



“Smart Air” Strategy Execution

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84223

About the Speakers

Falko Lameter

- CIO, KAESER Kompressoren SE
- Responsible for information technology and organization at Kaeser Compressors.
- Established digital information processing across the entire company.
- Early initiator and driver of enterprise digitalization.
- Played golf only once and then scored a hole-in-one.

Amogh Umbarkar

- VP, SAP T&I Big Data
- Responsible for the Customer adoption and Ecosystem collaboration
- Passionate about adopting and delivering innovation to achieve better business outcomes
- Leads the Big Data Customer Advisory Board to bring Thought Leadership for driving continuous product innovation.
- Avid Soccer fan

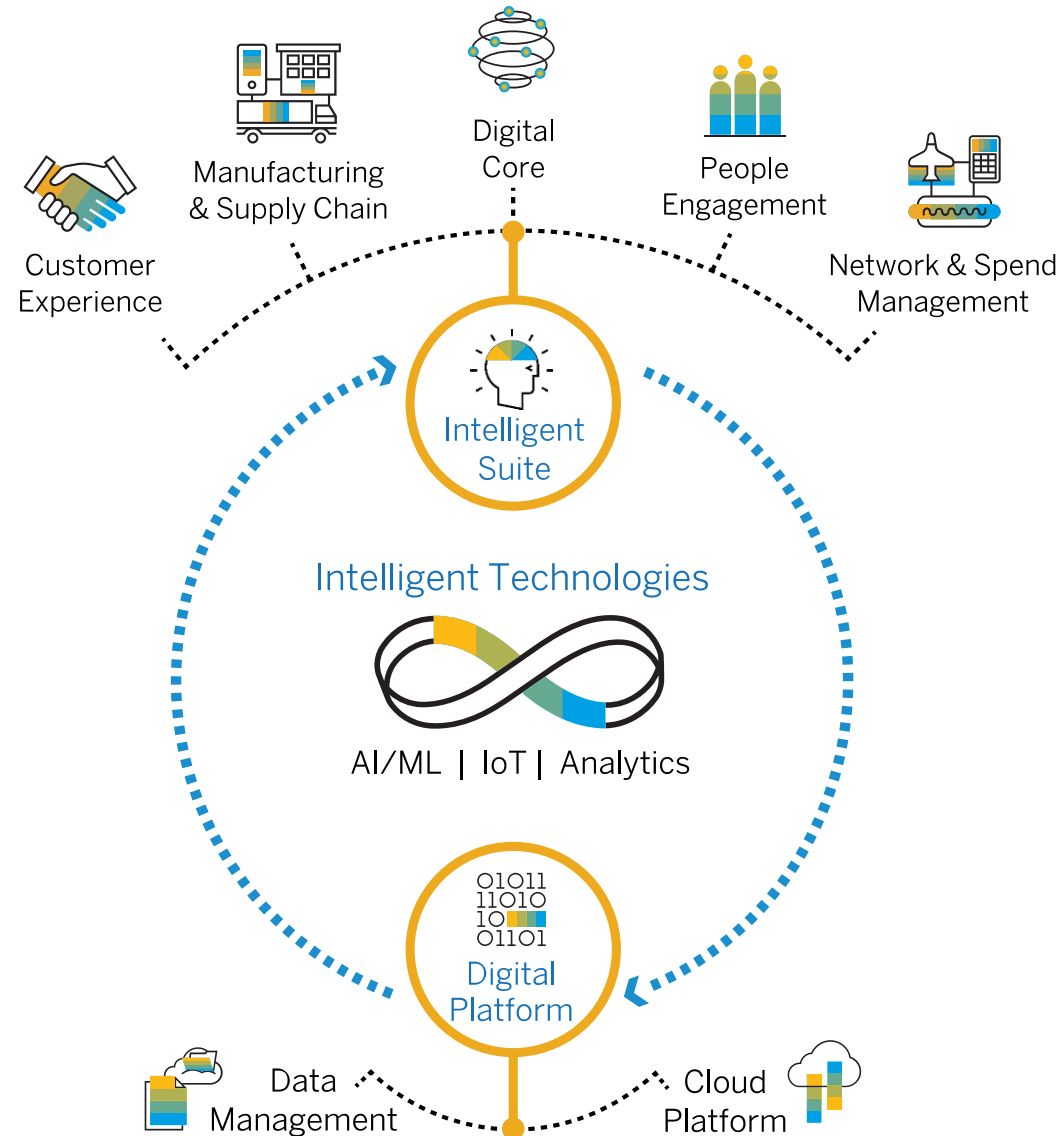
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For all recent and planned innovations, potential data protection and privacy features include simplified deletion of personal data, reporting of personal data to an identified data subject, restricted access to personal data, masking of personal data, read access logging to special categories of personal data, change logging of personal data, and consent management mechanisms.

SAP Strategy – Deliver the Intelligent Enterprise



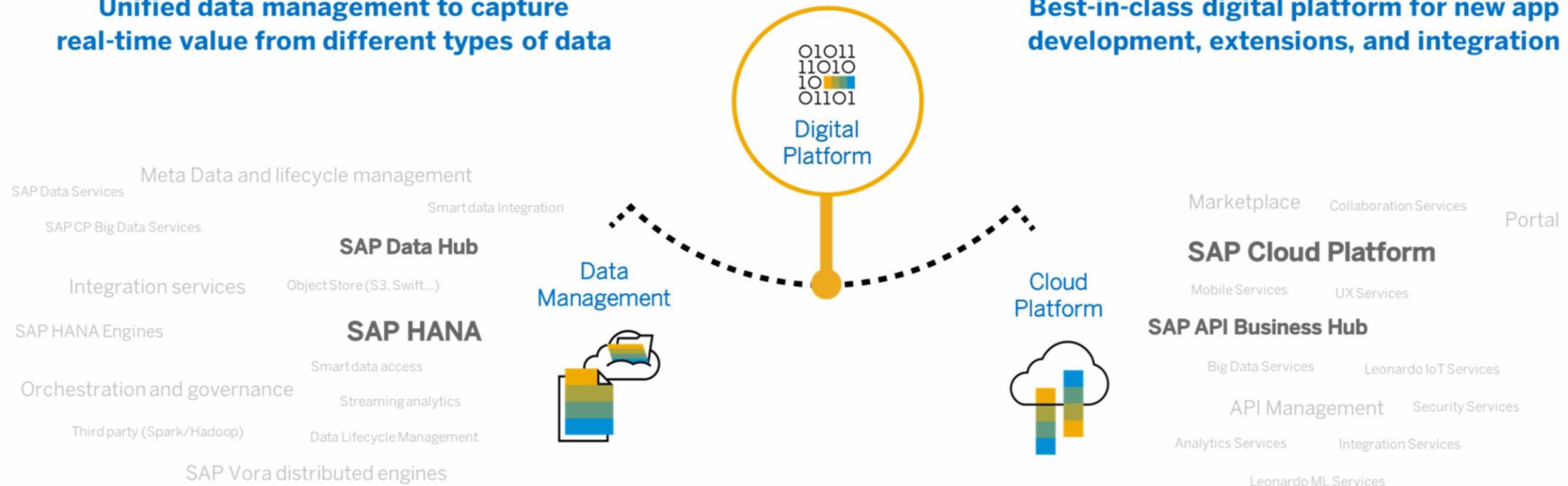
THE INTELLIGENT ENTERPRISE
features **3 KEY COMPONENTS**

- 1 Intelligent Suite
- 2 Digital Platform
- 3 Intelligent Technologies

Digital Platform: Unlock data-driven intelligence and innovation

Unified data management to capture real-time value from different types of data

Best-in-class digital platform for new app development, extensions, and integration



Next-generation data management expands SAP HANA in-memory database to address structured and unstructured data use cases and external data

SAP HANA powers SAP applications as the foundation of high-performance data warehousing and analytics

SAP Data Hub provides data orchestration and metadata management across heterogeneous data sources

Platform for extending the business processes of the Intelligent Suite and enabling new innovations

Delivering deep data and process integrations through APIs and microservices

Marketplace for ecosystem to build new innovations leveraging APIs and business services

SAP Data Hub – Unified Data Orchestration, Integration & Processing

Data-driven applications

IoT

Machine Learning

Analytics / BW

...

SAP Data Hub



Metadata Management



Orchestration



Processing & Pipelines



Integration & Ingestion



Distributed Datalake

(SAP HANA, SCP BDS, Object Stores, etc.)



B2B

Enterprise applications (APIs, Business Processes, Business Functions, etc.)

Data Lake

Cloud Stores (S3, GCS, WASB etc.)
Hadoop / Hive / Spark etc.

Enterprise Sources

Data warehouses / Data Marts
Databases (Oracle, SQL Server, DB2, etc.)
Other Enterprise solutions (e.g. Salesforce.com, cloud elements, OS/soft, Adobe, SAP EIM, etc.)

Streams / semi-structured

IoT devices, Things, etc.
Kafka, MQTT, Google Sub/Pub, etc.

Unstructured

Multimedia (PPT, documents, image, audio, video, etc.)
OpenText, Box, Dropbox, etc.

ABAP Integration

Workflow

Cloud Integration API

HANA / Vora integration

SAP BW

SAP S/4HANA

SAP Analytics Cloud

SAP BW

Data Services Jobs

SAP HANA

HANA Flowgraphs

BW Process Chains

Data Services Jobs

SAP HANA

HANA Flowgraphs

C4C

SAP Fieldglass

GIGYA

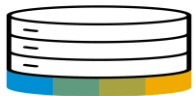
SAP Ariba

SAP Concur

Business Apps

Business Services

SCP



SAP HANA

SAP Applications

External and distributed data sources

SAP Data Intelligence – Data Science Platform & SAP Data Hub aaS

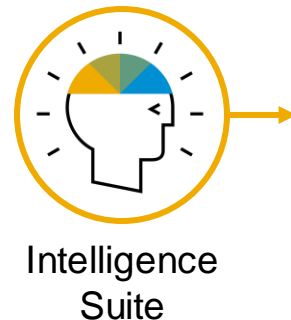
Data science, machine learning, and data orchestration

Currently in Beta

Goal / Vision

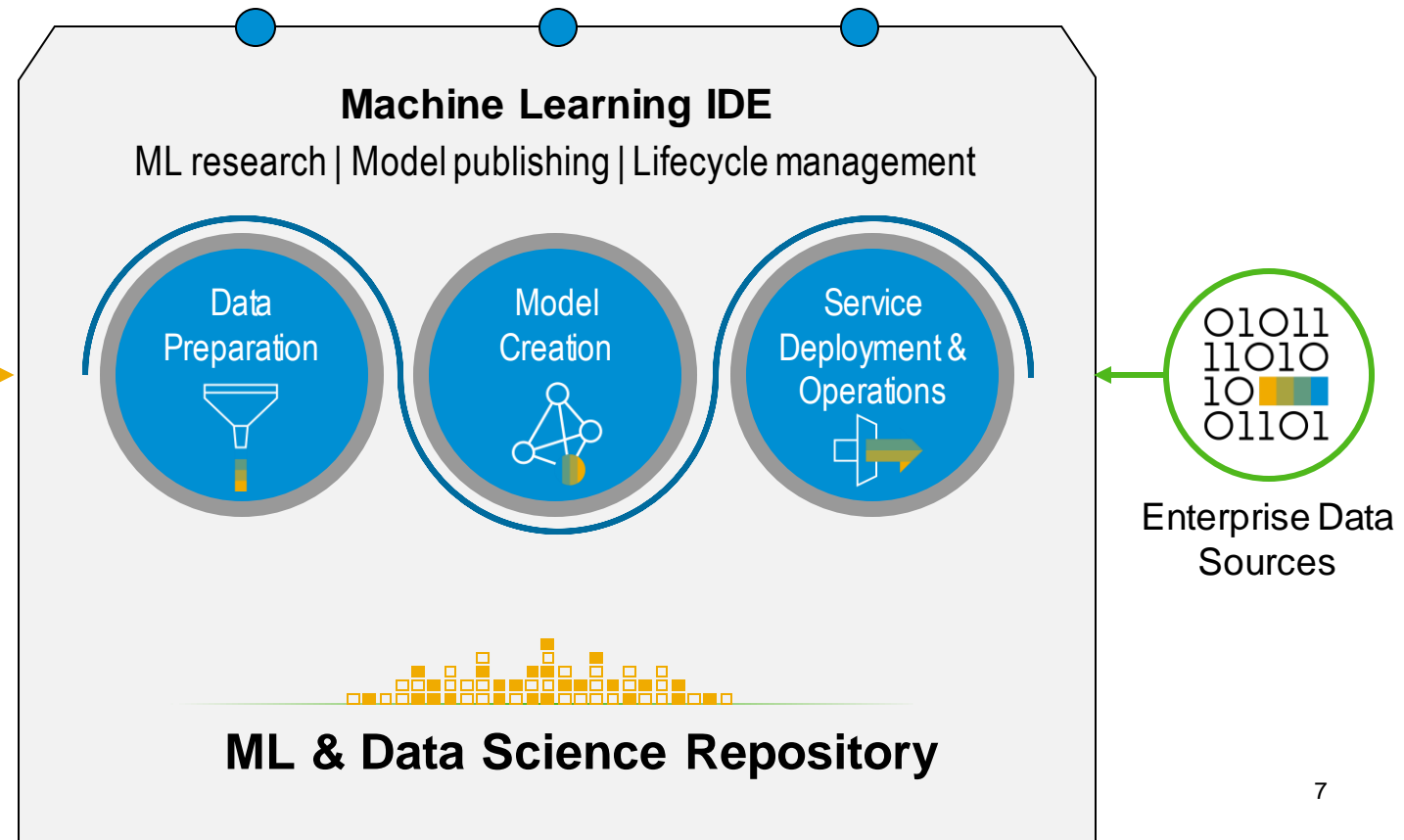
Building an open, scalable, complete machine learning & data science platform

- SAP Data Hub as a Service as foundation and flexible execution environment
- Tight integration into existing machine learning services
- Manage thousands of models in production
- Automate retraining, maintenance, and retirement
- Embed into SAP applications
- Stay compliant and auditable



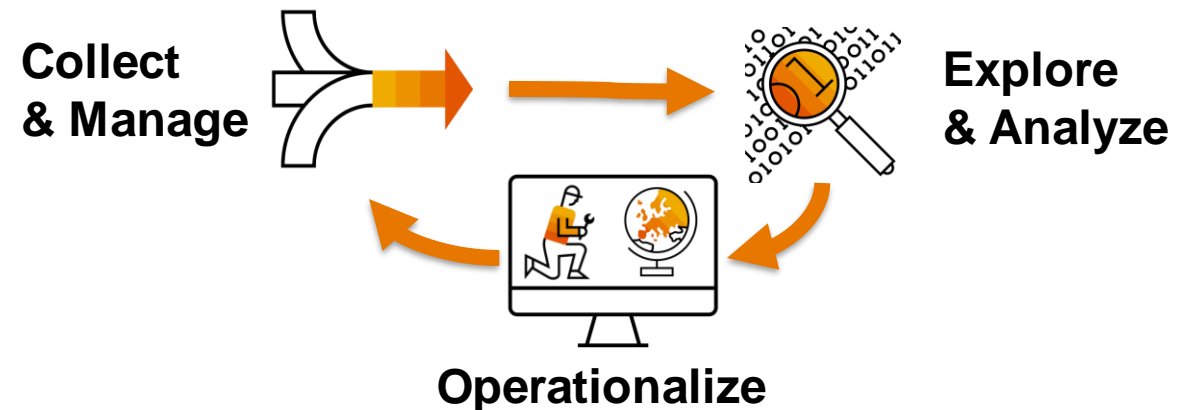
Machine Learning & Data Science Platform

Orchestration | Integration | Operationalization



Three things to bring back home...

1. **There is a Strategy for Innovation** with landmarks, but not a project plan. Iterate to success.
2. **Digitalization** spans across the whole Enterprise, Processes and the Product Lifecycle.
3. **Follow the data journey**



KAESER Kompressoren SE

A mid-size enterprise with a strong technology footprint and a proven early adopter



One of the world's leading manufacturer for energy-efficient compressed air systems



 **6000+**

Over 6000 employees worldwide



Manufacturing in Germany

 **100**

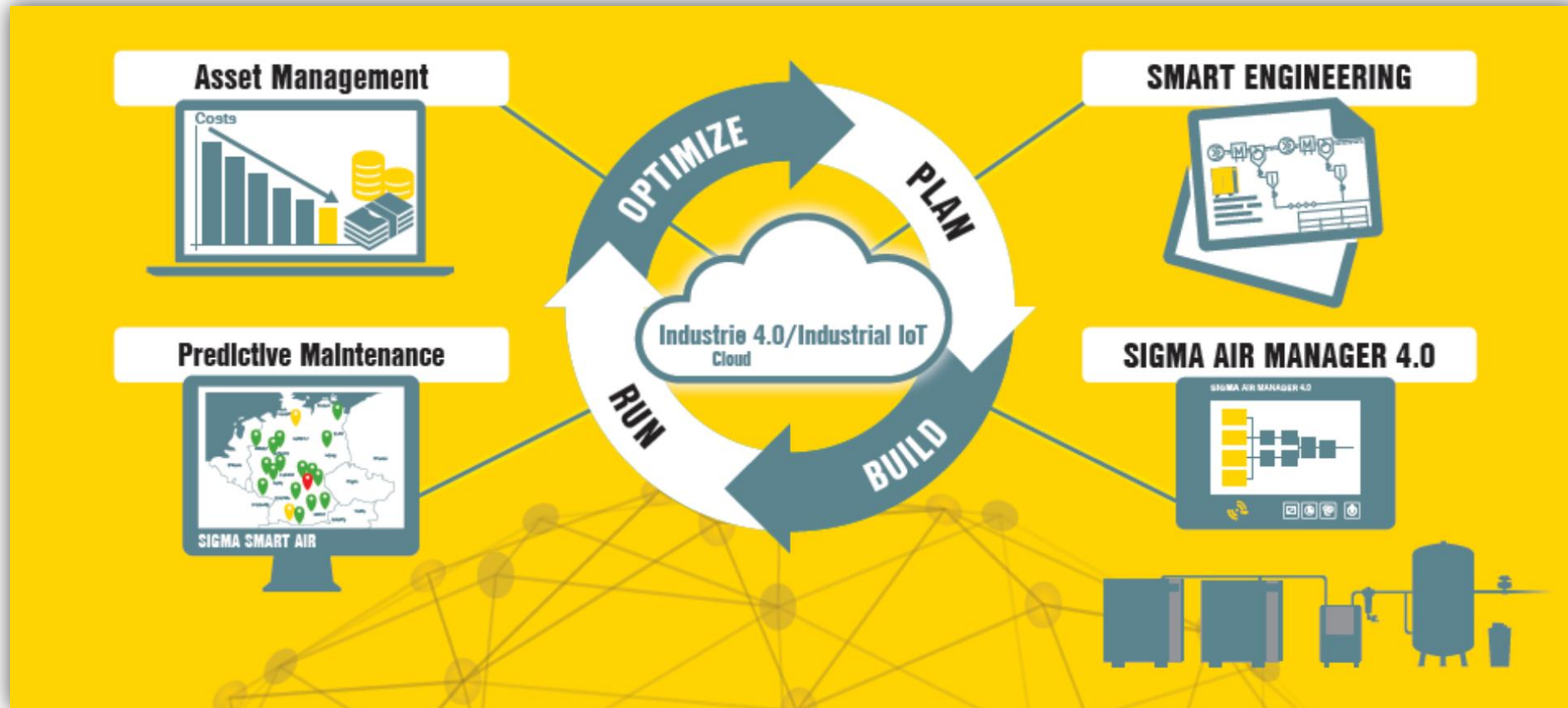
Founded 100 years ago
in 1919 by Carl Kaeser
in Coburg, Germany



Global Sales & Service
in EMEA, Americas, APAC

A Customer-Centric Digital Supply Chain

Digitalizing the entire product lifecycle



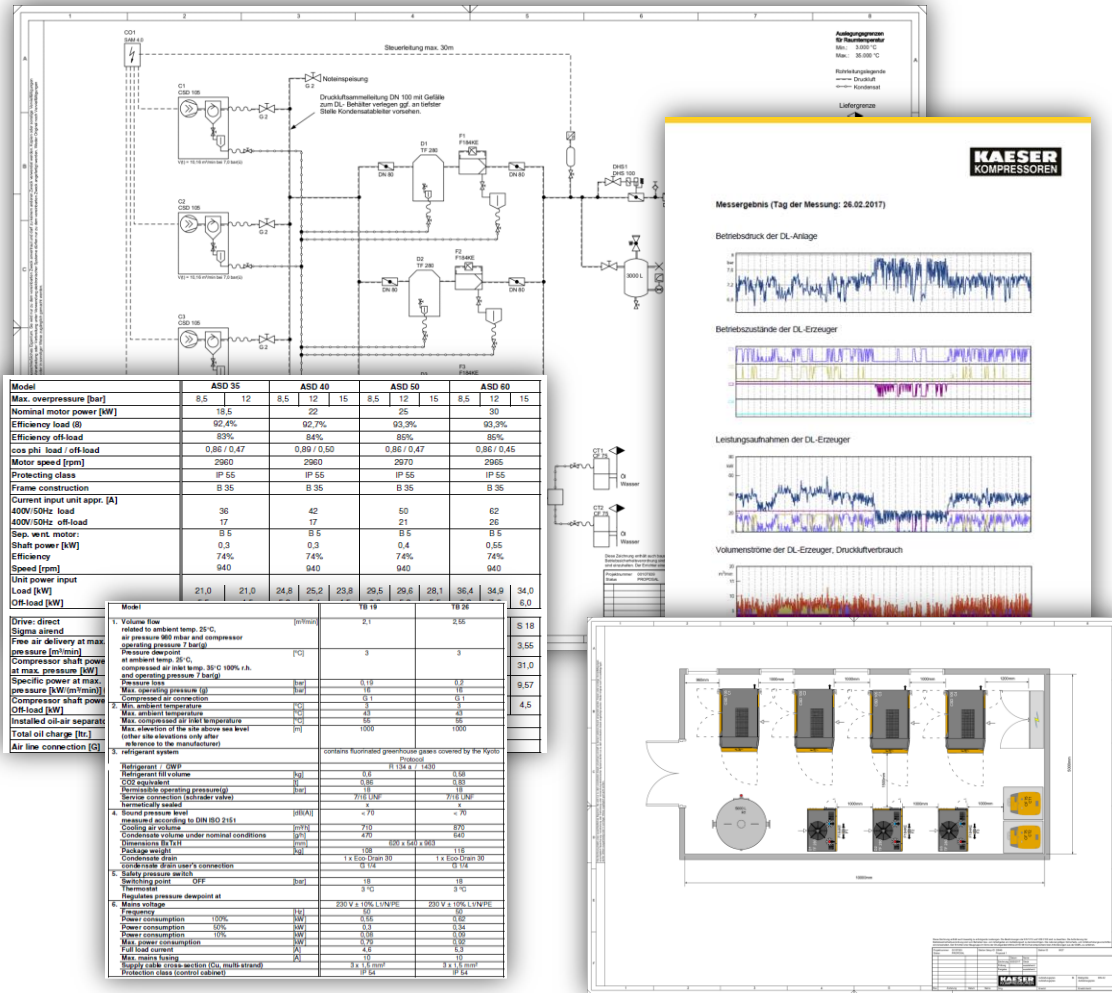
Exemplary Compressed Air Station

Sigma Air Manager 4.0



Lifecycle of a Compressed Air Station

KAESER Smart Engineering



Acquisition

As-is & Air Demand Analysis

Planning

Solution planning, simulation & documentation
Solution proposal

Realization

ATP, MTO, ETO, ..., Installation (Sub-Contracting)

Commissioning

Integrate into PdMS & Service

Operation

Run Predictive Maintenance & Service

Decommissioning

KAESER Smart Products Digital Twin

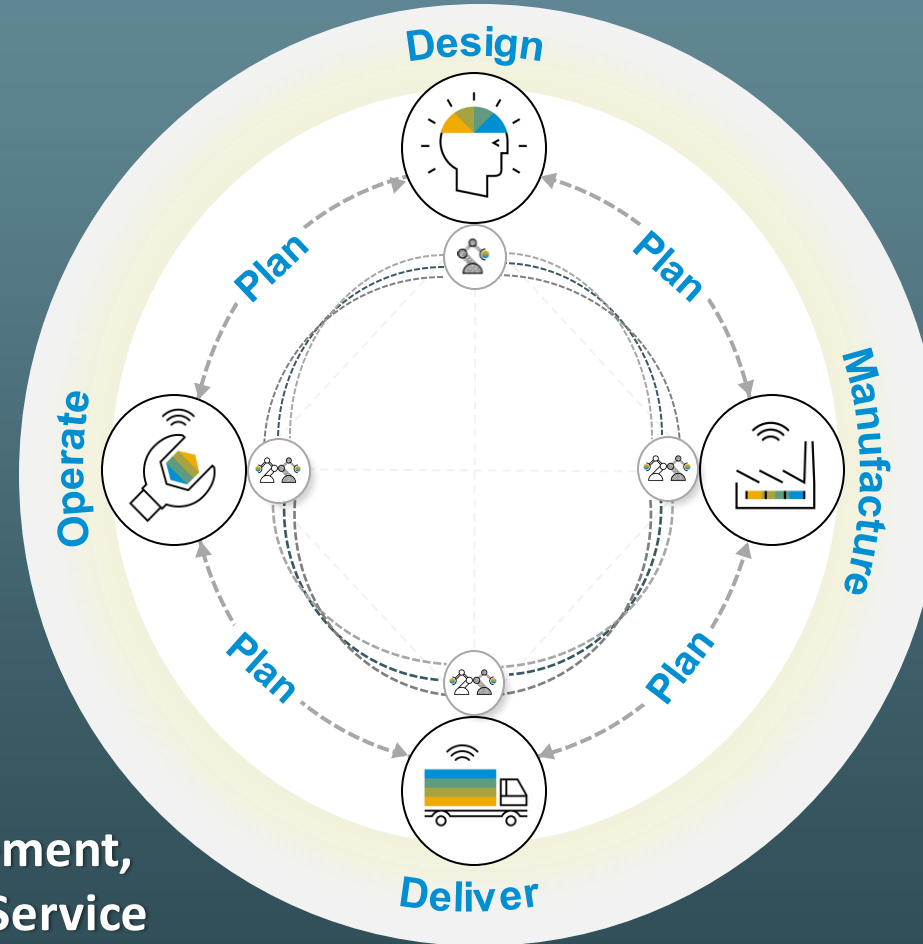
Connect Digitally to Asset Management Reality

Operator

KAESER

KAESER
Asset Intelligence

KAESER
Smart Products

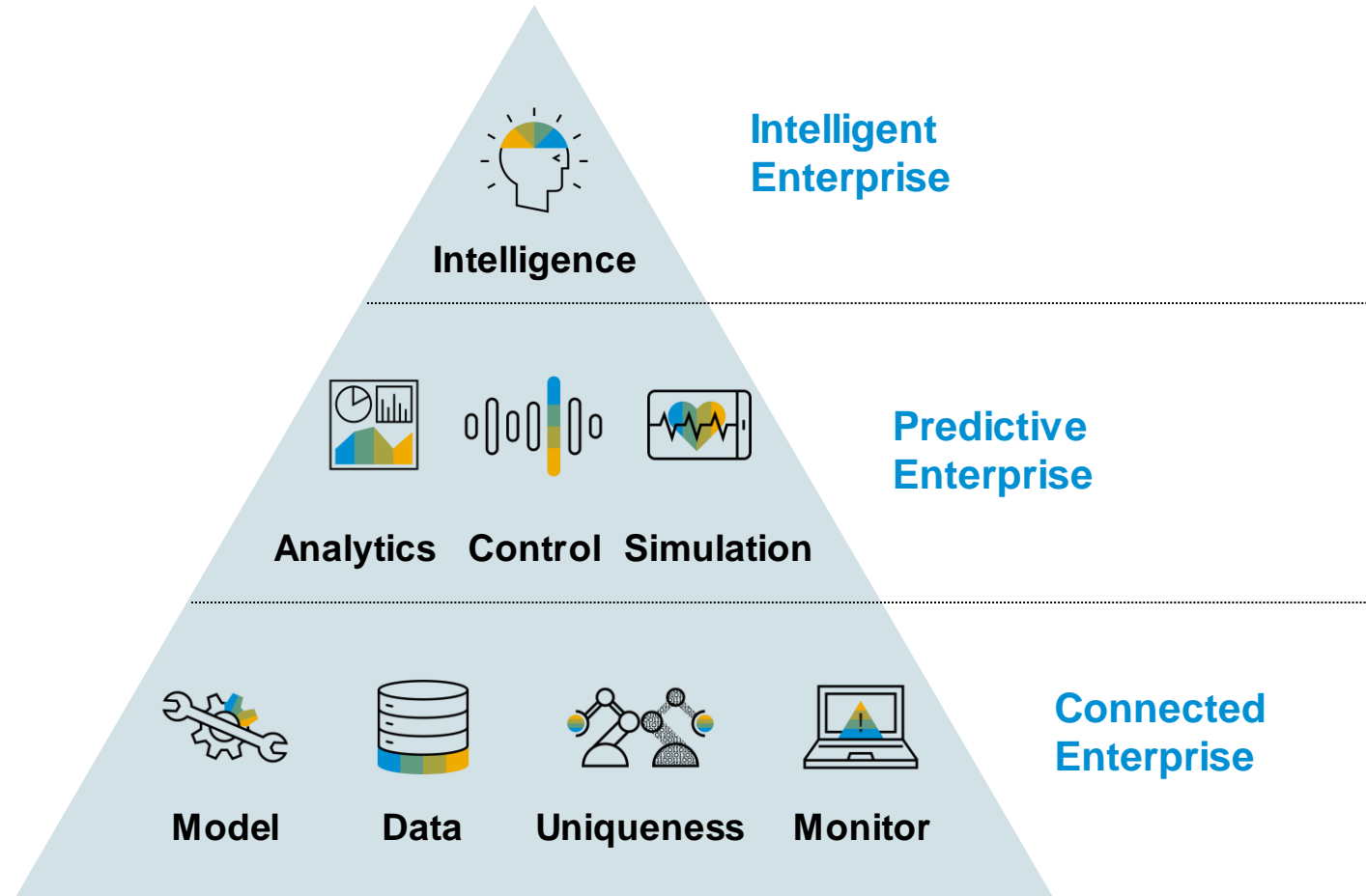


SAP Asset Intelligence Management,
SAP Predictive Maintenance & Service

SAP Intelligent Product Design,
Engineering and Manufacturing

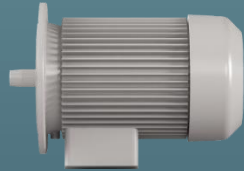
Evolution of the Digital Twin

From Data Repository to Intelligent Orchestrator



KAESER Smart Asset – Track & Trace

Supplier



- Material-Serial-Number (component)
- Technical Documentation
- Manuals
- Spare Parts Lists
- Certificates



KAESER Product



- Material-Serial-Number (final product)
- Equipment list
- Final inspection data

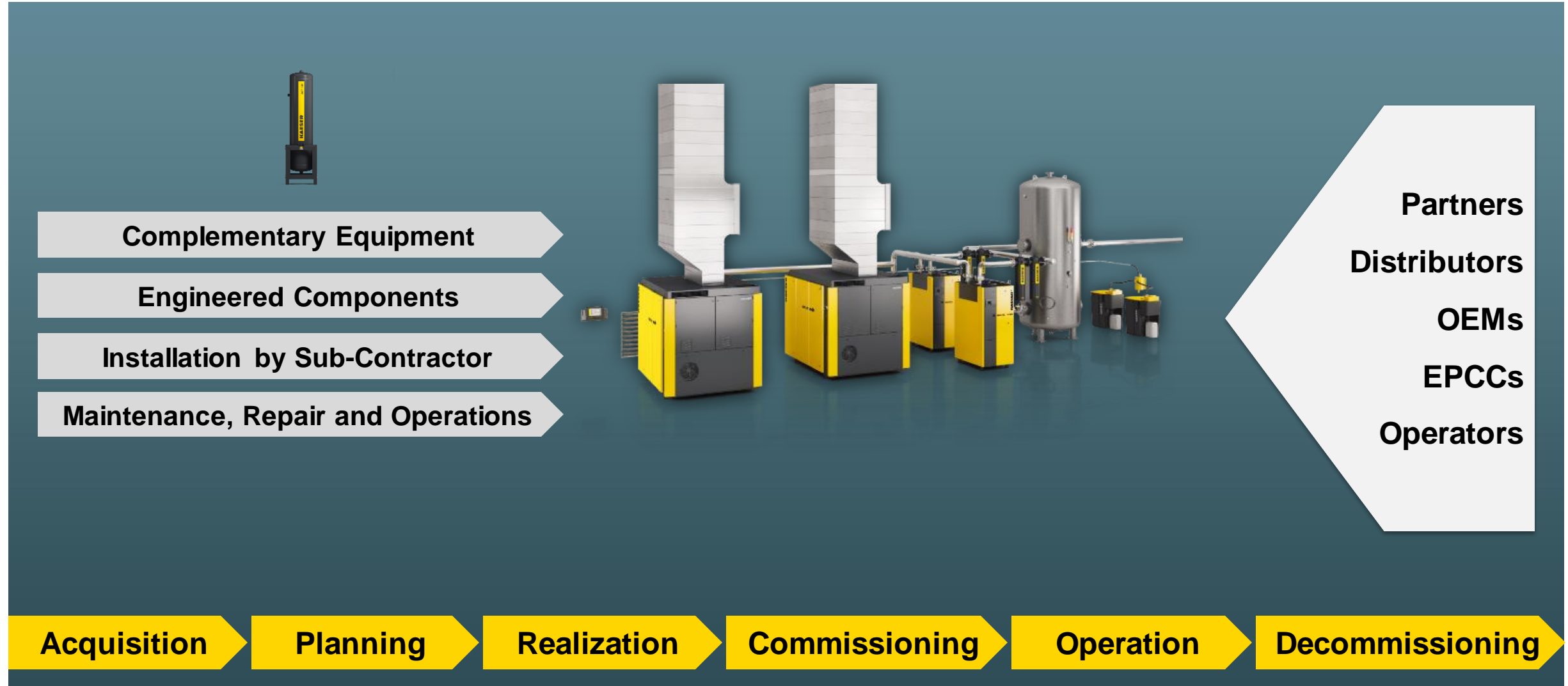

iBase

Source 

Make 

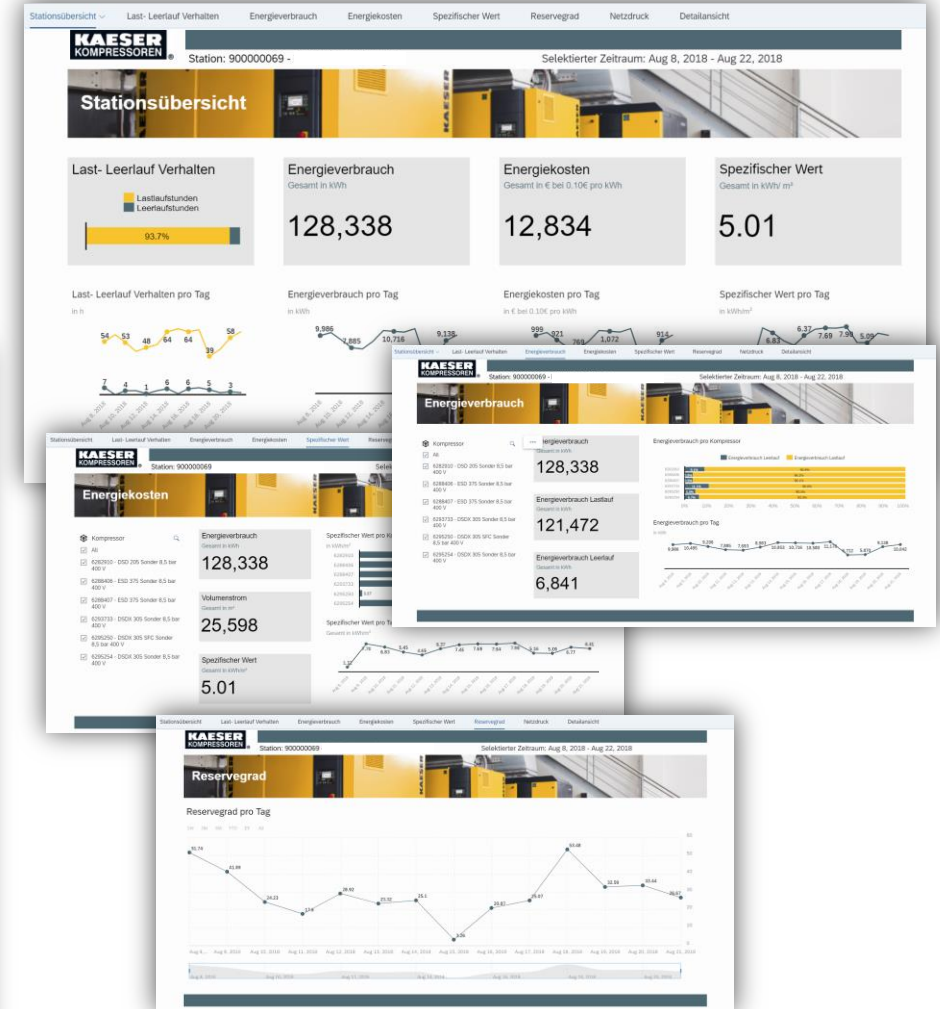
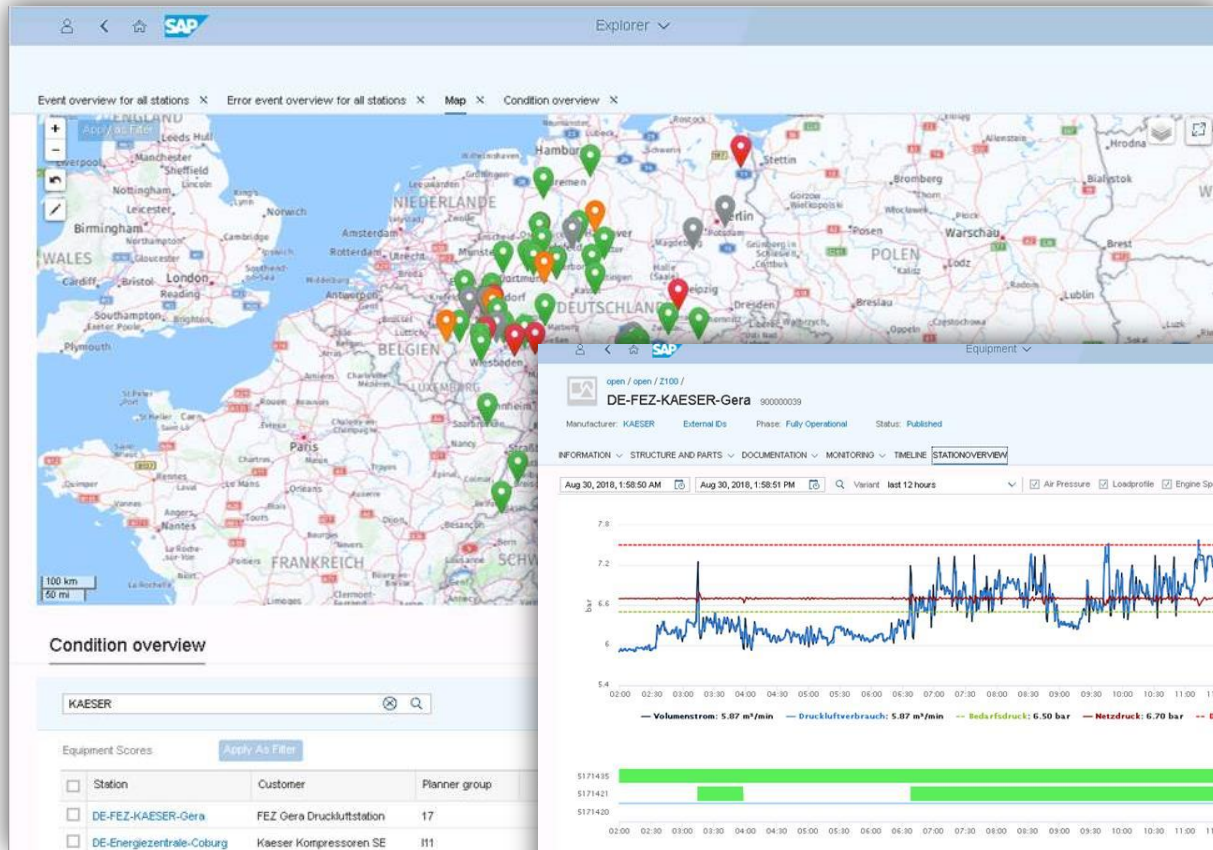
Deliver 

KAESER Smart Asset – Lifecycle



KAESER Plant Control Center

SAP Predictive Maintenance and Service On-Premise



The digital twin of all KAESER products, forming an Innovation Backbone



Equipment

COMPRESSORS / SCREW_COMPRESSOR / ASD 50 SFC /
 ASD 50 SFC 8,5bar 400/50 EU 5044920

Veröffentlichen Verwalten ☆ ⚙️ 📄

INFORMATIONEN ▾ STRUKTUR UND TEILE ▾ **DOKUMENTATION ▾** MONITORING ▾ INSTANDHALTUNG & SERVICE ▾ ZEITLEISTE

Highlights Einstellungen

Equipment ■ Modell ■

Vollständigkeit

Gesamt 66%

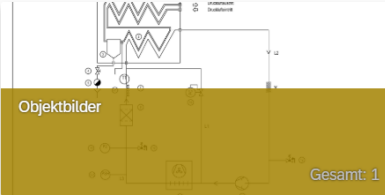
Einbaudaten 66%

Attribute 100%

Anweisungen 0%

Dokumente 100%

Objektbilder



Gesamt: 1

Benachrichtigungen

Letztes Jahr

1

Ungelesen

Gesamt: 1

Dokumente

Letztes Jahr

Hinzugefügt 6

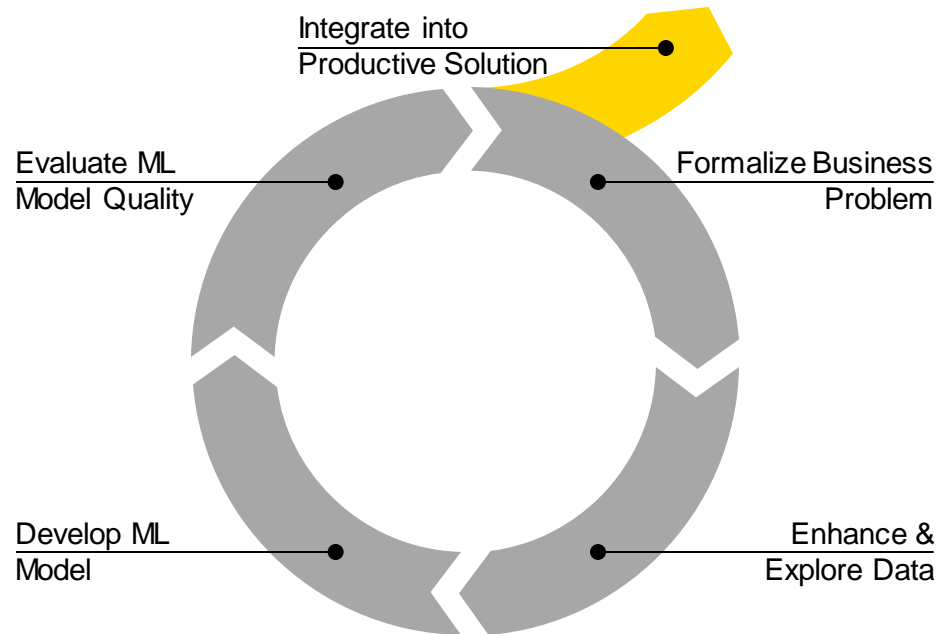
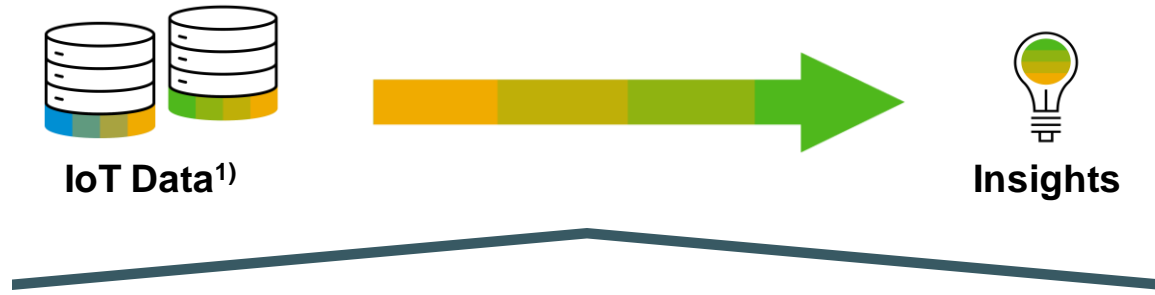
Entfernt 1

Gesamt: 6

KAESER Business Collaboration



Agile Data Science Methodology for Insight Generation



Quick Facts

- Data-driven insight generation requires rapid prototyping from problem formulation through a business user to machine learning model development by a data scientist and joint result assessment
- Prototyping organized in cycles analogously to agile development methodology
- Key enabler: unified access to all relevant data sources
- Upon achieving desired model quality and business value transition to productive mode and integration into live solution for business users

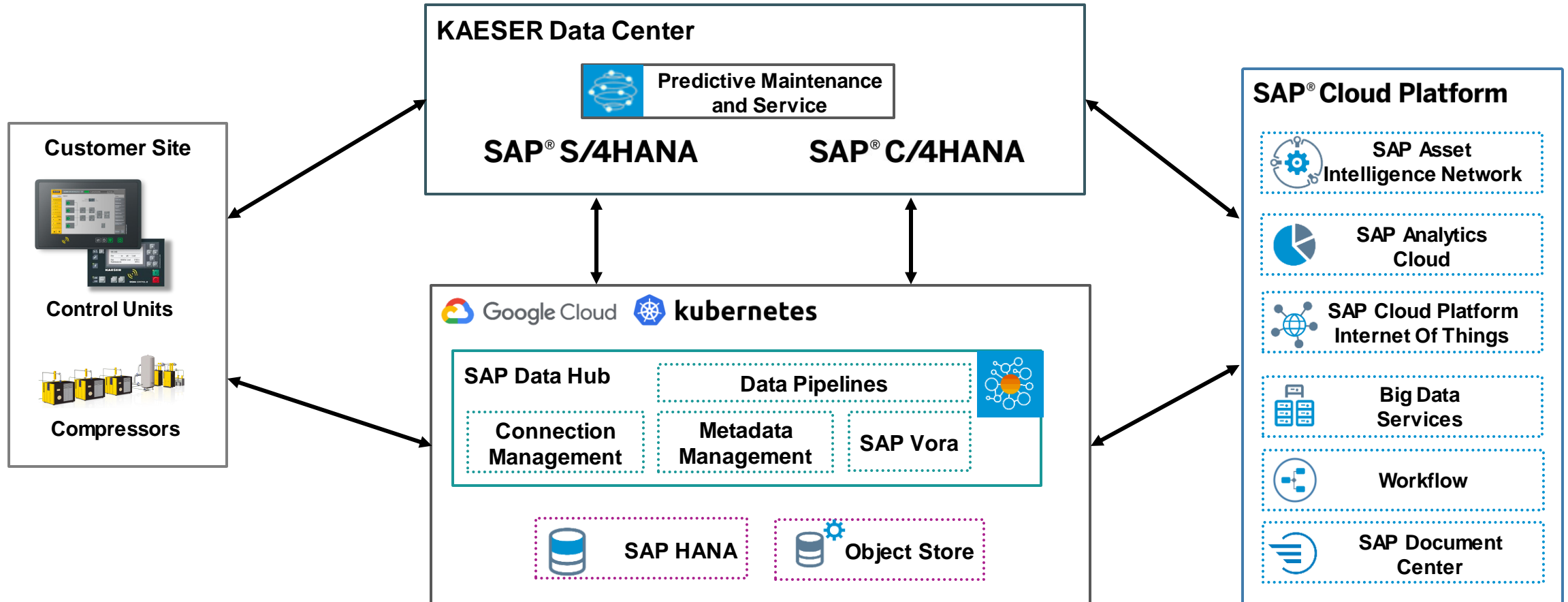
Involved Technologies

- SAP Predictive Maintenance and Service
- SAP HANA
- SAP Data Hub
- SAP Analytics Cloud
- R Notebooks

¹⁾ Data stored in SAP Predictive Maintenance and Service OPE

From machine data into actionable insights

Current State of the Big Data Architecture



Establishing an Enterprise Data Lake



Embarking on an Innovation Journey for Industry 4.0

Project Approach & Milestones



Design Thinking

Spring 2018

- Multiple business use cases identified

Business challenge:

- No central data repository with unified access
- Limited insight into machine conditions

Goal:

- Establish an enterprise data lake, serving Engineering, Manufacturing, Service and Customers



Scrum

Functional Pilot

Autumn / Winter 2018

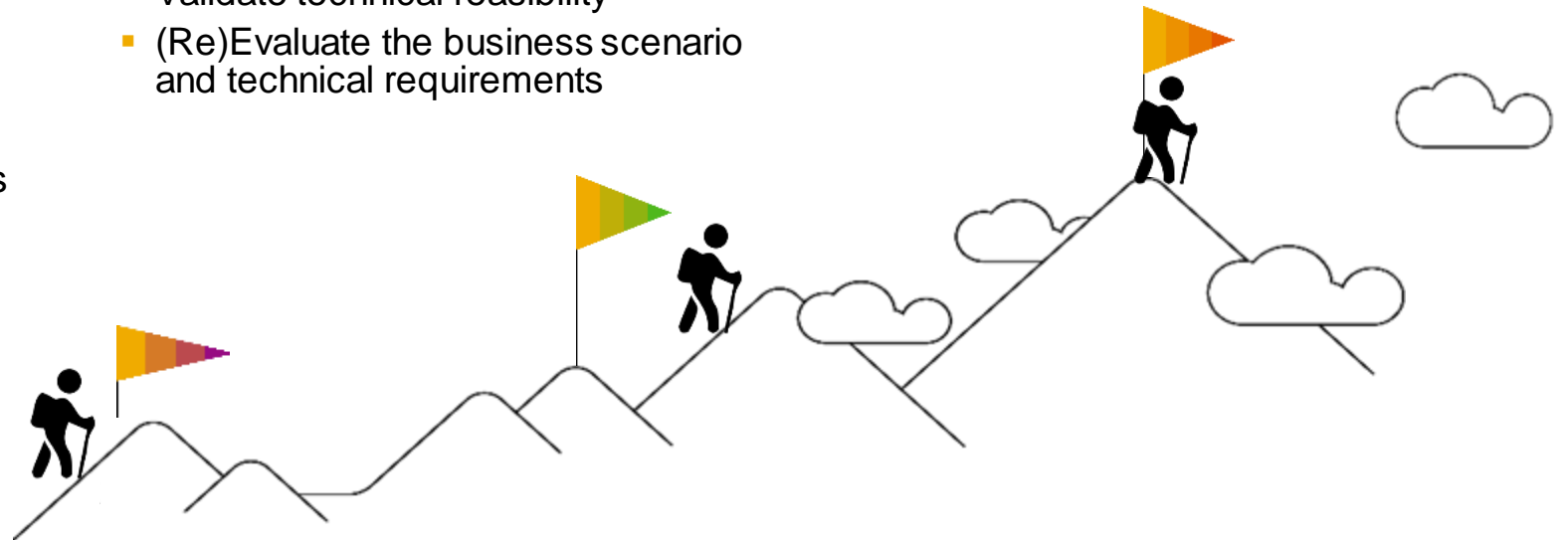
- Implement selected use case
- Validate technical feasibility
- (Re)Evaluate the business scenario and technical requirements



Productive Pilot

Spring 2019

- Prepare for deployment at scale
- Operationalize the solution
- Realize tangible business outcome



Use Case: Establish an **Enterprise Data Lake** fed by several ingest paths, supporting the **ad-hoc analysis of Compressor Data** for Service technicians

What is needed

- **Collect & analyze huge amounts of data** for
 - Faster service cycles, predictive maintenance
 - Optimized Product Development
 - Nurturing the “Air as a Service” business model
 - Data Science

Current Business Challenges

- **Limited remote insight** into compressor operation
- **Manual and selective data extraction & conversion**
 - repetitive manual and time-consuming steps
- **No long-term analysis**
 - individual Excel charts with limited data volume
- **No central repository** for converted & analyzed data

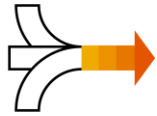
The idea

- **Automated & guided uploads** of machine data
 - via IoT Services and uploads via Service Portal
- **Automated Data Processing**
 - Use SAP Data Hub and create business relevance by using context information such as Customer Data, Supply Chain Information or Machine specs
- Build an **Enterprise Data Lake** to be consumed by Service & Engineering, Data Scientists and Applications



Why SAP Data Hub

Extensibility via docker



Different ingestion alternatives

E-Mail, File Upload, Stream



Performance

Kubernetes Cluster



Use your own language

Python, Golang, NodeJS

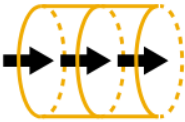


Machine

Different compressor types



Inbox



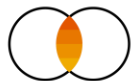
Processing



Hot, Warm, Cold
Storage



Access data



Merge master data

**Use context from
Business Systems (e.g. S/4, C/4)**



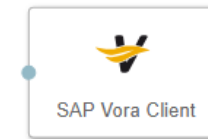
Data volume

80k compressors globally

10 GB raw data per compressor & year



Schema evolution

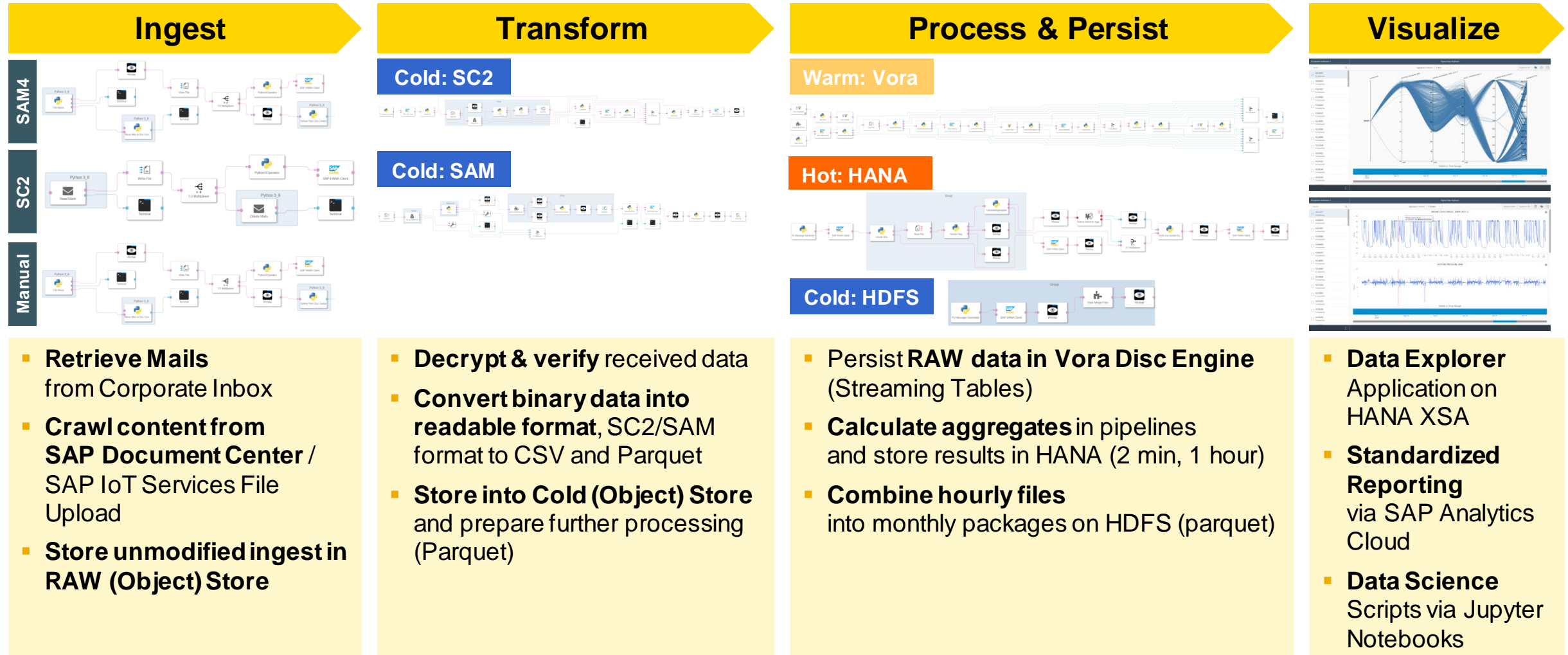


Operators to access the
various data storages

GCS, HDFS, File, HANA, Vora

Data Processing

via Pipelines in SAP Data Hub



Faster insight improving service handling and building reliable products



Business

- Faster Turnaround Times
Reduced cost of service
- Optimized Product Development
Improved reliability
- Enablement of new revenue streams
Compressed Air „as a Service“



IT

- Cutting-edge technology with cloud native architecture
Scalability / Flexibility
- Central data repository
Simpler governance

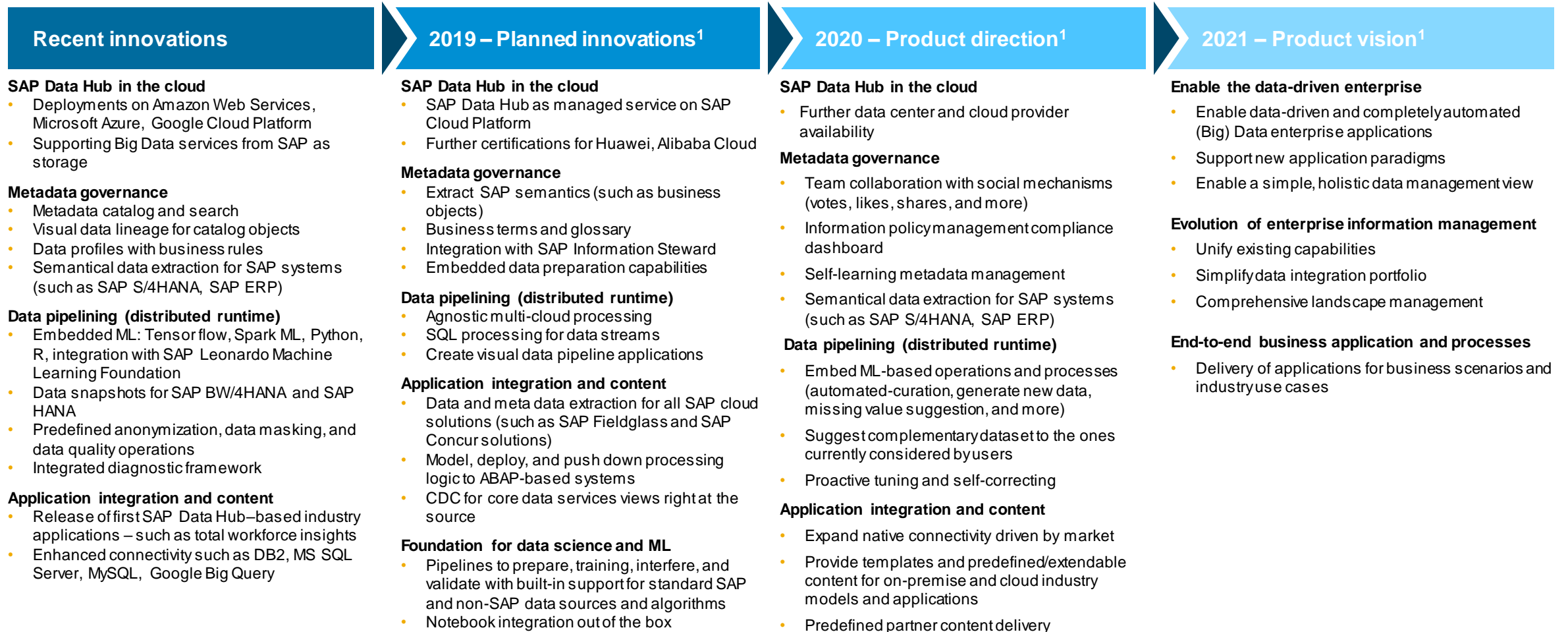


Human Empowerment

- Self-service data insights
Democratization of data
- Added value service for subsidiaries and partners
Increased loyalty

SAP Data Hub

Product road map overview – Key innovations



1. This is the current state of planning and may be changed by SAP at any time without notice.

**Thank You.
Questions?**



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Presentation Materials

Access the slides from 2019 ASUG Annual Conference here:

<http://info.asug.com/2019-ac-slides>

Q&A

For questions after this session, contact us at [falko.lameter@kaeser.com] and [amogh.umbarkar@sap.com].

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