Solving Business Problems in a New Way with Intelligent Technologies

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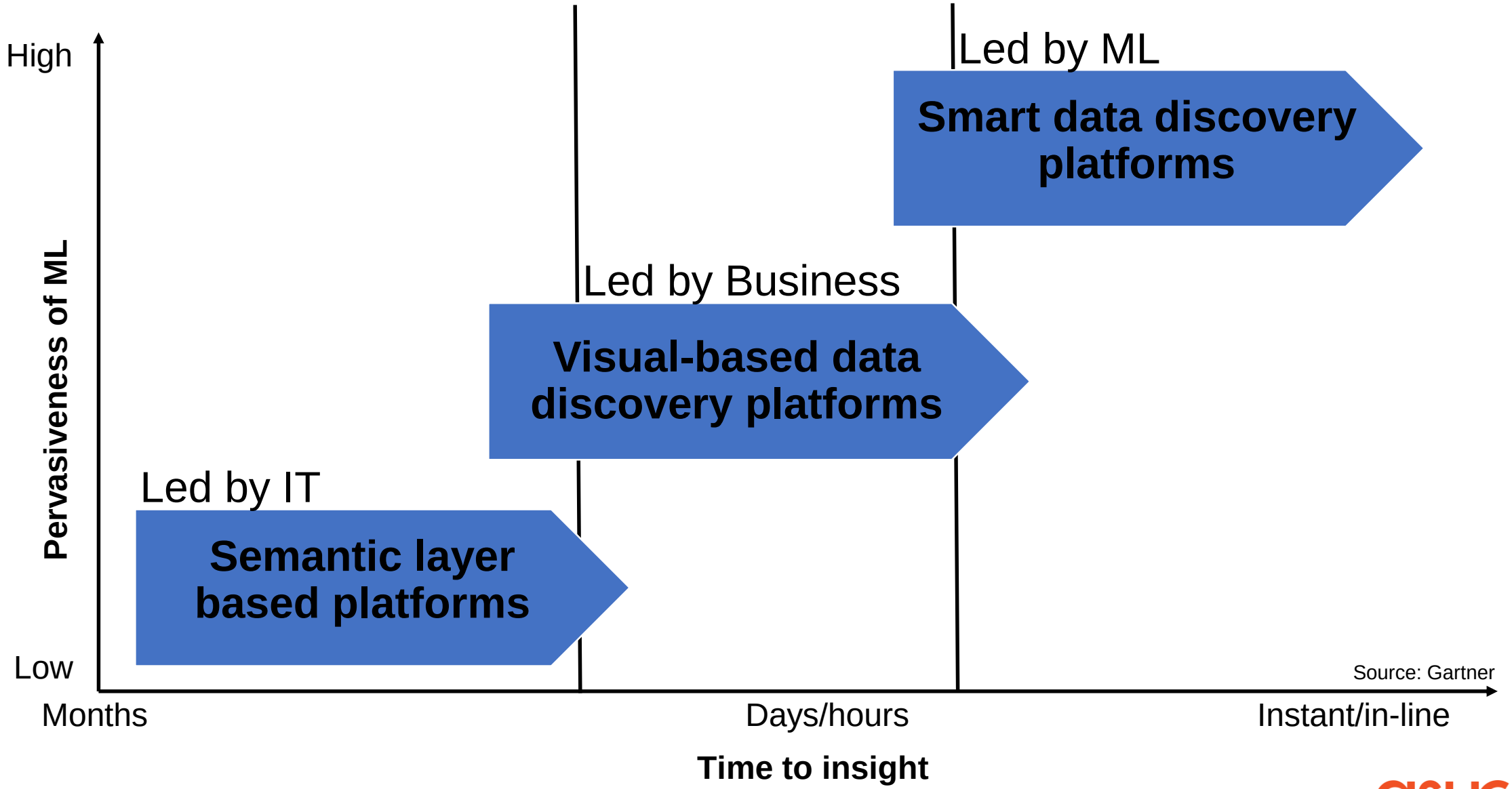
SAP

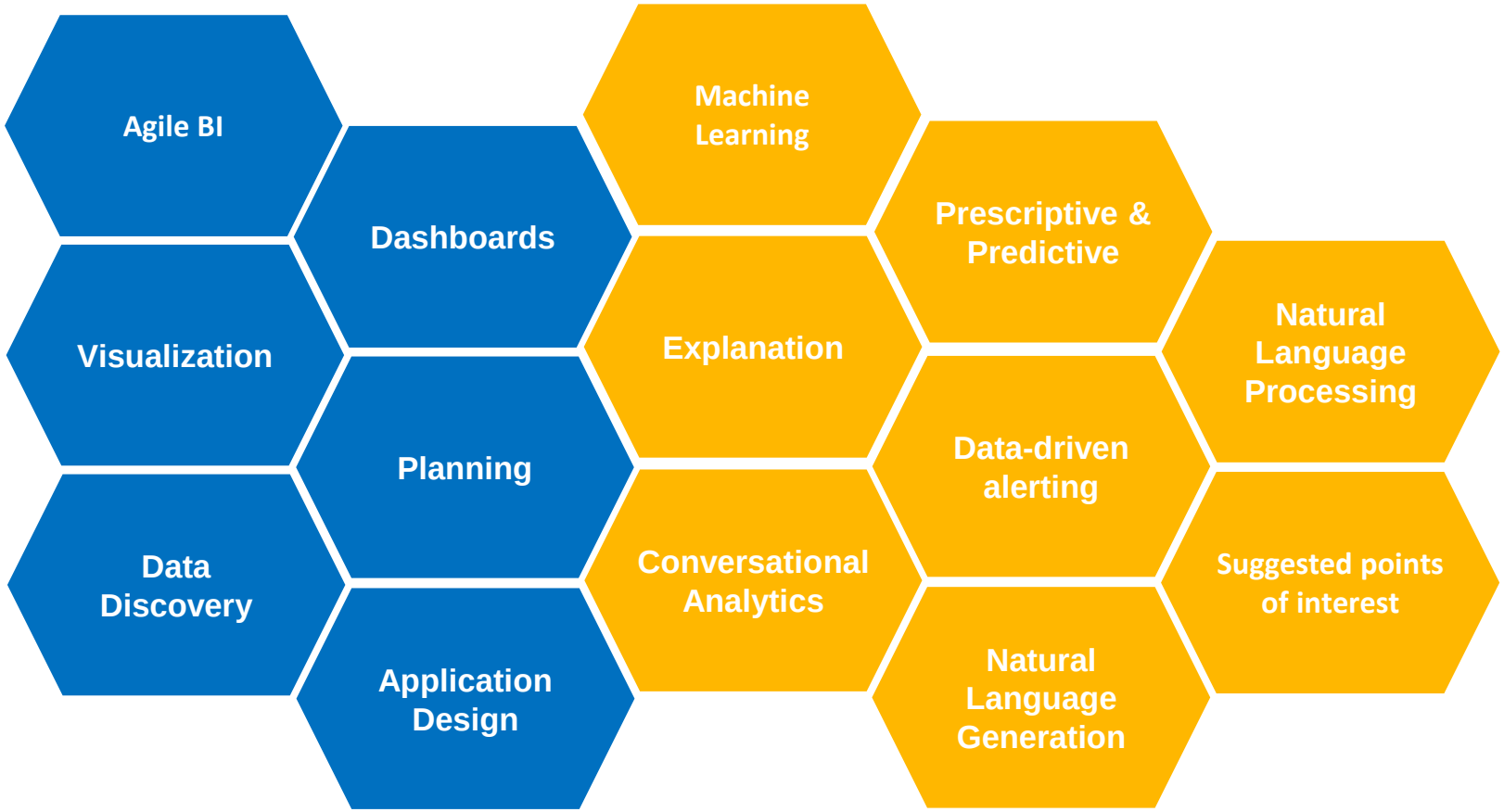
"If you don't reveal some insights soon, I'm going to be forced to slice, dice, and drill!"

Solving Problems in a New Way



Rethinking analytics with intelligent augmentation

SAP Analytics Cloud brings together human authored and automated analytics



Use Case

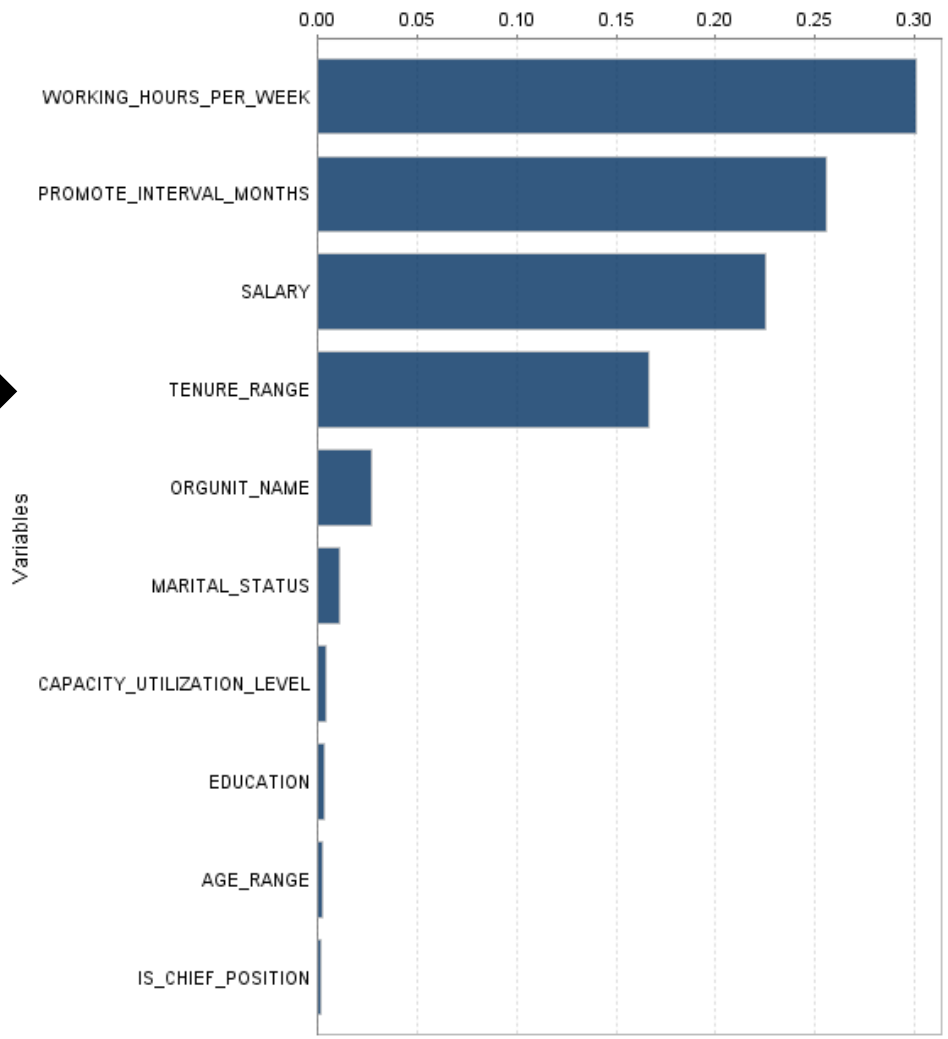
Predictive Outcome

1) Entity:  **Who (Employee)**

2) Target:  **will Leave Company?**

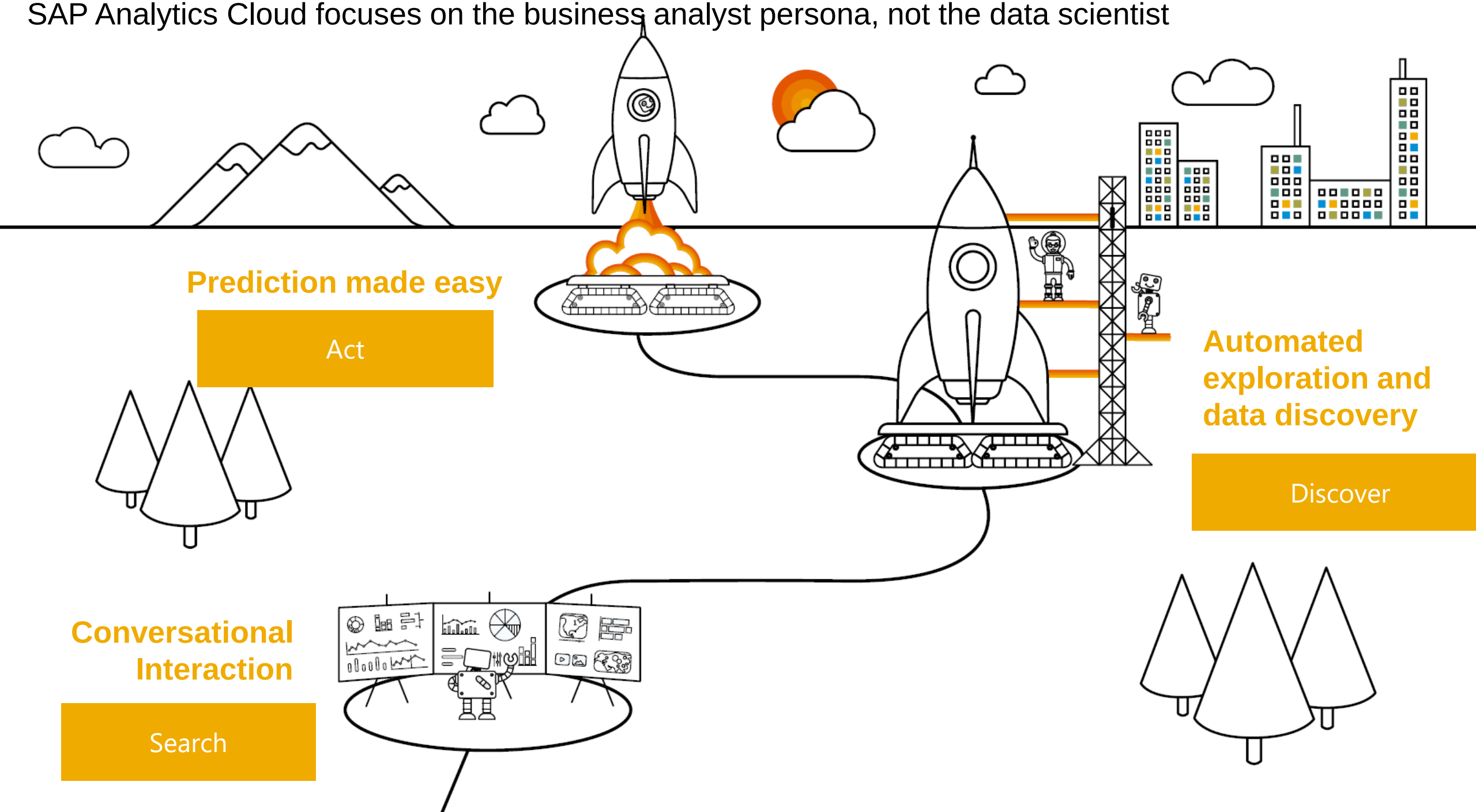
3) Descriptive Attributes:

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



Demonstration

SAP Analytics Cloud focuses on the business analyst persona, not the data scientist



Prediction made easy

Act

Automated exploration and data discovery

Discover

Conversational Interaction

Search

Contextual Augmented Analytics in SAP Analytics Cloud

Feature	Intention
Search to Insight	Find information quickly, present in the most understandable way
Smart Insights	Explain a data point or chart
Smart Discovery	Explain a target column with an automatically generated predictive model Automatic story creation
Smart Group	Group transactions together (cluster) to show hidden patterns in the data.
Smart Predict	Prescribe the optimal outcome
Predictive forecasting	Generate a forecast based on the context – Planning and BI

Use Cases

Converting Business Problems to Predictive Insight

Target (?):	**Who will** Leave Company?	**Who** will buy Suede Boots in the next 30 days?
Entity:	Employee	Customer
Descriptive Attributes:	❑ Gender ❑ Tenure ❑ Department ❑ Time Since Last Promotion ❑ Working Hours Per Week ❑ Marital Status ❑ Salary ❑ Training Hours Per Week ❑ Age Range	❑ Owns Pets ❑ Has Children ❑ Age ❑ How recent was the last purchase? ❑ How frequently do they purchase? ❑ How much do they spend? ❑ What products did they by in the last 30 days?

SOLVE REAL BUSINESS PROBLEMS

By Optimizing Resources and Improving Margins

- 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 and Margin Analysis
- Financial Risk Modeling
- Employee Retention Modeling
- Succession Planning

- Life Sciences
- Health Care
- Media
- High Education
- Public Sector / Social Sciences
- Construction and Mining
- Travel and Hospitality
- Big Data and IoT

Examples of SAP Co-Innovations in Industrial Manufacturing &Components

1. Demand Signal Mgmt & Forecasting

Demand Signal Management (DSiM) to better respond to customers and sales

2. Raw Material Pricing Impacts

Forecast COGS pricing impact on business margins

3. Spares / Service Parts Inventory Optimization

Improved stock levels and avoidance of stock cuts or expiration

4. Product Traceability

Leverage blockchain technology to create an irrefutable, validated record of material and product provenance

5. Connected Goods

Integrated products, consumables, and devices across the supply chain

6. Connected Manufacturing

Integrated M2M across plants, partners, and suppliers

7. Predictive Maintenance

Interpret equipment readings for condition based and predictive maintenance

8. Increase Operational Efficiency with AIN

Global registry of industrial Equipment built and shared between multiple parties

Market & Customer Insights

New Product Development & Innovation

Business Planning

Supply Networks

Manufacturing Operations

Multichannel Distribution

After Market Service

9. Asset Data Quality

Automatically identified statistical data quality models

10. Overall Equipment Effectiveness

Loss analysis tool for the manufacturing shop floor

11. Engineering DW and Manufacturing Analytics Platform

In-process, distributed analytics and ML with a simplified manufacturing/ product data landscape

12. Predictive Quality Management

Predict product quality using in-line data to detect issues earlier in the manufacturing flow

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13. Early Warning of Equipment Failures

Sensor data to detect equipment anomalies before failure

14. Digital Twin

Real-time, simulation-based equipment monitor

15. Dynamic Inventory Optimization

Real time supply chain data consolidation and global inventory visualization with modern tools and processes

16. Process Mining

Visualize process variants to improve efficiency and compliance

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Applying Machine Learning to Planning

Machine Learning Helps Planners Take Confident Decisions with SAP Analytics Cloud predictive planning, powered by Smart Predict

- Data driven planning
  - Predictive forecasting **automates the creation of baseline** planning models
  - Planners then **supplement these forecasts based on business acumen**
  - Planners **monitor plan attainment based on continuously updated predictions**
  - SAP Analytics Cloud predictive planning supports **for both top down and bottom up planning processes** – enabling the planner to automatically building forecasts at the correct level of detail
- Key example of how machine learning augments & supports human judgment throughout the planning lifecycle

SAP Analytics Cloud predictive planning key use cases

Use Case	What are the key business questions this use case answers?
Expense & Cost planning	What will be my expenses by location and category? What is driving these expenses? How could we reduce these expenses? Should we transfer budget from one area to another based on business need?
Revenue & Sales planning	What is the revenue forecast per business unit? What are the key drivers of revenue variation? How will sales evolve for specific products in the future?
Headcount planning	How many employees will leave due to attrition or retirement next year? What are the profiles of employees that leave? How much will it cost to recruit replacements?

SAC Augmented Analytics Roadmap

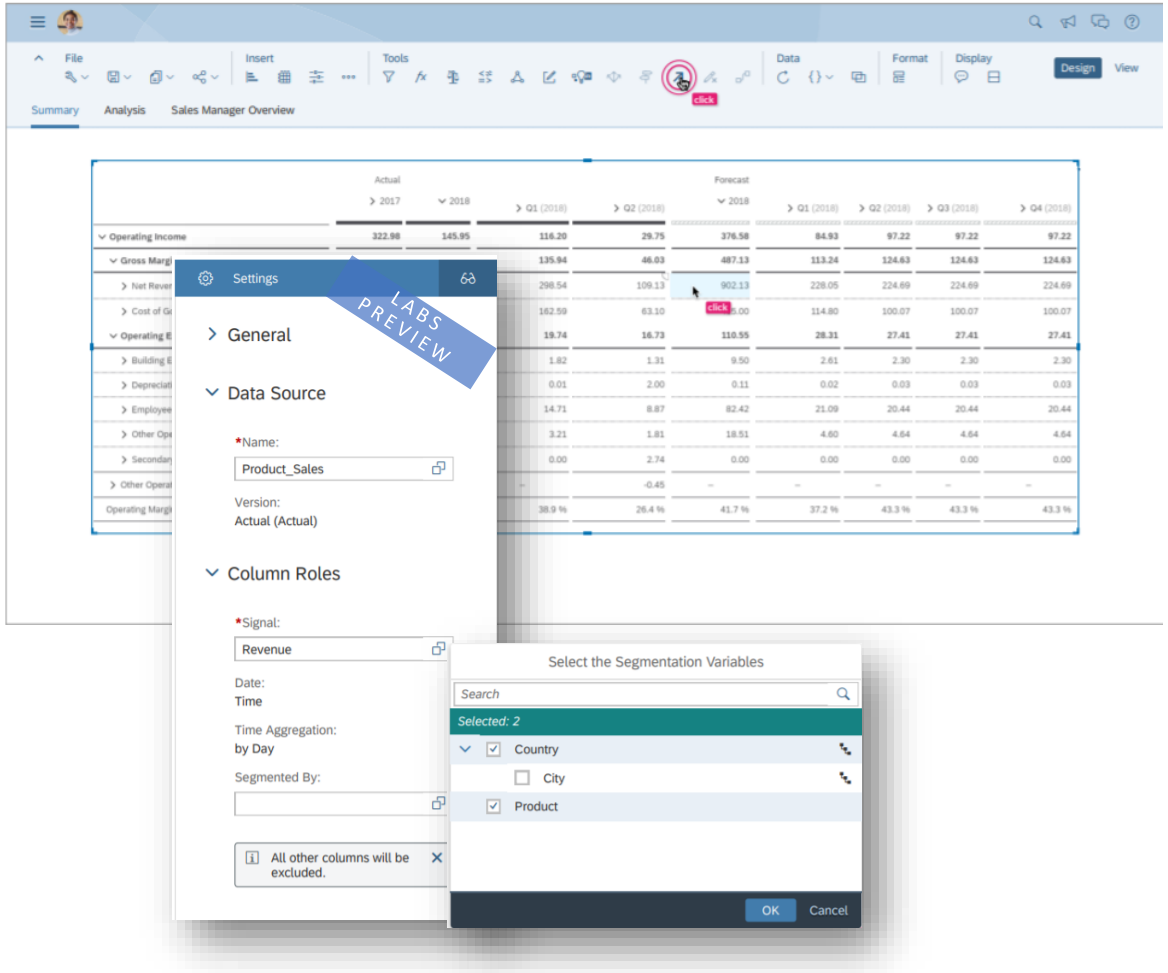
Predictive forecasting with automated forecasting
Deeper Smart Predict and Planning Integration - 2020 Q3

- Deeper integration between predictive and planning: Data level integration between Smart Predict and Planning
- Productivity & Scalability: Automated forecasts based on crossed dimensions (e.g. product, region) enables predictive forecasts at a lower level of granularity (e.g. individual forecasts for each product and region such as SAP HANA Sales in Germany). Enables greater control and accuracy of predictions.
- Trust: Smart Predict allows the planning users to see debrief information to validate the quality of the predictive forecasts and use predictive forecasts with trust.
- Insights: Planning users want to get business oriented insights, not only raw predictive forecasts, such as signal decomposition (trend, cycles) as well as the major variables influencing the predictive forecasts.
- One | Simple | Cloud: Delivering on the promise of Predictive, BI & Planning on one platform

Smart Predict & Planning: Automated forecasting

2020 Q3

- Planners will benefit from Smart Predict capabilities to generate predicted forecasts considering one or several business dimensions. Smart Predict will allow them to analyse forecast accuracy by dimension value and understand signal breakdown in details
- Planners will select a Planning model as input of Smart Predict, generate segmented predictive models and deliver predicted forecasts in the Planning grid in a few clicks
- Input asked to the user will be minimal: actuals are used by default, only relevant columns are displayed, selection of multiple dimensions is supported for segmentation.
- Beta version currently planned for Q2 2020 (April), general release planned for Q3 2020



Smart Predict 2020 Product Plan Highlights

- Smart Predict will augment SAP Analytics Cloud Planning workflows – delivering predictive forecasts to help planners take decisions – Planned for Q2 (beta), Q3 (initial release).
- The end-to-end workflow between datasets and stories will be improved, with dataset refresh, and consumption of live datasets in stories – Planned for Q2.
- Predictive scenarios will be integrated in SAP Analytics Cloud *Files* structure, to better secure predictive scenarios & import/export scenarios between SAC systems – Planned for Q2.
- Live Predict Capabilities will be expanded over time, with support of calculation views – Planned for H2.
- Additional planned capabilities include Explainable AI, data preparation…

SAP Analytics Cloud Smart Predict – Product Plan

Q1 2020

Machine Learning for Business Analysts

- Business analysts can choose multiple dimensions to generate bottom-up predictive forecasts at larger scale.
- Business analysts can gauge variable influence for Time-Series predictive models.

Q2 2020

From Analytics to Augmented Analytics

- BI stories that leverage predictions can be automatically refreshed when these predictions are refreshed.
- Predictions generated with Live Predict can be directly consumed in SAC live BI Stories.

Forecasts & Bottom-up Forecasting

- Planners can leverage Smart Predict to produce bottom-up predictive forecasts at larger scale and augment the Planning grid (bottom-up forecasting) (beta)

Machine Learning for Business Analysts

- Predictive scenarios are managed as others SAP Analytics Cloud artefacts.
  - It allows better authentication & security management (integration to SAP Analytics Cloud file system)

Future Direction

From Analytics to Augmented Analytics

- Business analysts can run Smart Predict on SAP Analytics Cloud Analytical Models and define the analytical entity they are interested in (smart flattening)
  - It enables BW on HANA and BW/4HANA support as Smart Predict can be run on BW-generated Calculation views
- Business analysts can analyze predictions accuracy & insights directly in a BI Story
- Smooth transition from Smart Discovery to Smart Predict is offered.

Forecasts & Bottom-up Forecasting

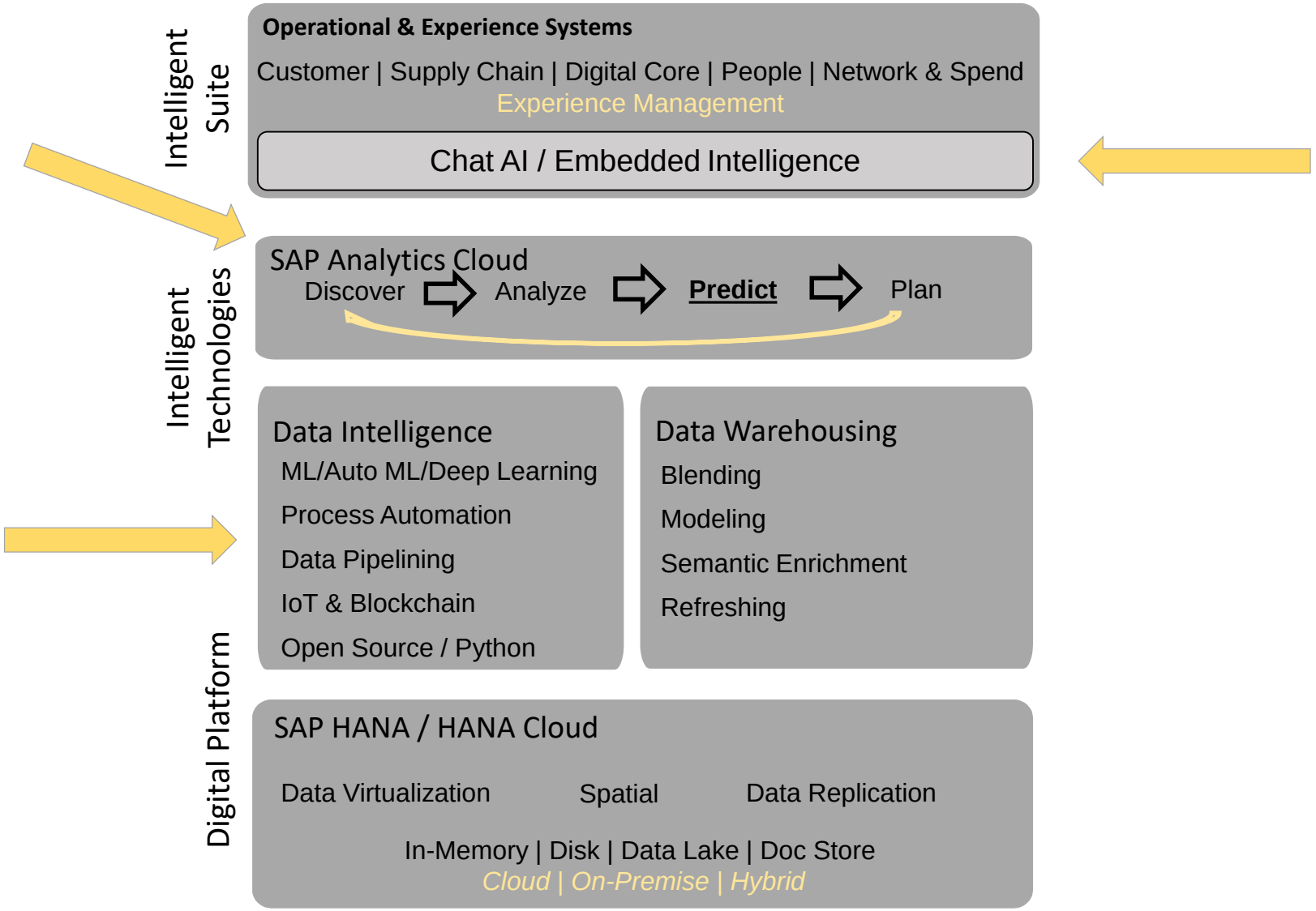
- Bottom-up forecasting (general release)
- Planners can choose the level of the temporal aggregation, support of parent-child hierarchies is enhanced.

Machine Learning for Business Analysts

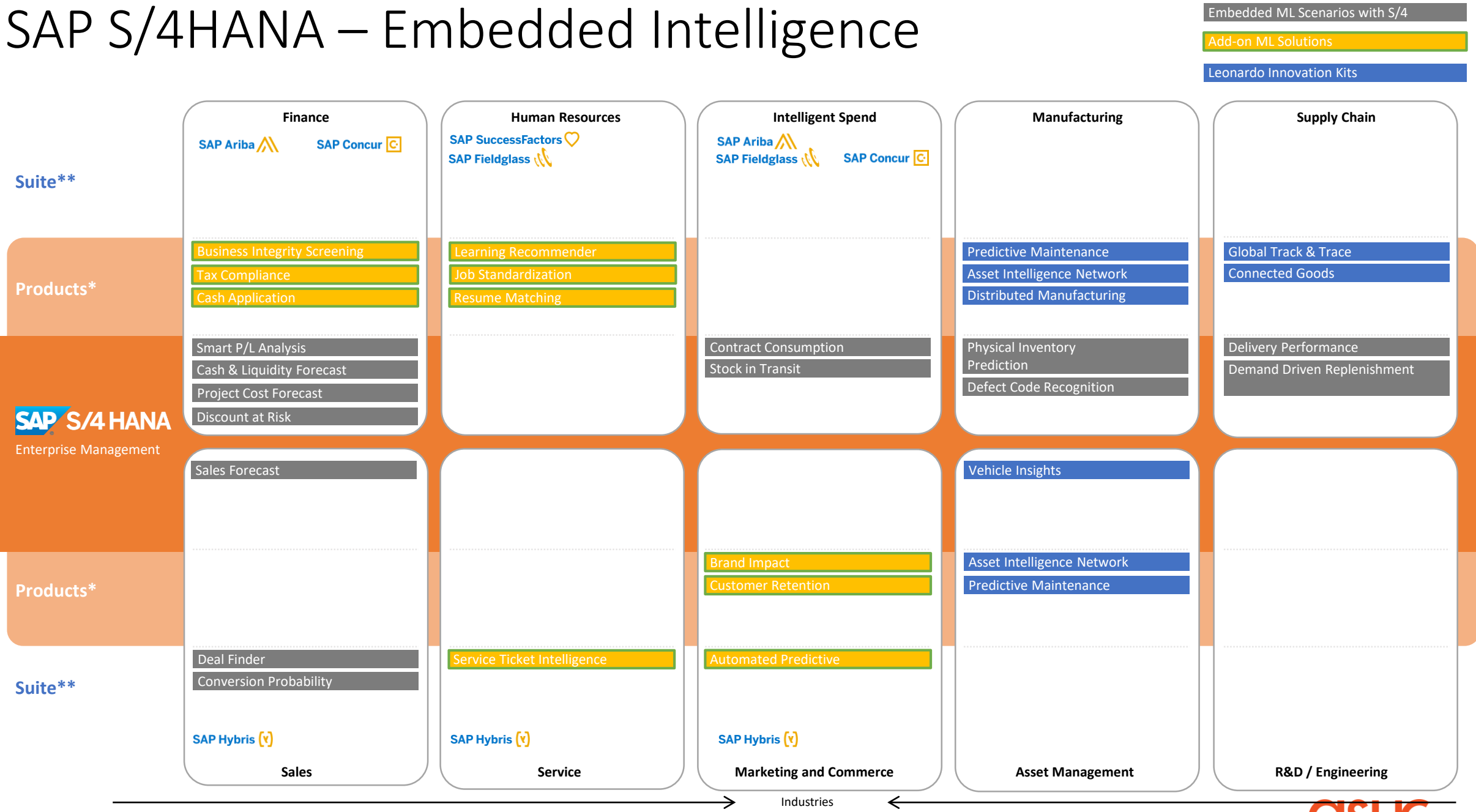
- Business analysts can apply filters on ready-to-use dataset
- Prepare data for predictive purposes & generate features
- Schedule automated update of predictions & refresh stories automatically
- Improved predictions accuracy and predictive models stability over time
- Explainable AI: identify potential biases in the predictions & propose improvements; find non-obvious insights; build trust through transparency

Machine Learning in the Enterprise

Machine Learning in the Enterprise



SAP S/4HANA – Embedded Intelligence



More capabilities can be built as custom scenarios

Comparing approaches to automation

Rule engines

Engines preloaded with highly specific process knowledge enable **rule-based automation**

Machine-learning

Machine-learning identifies hidden patterns in knowledge-intensive processes and learns from the data **without being explicitly programmed**

Robotic process automation

Robotics process automation helps run repetitive, **rule-based,** and user interface– focused tasks and bridges temporary gaps

For the Data Scientist

SAP Data Intelligence

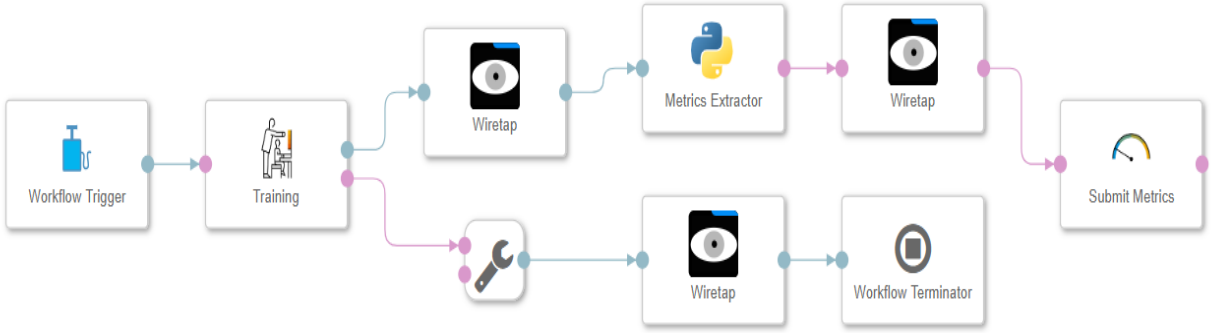
Build agile data-driven processes

Approach “by hand“

```
import org.apache.spark.mllib.classification.{SVMModel, SVMWithSGD}
import org.apache.spark.mllib.evaluation.BinaryClassificationMetrics
import org.apache.spark.mllib.util.MLUtils

// Load training data in LIBSVM format.
val data = MLUtils.loadLibSVMFile(sc, "data/mllib/sample_libsvm_data.txt")

// Split data into training (60%) and test (40%).
val splits = data.randomSplit(Array(0.6, 0.4), seed = 11L)
val training = splits(0).cache()
val test = splits(1)

// Run training algorithm to build the model
val numIterations = 100
val model = SVMWithSGD.train(training, numIterations)

// Clear the default threshold.
model.clearThreshold()

// Compute raw scores on the test set.
val scoreAndLabels = test.map { point =>
  val score = model.predict(point.features)
  (score, point.label)
}

// Get evaluation metrics.
val metrics = new BinaryClassificationMetrics(scoreAndLabels)
val auROC = metrics.areaUnderROC()

println("Area under ROC = " + auROC)

// Save and load model
model.save(sc, "target/tmp/scalaSVMWithSGDModel")
val sameModel = SVMModel.load(sc, "target/tmp/scalaSVMWithSGDModel")
```

Source: http://spark.apache.org/docs/latest/mllib-linear-methods.html

Agile „Data Pipelining“ approach with SAP Data Intelligence

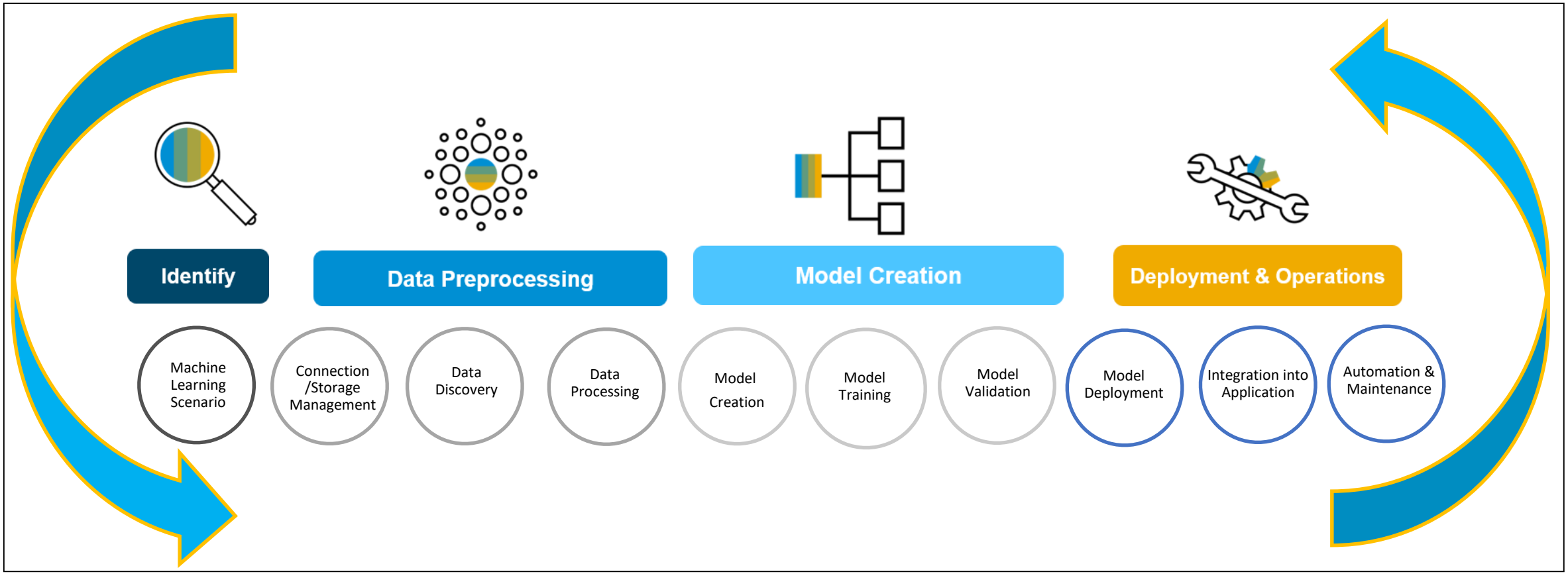


What is SAP Data Intelligence?

Create powerful data pipelines to **leverage** your data projects and to **orchestrate** the data processing

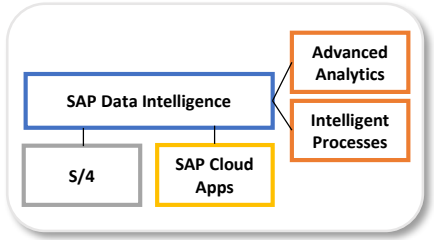
Harness the advanced machine learning content to **accelerate** and **scale** and **automate** your Data Science projects

Manage metadata across a diverse data landscape and **create** a metadata repository



Use SAP Data Intelligence to reimagine your business processes using …

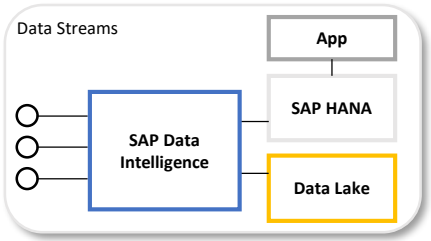
Business Application Transformation



Streamline innovation initiatives around Business Applications, supporting enterprise transformation programs

- **Customer Risk Intelligence with S/4 HANA Cloud**
- **Timesheet Analytics with Fieldglass**

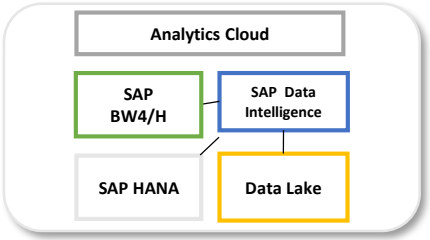
IoT Ingestion and Orchestration



Transform IoT event streams into enterprise-ready data, and derive actionable insights

- **Predictive maintenance**
- **Manufacturing product as-a-service**
- **Intelligent logistics**

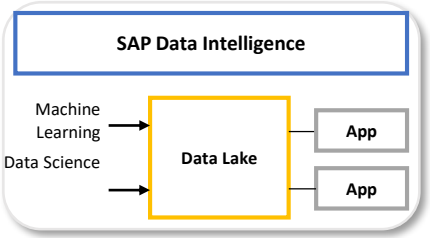
Data Warehousing



Build a multifaceted data warehouse, across diverse and distributed data assets

- **Customer 360 view**
- **Marketing campaign effectiveness**
- **Renewable energy production simulation**

Data Science and Machine Learning

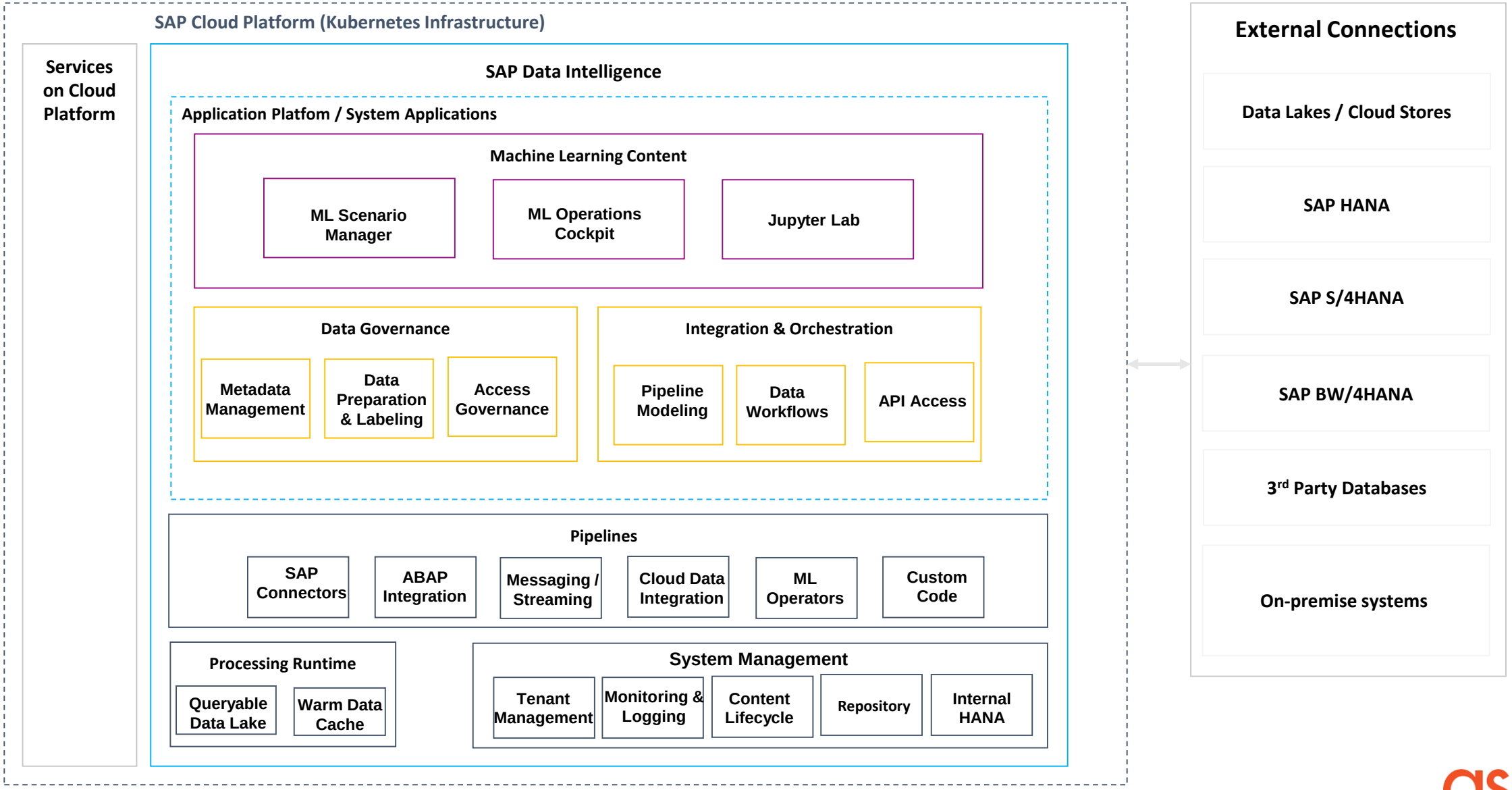


Streamline data science and machine learning, from modeling and development to operations, across all enterprise data assets

- **Customer churn prediction**
- **Intelligent document processing**
- **Image object detection & recognition**

SAP Data Intelligence

Architecture View



Key Points to Consider

Catering to a Variety of User Types

- SAP provides a wide range of algorithms for data scientists and non-data scientists

SAP In Memory Processing & Scalability

- SAP can learn off the data in memory without moving it around
- Better integration with SAP Cloud Platform and SAP HANA (delegated processing)

Data Transformation

- Integrated SAP HANA transformation capabilities with powerful SQL generation capabilities

Model Segmentation

- SAP has powerful model scheduling and segmentation capabilities

Embedded Machine Learning Modeling

- SAP leverages an embedded framework within SAP Applications to provide prebuilt and custom embedded business automation

Conversational AI & Embedded Robotic Process Automation

- SAP is the only solution to provide RPA directly within the SAP application layer

Questions?

For questions after this session, contact me at Jason.White@sap.com

Thank you.

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