



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

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CUSTOMER



THE BEST RUN 

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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

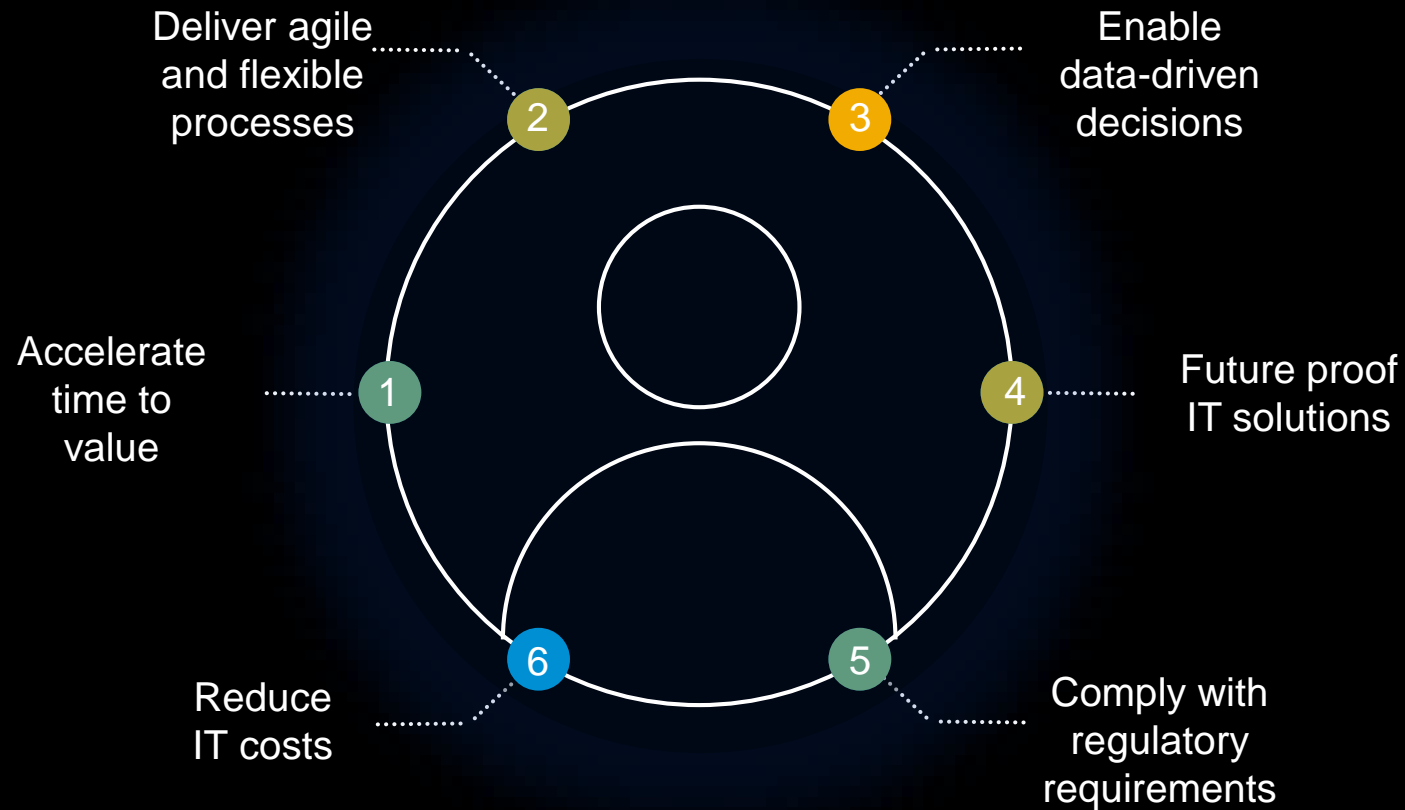
4

Operationalizing the Intelligent Enterprise

Intelligent Scenario Lifecycle Management (ISLM)

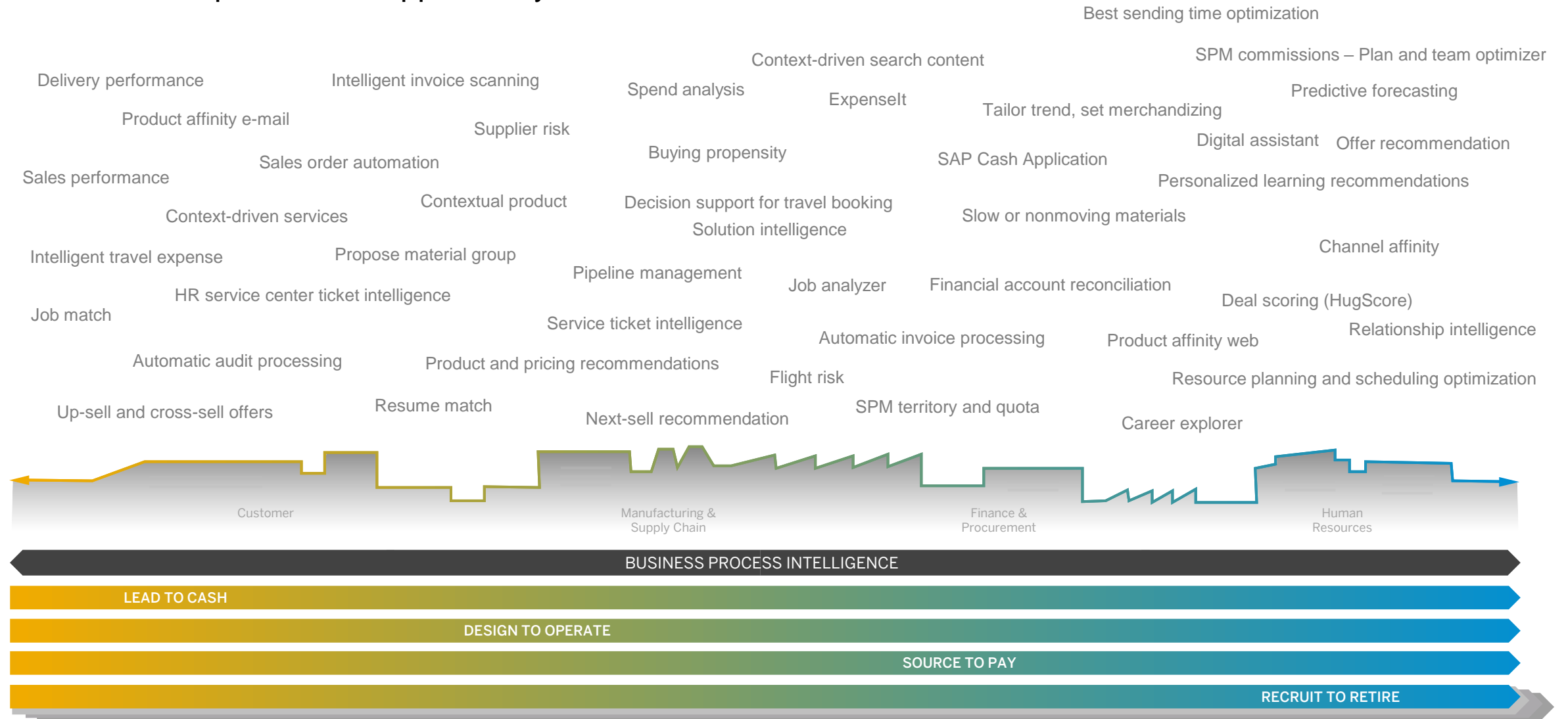
Priorities for an intelligent enterprise

The
goal



Enterprise artificial intelligence

AI in business processes supported by SAP software



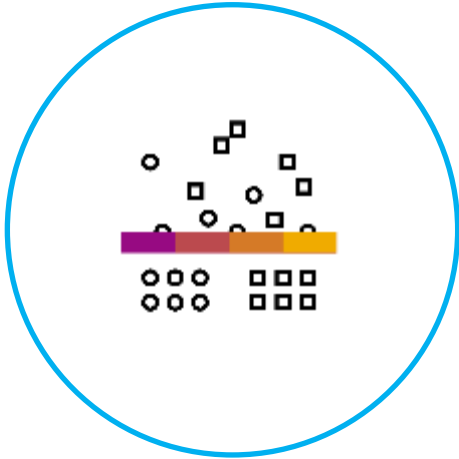
A **New** Way of Thinking

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)



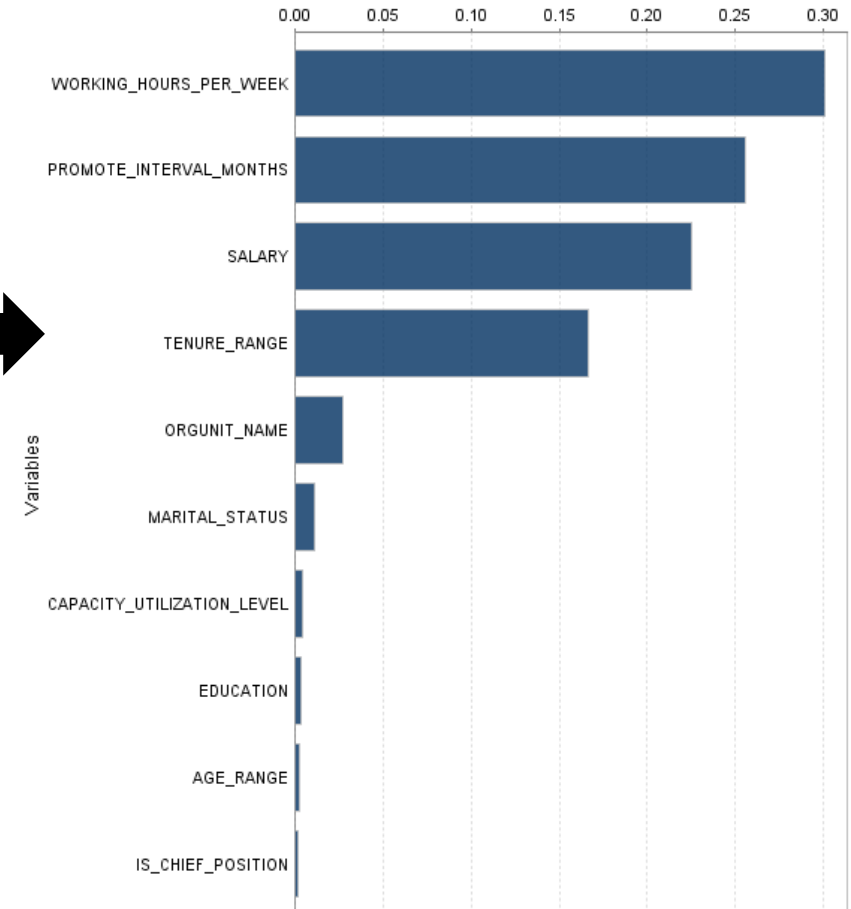
1) Entity:  Who (Employee)

2) Target:  will Leave Company?

3) Descriptive Attributes:

<input type="checkbox"/> Gender	<input type="checkbox"/> Marital Status
<input type="checkbox"/> Tenure	<input type="checkbox"/> Training Hours Per Week
<input type="checkbox"/> Age Range	
<input type="checkbox"/> Department	
<input type="checkbox"/> Salary	
<input type="checkbox"/> Last Promotion	

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)



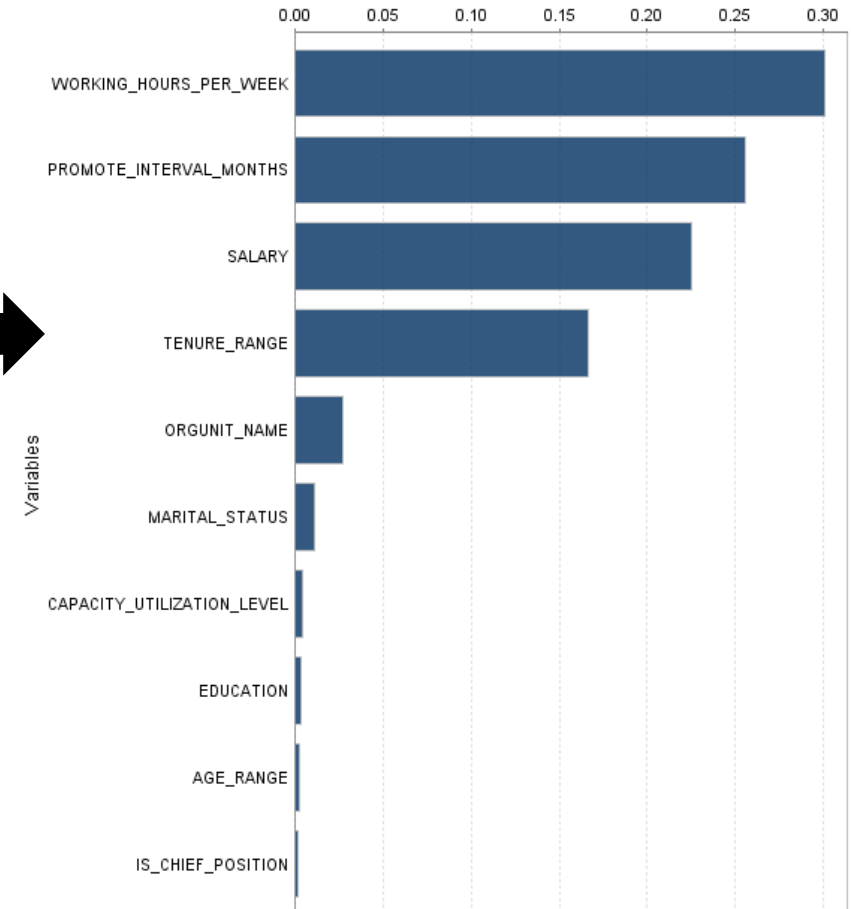
1) Entity:  Who (Customer)

2) Target:  will stop buying from us?

3) Descriptive Attributes:

<input type="checkbox"/> Gender	<input type="checkbox"/> Spending Habit
<input type="checkbox"/> Tenure	<input type="checkbox"/> 30 days prior (by Product)
<input type="checkbox"/> Age Range	<input type="checkbox"/> FICA Score
<input type="checkbox"/> Salary	<input type="checkbox"/> Own or Rent
<input type="checkbox"/> Marital Status	


Predictive Outcome Influencing Factors





Use Case – Additional Capabilities Example

1) Entity: **Shopper**

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

- 3) Descriptive Attributes:
- | | |
|--|--|
| <input type="checkbox"/> Location | <input type="checkbox"/> Customer behaviors list |
| <input type="checkbox"/> Marital Status | <input type="checkbox"/> ... |
| <input type="checkbox"/> Occupation | <input type="checkbox"/> ... |
| <input type="checkbox"/> Has children? | <input type="checkbox"/> ... |
| <input type="checkbox"/> Owns pets? | <input type="checkbox"/> ... |
| <input type="checkbox"/> Spending Habit 30 days prior (by Product) | <input type="checkbox"/> ... |
| <input type="checkbox"/> Recency | <input type="checkbox"/> ... |
| <input type="checkbox"/> Frequency | <input type="checkbox"/> ... |
| <input type="checkbox"/> Monetary - \$ | <input type="checkbox"/> ... |



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



SALES & MARKETING



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



OPERATIONS



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



FRAUD AND RISK



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



FINANCE AND HR



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



OTHER



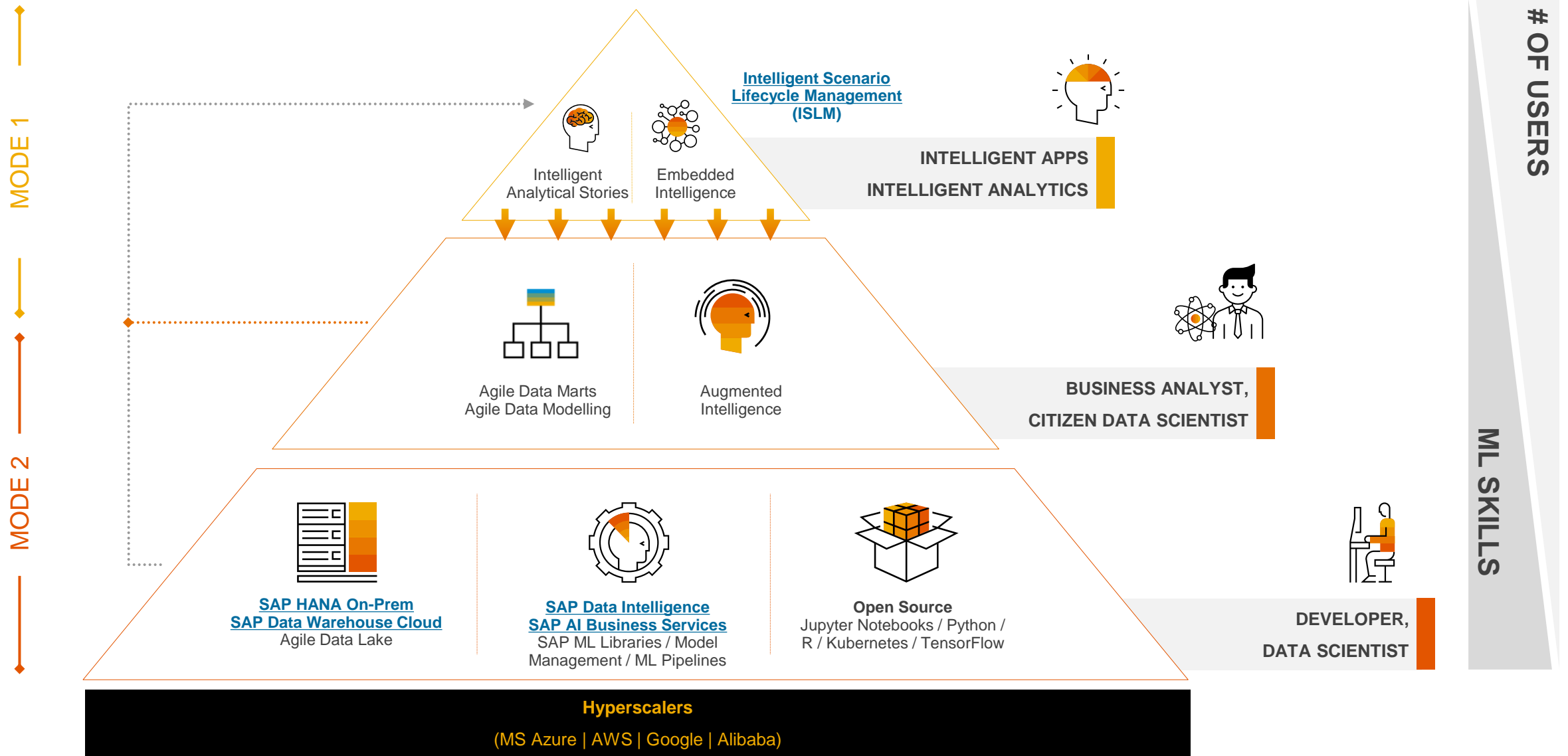
- <enter your business ? here>

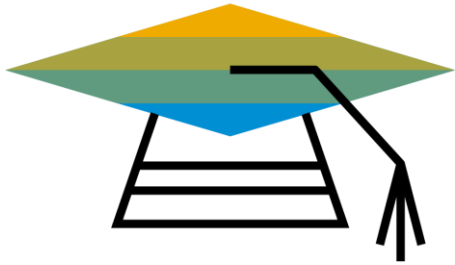
**Intelligent
Enterprises**

**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

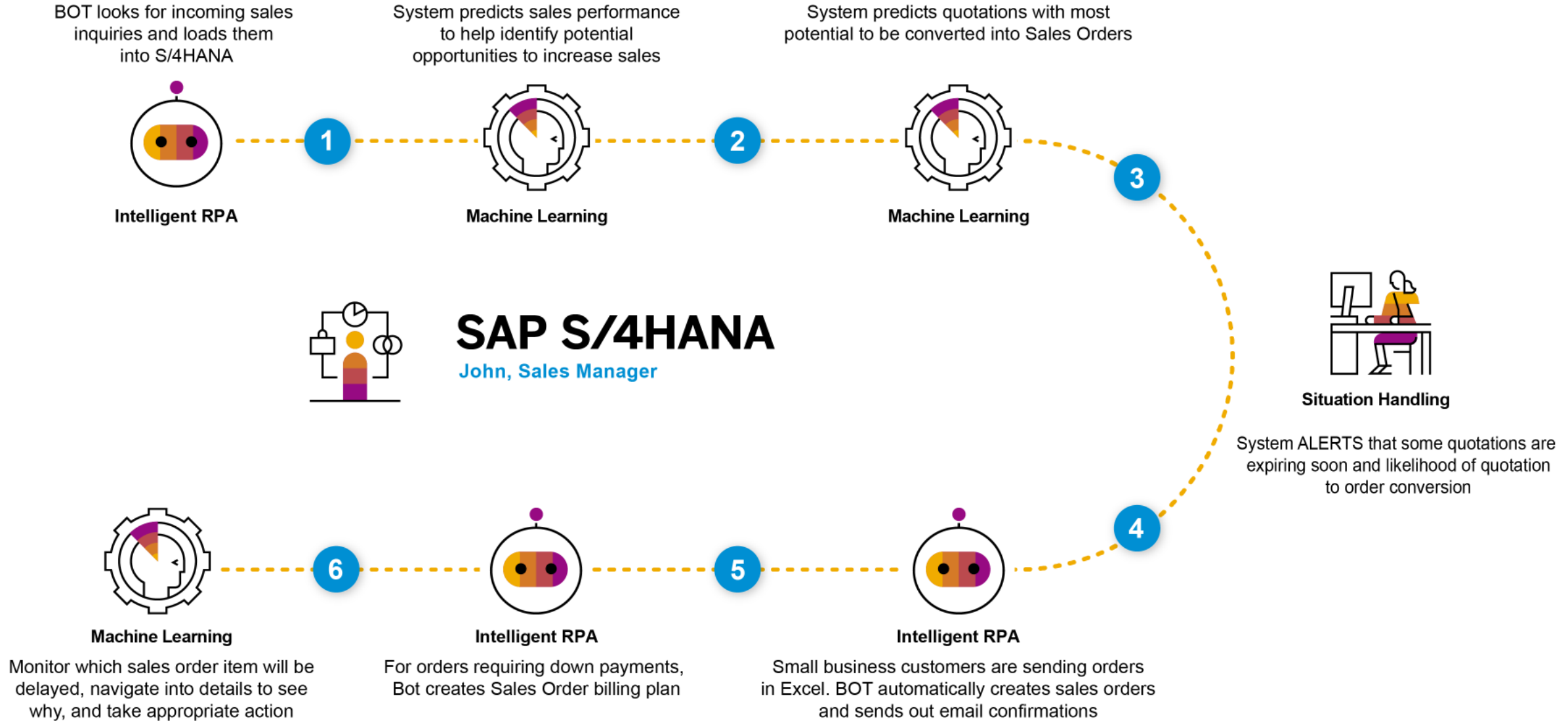
1. **Create sales inquiries**
2. **Predict sales performance**
3. **Predict quotation to order conversion rate**
4. **Alert to expiring quotation**
5. **Create sales orders**
6. **Create payment plans**
7. **Predict delivery delays**




We have been reactive in managing delivery delays and need to be more proactive but lack the right insights

There must be a less manual way to create sales inquiries!

How Intelligent Technologies Help Sales Managers [YouTube link](#)





With the right insights, I'd like to proactively manage delivery delays

It would be great to speed up Purchase Requisition processing

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](#)

RPA BOT creates Purchase Requisitions from Excel and loads them into S/4HANA



Intelligent RPA

1

Machine Learning enables intelligent, efficient Purchase Requisition approvals



Machine Learning

2

BOT extracts Purchase Order confirmation details from incoming emails to update the PO



Intelligent RPA

3



SAP S/4HANA

Sam, Operational Purchaser



Situation Handling

System notifies about missing PO confirmations to avoid late delivery

4



Machine Learning

Machine Learning predicts a shipment's delivery date to prevent production delays and re-scheduling

5

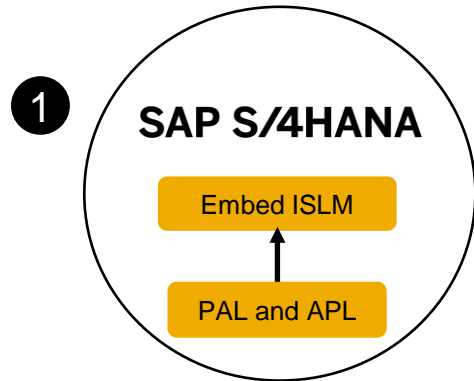


Situation Handling

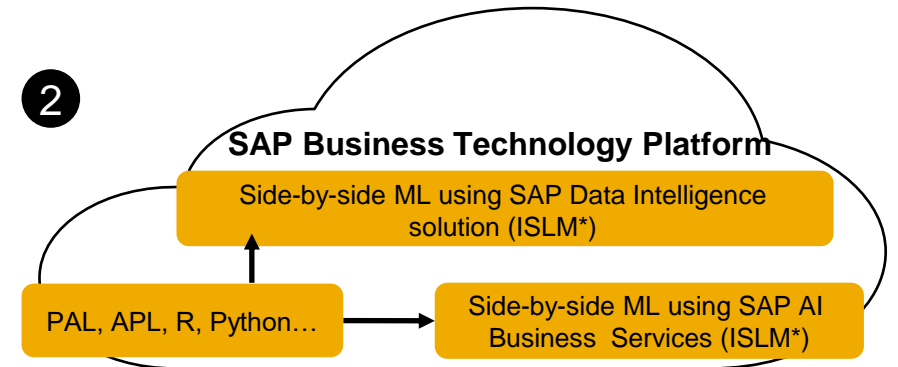
System alerts about quantity deficit for a delivery and proposes alternate suppliers

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

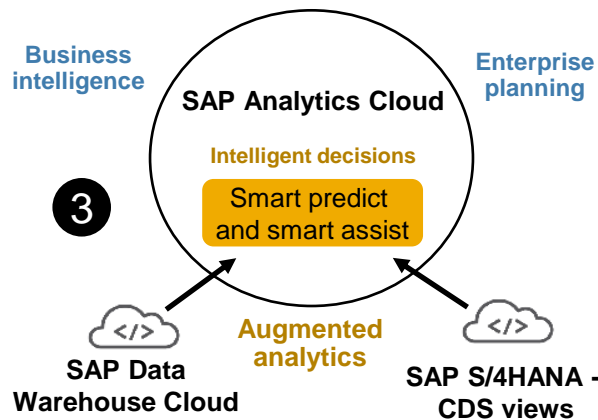
Embedding predictive algorithms in SAP S/4HANA (embedded)



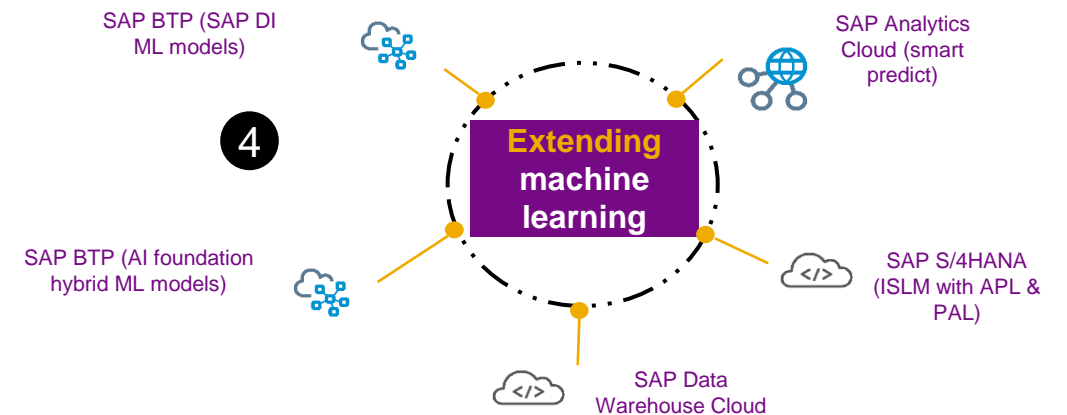
Consuming predictive and ML services from SAP Business Technology Platform (side by side)



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 **(Cash Application)**

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](#)

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](#)

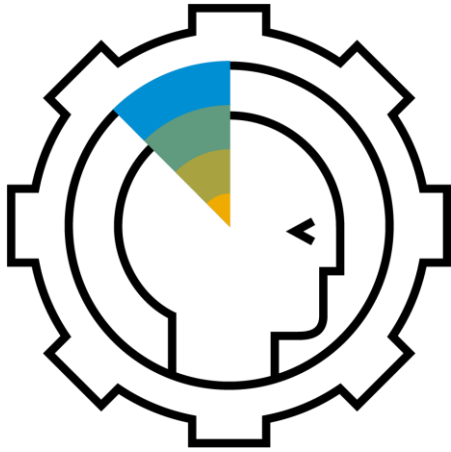
Intelligent Intercompany Reconciliation

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

- 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

Deep learning

- 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

Predictive analytics

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

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

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)

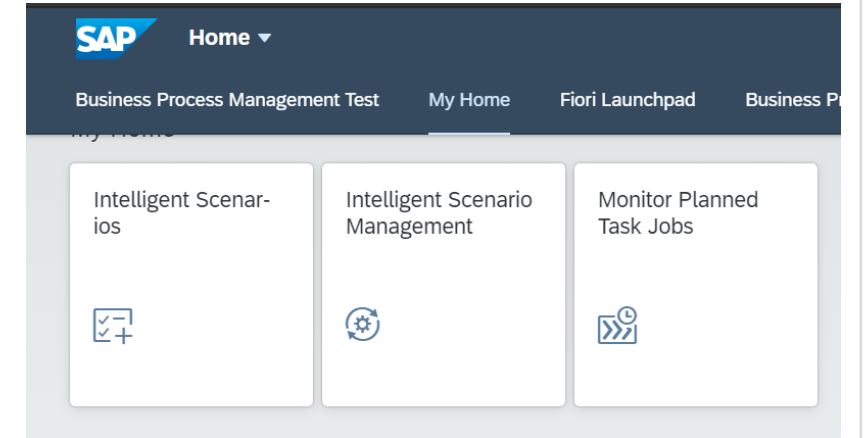


ISLM: Standardized integration of AI in SAP S/4HANA



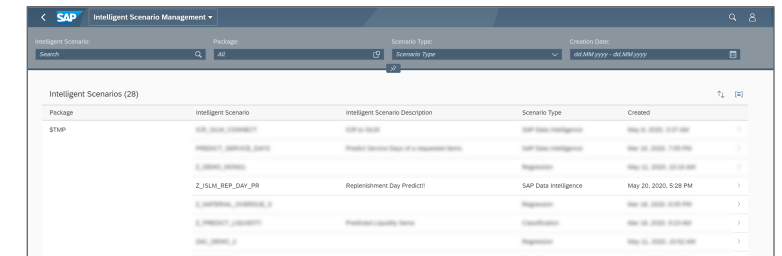
What is ISLM?

- “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



The screenshot shows a table titled 'Intelligent Scenarios (28)'. The table has columns for Package, Intelligent Scenario, Intelligent Scenario Description, Scenario Type, and Created. The data is as follows:

Package	Intelligent Scenario	Intelligent Scenario Description	Scenario Type	Created
STMP	SAP Data Intelligence	May 20, 2020, 5:28 PM
...
...
...
...
...



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:

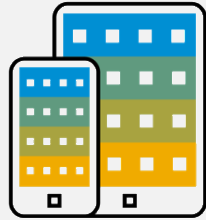
APL

- 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

The screenshot displays the SAP Intelligent Scenarios management interface. At the top, the SAP logo and 'Home' are visible. A navigation bar includes 'My Home', 'Analysis Path Framework Modeling', 'KPI Design', 'Query Design', 'Predictive Models', and 'Intelligent Scenarios'. Below this, two menu items are shown: 'Intelligent Scenario Management' and 'Intelligent Scenarios', with the latter highlighted by a red box. The main content area shows a search bar and filters for 'Intelligent Scenario', 'Package', 'Status', 'Scenario Type', and 'Date'. A table of 37 items is displayed with columns for Package, Intelligent Scenario, Status, Intelligent Scenario Description, Scenario Type, and Created. A 'Create' dropdown menu is highlighted in red, and a sub-menu is open, showing options for 'Embedded' and 'Side-by-Side', with 'Side-by-Side' also highlighted in red.

Package	Intelligent Scenario	Status	Intelligent Scenario Description	Scenario Type	Created
\$TMP		OK		SAP Data Intelligence	Apr 8, 2020, 3:58 PM
		OK		SAP Data Intelligence	
		OK		SAP Data Intelligence	
		OK	File & Settings	SAP Data Intelligence	
FIN_ICA_MATCH	FIN_ICA_MATCH	OK	FIN_ICA_MATCH	SAP Data Intelligence	
\$TMP		OK		SAP Data Intelligence	2020, 3:58 PM

IMG configuration for ISLM: Connection to SAP Data Intelligence

Structure

- > UI Technologies
- > General settings
- > Mobile Infrastructure
- > Business Warehouse
- > Business Planning and Consolidation
- ✓ Application Server
 - > Installation Services
 - ✓ Basis Services
 - > SNOTE
 - Intelligentes Szenario-Lebenszyklusmanagement
 - Seviceverbindungen für Infrastruktur des maschinellen Lernens
 - Create Connection to SAP Data Intelligence**
 - Maintain Connection for an Intelligent Scenario
 - Konfiguration für Jobeinplanung
 - Synchronization Interval Definition
 - Resource Limit Configuration

Create a RFC destination to the SAP Data Intelligence tenant

RFC Destination: ZTEST_DI_AUTH

Connection Type: G HTTP Connection to External Server Description

Description

Description 1: SAP Data Intelligence Platform Tenant Connection

Description 2: Tenant Type: Canary

Description 3:

Administration Technical Settings Logon & Security Special Options

Target System Settings

Host: vsystem.ingress.dh-lmwn8udx0.dh-canary.shoot.live.k8s-han Port:

Path Prefix:

HTTP Proxy Options

Global Configuration

IMG configuration for ISLM: ISLM mapping table

Structure

- > UI Technologies
- > General settings
- > Mobile Infrastructure
- > Business Warehouse
- > Business Planning and Consolidation
- Application Server
 - > Installation Services
 - Basis Services
 - > SNOTE
 - Intelligentes Szenario-Lebenszyklusmanagement
 - Seviceverbindungen für Infrastruktur des maschinelles Lernen
 - Create Connection to SAP Data Intelligence
 - Maintain Connection for an Intelligent Scenario
 - Konfiguration für Jobeinplanung
 - Synchronization Interval Definition
 - Resource Limit Configuration

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

ISLM Connection Mapping

<input type="checkbox"/>	Select Data For Deletio...	Intelligent Scenario Name	Connection Information
<input type="checkbox"/>	<input type="checkbox"/>	ZVIS_ISLM_AUTOFILL_M	ZISLM_DI_CON_MM
<input type="checkbox"/>	<input type="checkbox"/>	Z_ISLM_REP_DAY_PR	ZTEST_DI_AUTH

Intelligent Scenario Management app

SAP Home ▾

< My Home Analysis Path Framework Modeling KPI Design Query Design Predictive Models Intelligent Scenarios

Intelligent Scenario Management Intelligent Scenarios

< **SAP** Intelligent Scenario Management ▾

Intelligent Scenario: Search Package: All Scenario Type: Scenario Type Creation Date: dd.MM.yyyy - dd.MM.yyyy

Intelligent Scenarios (28)

Package	Intelligent Scenario	Intelligent Scenario Description	Scenario Type	Created
\$TMP	ISL_SCEN_CONNECT	ISL to ISL	SAP Data Intelligence	May 19, 2020, 5:27 AM
	PRODUCT_SERVICE_DAYS	Product Service Days of a required item	SAP Data Intelligence	May 19, 2020, 7:08 PM
	Z_ISLM_REP_DAY_PR	Replenishment Day Predict!!	SAP Data Intelligence	May 20, 2020, 5:28 PM
	Z_MATERIAL_SERVICE_D		Regression	May 19, 2020, 6:08 PM
	Z_PRODUCT_SERVICE_D	Product Service Days	Classification	May 19, 2020, 6:23 AM
	ISL_SCEN_2		Regression	May 19, 2020, 6:10 AM

Intelligent Scenario Management app – Train (1/3)

The screenshot illustrates the 'Train' process in the SAP Intelligent Scenario Management app. On the left, the 'Versions (2)' list shows 'Version 3' selected, with a 'Train' button highlighted in red. A yellow arrow points to the 'Train' dialog box on the right. The dialog displays the following information:

- Intelligent Scenario Version**
 - Intelligent Scenario: Z_ISLM_REP_DAY_PR
 - Version: 3
 - Description: Changes in Metrcis
 - Type: SAP Data Intelligence
 - Created: May 20, 2020, 5:34 PM
- Configurations**
 - Description: MyDescription
- Parameters (1)**

Name	Value
ArtifactReferenceName*	MyArtifactName

At the bottom of the dialog, the 'Train' button is highlighted in red, and a 'Cancel' button is also visible.

Intelligent Scenario Management app – Train (2/3)

See status change:

- Scheduled
- Training
- Completed

Check the execution report after completion

Execution	Status	Description	Executed on
Execution 7	Scheduled	MyDescription	May 26, 2020, 10:18 PM
Execution 6	Completed	Test MS	May 26, 2020, 3:40 PM
Execution 5	Completed	run1	May 26, 2020, 11:41 AM
Execution 4	Completed	test	May 26, 2020, 9:58 AM
Execution 7	Training	MyDescription	
Execution 6	Completed	Test MS	May 26, 2020, 3:40 PM
Execution 7	Completed	MyDescription	May 26, 2020, 10:18 PM

Intelligent Scenario Management app – Train (3/3)

Training Execution Result – Execution Report

The screenshot displays the SAP Intelligent Scenario Management app interface for an execution report. The title bar shows 'SAP Execution Report' with a dropdown arrow. Below the title, the report identifier 'Z_ISLM_REP_DAY_PR - Version 3 - Execution 7' is shown. The report is divided into three tabs: 'Execution Report' (selected), 'Parameters', and 'Debrief'. The 'Execution Report' tab contains the following information:

Execution Status:	Executed on:	Last Changed At:
Completed	May 26, 2020, 10:18 PM	May 26, 2020, 10:28 PM
Description:	Created By:	
MyDescription	SCHLOTTE	

The 'Parameters' tab is currently selected and shows a table with the following data:

Name	Value
ArtifactReferenceName	MyArtifactName

The 'Debrief' tab is also visible and contains a section for 'General Additional Info' with the following data:

Key	Value
Quality	4.5
Coverage	2.5
RMSE	25.72
n	1000.0
Data Power	7.0

Intelligent Scenario Management app – Deploy

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

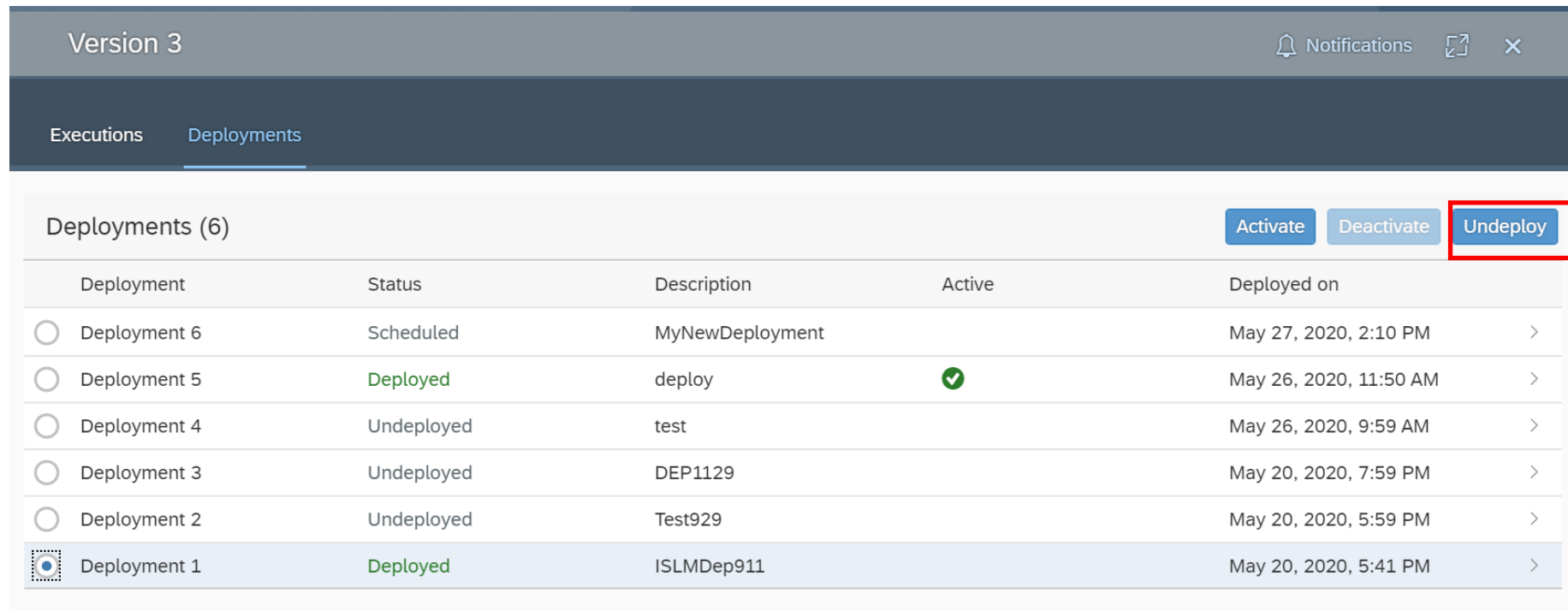
The screenshot displays the 'Version 3' interface of the Intelligent Scenario Management app. The top navigation bar includes 'Notifications' and window control icons. Below the navigation bar, there are two tabs: 'Executions' (selected) and 'Deployments'. The 'Executions (7)' list shows seven entries, with 'Execution 7' selected and its status 'Completed'. A red box highlights the 'Deploy' button in the top right corner of the 'Executions' list. An inset window shows the 'Deployments (6)' list, with 'Deployment 6' selected and its status 'Scheduled'. The 'Deployments' list includes columns for 'Deployment', 'Status', 'Description', 'Active', and 'Deployed on'. The 'Active' column for 'Deployment 6' shows a green dot, indicating it is active.

Execution	Status	Description	Executed on
<input checked="" type="radio"/> Execution 7	Completed	MyDescription	May 26, 2020, 10:18 PM
<input type="radio"/> Execution 6	Completed		
<input type="radio"/> Execution 5	Completed		
<input type="radio"/> Execution 4	Completed		
<input type="radio"/> Execution 3	Completed		
<input type="radio"/> Execution 2	Failed		
<input type="radio"/> Execution 1	Completed		

Deployment	Status	Description	Active	Deployed on
<input type="radio"/> Deployment 6	Scheduled	MyNewDeployment	<input checked="" type="checkbox"/>	May 27, 2020, 2:10 PM
<input type="radio"/> Deployment 5	Completed		<input checked="" type="checkbox"/>	
<input type="radio"/> Deployment 4	Completed		<input checked="" type="checkbox"/>	
<input type="radio"/> Deployment 3	Completed		<input checked="" type="checkbox"/>	
<input type="radio"/> Deployment 2	Completed		<input checked="" type="checkbox"/>	
<input type="radio"/> Deployment 1	Completed		<input checked="" type="checkbox"/>	

Intelligent Scenario Management app – Undeploy

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



The screenshot shows the 'Version 3' interface of the Intelligent Scenario Management app. The 'Deployments' tab is active, displaying a list of six deployments. The 'Undeploy' button is highlighted with a red box. The table below shows the details of the deployments.

Deployment	Status	Description	Active	Deployed on
Deployment 6	Scheduled	MyNewDeployment		May 27, 2020, 2:10 PM
Deployment 5	Deployed	deploy	✓	May 26, 2020, 11:50 AM
Deployment 4	Undeployed	test		May 26, 2020, 9:59 AM
Deployment 3	Undeployed	DEP1129		May 20, 2020, 7:59 PM
Deployment 2	Undeployed	Test929		May 20, 2020, 5:59 PM
Deployment 1	Deployed	ISLMDep911		May 20, 2020, 5:41 PM

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.

Version 3

Notifications

Executions Deployments

Deployments (6)

Activate Deactivate Undeploy

Deployment	Status	Description	Active	Deployed on
<input type="radio"/> Deployment 6	Scheduled	MyNewDepl		
<input checked="" type="radio"/> Deployment 5	Deployed	deploy		
<input type="radio"/> Deployment 4	Undeployed	test		
<input type="radio"/> Deployment 3	Undeployed	DEP1129		
<input type="radio"/> Deployment 2	Undeployed	Test929		May 20, 2020, 5:59 PM
<input type="radio"/> Deployment 1	Deployed	ISLMDep911		May 20, 2020, 5:41 PM

Confirmation

Do you want to use the active version in your business application?

OK Cancel

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](#)

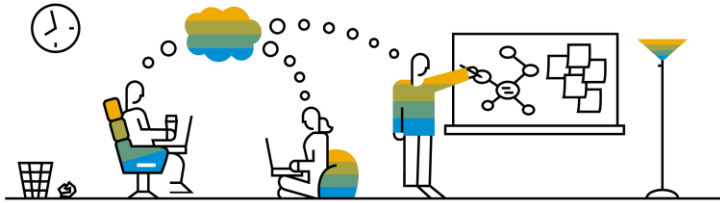


Essential



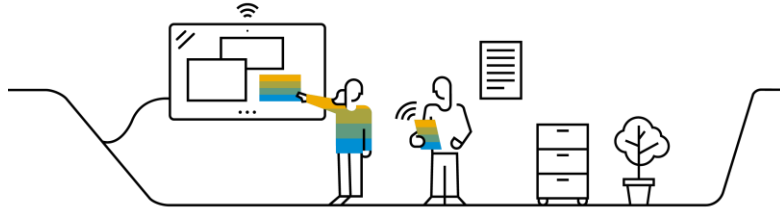
Extended

Key Points



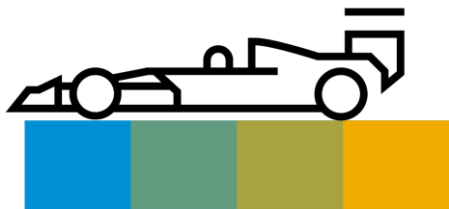
#1

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

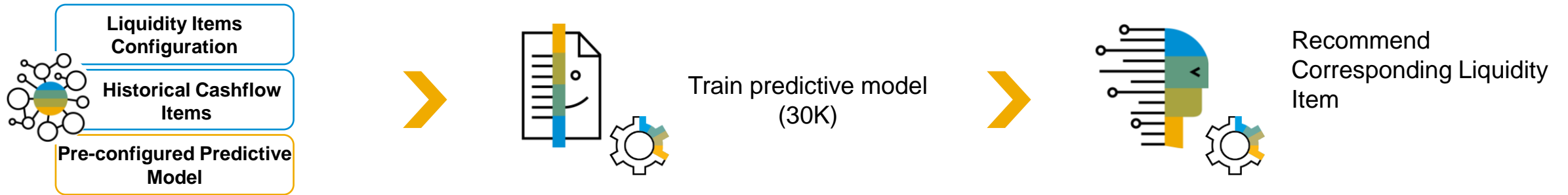
Business Technology Platform

Global Center of Excellence

Jason.White@sap.com

Appendix

Detect Abnormal Liquidity Items



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



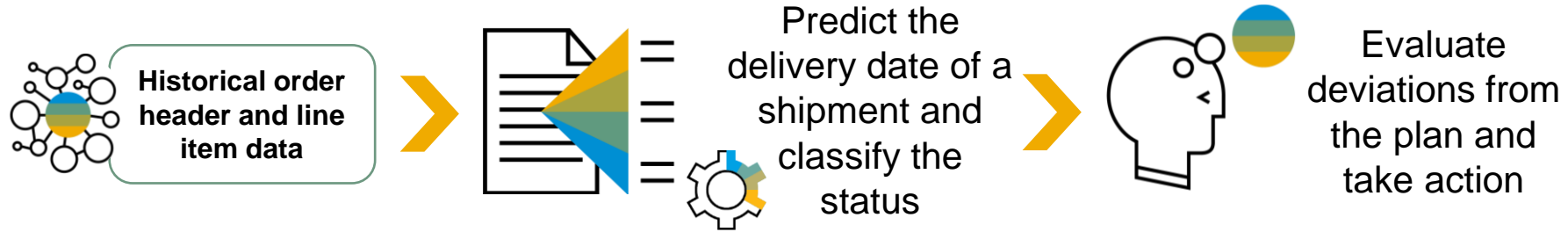
Save costs
(better prices from the suppliers)



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)



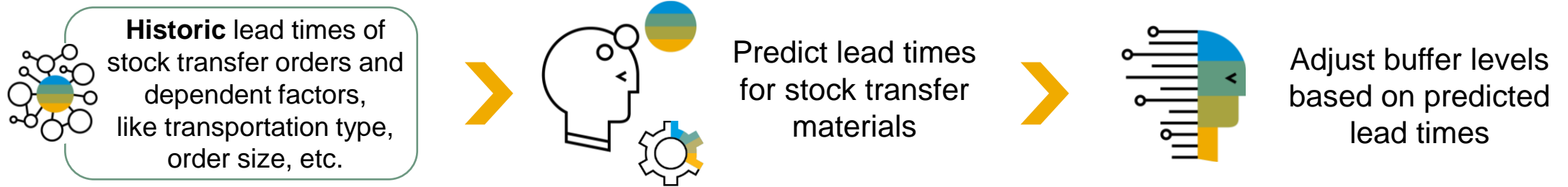
Reduce stock-out of critical parts



Reduce safety stock inventory

Demand-Driven Replenishment

Dynamic Buffer Level Adjustment



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



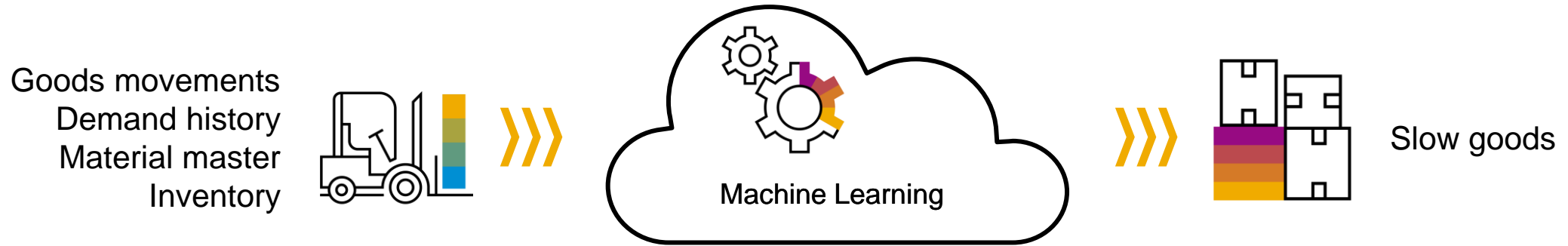
Ensure best customer service levels



Reduce bound capital

Early detection of slow moving stock

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



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



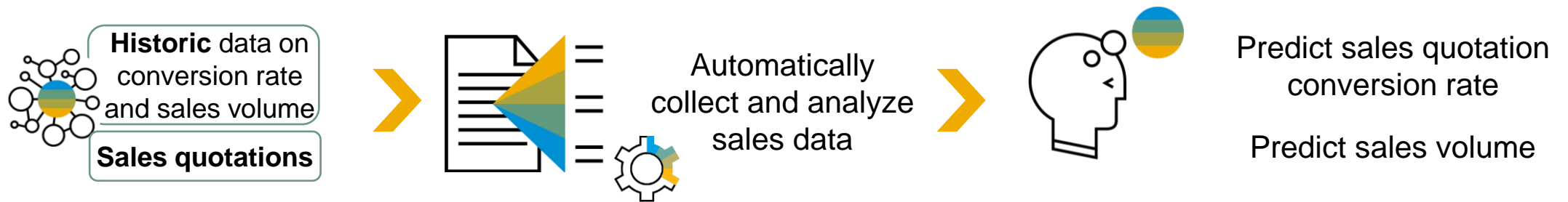
Avoid/reduce scrap



Increase supply chain efficiency

SAP Quotation Conversion Probability Rate

Improve Sales Forecasts



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



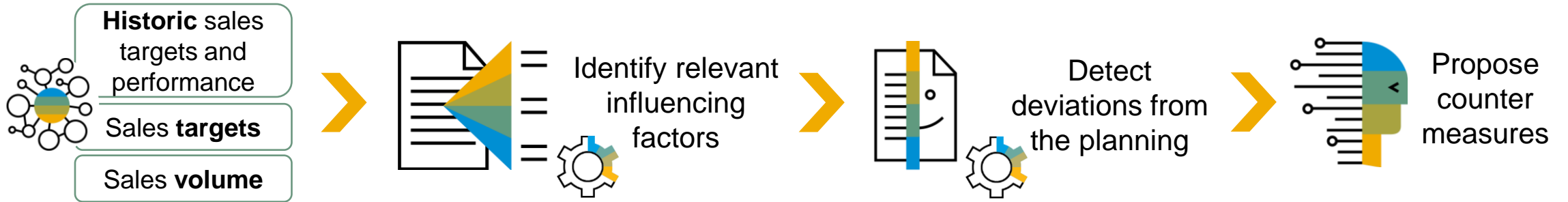
Increase achievable sales volume



Reduce sales administration costs

Sales Performance

Predict Sales Forecasts



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



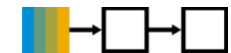
Higher revenue growth
Identify more achievable sales targets



Reduce Sales FTE Effort
on Pipeline Analysis and Reporting



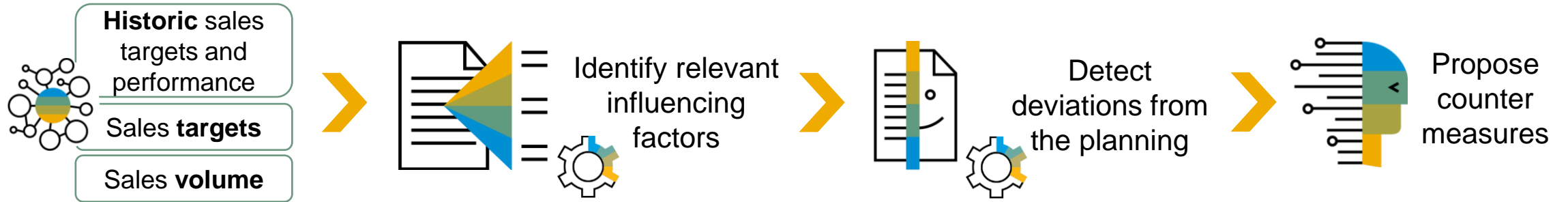
Reduce sales training costs
Better support sales staff with less work experience



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

Delivery Performance

Predict Delivery Delay



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



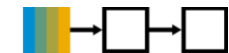
Higher revenue growth
Identify more achievable sales targets



Reduce Sales FTE Effort
on Pipeline Analysis and Reporting

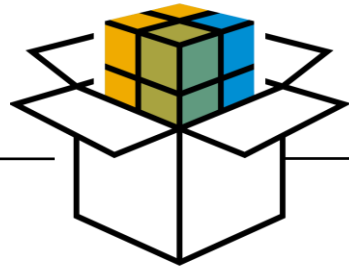


Reduce sales training costs
Better support sales staff with less work experience



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

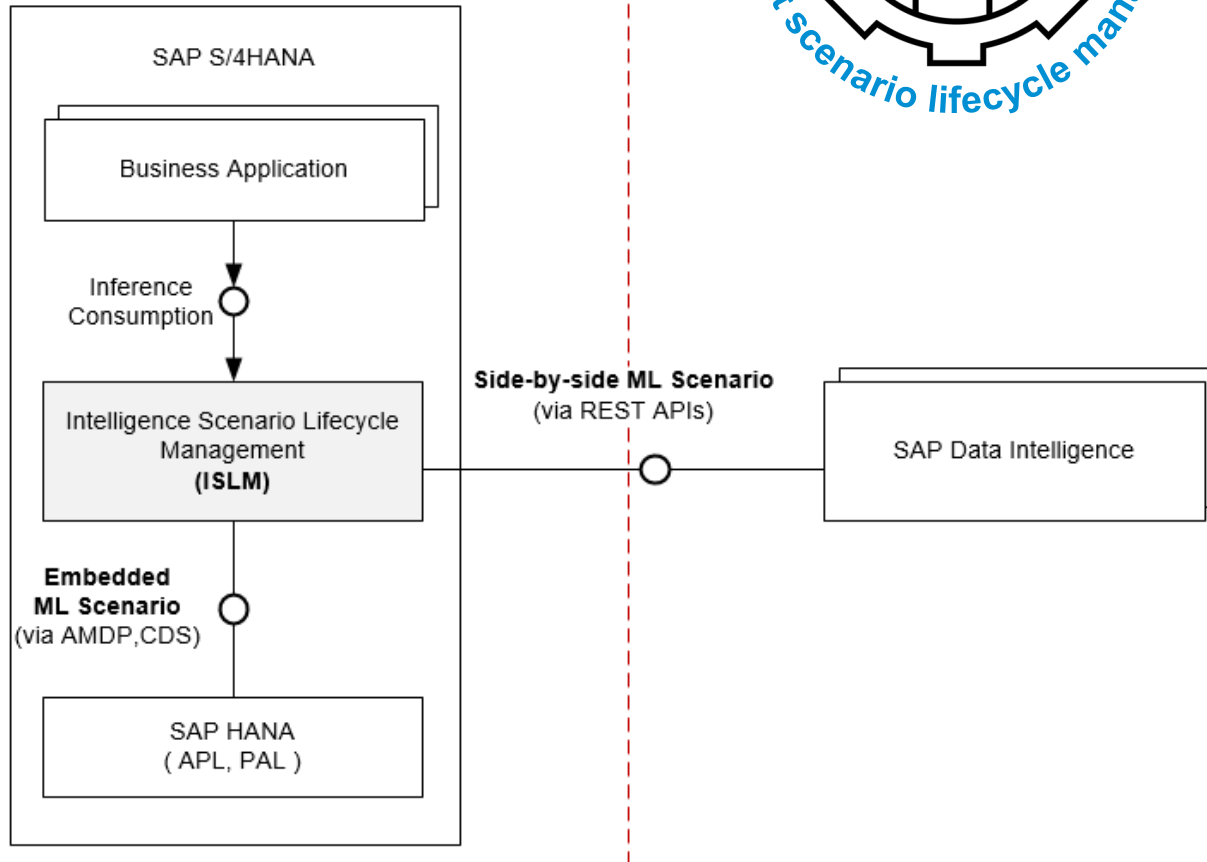
Embedded scenario:

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.**

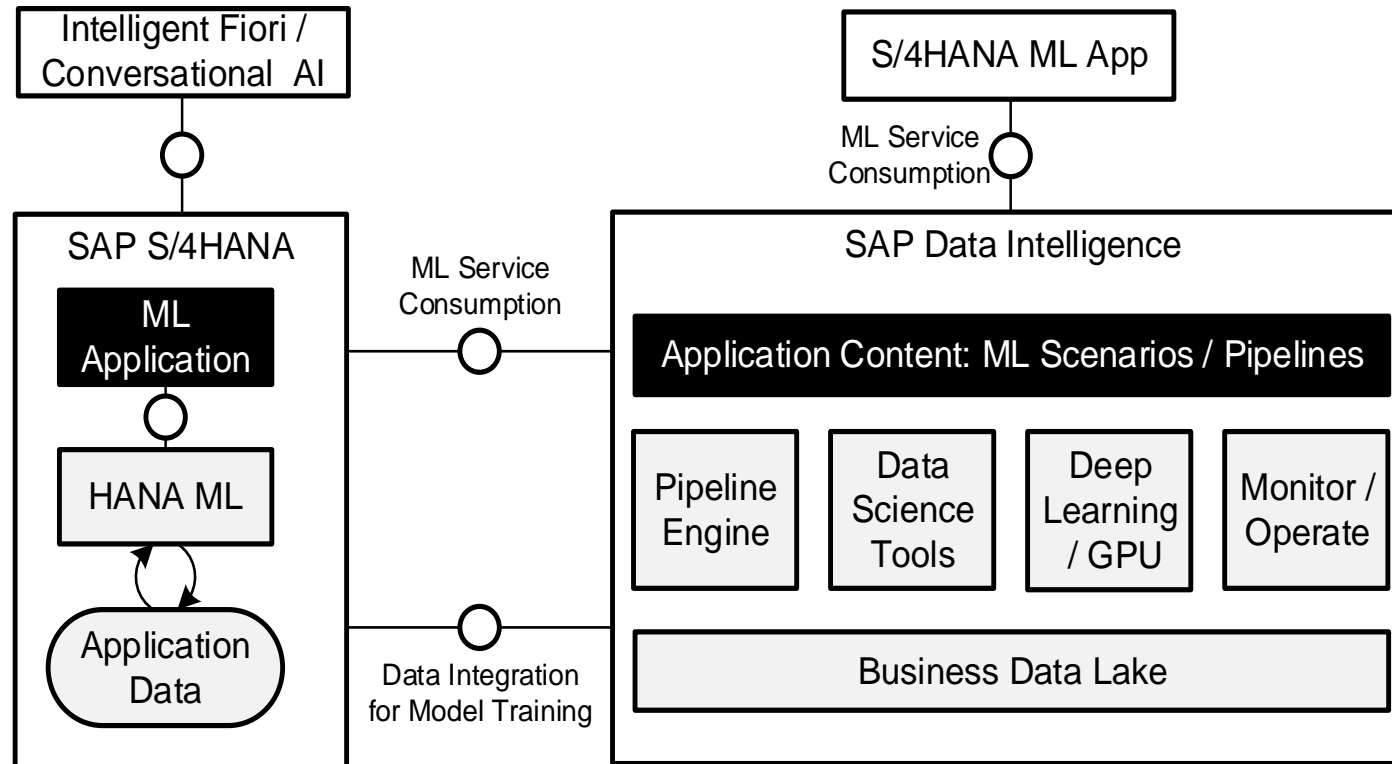
SAP Applications such as **SAP S/4HANA** create, ship (and transport) Intelligent Scenario use cases of type embedded **AND side-by-side.**

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



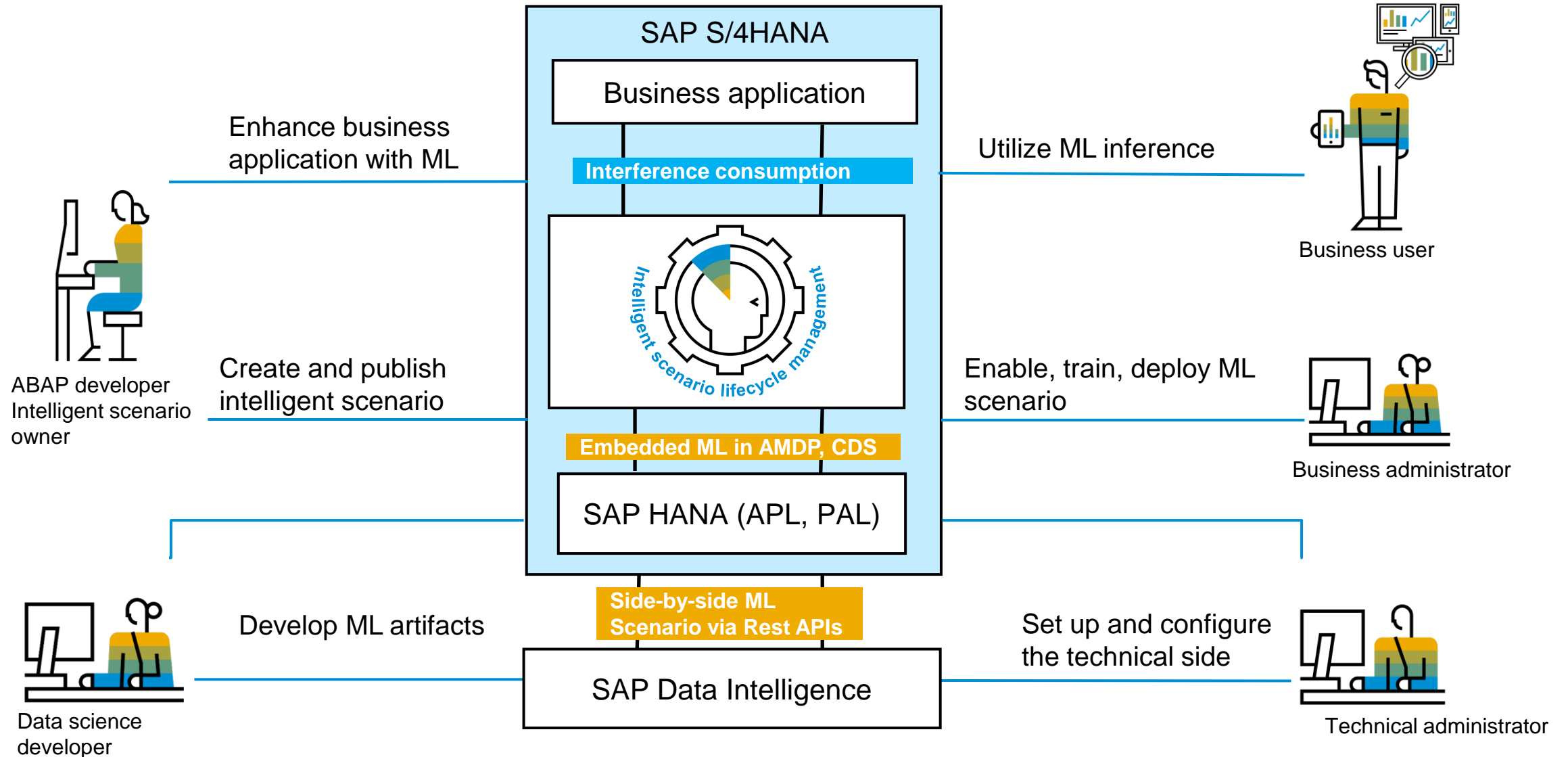
EMBEDDED ML:
SIMPLE CASES LIKE TRENDING OR FORECASTING

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

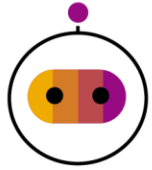
Personas involved in development, consumption, and operation



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



SAP S/4HANA

Ted, Accounts Receivable Manager



Situation Handling

System ALERTS when invoices due are excluded from the payment advice

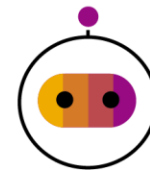
4



Intelligent RPA

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

5



Intelligent RPA

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

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

Inventory 2019 - Purchase Order Configuration

2019-01-01 10:00:00 AM

Item	Quantity	Unit	Price	Total	Order
1000	100	EA	10.00	1000.00	1000
2000	200	EA	20.00	4000.00	2000
3000	300	EA	30.00	9000.00	3000
4000	400	EA	40.00	16000.00	4000
5000	500	EA	50.00	25000.00	5000
6000	600	EA	60.00	36000.00	6000
7000	700	EA	70.00	49000.00	7000
8000	800	EA	80.00	64000.00	8000
9000	900	EA	90.00	81000.00	9000
10000	1000	EA	100.00	100000.00	10000

10000

Automated Predictive Under the Hood

Predictive Power and Predictive Robustness

Predictive Power

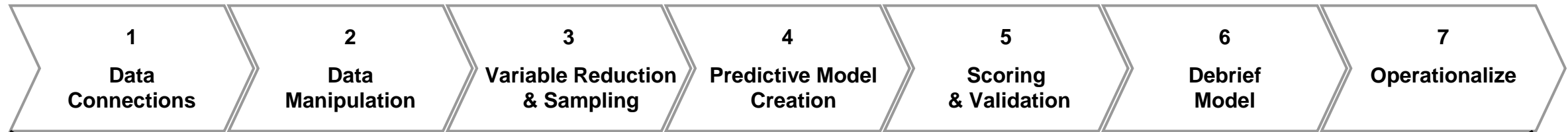
- The KI measure the capacity of the Input Variables (Explanatory Variables) to explain the target.
- KI ranges from 0 (a pure random model) to 1 (a perfect ideal model)
- What's a good KI? It completely depends on the business case and available data

Predictive Robustness

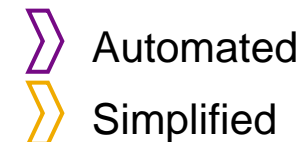
- The KR measures the ability of a model to display the same level of performance on new data sets as training ones.
- The KR ranges from 0 to 1
- What is a good KR? 0.95 and above for models expected to be applied.

Machine Learning automation

Decreases time to deploy by up to 70%



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



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

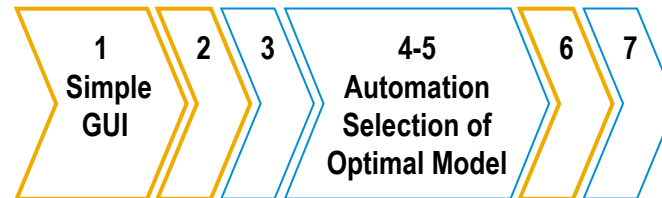
Live example

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!



Automated

Simplified

Forecast Model Bursting

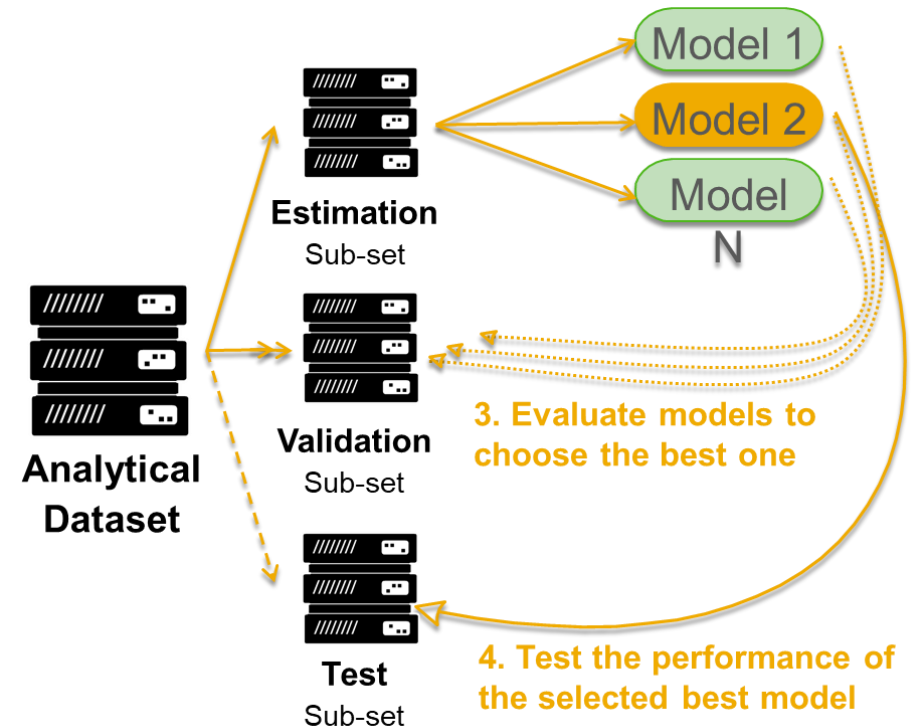
Ability to create 1,000's of individual forecast models from one automated job.

Terminology

Term	Definition
Variable	Logical representation of a data column in a tabular structure It has some basic attributes (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 Classification, 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

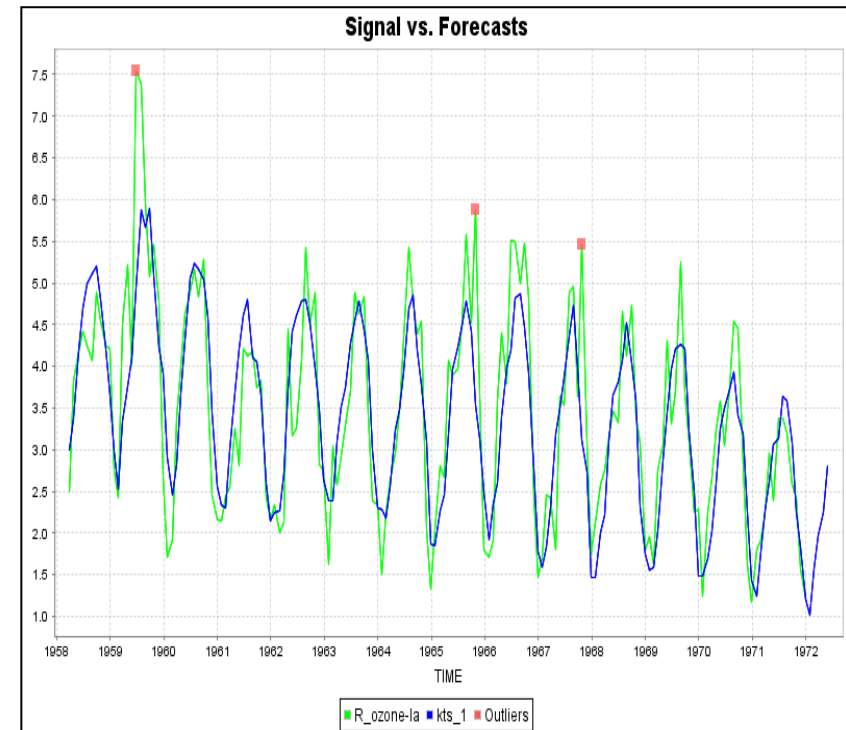
Automated Time Series Models

A time series has the following components:

$$\text{Signal} = \text{Trend} + \text{Seasonal/Periodic} + \text{Fluctuation} + \text{Residual}$$

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

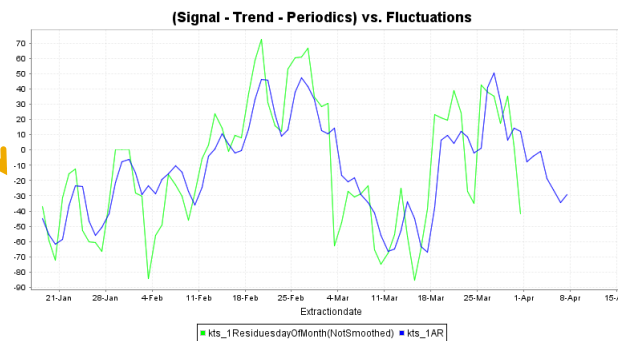
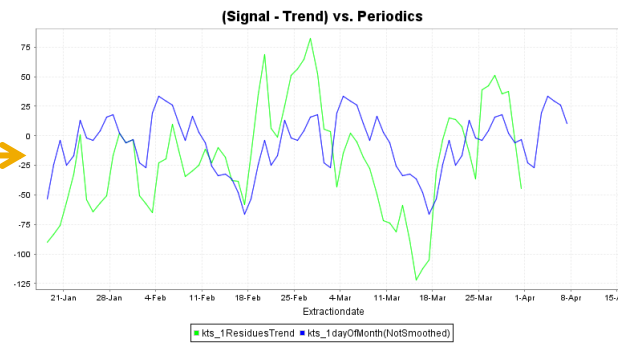
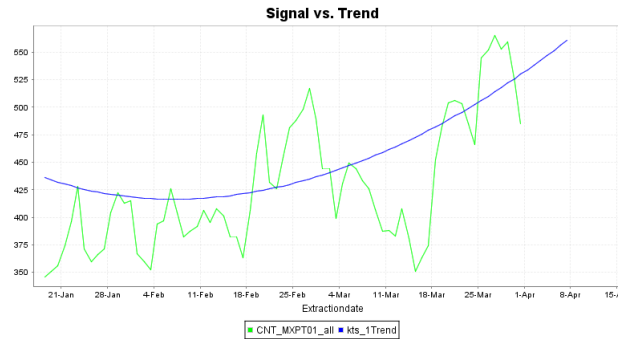
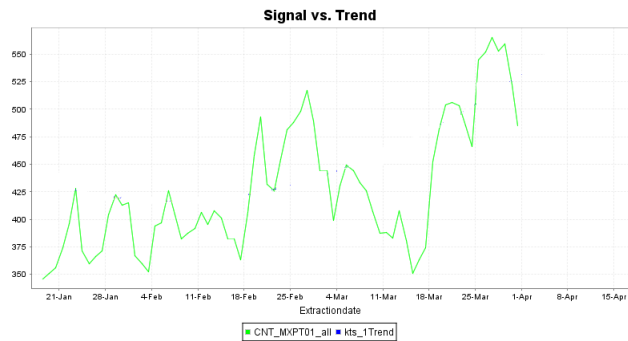
1. Separate the signal into its components:
 - Trend
 - Seasonality and/or Periodicity
 - Predictable fluctuations
2. Build a model that describes the past data
3. Predict future values for a desired range



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

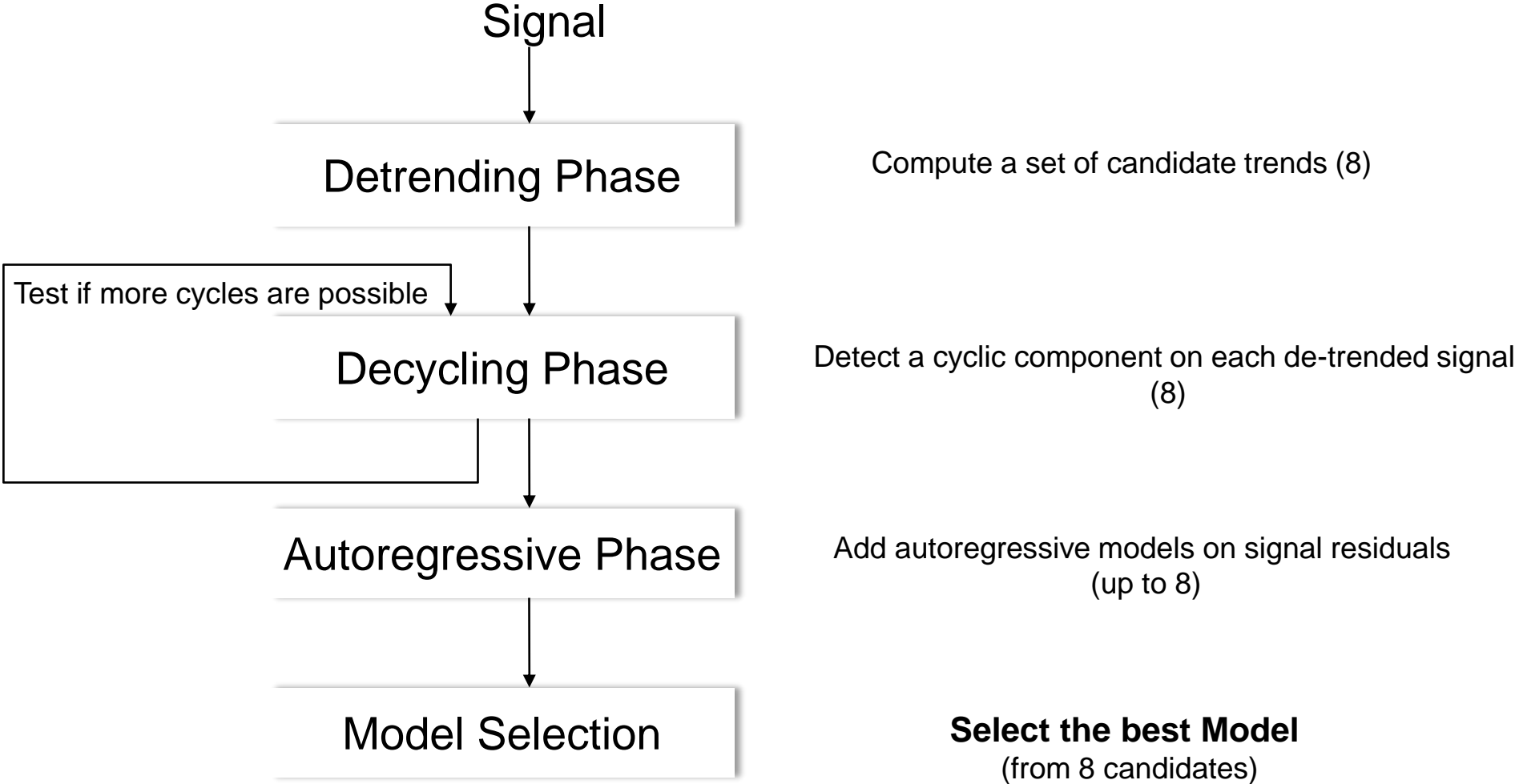


Test whether a **trend** can be fitted to the data

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



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