



Applying Machine Learning & Analytics to build the S/4 Business Case

Kevin McConnell, SAP
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PUBLIC

Analytics & ML to build S/4 Business Case

Kevin McConnell, Intelligent Technology Solution Mgt, SAP
Session ID 82730



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About the Speakers

Kevin McConnell, Intelligent Technology Solutions

- Kevin has been creating Intelligent Solution Initiatives for almost 20 years. First at SAS, then HP and now at SAP.
- He performed stand-up comedy in NYC over 25 years ago. (*Obviously it did not go well*)

Key Outcomes/Objectives

- Difference between Analytics & Machine Learning
- Understand the value Analytics & ML play in S/4
- Determine how to improve ROI with Analytics & ML

Agenda

- Why Analytics
- Customer POV
- Embedded ML vs ML Services
- Capabilities Available
- Building the Business Case



Oakland A's

1997: W/L% .401

2002: W/L% .635

Salary \$40M

By using analytics to create, execute and review the plan they improved 58%

Leading with analytics allowed the A's to achieve the same results as the NY Yankees in 2002

at 1/3 the cost

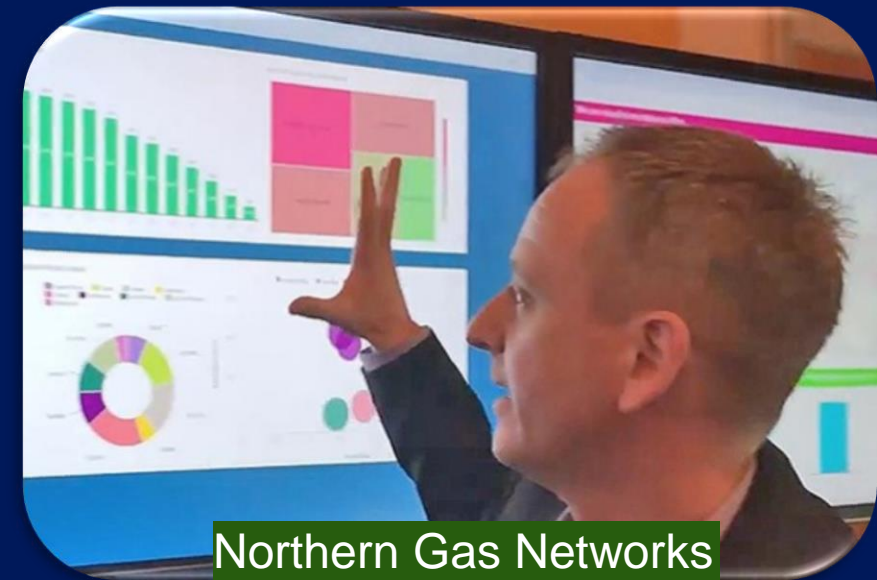
The same optimization can be applied to business



New York Yankees

2002: W/L% .635

Salary \$120M



Northern Gas Networks

Analytics led S/4 Transformation Success

NGN used Digital Boardroom & Predictive capabilities to plan their S/4 Deployment

Challenges

- Growth limited by geography
- Competition & Regulators preclude price increases
- Profits must come from efficiencies

Business Benefits

- Predicting leaks increased profitability ↑
- Recovered 3rd party & internal costs ↓
- Improved compliance (reduced risk) ↓



Industry
Energy &
Natural
Resources

Region
EMEA

Employees
2,000



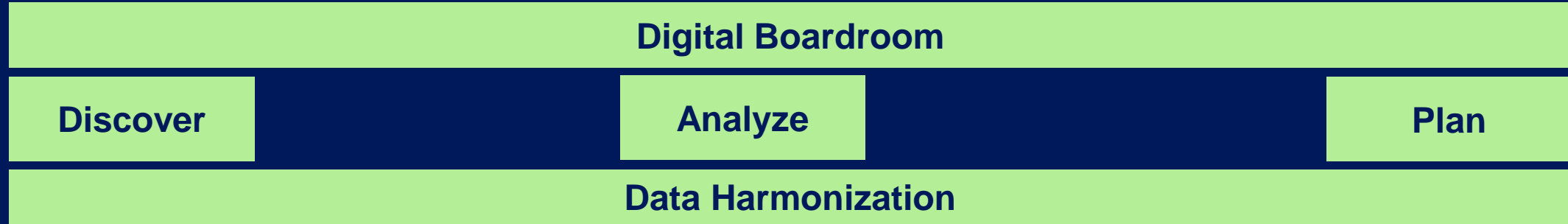
“Digital Board Room is the command center for S/4”

Tom Pollock
Head of Smart Information Management
Northern Gas Networks

[Link to Public Video](#)

SAC enables Strategic Insight & powers Embedded Machine Learning

Leonardo & Analytics



Intelligent Applications



S/4 Digital Core Capabilities



Embedded ML Scenarios

Smart Alerts for P&L

Project Cost Forecast

Payment Block Disc @Risk

Stock in Transit

Supplier Delivery Delay

Delivery Performance

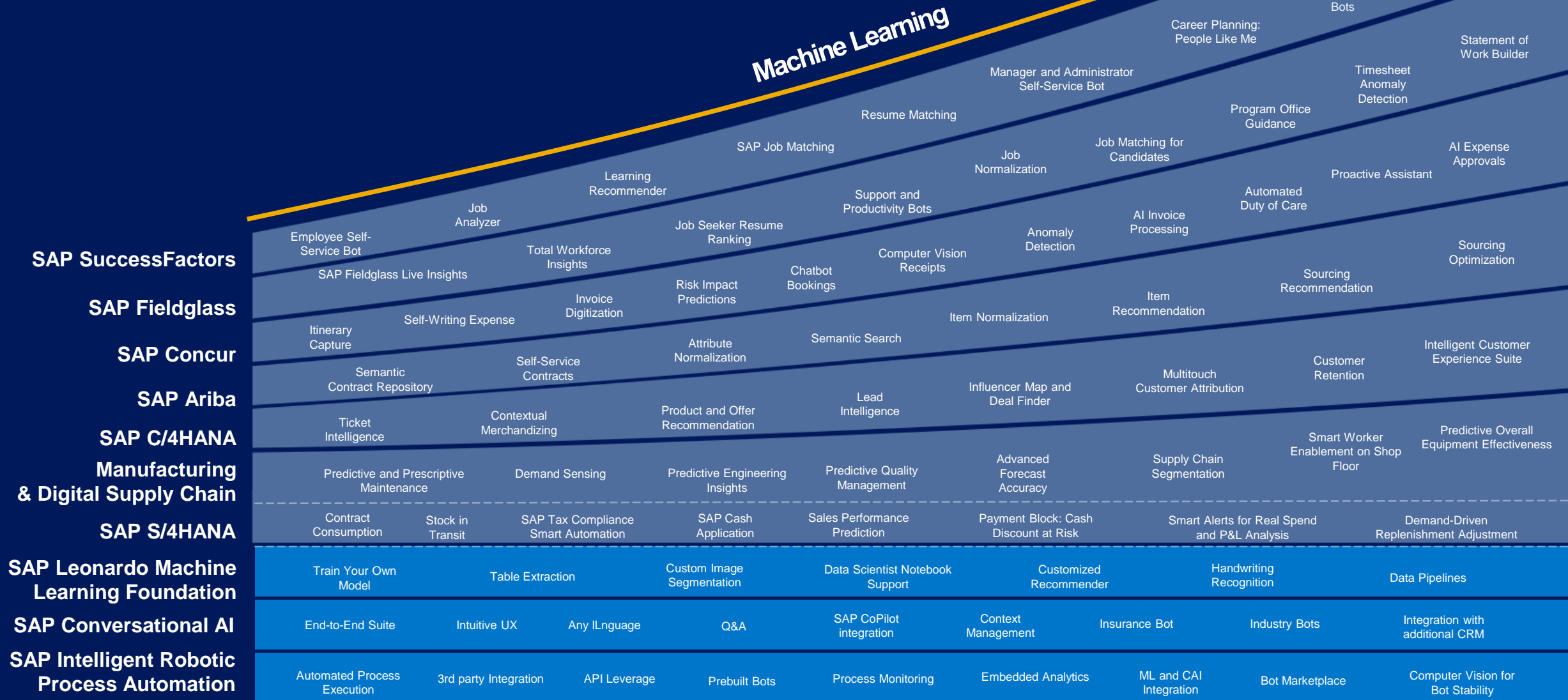
Finance

Supply Chain

Procurement

Build the Intelligent Enterprise

Machine Learning Roadmap Excerpt



SAP Leonardo embedded intelligence in SAP S/4HANA

Predictive Analytics integrator

Seamless Integration

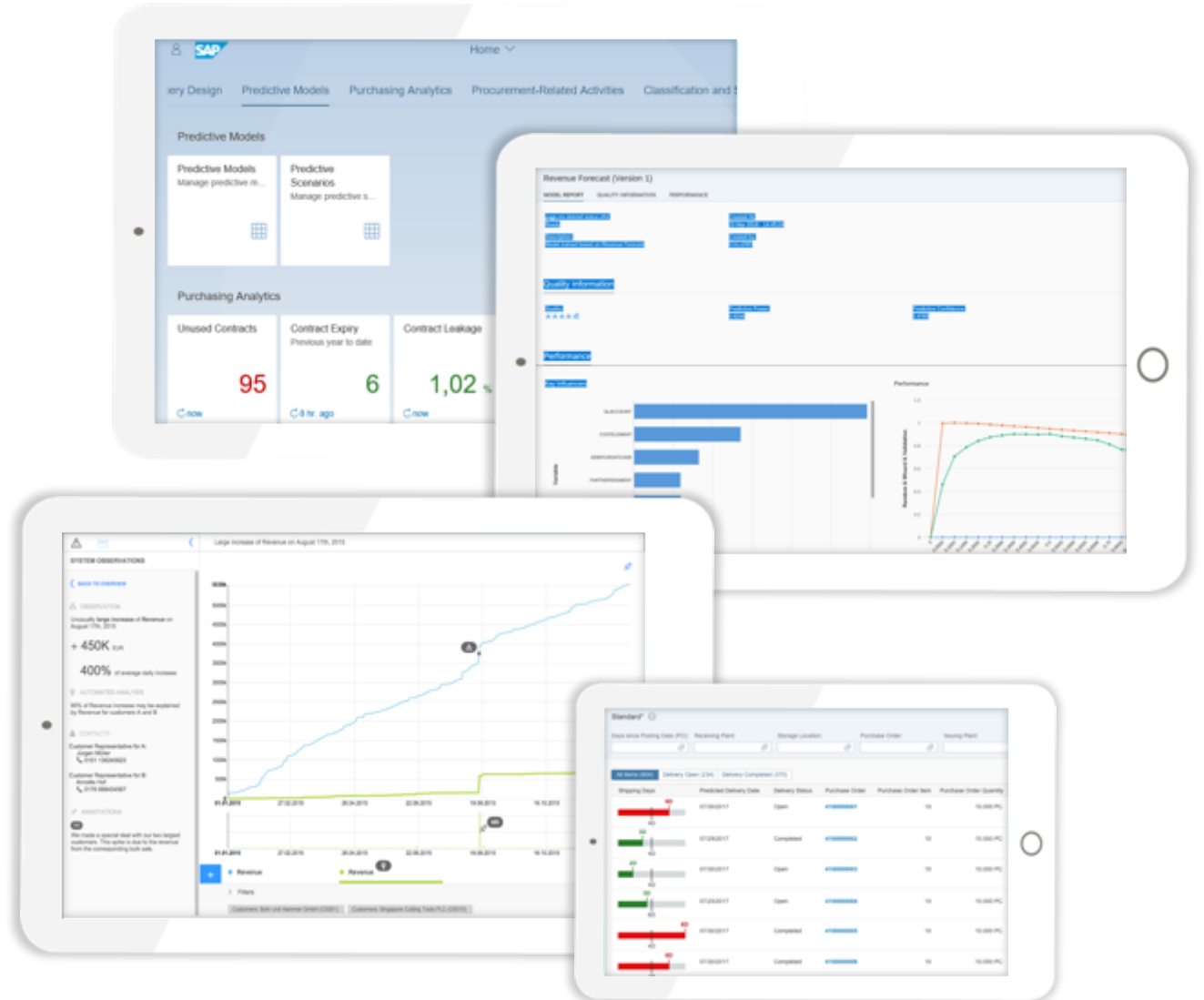
Predictive Analytics integrator enables SAP Applications such as **SAP S/4HANA** to create and ship Predictive use cases specific to their business directly to their customers

Manage Model Lifecycle

- Customers can retrain models directly within the applications
- Model debriefing enables users to verify model quality

Easily Adapt & Customize

- Customer/Partners can adapt Predictive use cases or create new ones based on their own business needs in SAP Predictive Analytics and publish to the application with one click



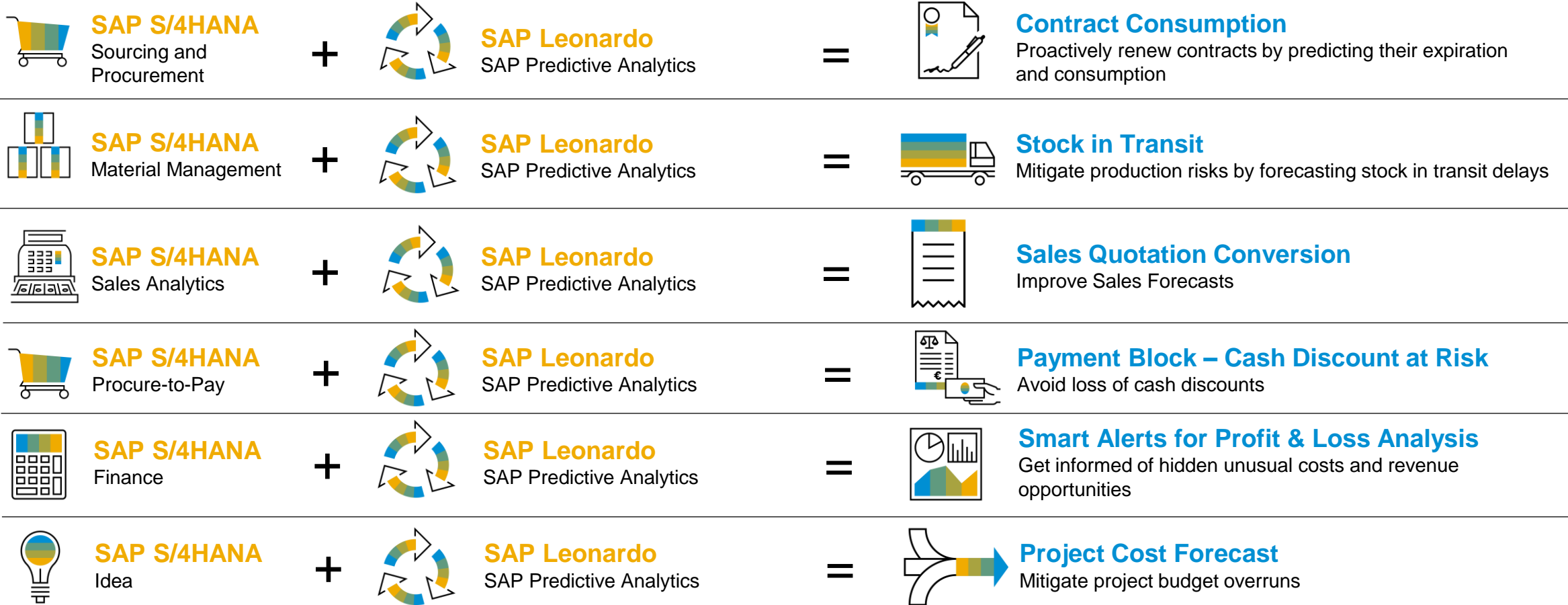
Intelligent **Enterprise** Examples



SAP Leonardo embedded in S/4HANA










Machine Learning and Predictive Analytics

Live!



SAP Leonardo intelligent applications for Machine Learning and Predictive

Live

SAP S/4HANA®		+	SAP® Leonardo		=	ML Enabled Business Scenarios	
	SAP S/4HANA Finance	+		SAP Leonardo SAP Predictive Analytics	=		SAP Business Integrity Screening Increase accuracy of fraud alerts with predictive analytics
	SAP S/4HANA Finance	+		SAP Leonardo SAP Predictive Analytics	=		SAP Tax Compliance Smart Automation on Compliance Issue Processing
	SAP C/4HANA Cloud 4 Customer	+		SAP Leonardo SAP Predictive Analytics	=		SAP Opportunity Scoring Increase win rates with Predictable sales pipeline and revenue forecast

SAP Smart Alerts for Profit & Loss Analysis

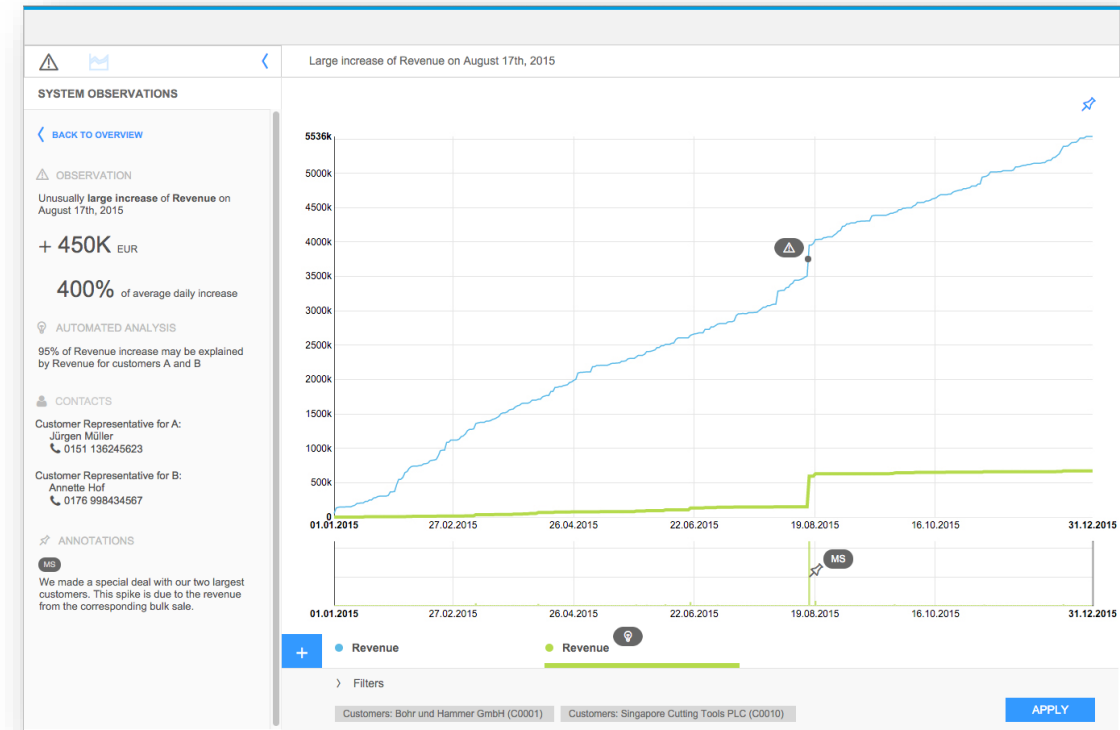
Get informed of hidden unusual costs and revenue opportunities

SAP Smart Alerts for Profit & Loss Analysis enables users to

- Automatically explore the multi-dimensional space of available filter combinations
- Detect unusual increases and decreases in single key figures
- Notify about changes in trending behavior
- Warn about correlation changes between multiple key figures
- Allow users to collaboratively expand on those automatic findings by placing annotations

Business Benefits

- Decrease time for investigation
- Earlier detection of unusual business situations
- Better collaboration through annotations



Payment Block - Cash Discount at Risk

Avoid loss of cash discounts

SAP Payment Block - Cash Discount at Risk allows accountants and purchasers to:

- Proactively display issues requiring attention, all relevant information, and actions in one place
- Analyze the underlying issues with detailed data context
- Receive recommendations based on former user behavior
- Avoid loss of cash discounts

Business Benefits

- Reduce effects for exception handling and recurring tasks
- Process automation to enable faster decision making
- Avoid loss of cash discounts
- Enable employees focus on important tasks

The screenshot displays the SAP Supplier Invoice interface for invoice 5100000143/2017. The header shows the Gross Invoice Amount as 900.00 EUR, the Invoicing Party as S2430002, and the Invoice Status as Posted. The Payment Status is highlighted in red as 'Blocked for Payment'. The 'Payment Block' tab is selected in the navigation bar. Below the header, an orange warning box states: '⚠ This invoice is blocked for payment'. The 'Actions' section includes links for 'Contact Supplier' and 'Contact Purchaser'. The 'Blocked Invoice Items' table lists one item with a blocking reason of 'Multiple'. The 'Invoice Timeline' at the bottom shows the invoice document date (18/06/2017), invoice posting date (18/06/2017), and invoice payment due date (18/06/2017).

Invoice Item	Blocking Reason	Description	Purchase Order Item
1	Multiple	Trading Good 0011.PD.Regular Proc.	4500000126/00010

SAP Quantity Contract Consumption

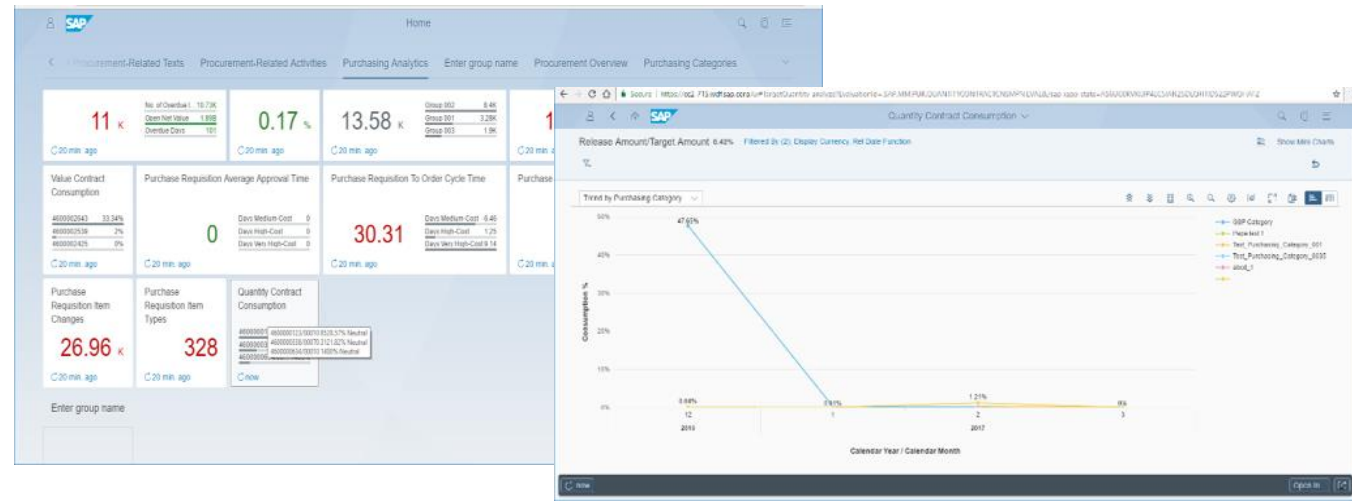
Anticipate contract renegotiations in time

SAP Quantity Contract Consumption advise leaders to

- Anticipate contract renegotiations in time
- Negotiate with supplier early and efficiently
- Define the predictive models, train and run the scenarios
- Pre-built set of KPIs allow for robust analytics on S/4HANA cloud data with drill down functionality

Business Benefits

- Enhanced usability for the businesses visualizing with predictions
- Early & efficient supplier renegotiation
- Better prices for goods from suppliers
- Enhanced purchasing compliance
- Providing predictive analytics for the business scenarios



SAP Predict Arrival of Stock in Transit

Predict and manage delivery delays

SAP Predict Arrival of Stock in Transit allows warehouse managers to

- Predict the arrival date of a shipment and classify the status into different classes
- Defining the predictive models, training and running the scenarios
- Pre-built set of KPIs allow for robust analytics on S/4HANA cloud data with drill down functionality.
- Early & efficient visibility for stock transport orders
- New integration capabilities with SAP S/4HANA Cloud to gain real-time insights in produce scenario's with predictive analytics

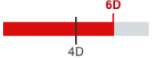
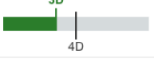
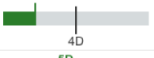
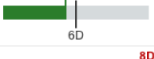
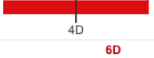

Business Benefits

- Optimize and automate the business process of tracking Stocks In Transit
- Overall more reliable planning / scheduling of goods in transit processes
- Providing predictive analytics for the business scenarios
- Enhanced usability for the businesses visualizing with predictions

Standard* Hide Filters

Days since Posting Date (PO): Receiving Plant: Storage Location: Purchase Order: Issuing Plant: Adapt Filters Go

All Items (604) Delivery Open (234) Delivery Completed (370) Settings Help

Shipping Days	Predicted Delivery Date	Delivery Status	Purchase Order	Purchase Order Item	Purchase Order Quantity	Material	Receiving Plant
	07/30/2017	Open	4100000001	10	10.000 PC	Trading Good (TG0001)	Plant 1 DE FIO (FIO2)
	07/29/2017	Completed	4100000002	10	10.000 PC	Trading Good (TG0001)	Plant 1 DE FIO (FIO2)
	07/30/2017	Open	4100000003	10	10.000 PC	Trading Good (TG0001)	Plant 1 DE FIO (FIO2)
	07/25/2017	Open	4100000004	10	10.000 PC	Trading Good (TG0001)	Plant 1 DE FIO (FIO2)
	07/30/2017	Completed	4100000005	10	10.000 PC	Trading Good (TG0001)	Plant 1 DE FIO (FIO2)
	07/30/2017	Completed	4100000006	10	10.000 PC	Trading Good (TG0001)	Plant 1 DE FIO (FIO2)

Project Cost Forecasting

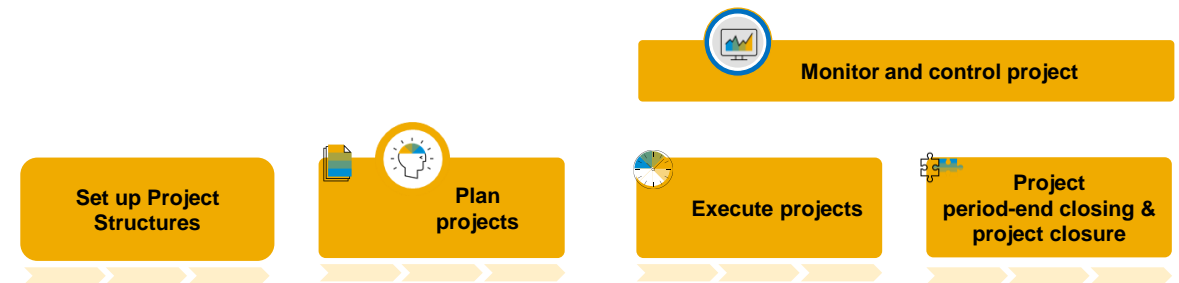
Predicting project costs ahead of time

Project Cost Forecasting allows the **Project Manager** to

- Forecast the project cost with increased accuracy
- Reduce the risks of budget overruns
- Reduce Manual Efforts

Business Benefits

- **Cost savings:** Less budget overruns and better project investment decisions based on more realistic estimations
- **Efficiency:** Reduced effort for project cost planning and forecasting while improving the accuracy
- **Customer satisfaction:** Improved customer satisfaction due to ability to deliver projects on time



SAP Business Integrity Screening

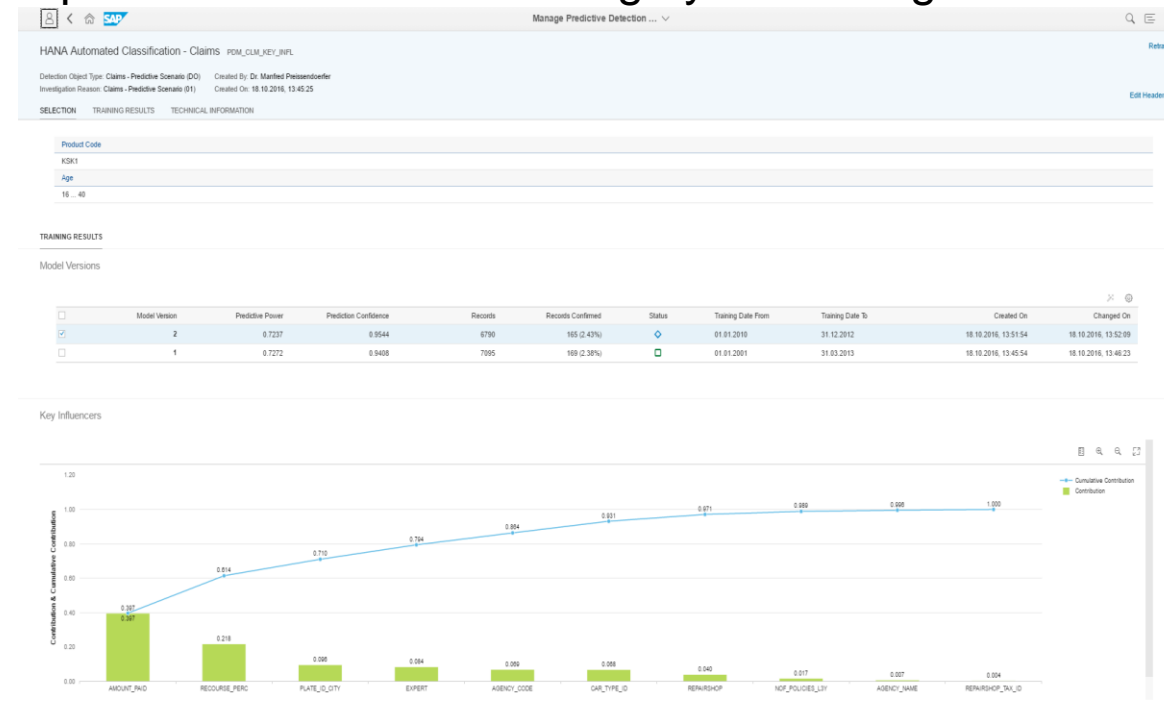
Detect and rank information that positively correlates with anomalies

SAP Business Integrity Screening allows **your Business Analysts and Investigators** to

- Automatically detect and rank attributes within classified data that positively correlate with anomalous cases
- Incorporate them with existing detection methods into new Business Integrity Screening strategies
- Seamlessly integrate algorithms of HANA's Automated Predictive Library (APL)
- Leverage robust, state-of-the-art machine learning algorithms

Business Benefits

- Detection of new suspicious patterns
- Reduction of false positives
- Seamless integration of ML algorithms into the proven SAP Business Integrity Screening framework



SAP Tax Compliance

Smart Automation on Compliance Issue Processing

With every new decision the company's Tax Knowledge Base grows and

SAP Tax Compliance allows **your Tax Managers** to

- Transparently apply HANA's Automated Classification
- Benefit from the company's memory of its tax managers past decisions
- Automate compliance issue processing and limit human interaction to exceptional cases
- Choose level of automation on compliance check basis

Business Benefits

- Automatically learn from new decisions
- Increase efficiency by smart compliance issue processing automation
- Seamless integration of ML algorithms into the SAP Tax Compliance

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SAP Quantity Contract Consumption

Anticipate contract renegotiations in time

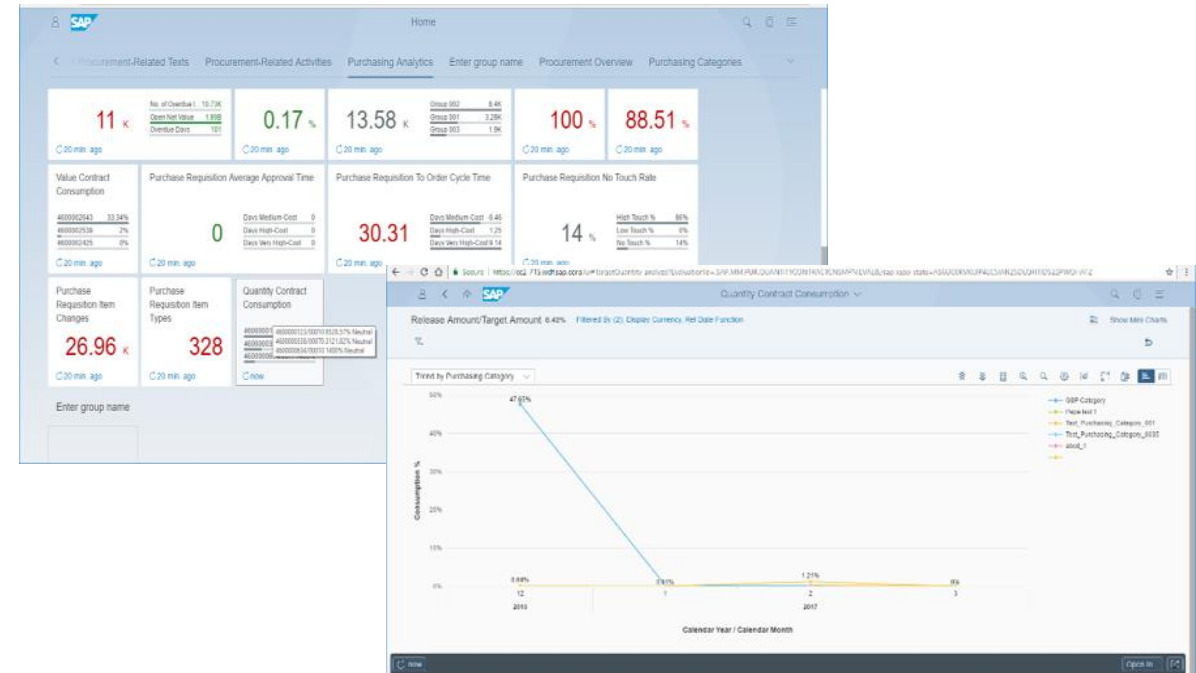
Buyers need to re-negotiate contracts that are soon to be expired. The Machine Learning algorithms identify the contracts that are at the end of the term and provide the probability if a contract is going to be consumed sooner than expected

SAP Quantity Contract Consumption advise **procurement leaders** to

- Anticipate contract renegotiations in time
- Negotiate with supplier early and efficiently
- Define the predictive models, train and run the scenarios
- Pre-built set of KPIs allow for robust analytics on S/4HANA cloud data with drill down functionality

Business Benefits

- Enhanced usability for the businesses visualizing with predictions
- Early & efficient supplier renegotiation
- Better prices for goods from suppliers
- Enhanced purchasing compliance
- Providing predictive analytics for the business scenarios



SAP Cash Application

Intelligent receivables automation powered by SAP Leonardo Machine Learning



SAP Cash Application software intelligently learns matching criteria from your history, reads and processes payment advice documents, and automatically clears payments with minimal intervention.

Improves days sales outstanding

Integrates smoothly with SAP S/4HANA

Allows shared services to scale as the business grows

Drastically reduces manual effort to focus on strategic tasks and service quality

Using cloud analytics with SAP S/4HANA® lets HOERBIGER discover, visualize, and share insights in one future-fit system.

Operational dashboards in the SAP® Analytics Cloud solution present data from SAP S/4HANA® in real time so that HOERBIGER can:

- Establish a reporting system for plants with globally defined KPIs to improve plant performance
- Shorten audit times and reduce the support efforts in IT to free staff for more strategic tasks
- Control access to data and analytics based on global governance policies
- Ensure consistency and trust across the enterprise with a single version of truth sourced directly from ERP
- Provide role-based access to real-time data over virtual private networks or mobile devices
- Empower users to create data models and visualizations

“In this smooth integration of data from SAP S/4HANA with the analytics features of SAP Analytics Cloud, HOERBIGER has found a long-sought information management solution, becoming a truly intelligent enterprise that thrives through analytics-driven insights.”

Teja Ullrich, Senior Vice President – Corporate IT, HOERBIGER Wien GmbH



**HOERBIGER
Holding AG**
Zug, Switzerland

Industry
Industrial
machinery and
components

Employees
7,300

Revenue
~€1.2 billion

Featured Solutions and Services
SAP S/4HANA and SAP Analytics Cloud



Ways of communicating SAP S/4HANA impact to your shareholders

SAP S/4HANA impact on stock price

Key Shareholder Value Levers



Thank you

Merci

ありがとう

Gracias

谢谢

Danke

Contact information:

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Intelligent Technologies Solution Management

kevin.mcconnell@sap.com

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Appendix



SAP Predict Arrival of Stock in Transit

Predict and manage delivery delays


For companies issuing and receiving good from and to their plants, it is important to track the status of the materials in transit in order to take action in case of problems. The "Materials Overdue – Stock in Transit" app gives an overview of the open shipments allowing the business user to take action. With PAI we are enhancing the app with 'Predicted Shipment Dates' for each Goods Movement to allow Users to take action to manage delivery delays.

SAP Predict Arrival of Stock in Transit allows **warehouse managers** to

- Predict the arrival date of a shipment and classify the status into different classes
- Defining the predictive models, training and running the scenarios
- Pre-built set of KPIs allow for robust analytics on S/4HANA cloud data with drill down functionality.
- Early & efficient visibility for stock transport orders
- New integration capabilities with SAP S/4HANA Cloud to gain real-time insights in produce scenario's with predictive analytics

Business Benefits

- Optimize and automate the business process of tracking Stocks In Transit
- Overall more reliable planning / scheduling of goods in transit processes
- Providing predictive analytics for the business scenarios
- Enhanced usability for the businesses visualizing with predictions

Standard* 

Hide Filters

Days since Posting Date (PO):

Receiving Plant:

Storage Location:



Purchase Order:

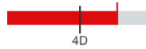


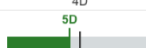

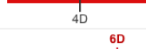
Issuing Plant:

Adapt Filters

Go

All Items (604) | Delivery Open (234) | Delivery Completed (370)

Shipping Days	Predicted Delivery Date	Delivery Status	Purchase Order	Purchase Order Item	Purchase Order Quantity	Material	Receiving Plant
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	07/29/2017	Completed	4100000002	10	10.000 PC	Trading Good (TG0001)	Plant 1 DE FIO (FIO2)
	07/30/2017	Open	4100000003	10	10.000 PC	Trading Good (TG0001)	Plant 1 DE FIO (FIO2)
	07/25/2017	Open	4100000004	10	10.000 PC	Trading Good (TG0001)	Plant 1 DE FIO (FIO2)
	07/30/2017	Completed	4100000005	10	10.000 PC	Trading Good (TG0001)	Plant 1 DE FIO (FIO2)
	07/30/2017	Completed	4100000006	10	10.000 PC	Trading Good (TG0001)	Plant 1 DE FIO (FIO2)

Payment Block - Cash Discount at Risk

Avoid loss of cash discounts

The invoicing process is already a highly digitalized and automated process. Algorithms are checking the invoices against the existing Purchase Orders and the procurement rules. In spite of a highly automated invoice matching process there are always exceptions which need manual interaction from purchasers or accounts payable experts, e.g. because of unplanned additional costs in the invoice or quantity / price deviations. These exceptions are time consuming and expensive. Supplier invoices automatically get blocked if a blocking reason occurs, and the responsible purchaser has to solve the underlying issues.

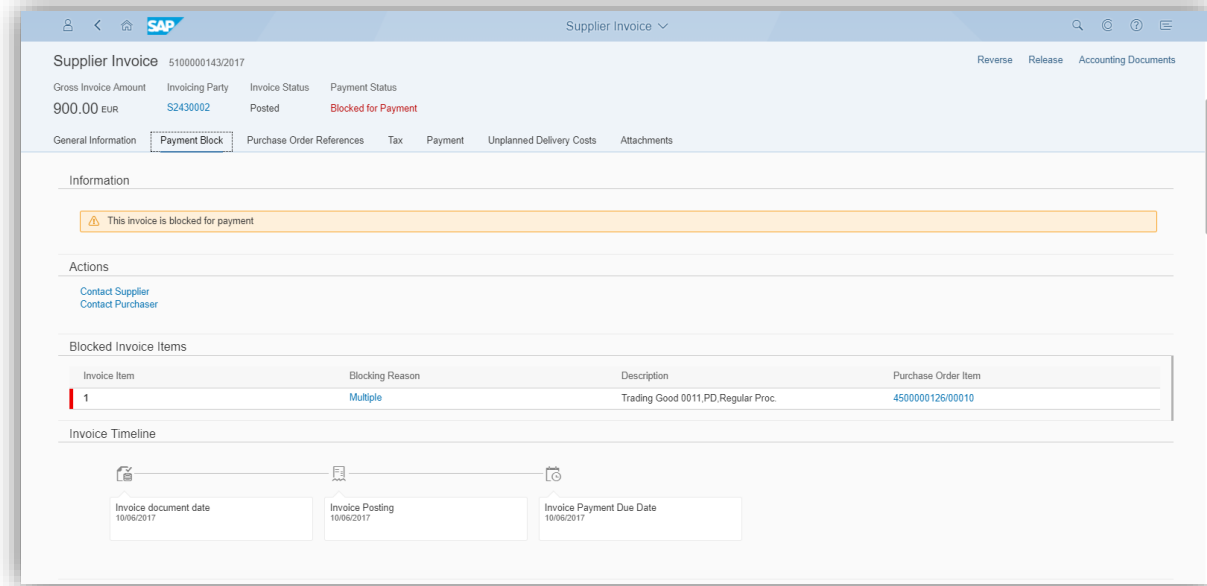
The process can be further automated by getting recommendations to track, analyze, and solve the situation. The faster processing time will also avoid loss of cash discounts

SAP Payment Block - Cash Discount at Risk allows **accountants and purchasers** to:

- Proactively display issues requiring attention, all relevant information, and actions in one place
- Analyze the underlying issues with detailed data context
- Receive recommendations based on former user behavior
- Avoid loss of cash discounts

Business Benefits

- Reduce effects for exception handling and recurring tasks
- Process automation to enable faster decision making
- Avoid loss of cash discounts
- Enable employees focus on important tasks



SAP Smart Alerts for Profit & Loss Analysis

Get informed of hidden unusual costs and revenue opportunities

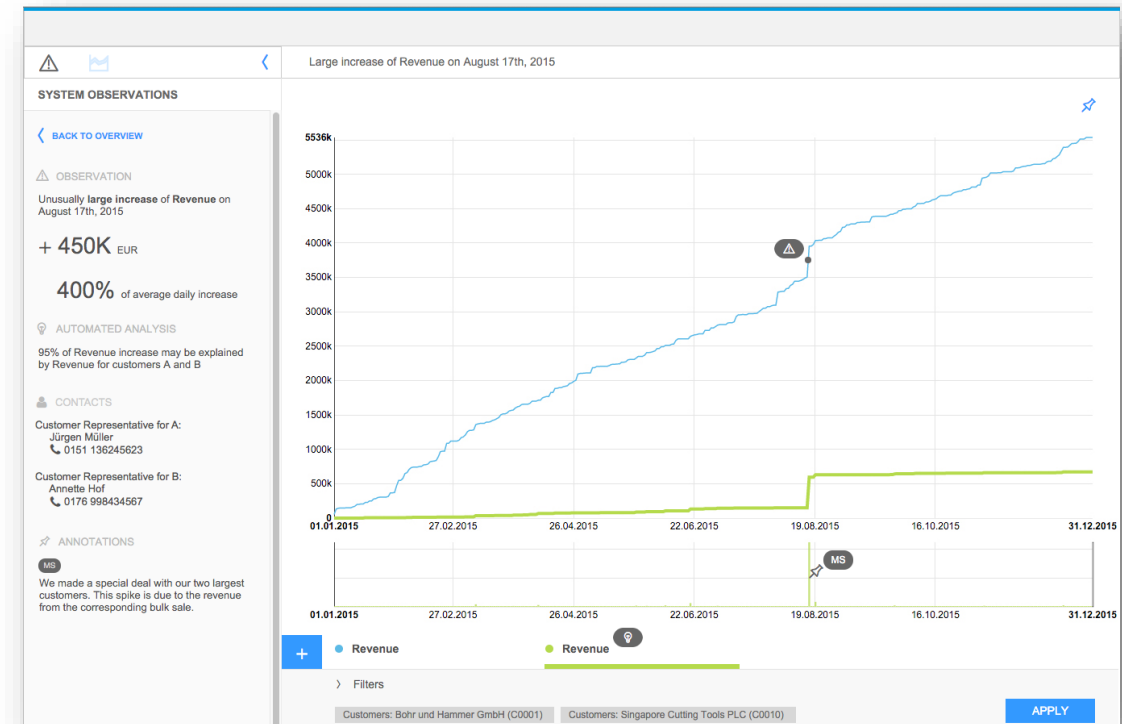
Smart Alerts aims to autonomously detect unusual business situations in revenue and cost accounts. Smart Alerts will pro-actively inform the group controller of potential issues and propose explanations for unusual business situations by analyzing the revenue and cost data.

SAP Smart Alerts for Profit & Loss Analysis allows **your controller** to

- Automatically explore the multi-dimensional space of available filter combinations
- Detect unusual increases and decreases in single key figures
- Notify about changes in trending behavior
- Warn about correlation changes between multiple key figures
- Allow users to collaboratively expand on those automatic findings by placing annotations

Business Benefits

- Decrease time for investigation
- Earlier detection of unusual business situations
- Better collaboration through annotations



Project Cost Forecasting

Predicting project costs ahead of time

Projects often do not meet their budget and timeline. Typical reasons are based on inadequate data and imperfect forecasting techniques, as well as political and psychological factors. So users often tend to be overly optimistic or, on the contrary reserve safety buffers resulting into poor project planning and forecasting. In addition project cost planning and forecasting can be quite effort intensive.

Using machine learning in combination with reference class forecasting, i.e. by learning from past projects, the system can derive project forecasts based on facts, rather than on subjective criteria. The first focus is on cost forecast for projects and Work Breakdown Structure (WBS) elements in SAP S/4HANA (cloud). The use case can be extended at a later point in time to cover for example investment portfolios as well as other project key figures apart from costs such as revenues, durations and schedules, or resource demands.

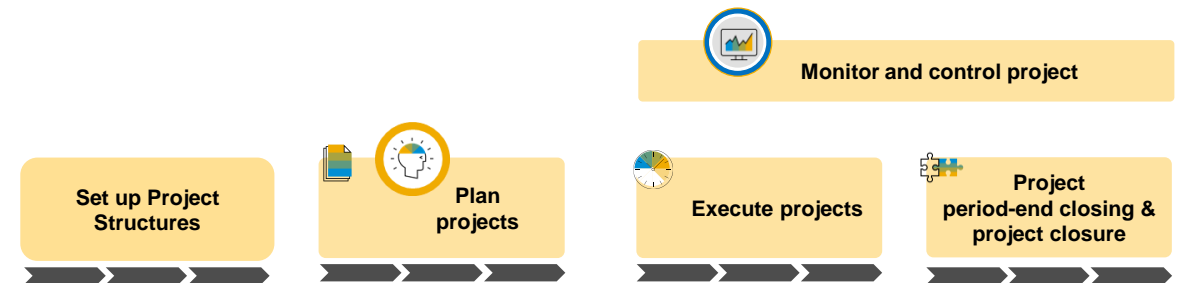
So the accuracy of project cost forecasts can be increased and hence the risks of budget overruns reduced. In addition manual efforts can be drastically reduced.

Project Cost Forecasting allows the **Project Manager** to

- Forecast the project cost with increased accuracy
- Reduce the risks of budget overruns
- Reduce Manual Efforts

Business Benefits

- **Cost savings:** Less budget overruns and better project investment decisions based on more realistic estimations
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SAP Business Integrity Screening

Detect and rank information that positively correlates with anomalies

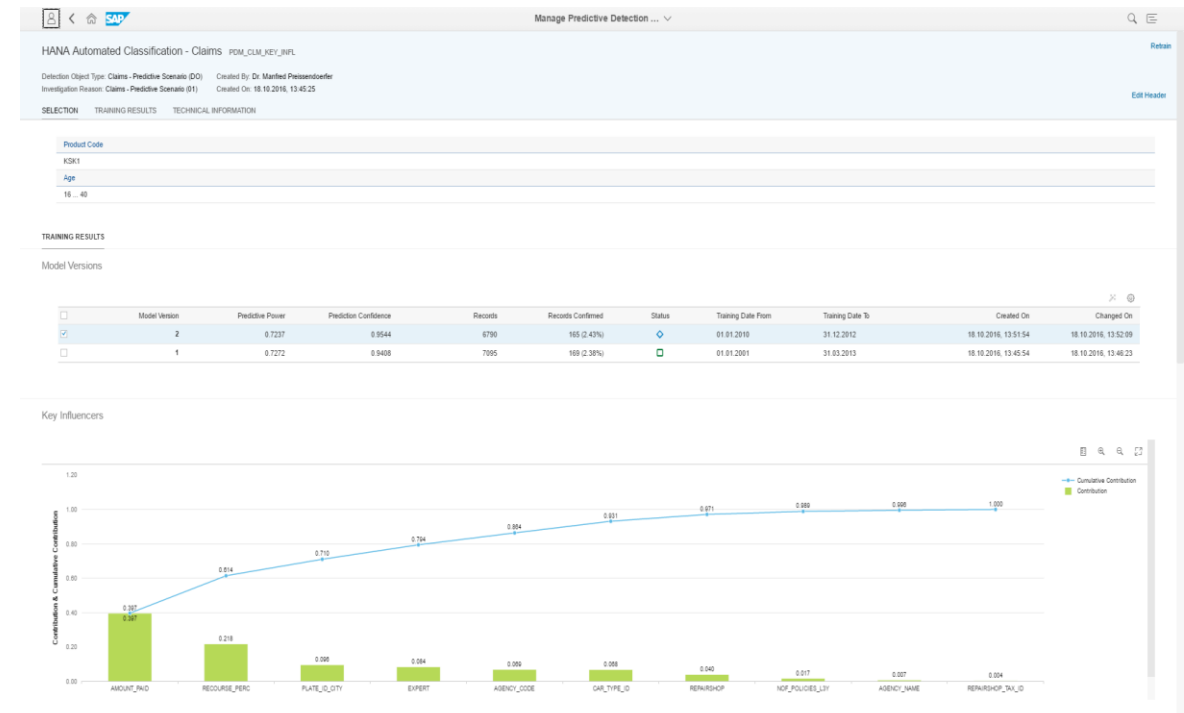
Investigators may add supervised machine learning capabilities to screening strategies leveraging their company's investigative history – without expert knowledge in data science and algorithm tuning

SAP Business Integrity Screening allows **your Business Analysts and Investigators** to

- Automatically detect and rank attributes within classified data that positively correlate with anomalous cases
- Incorporate them with existing detection methods into new Business Integrity Screening strategies
- Seamlessly integrate algorithms of HANA's Automated Predictive Library (APL)
- Leverage robust, state-of-the-art machine learning algorithms

Business Benefits

- Detection of new suspicious patterns
- Reduction of false positives
- Seamless integration of ML algorithms into the proven SAP Business Integrity Screening framework



SAP Tax Compliance

Smart Automation on Compliance Issue Processing


With every new decision the company's Tax Knowledge Base grows and **SAP Tax Compliance** leverage this by continually classifying compliance issues and trigger automated correction measures or close them as false positives. In rare cases human interaction is requested to do the decision.

SAP Tax Compliance allows **your Tax Managers** to


- Transparently apply HANA's Automated Classification
- Benefit from the company's memory of its tax managers past decisions
- Automate compliance issue processing and limit human interaction to exceptional cases
- Choose level of automation on compliance check basis

Business Benefits

- Automatically learn from new decisions
- Increase efficiency by smart compliance issue processing automation
- Seamless integration of ML algorithms into the SAP Tax Compliance



Home



Compliance Check Hits

Standard

Processing Status: Conclusion: Task List Status:

Hide Filter Bar Filters Go

Compliance Scenario Runs / Checks of Scenario Accounts Payable Basic Checks in Germany / Hits of Check Vendors without VAT ID

Hits of Check Vendors without VAT ID (147)

Hit Task

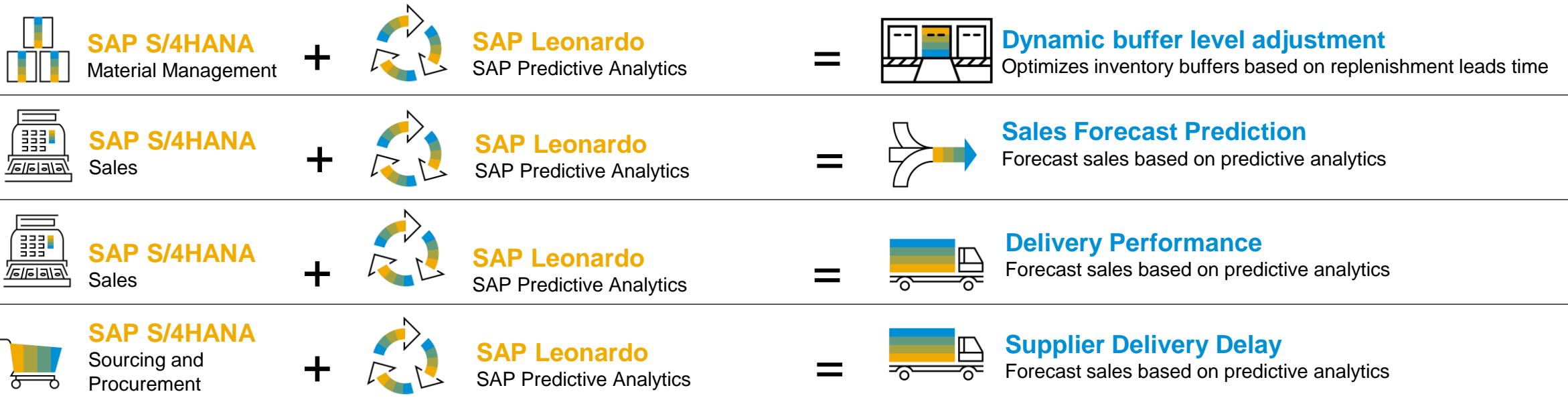
Set Status Set Conclusion Create Task List Go To

<input type="checkbox"/>	Processing Status	Conclusion	Score	Task List Template	Task List	Vendor	Vendor Name	House Number and Street
<input type="checkbox"/>	In Process	Confirmed		527	9876	1000196	Schmelzpunkt	Hauptstr. 123
<input type="checkbox"/>	In Process	Confirmed		527	9930	1000133	Leif Erant	Deichstr. 2
<input type="checkbox"/>	In Process	Confirmed		527	9930	BT_SUPP_01	BT Supplier 1	Hasso Plattner Ring 7
<input type="checkbox"/>	In Process	Confirmed		527	9930	BT_SUPP_02	BT Supplier 2	Hasso Plattner Ring 7
<input type="checkbox"/>	In Process	Pending		527		1003780	Vendor	Dietmar-Hopp-Allee 16
<input type="checkbox"/>	In Process	Pending		527		10038	Vendor	10038
<input type="checkbox"/>	In Process	Pending		527		1003131	SMC BP1	SMC 1234
<input type="checkbox"/>	Completed	Not Confirmed		527		1003541	SAP Julius	
<input type="checkbox"/>	Completed	Not Confirmed		527		300999	Hammer Sports	Hauptstraße 1
<input type="checkbox"/>	Completed	Not Confirmed		527		1000060	Sonder Locke	
<input type="checkbox"/>	Completed	Not Confirmed		527		AN_BP_0121	Leopold Kostal GmbH & Co. KG	An der Bellmerei 10
<input type="checkbox"/>	Completed	Not Confirmed		527		AN_BP_0121	Leopold Kostal GmbH & Co. KG	An der Bellmerei 10
<input type="checkbox"/>	Completed	Not Confirmed		527		TEST1 Yan	TEST1 Yan	Wassbleicher Str. 80
<input type="checkbox"/>	Completed	Not Confirmed		527		12	WTY Dealer WTY Dealer	Hasso-Plattner-Ring 7
<input type="checkbox"/>	Completed	Not Confirmed		527		524	GP E001 F001	Strasse 1
<input type="checkbox"/>	Completed	Not Confirmed		527		100030	Supplier WW	Mainstreet 1

SAP Leonardo embedded in S/4HANA

Machine Learning and Predictive Analytics

1808-1811



Demand-Driven Manufacturing

Dynamic Buffer Level Adjustment

In the planning method of “Demand-Driven Replenishment”, one key element is the dynamic adjustments of buffer levels

One key input for the buffer levels recalculation is the buffer replenishment lead time. The buffer levels depend proportionally on this lead time.

The more accurate the lead time can be determined, the better the buffer can be sized: big enough to ensure customer service levels, small enough to reduce bound capital

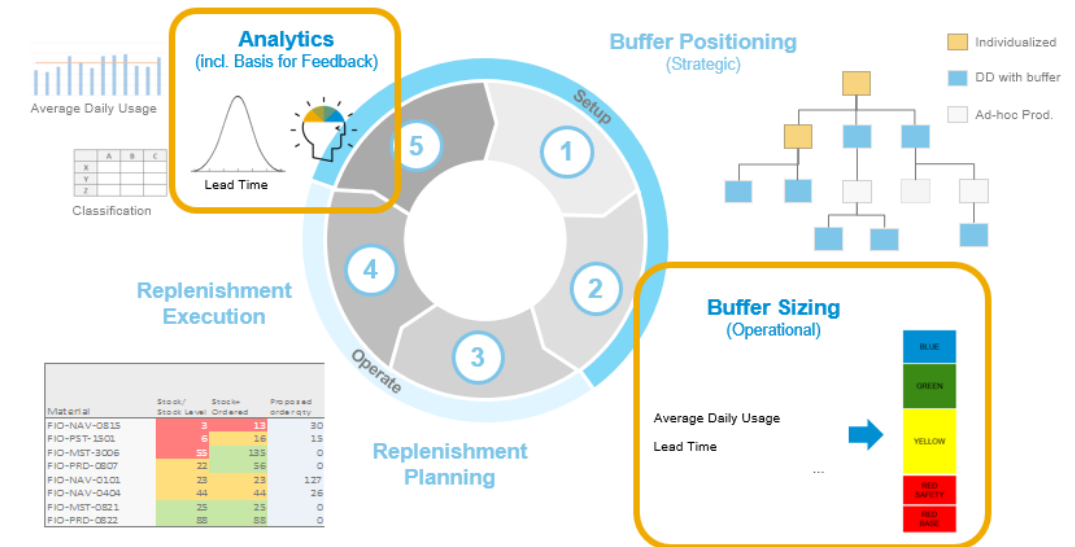
Based on historic lead times and their business context suggest buffer level adjustments to serve best the ever-changing reality

Demand-Driven Replenishment allows the Inventory Manager to

- Evaluate historic lead times of stock transfer orders
- Consider context information of orders to identify patterns and dependencies

Business Benefits

- Ensure best possible customer service levels at lowest possible costs (i.e. bound capital through buffered stock)



Supplier Delivery Prediction

Avoid delayed raw material availability or production rescheduling

Materials required for production are supplied by multiple suppliers. The delay in delivery would impact on-time production at plant and rescheduling assembly lines which is very costly. Indirect material delay also cause delay in supporting employees with required product/service. The Machine Learning algorithms identify the supplier delays based on the multiple situation and predicts the chances of delay. During creation of PO / PR, the lead time from material master sometimes don't take the processing and approval time into consideration.

Supplier Delivery Prediction allows **purchasers** to

- Predict more reliable delivery lead time when creating PR / PO
- Predict the arrival date of a shipment and classify the status into different classes
- The recommendations are enriched with insights gathered by the machine learning algorithm
- The results based upon transaction data predictions can later be reused at triggering sources such as Material Requirement Planning(MRP) or Source of Supply(SoS) to update delivery lead time or related parameters to avoid delays, thereby achieve delivery performance optimization.

Business Benefits

- More reliable planning / delivering of materials
- Avoid production delay and re-scheduling
- Decrease manual effort to monitor & resolve issues earlier
- Up to date lead time update for goods/services at master level for direct and indirect procurement

