Accounts Receivable Manager

AI Use Cases Used In Demo

Technology | ID	Use Case For AR Accountant
IRPA | 300	Manage Payment Advice
ML | 078	Payment Advice Extraction **(ML service)**
ML | 001	Cash Application **(ML service)**
SIT | 009	Invoice Skipped on Payment Advice
IRPA | 305	Dispute Management – Email Notification to Customer
IRPA | 305	Dispute Management – Manage Customer Email Response

Technology | ID	Use Case For Sales Manager
IRPA | 441	Create Sales Inquiry
ML | 026	Sales Performance Prediction **(Embedded ML)**
ML | 024	Quotation Conversion Probability Rate **(Embedded ML)**
SIT | 067	Sales Quotation Is Close to Expiring
IRPA | 584	Automatic Creation of Sales Orders from Excel
IRPA | 567	Manage Sales Order – Automated Upload Down Payments
ML | 025	Delivery Performance / Delivery in Time **(Embedded ML)**

ML service – additional price tag

Embedded ML – included in S/4 price tag

ML = Machine Learning

IRPA = Intelligent Robotic Process Automation

SIT = Situation Handling

Purchase Order Confirmations

Automated Predictive Under the Hood

Predictive Power and Predictive Robustness

Predictive Power

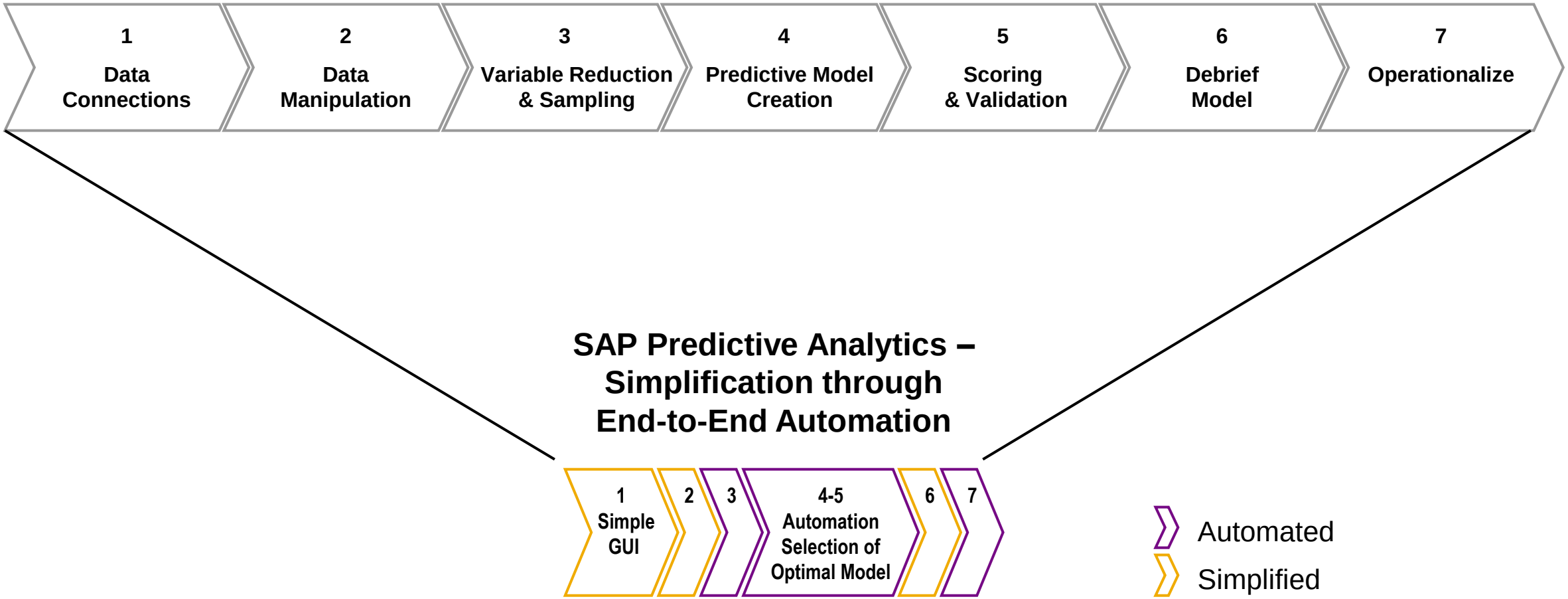
- The KI measure the capacity of the Input Variables (Explanatory Variables) to explain the target.
- KI ranges from 0 (a pure random model) to 1 (a perfect ideal model)
- What's a good KI? It completely depends on the business case and available data

Predictive Robustness

- The KR measures the ability of a model to display the same level of performance on new data sets as training ones.
- The KR ranges from 0 to 1
- What is a good KR? 0.95 and above for models expected to be applied.

Machine Learning automation

Decreases time to deploy by up to 70%



Value of Predictive Automation for non-Data Scientists

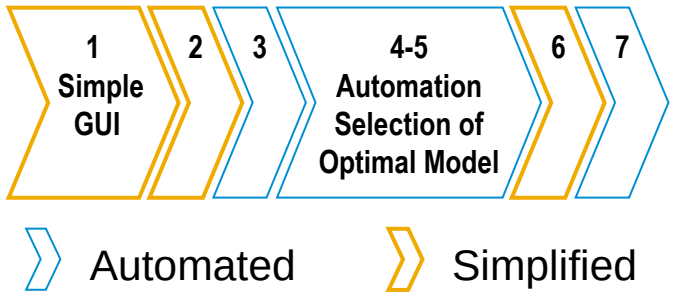
Decreases time to deploy by up to 70%

Strengthen Customer Relationships with Predictive Modeling
SAP Analytics
1,086 views

Live example

Before: 6 people x 8 weeks = 20 models
After: 1 person x 7 days = 400 models

SAP Predictive Analytics – Simplification through End-to-End Automation



For the Non-Data Scientist

No Coding, Just Configuration!

Forecast Model Bursting

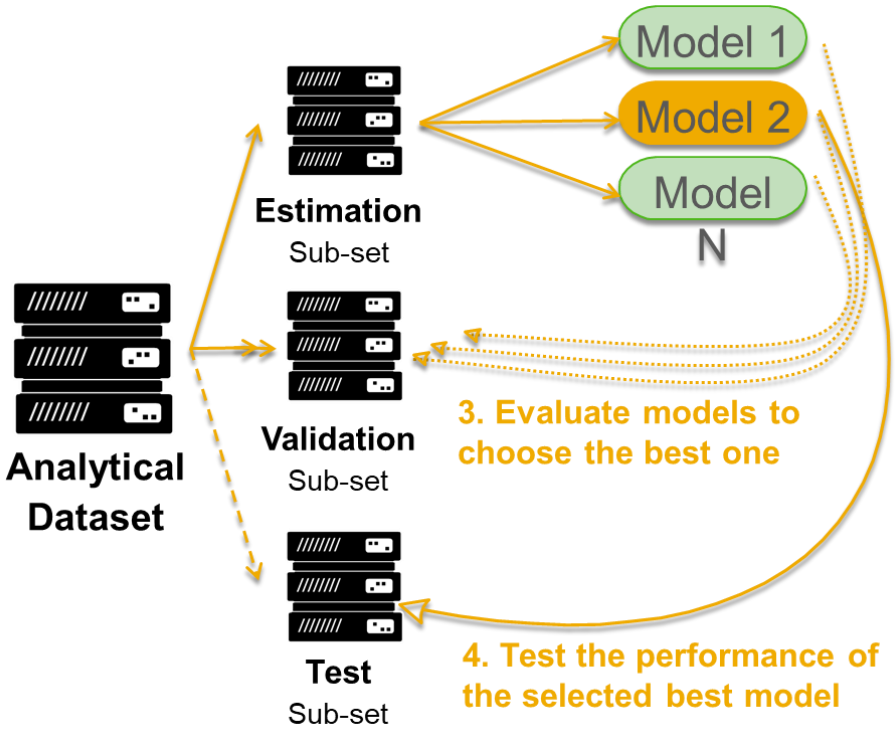
Ability to create 1,000's of individual forecast models from one automated job.

Terminology

Term	Definition
Variable	Logical representation of a data column in a tabular structure It has some basic atritbutes (name, data type, key, value type, …) Value type can be: nominal, ordinal, continuous, …
Nominal variable	Qualitative variable taking discrete values
Ordinal variable	Nominal variable where the order of the values is semantically meaningful (eg: weekday=1,2,3,…)
Continuous variable	Numerical variables on which basic statistics can be computed (min, max, variance, …)
Category	Discrete typed value which a variable may contain The data type can either string, number, date, segment, … For continuous variables, values are binned into equally sized segment [x,y]
KxMissing	PA doesn't perform any data imputation on discrete missing values and considers it as a regular category (namely KxMissing) all along the modeling process
KxOther	For nominal variable , PA has a special category grouping all irrelevant categories w.r.t the target
KI (predictive power)	KI measures the model capacity to explain the target from 0 to 1 (1 as perfect model) KI = 2 *AUC – 1 (AUC: Area Under the Curve)
KR (predictive confidence)	KR measures the model capacity to be generalized on new data from 0 to 1

Behind the scene: SAP automated algorithms

- Automatic data preparation (NULL value Classificaion, etc.)
- No over fitting
- Smallest complexity
- No need to balance the dataset using a stratified sample
- No variables pre-selection
- Correlated variables can be all kept
- Use as many relevant variables as available
- Use as many records as possible



Time Series Forecasting

Automated Time Series Models

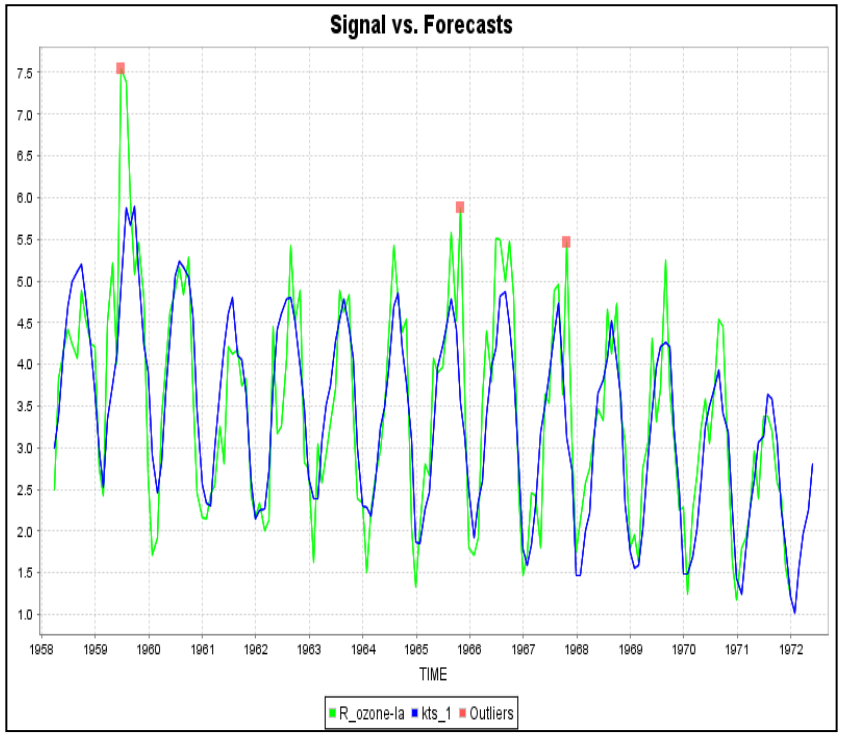
A time series has the following components:

Signal = Trend + Seasonal/Periodic + Fluctuation + *Residual*

There are 3 automated steps to developing a time series model:

1. Separate the signal into its components:
   - Trend
   - Seasonality and/or Periodicity
   - Predictable fluctuations

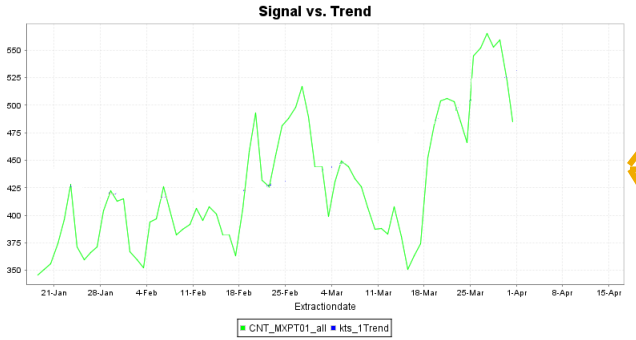
2. Build a model that describes the past data
3. Predict future values for a desired range



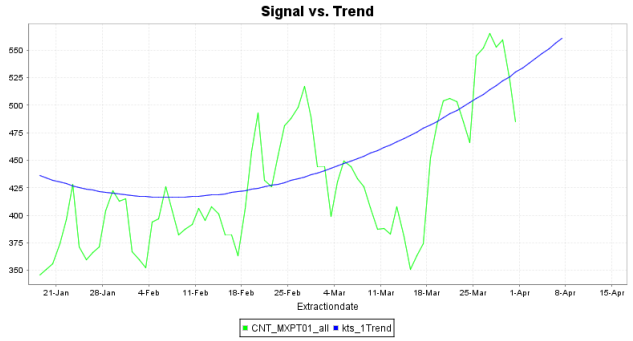
Periodic Component - Seasonal

- The seasonal variables are evaluated if sufficient time span is available in the training data
- The following seasonalities are created and evaluated automatically:
  - Seconds (S)
  - Minute (Mi)
  - Hour (H)
  - Day of Week (DoW)/ of Month (DoM)/ of Year (DoY)
  - Week of Month (WoM)/ of Year (WoY)
  - Month (M) / of Quarter (MoQ)/ of Year (MoY)
  - Quarter of Year (QoY)
  - Year (Y)

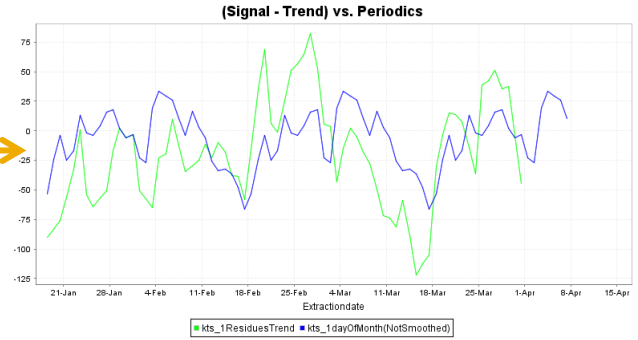
SAP Automated Time Series Models



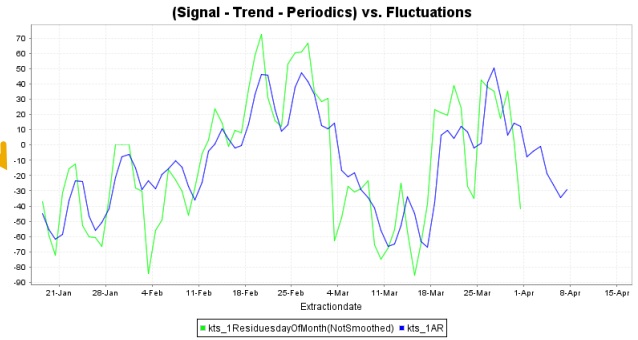
Original signal



Test whether a **trend** can be fitted to the data

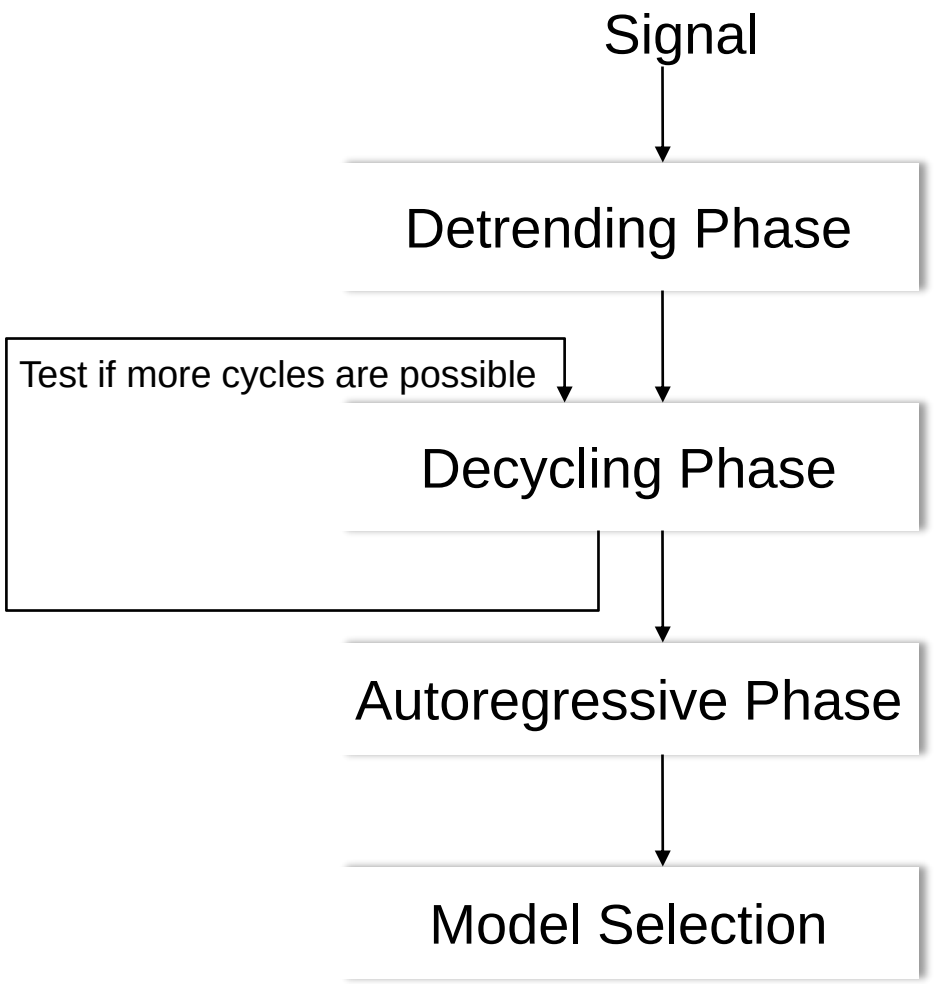


If a trend is detected, it will be subtracted from the signal and **cycles** will be fitted



The trend and cycles are subtracted from the signal and **fluctuations** are fitted

Choosing the Best Model



Compute a set of candidate trends (8)

Detect a cyclic component on each de-trended signal (8)

Add autoregressive models on signal residuals (up to 8)

Select the best Model
(from 8 candidates)

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