SAP Data Hub:
Data Integration with Enterprise Applications

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Speakers

Las Vegas

September 24–27, 2019

Marc Hartz

Barcelona

October 8-10, 2019

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Agenda

SAP Data Hub

- Introduction
- Capability Overview

Data Integration

- With SAP Applications
- With non-SAP Applications
- Leveraging SAP Cloud Platform

End-2-end Demo

Q&A

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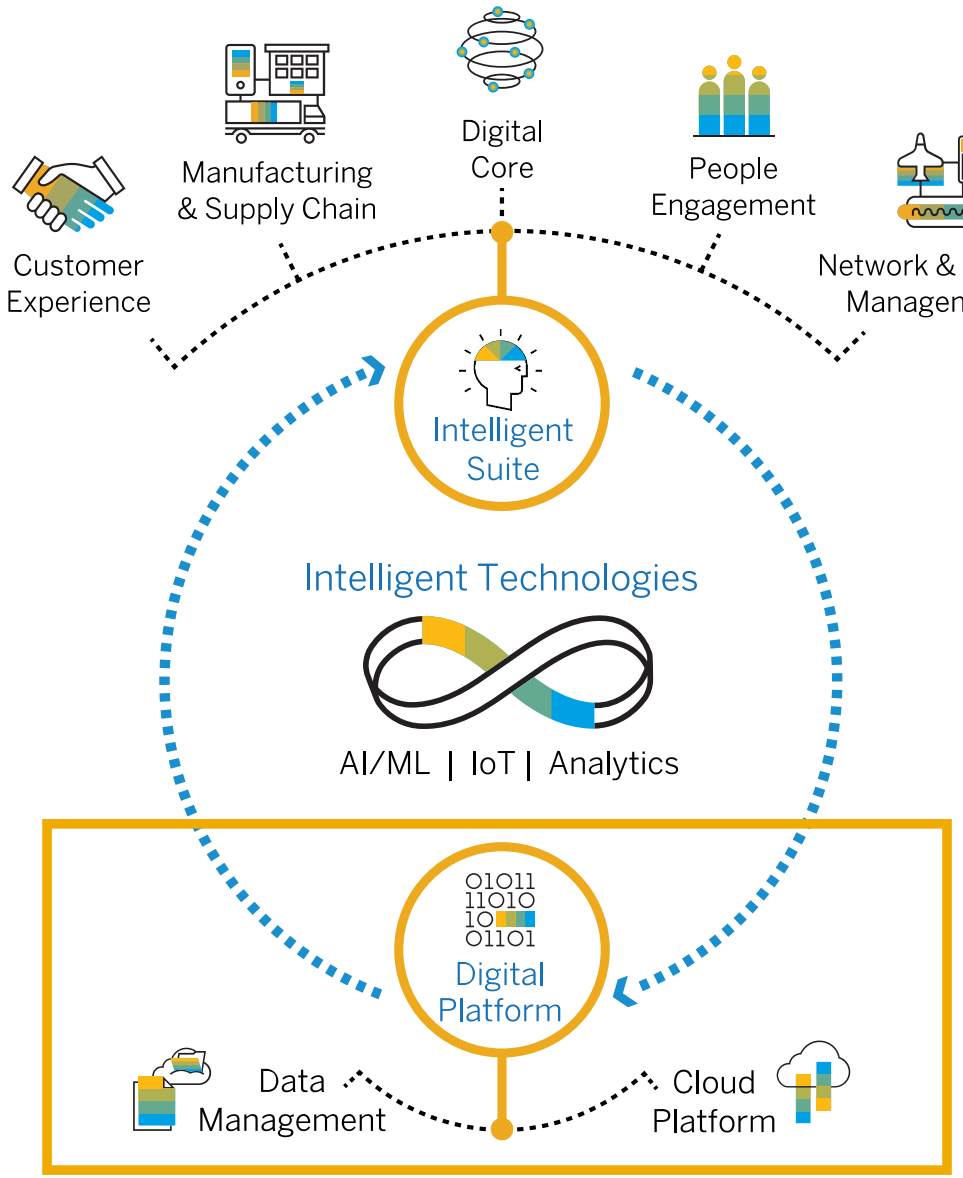
SAP Data Hub Introduction

SAP Strategy – Deliver the Intelligent Enterprise

THE INTELLIGENT ENTERPRISE features 3 KEY COMPONENTS:



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

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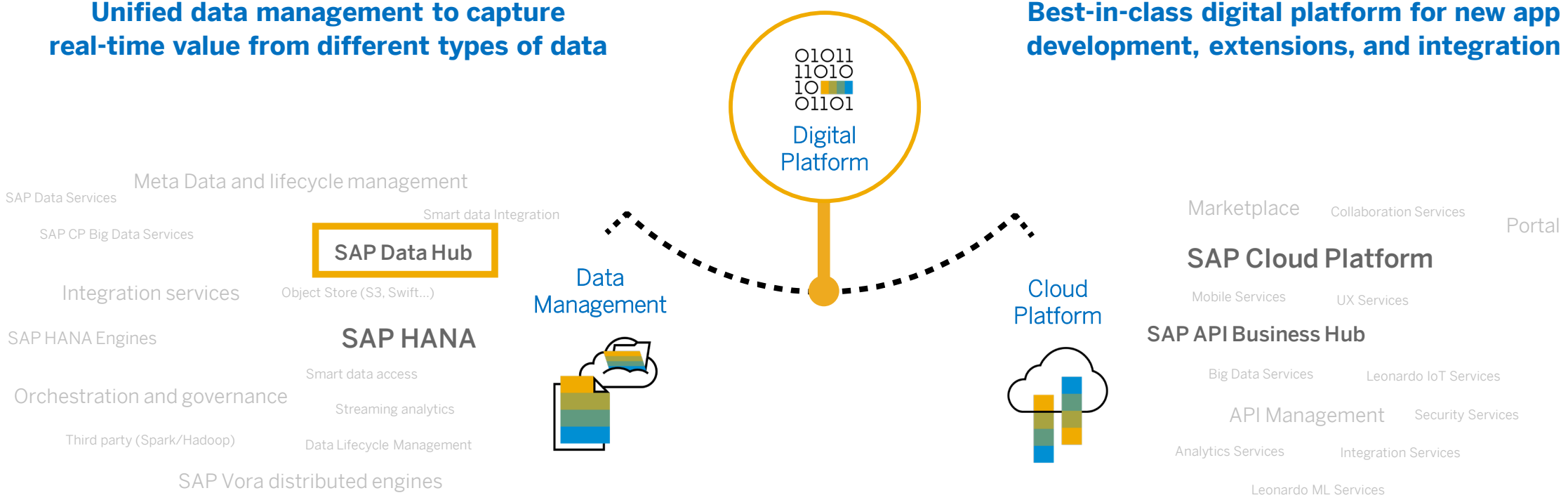
Digital Platform: Unlock data-driven intelligence and innovation

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

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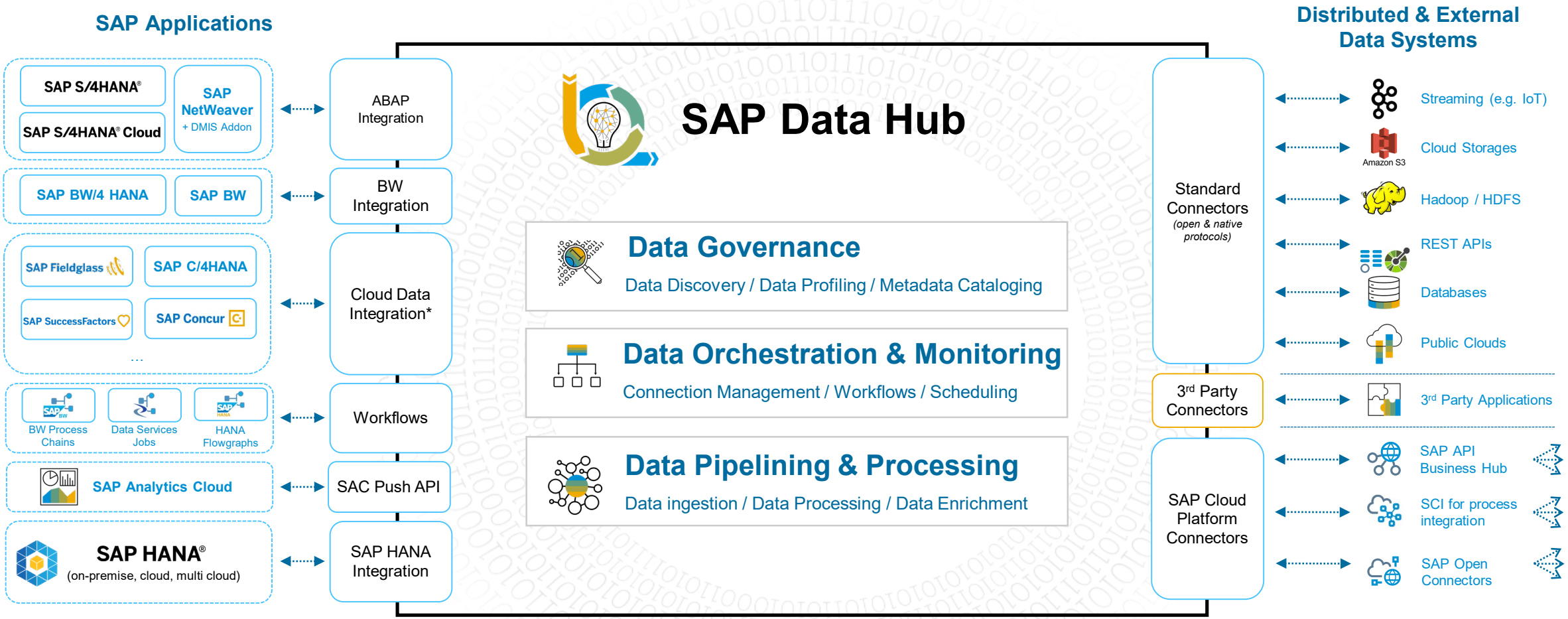
SAP Data Hub – Unified Data Integration for the Intelligent Enterprise



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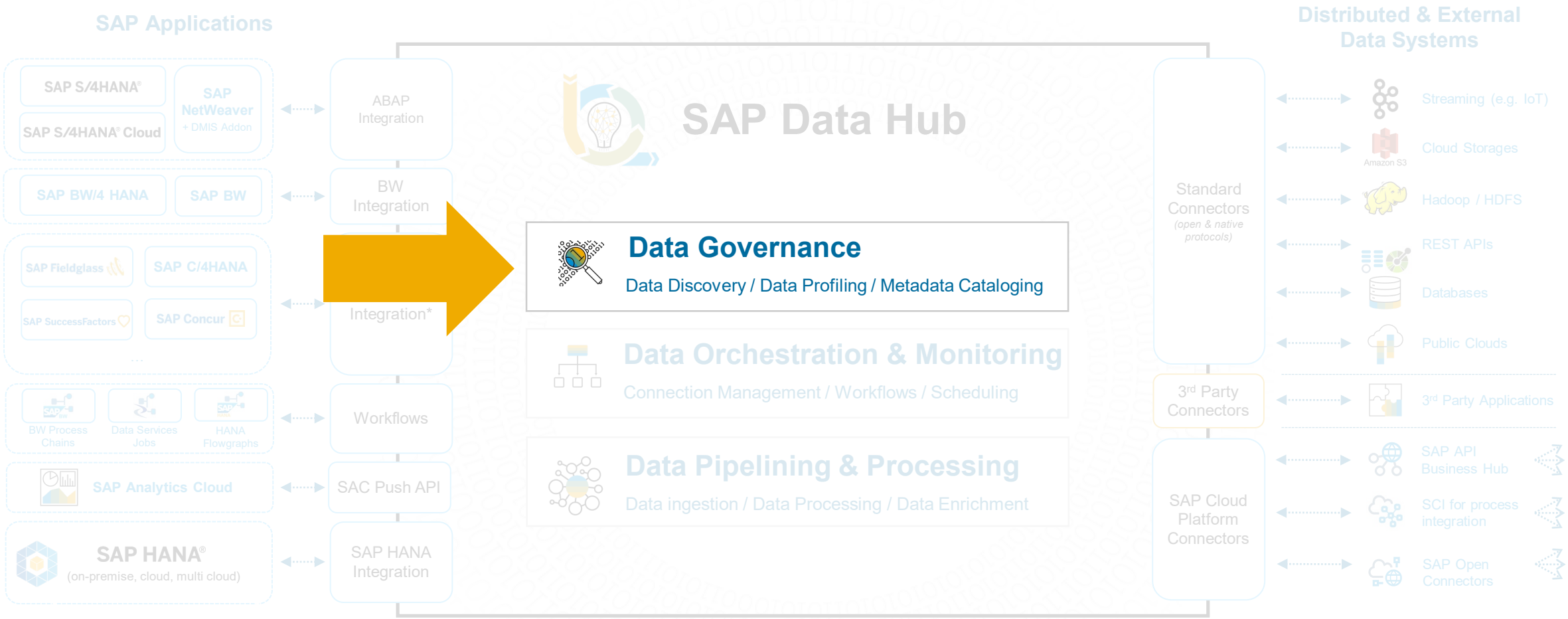
SAP Data Hub

Capabilities Overview

SAP Data Hub Capabilities: Data Governance



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Data Governance

Metadata Management

Build up catalog to get insight into your company's metadata

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Data Governance

Metadata Management using the Meta Data Explorer

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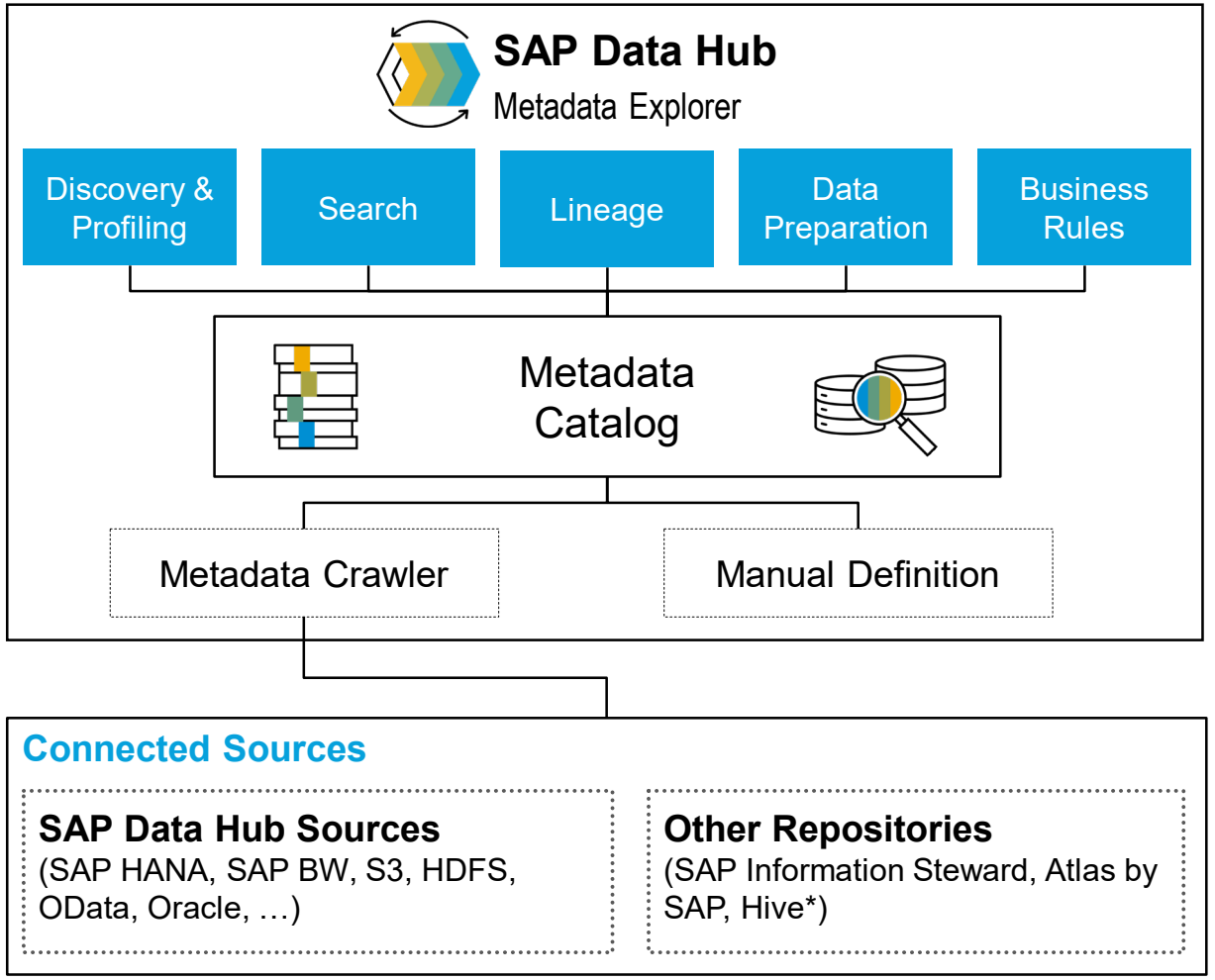
- **Explore** (Discover, Preview, Profile) data assets in connected systems
- System-wide **Metadata Catalog**
  - Metadata Crawler: Automatic indexing und publication of metadata
  - Manual Definition of metadata (datasets)
- **Classification** of data using labels (e.g. regarding quality and sensitivity)
- **Data Lineage** provides a clear end-to-end understanding of the data's origins and usage
- Define and run **Business Rules** to understand the data quality of your data
- **Data Preparation** allows business users to acquire, enrich, and enhance data in a spreadsheet like UI
- Tight integration with modeling environments for Data Pipelines and Workflows



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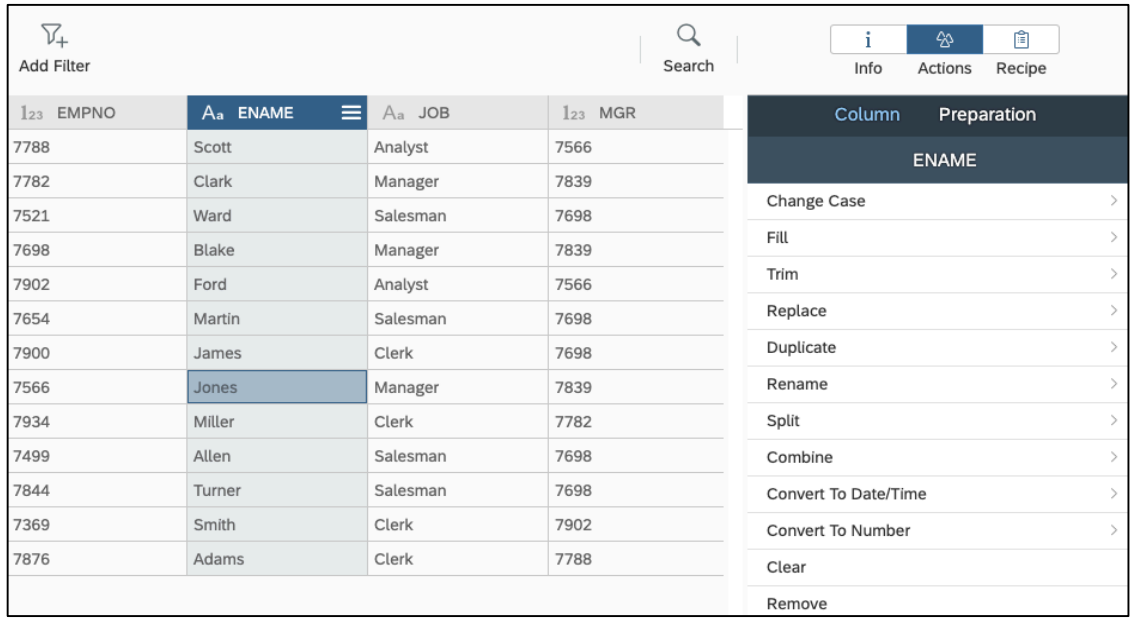
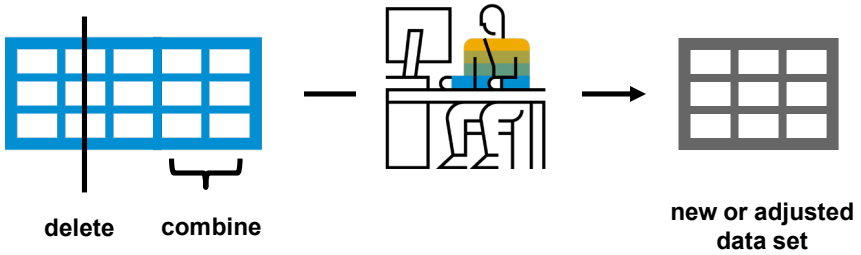
Data Governance

Data Preparation Self-service for Non-Technical Users





Capabilities

- Prepare the data based on a sample dataset
- Transform, shape, harmonize, curate, enrich the data via simple click actions
- View, present and report the outcome immediately
- Apply the transformations to the full dataset at any time

Main Use Cases

- End-to-end self-service data preparation
- Improve data quality to achieve data excellence
- Create new data sets based for scenario and project requirements

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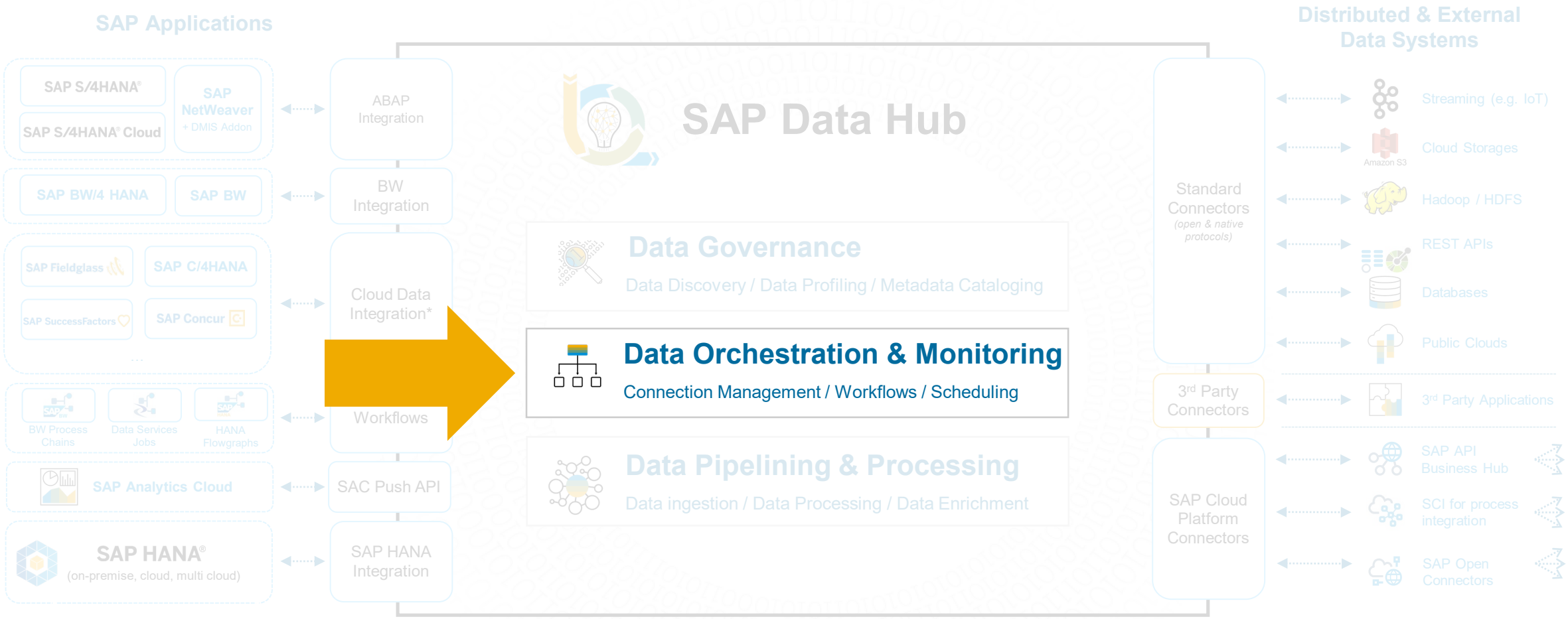
SAP Data Hub Capabilities: Data Orchestration & Monitoring



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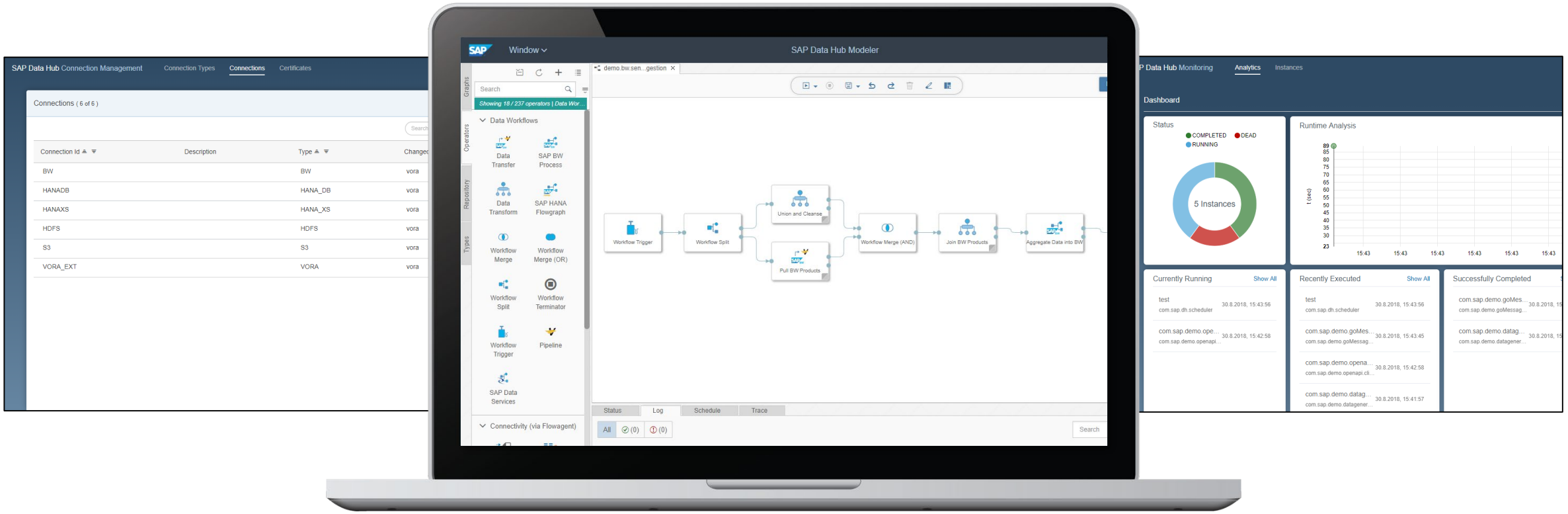
Data Orchestration and Monitoring



Connect, orchestrate and monitor processes across systems

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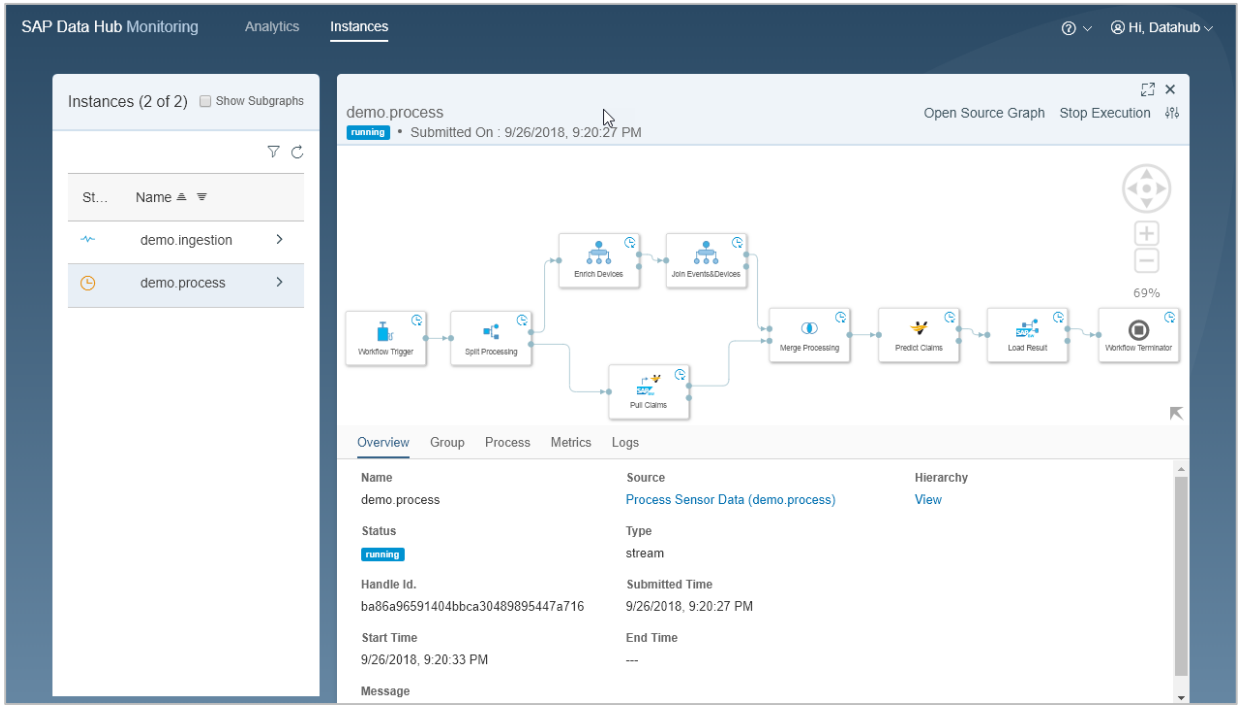
Data Orchestration and Monitoring

Connection Management, Data Workflows, Scheduling

- Central management of all system connections
  - Connect to diverse systems natively and remotely
  - Support user access management
- **Data Workflows** for cross-system data orchestration, e.g.
  - Trigger Execution of SAP BW process chains
  - Transfer data from SAP BW and SAP HANA
  - Execute remote SAP Data Services jobs
  - Trigger iFlows in SAP Cloud Platform Integration
  - Submit Spark jobs to Hadoop clusters
- **Scheduling** of Data Workflows
- Extensive **Monitoring**
  - Support view, control, and auditing of data operation in the connected data landscape



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SAP Data Hub Capabilities: Data Pipelining & Processing

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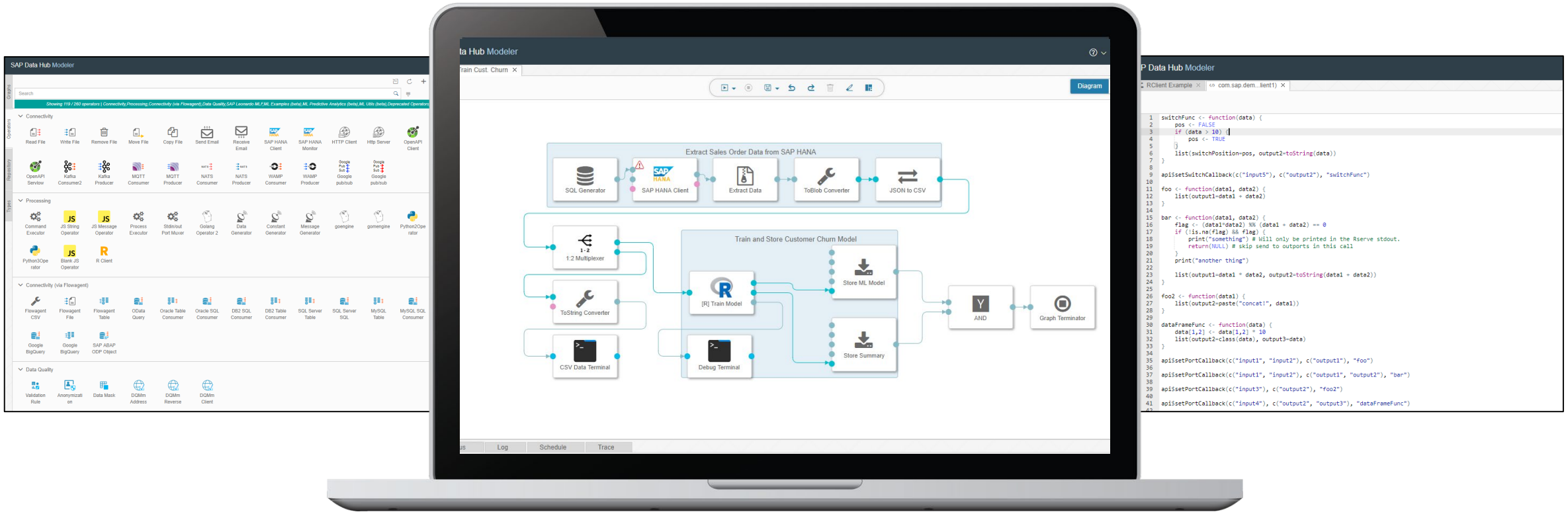
Data Pipelining & Processing



Build scalable and flexible flow-based applications to process, refine, and enrich data at the source.

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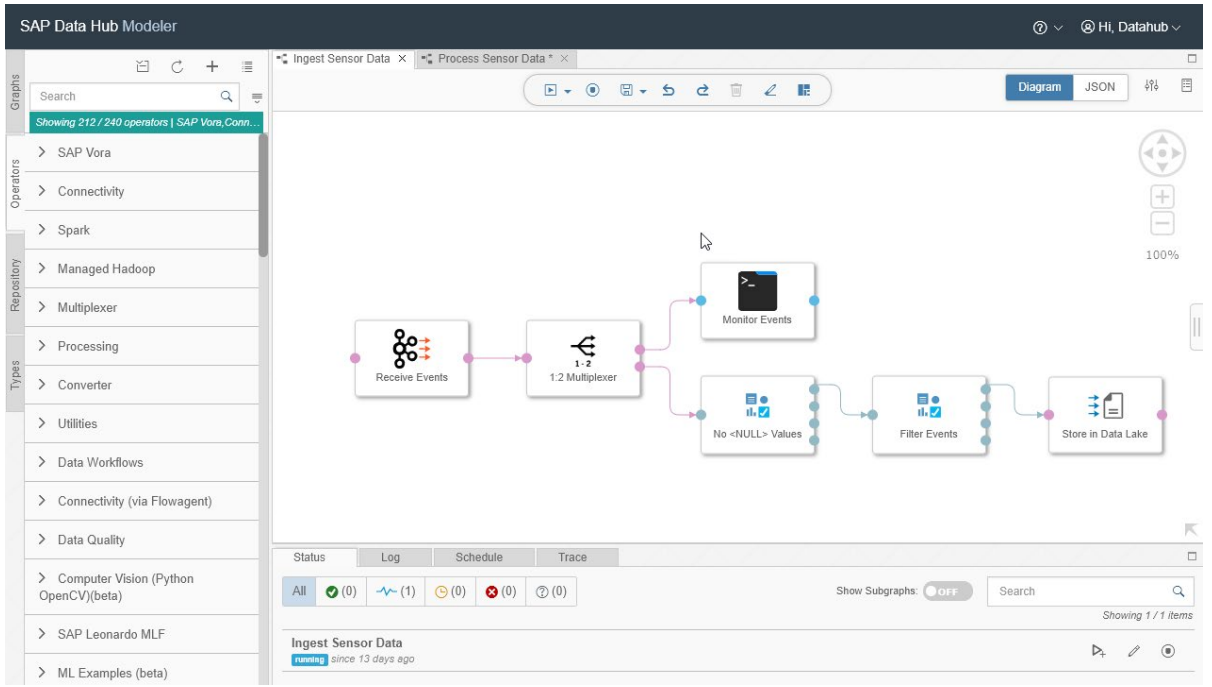
Data Pipelining & Processing

Build Flow-based Applications using the Pipeline Modeler

DAT363

- **Data Pipelines** = Flow-based applications
  - Operators (independent computation units)
  - Data (messages) flows between operators
- **Extensible**
  - Over 250 pre-defined operators (Connectivity, Processing, Data Quality, CV, ML, etc.)
  - Custom / Partner operators
  - Wrap any custom code
- **Scalable**
  - Containerized – Docker containers constitute the operators' execution environments
  - Distributed – Easy horizontal scaling
- **Re-Usability**
  - Create complex, multistep, reusable data pipelines and operators



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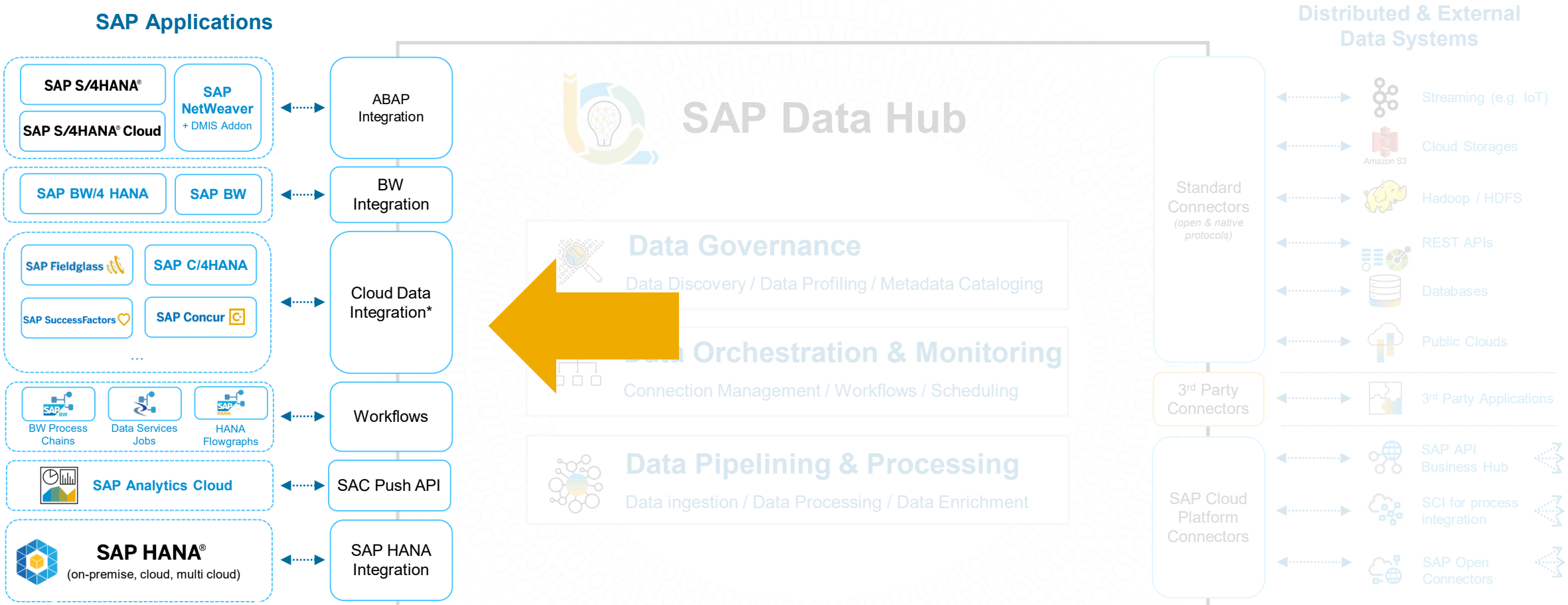
SAP Data Hub

Data Integration with SAP Applications

SAP Data Hub: Data Integration with SAP Applications



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Integration with ABAP-based SAP Systems

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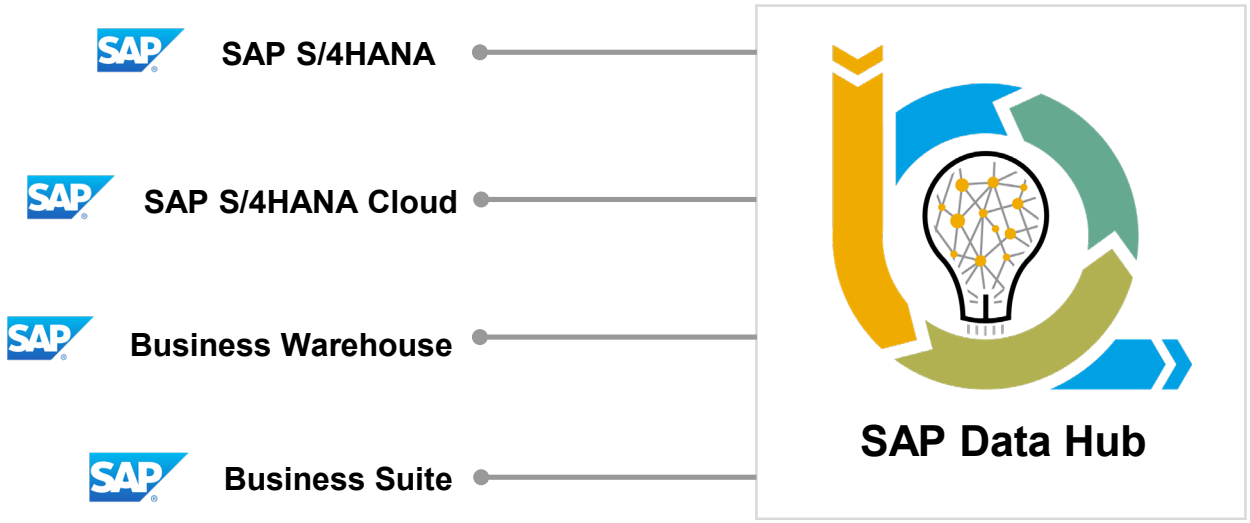
One model to consolidate all interaction scenarios between SAP Data Hub and an ABAP-based SAP systems directional and bi-directional



Capabilities

Provide **ABAP METADATA** to the SAP Data Hub Metadata Explorer

ABAP DATA PROVISIONING to transfer data into SAP Data Hub

ABAP FUNCTIONAL EXECUTION that is triggerable as a SAP Data Hub Operator

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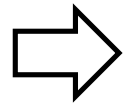
Integration requires certain system level, planned at least SAP S/4HANA 1909, SAP S/4HANA cloud 1911, SAP NetWeaver 7.00 with DMIS 2011/2018 Q4/2019 version. Certain functionality can only be made available for certain release levels.

Integration with ABAP-based SAP Systems

Good to know

ABAP CDS READER

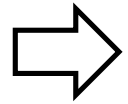
Operator that supports initial load and delta replication of ABAP CDS views.



ABAP CDS Views are only available in SAP S/4HANA

CUSTOM ABAP OPERATOR

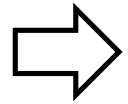
Operator to implement your ABAP custom code that will be executed as part of a pipeline in the connected ABAP system. For example to call a function module.



SAP S/4HANA cloud does not support custom code

SLT CONNECTOR

Operator to communicate with SAP LT Replication Server (SLT). Leverage existing replication scenarios to bring data into a SAP Data Hub pipelines.



Allows data consumption of lower SAP NetWeaver (<7.00) and S/4HANA (<1909) releases

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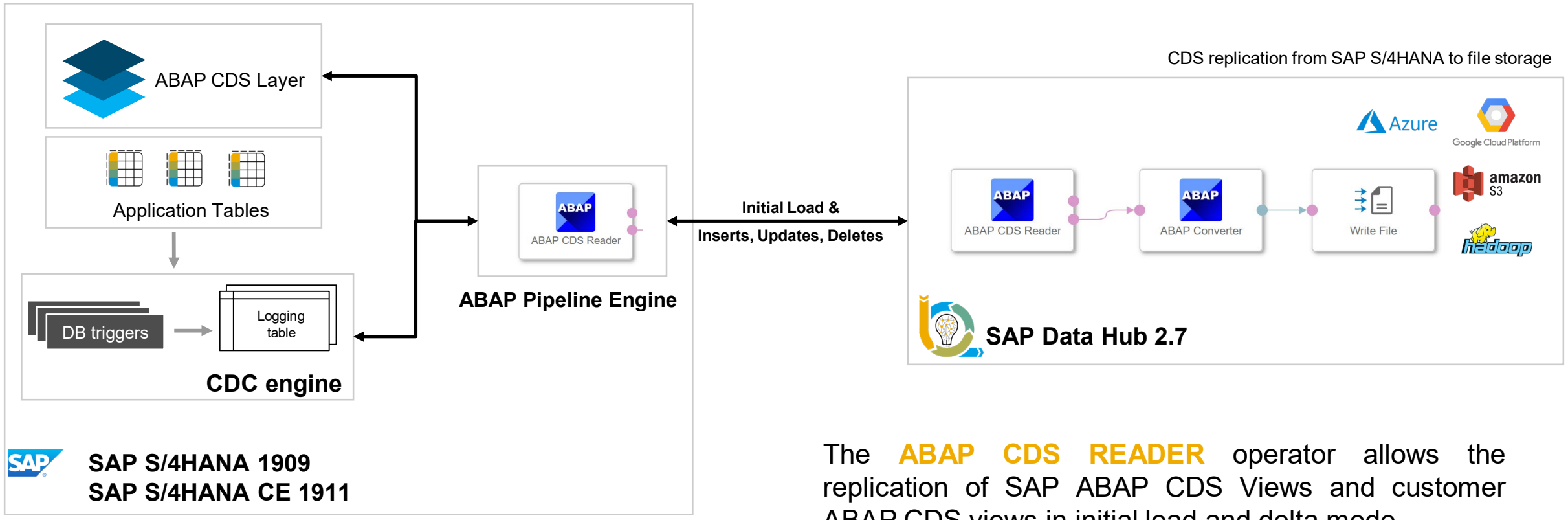
Integration requires certain system level, planned at least SAP S/4HANA 1909, SAP S/4HANA cloud 1911, SAP NetWeaver 7.00 with DMIS 2011/2018 Q4/2019 version. Certain functionality can only be made available for certain release levels.

Integration with ABAP-based SAP Systems

Example Data provisioning for SAP S/4HANA with ABAP CDS Reader

ABAP CDS is the semantically rich data model in SAP S/4 HANA and allows the consistent representation of a business object like a Business Partner



The **ABAP CDS READER** operator allows the replication of SAP ABAP CDS Views and customer ABAP CDS views in initial load and delta mode.

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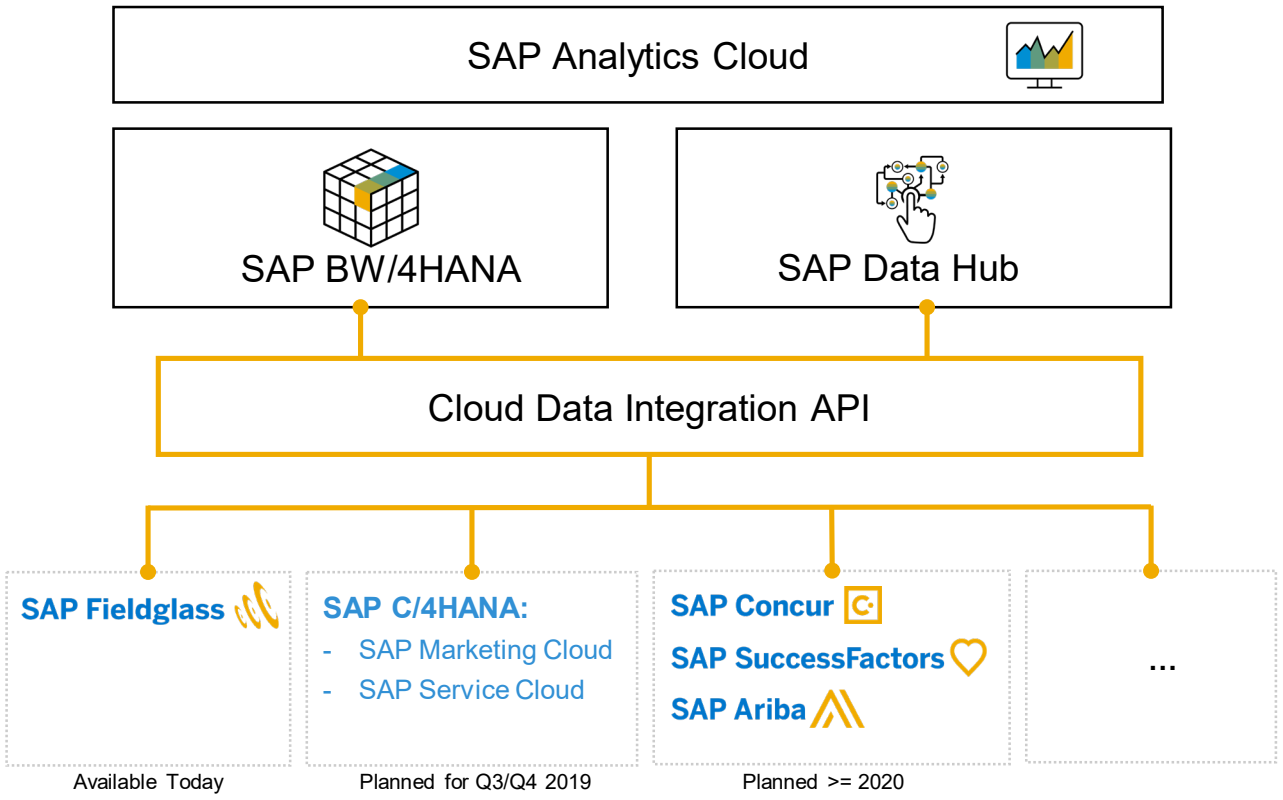
Integration with SAP Cloud solutions

One SAP Cloud Data Integration (CDI) for integration into all SAP Cloud solutions



Main Use Cases

- Holistic Data Management with SAP Data Hub
- Building Data Warehouse Analytics with SAP BW/4HANA
- Advanced Analytics and Planning with SAP Analytics Cloud

Capabilities

- Support both full and delta requests
- Seamless integration of data and metadata
- OData v4 as communication protocol

SAP Cloud Data Integration (CDI) is a core concept for integrating all SAP solutions in the cloud using **ONE API** based on open standards

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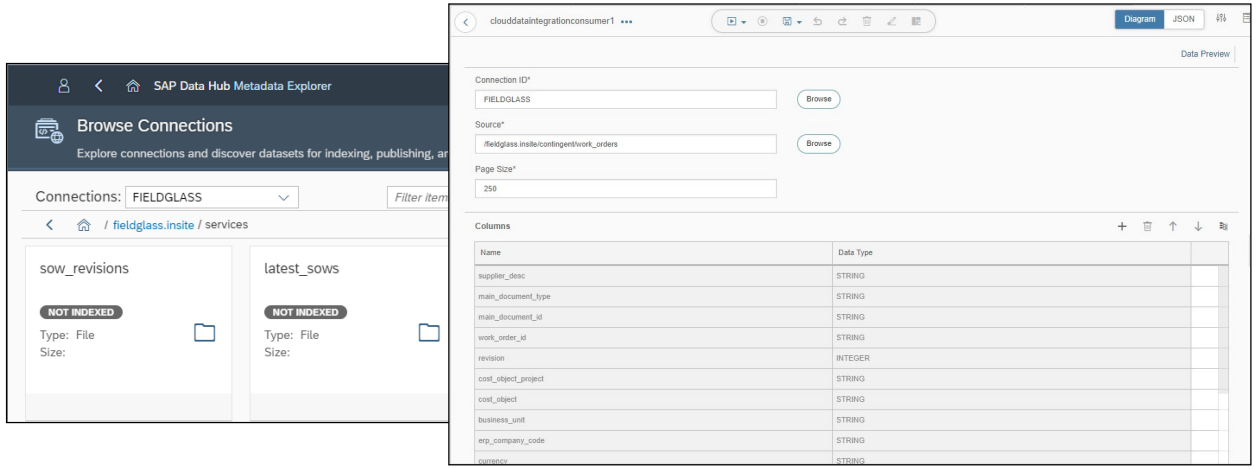
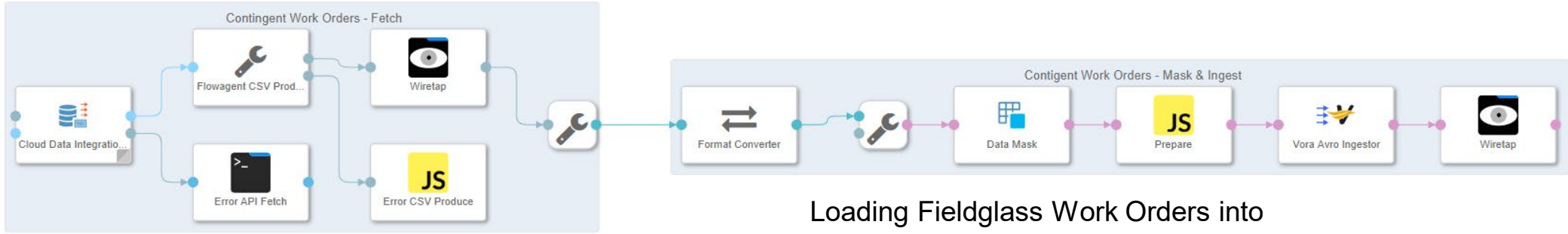
Integration with SAP Cloud solutions

Example Cloud Data Integration scenario with SAP Fieldglass & SAP Data Hub

Understanding metadata of SAP Fieldglass within the SAP Data Hub Metadata Explorer



SAP Fieldglass



Loading Fieldglass Work Orders into SAP Vora tables with data protection

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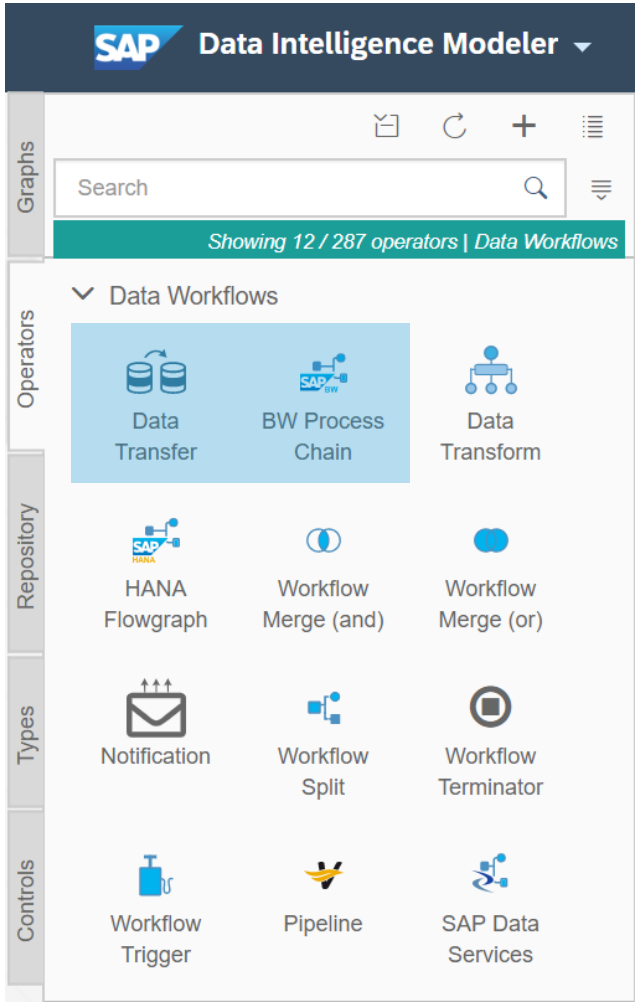
Integration with SAP Business Warehouse

Available Pipeline Operators:

- SAP BW Process Chain
  - Trigger execution of a process chain on a SAP BW system
- Data Transfer (SAP BW & SAP HANA)
  - Transfer data (query, infoprovider / tables, views) from SAP BW / SAP HANA into big data stores or SAP Vora tables
  - Via INA interface or direct access to HANA (Calculation Views)

Typical Scenarios:

- Load Data from Data Lake into BW
- Data Tiering from BW into Data Lake



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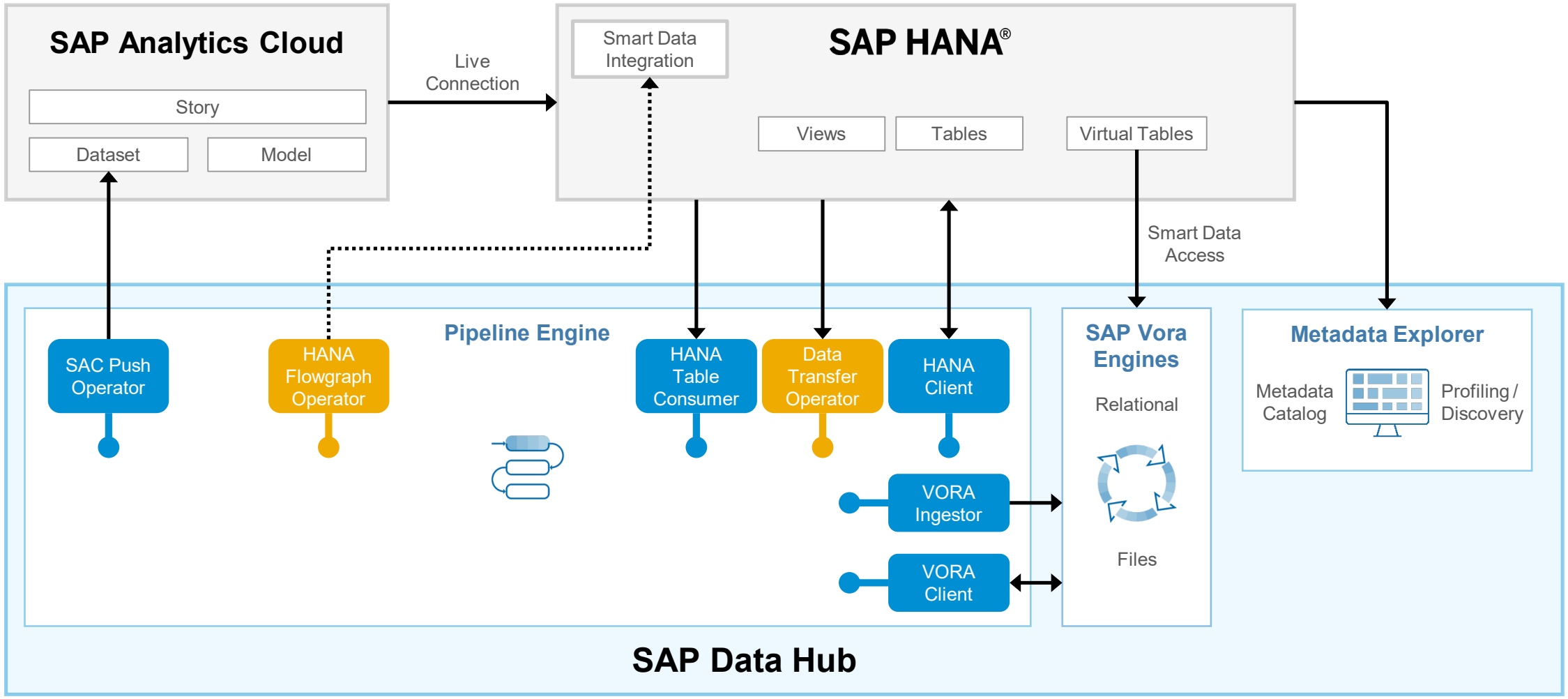
Integration with SAP HANA and SAP Analytics Cloud

SAP Data Hub integrates with SAP HANA and SAP Analytics Cloud on multiple levels



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SAP Data Hub

Data Integration with Non-SAP Applications

SAP Data Hub: Non-SAP Data Integration

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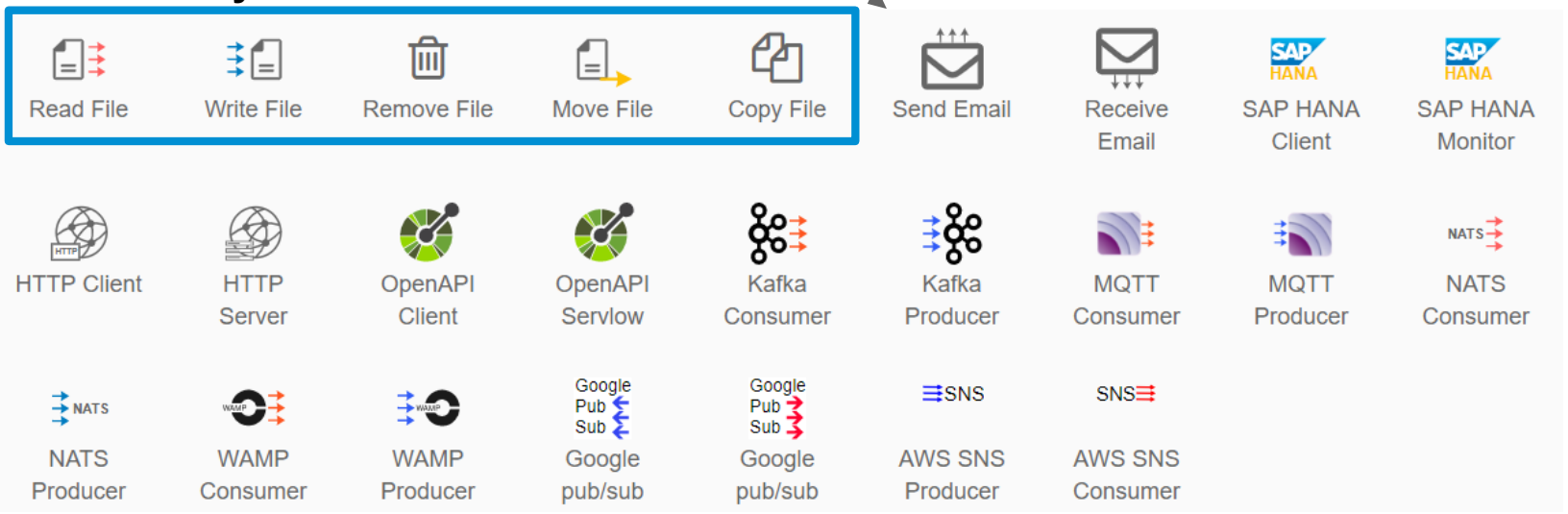
Non-SAP Data Integration

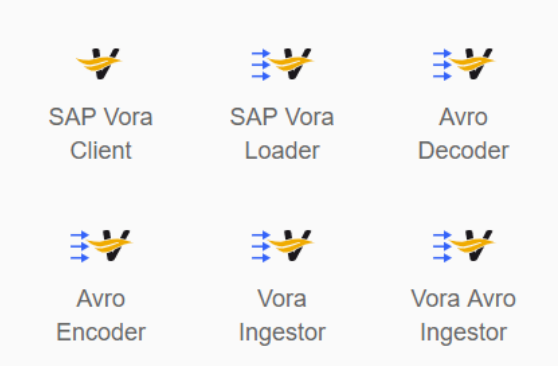
Built-in Standard Connectors

Connectivity:

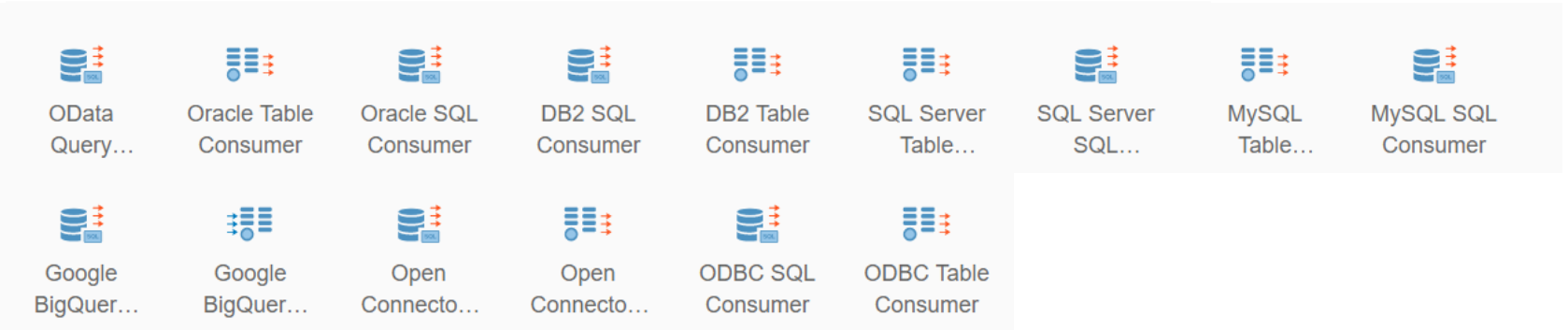


- Azure Data Lake (ADL)
- Google Cloud Storage (GCS)
- HDFS
- Amazon S3
- Azure Storage Blob (WASB)
- Local File System (file)
- SAP Semantic Data Lake
- WebHDFS

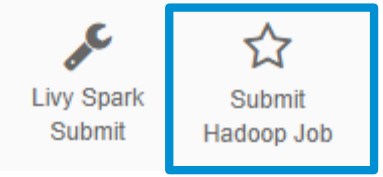
SAP Vora:



Connectivity (via Flowagent):



Spark / Hadoop:



- Spark
- Spark SQL
- PySpark
- Hive

Data Quality:

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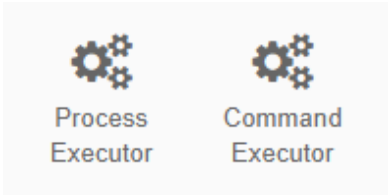
Non-SAP Data Integration

Operators for Data Processing

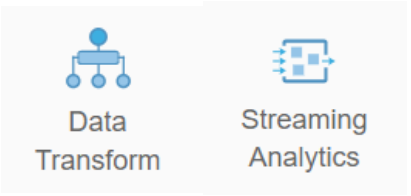
Process / Command Executors:

- Run a process within a pipeline and give contiguous stream to it
- Run a shell command for each arrival of a message within a pipeline



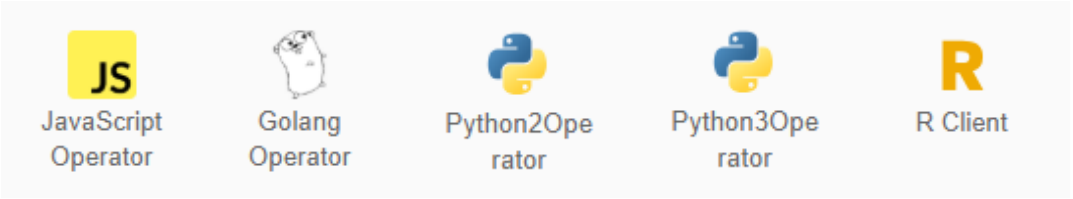
Transformation Operators:

- Run on-the fly transformations and do event stream processing using continous query language (CQL) on data within a pipeline



Scripting Operators:

- Write and run custom scripts for data manipulation within a pipeline
- Build re-usable operators in different programming languages



Subengines:

- Develop and compile new operators locally using SDK
- Register and run custom operators in available pipeline subengine

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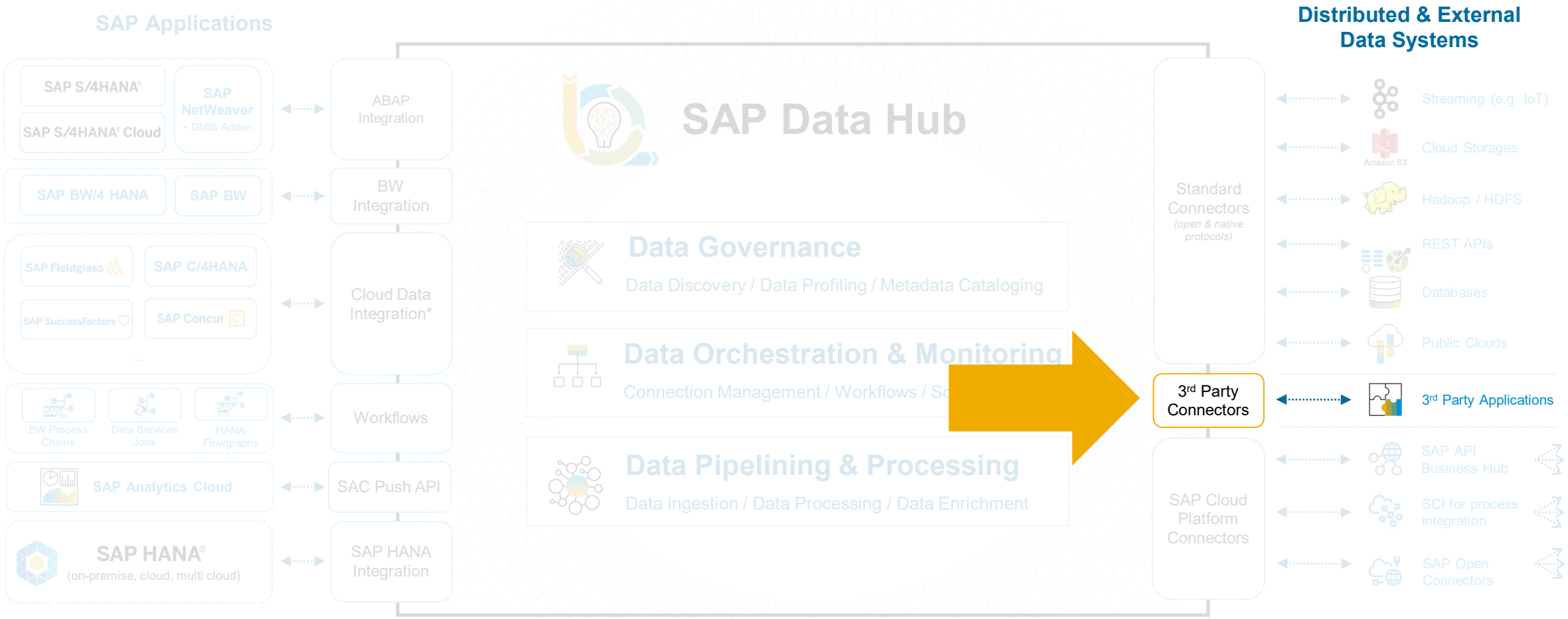
SAP Data Hub: Extensibility for 3rd Party Connectivity



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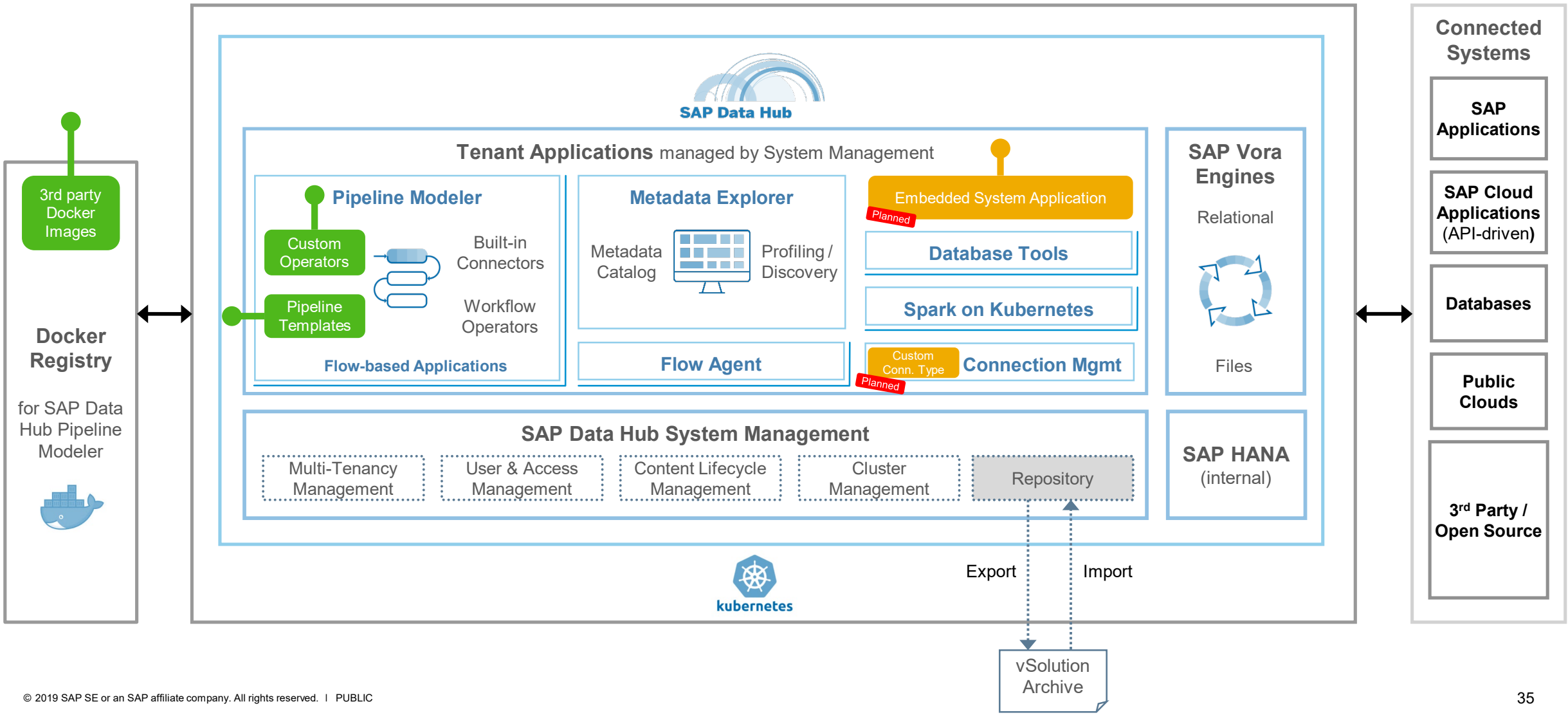
Extensibility for 3rd Party Connectivity

SAP Data Hub Extension Points



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Connecting data sources with SAP Data Hub

Three ways of connecting systems, engines and repositories

01 Managed system connectors

Available in the SAP Data Hub launchpad, these are the richest and most integrated connectors, providing metadata and governance services, profiling, source crawlers, etc.

- Includes connectors to ETL tools like SAP Data Services and SAP HANA SDI, where SAP Data Hub leverages brokered connections through an intermediary, allowing connection with many additional systems.
- All currently supported connectors can be found here.

02 Standard pipeline operators

Additional systems can be accessed within the pipeline modeler via specific operators, e.g. Kafka.

- All currently supported standard operators can be found here.

03 Custom operators

Custom operators can be created based on SAP provided base operators like JavaScript, Python, Spark, RestAPI, etc. Those are very powerful, and allow integration with a wide range of systems, applications, and data stores. They require an engineering skillset.

- How to build custom operators is described in this blog series.

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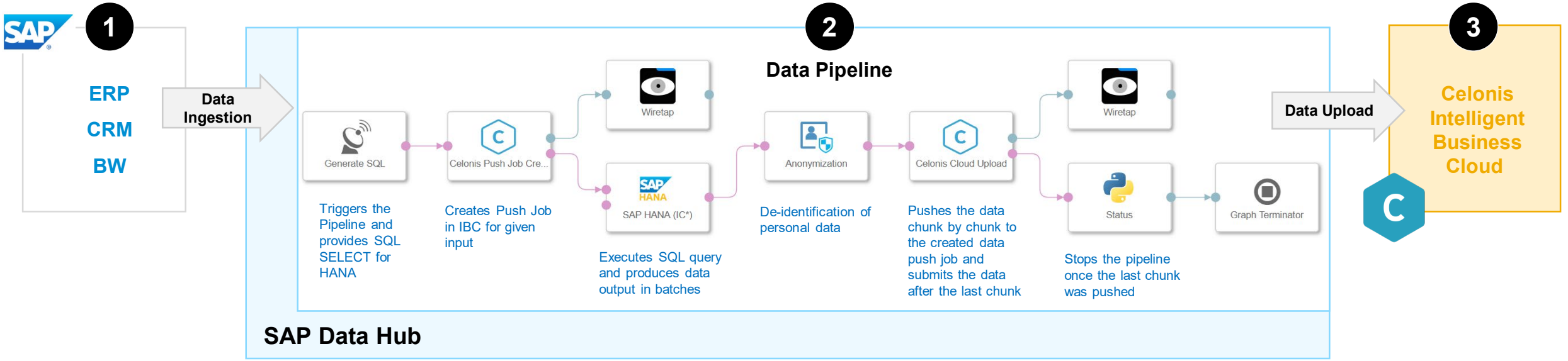
Extensibility for 3rd Party Connectivity

Example with Celonis Intelligent Business Cloud

- **SAP internal Lead-to-Cash Scenario:** Understand internal process inefficiencies all the way from demand management to maintaining a deal through process mining in Celonis leveraging SAP Data Hub
- Involved Steps
  1. Collect purchase related activities in ERP system (SAP S/4HANA)
  2. Anonymize personal data, transform activities into required event log structure to do process mining and upload event log to Celonis Intelligent Business Cloud (SAP Data Hub + 3rd Party Adapter from Celonis)
  3. Run Process Mining (Celonis Intelligent Business Cloud)



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Extensibility for 3rd Party Connectivity

Open for Partner and Customer Content Delivery

Data Hub‘s Extensibility Options

Partners and customers can add own content based on different layers:

- **Pipelines Templates:**
  - Parameterizable scenario templates
  - (Sub)graphs called in other graphs
- **Operators:**
  - Extend pre-defined base operators using powerful runtimes, e.g. Python, Go, Javascript, and R
  - Develop new operators with own runtimes, e.g. Process Executor
- **Dockerfiles:**
  - Provide execution environments for operators
  - Incorporate 3rd party libraries and executables

Data Hub Content Delivery

- Custom Data Hub Content can be packed into a **SAP Data Hub Solution** Archive
- SAP Data Hub Solutions can be defined, exported and imported via
  - SAP Data Hub System Management UI
  - vCTL Command Line Tool*
- SAP Data Hub Solution Structure:

```
vsolution
├── vrep
│   └── vflow
│       ├── dockerfiles
│       ├── graphs
│       └── operators
│           └── path
│               └── to
│                   └──package
│                       └── operator.json
└── vsolution.json
```

SAP Data Hub Content Marketplace:

- Planned Marketplace and Delivery channel for SAP Data Hub Partner Content via **SAP API Business Hub** in combination with **SAP App Center** for monetization

A win-win partnership:

- Partners can reach more customers with their services, while SAP Datahub Hub expands its reach with relevant content
- Our partners understand the customer use cases and can better support with domain-specific content by generalizing the specific issue with a broad solution

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SAP Data Hub Content Delivery

Publishing Content via SAP API Business Hub

SAP API Business Hub: Search, discover and consume content packages with pre-packaged integrations and sample applications from SAP and partners

List

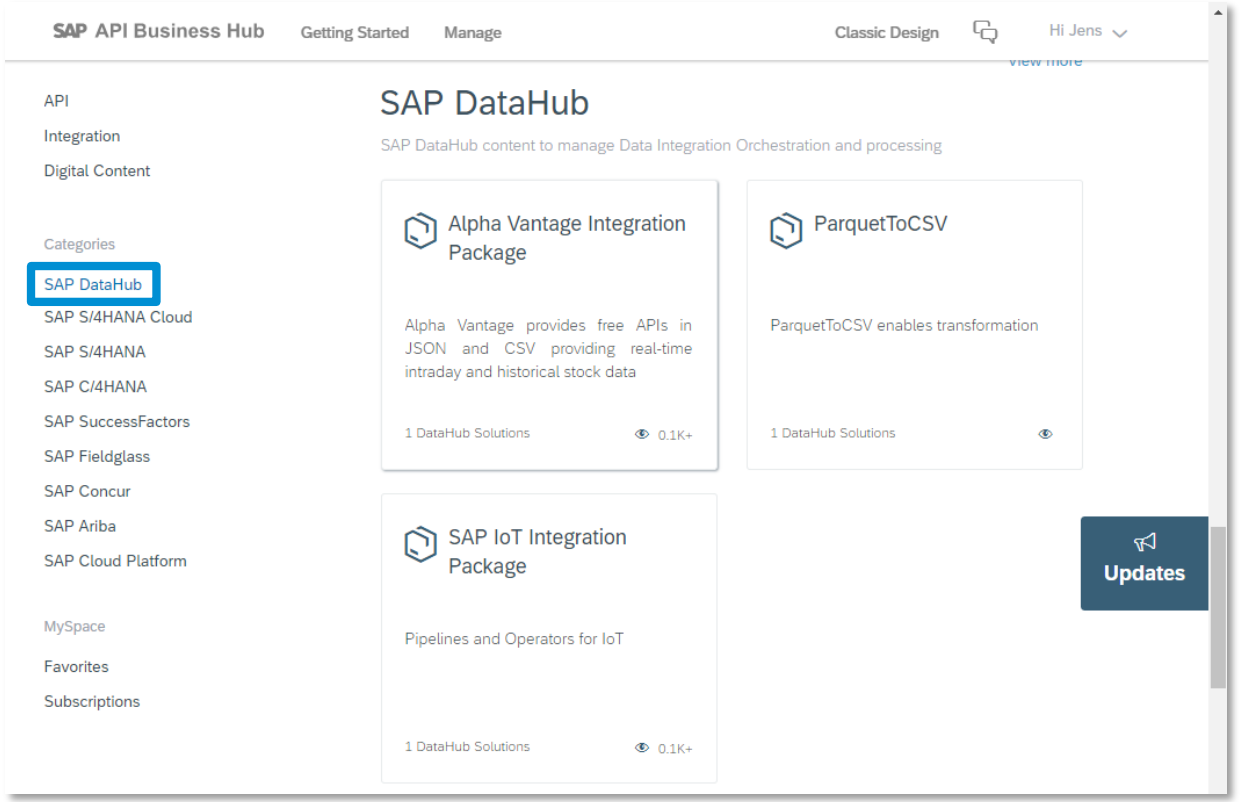
Digital Content (Integration)

Engage

With your developer ecosystem

Monetize

Via App Center, or by OEM-ing with SAP



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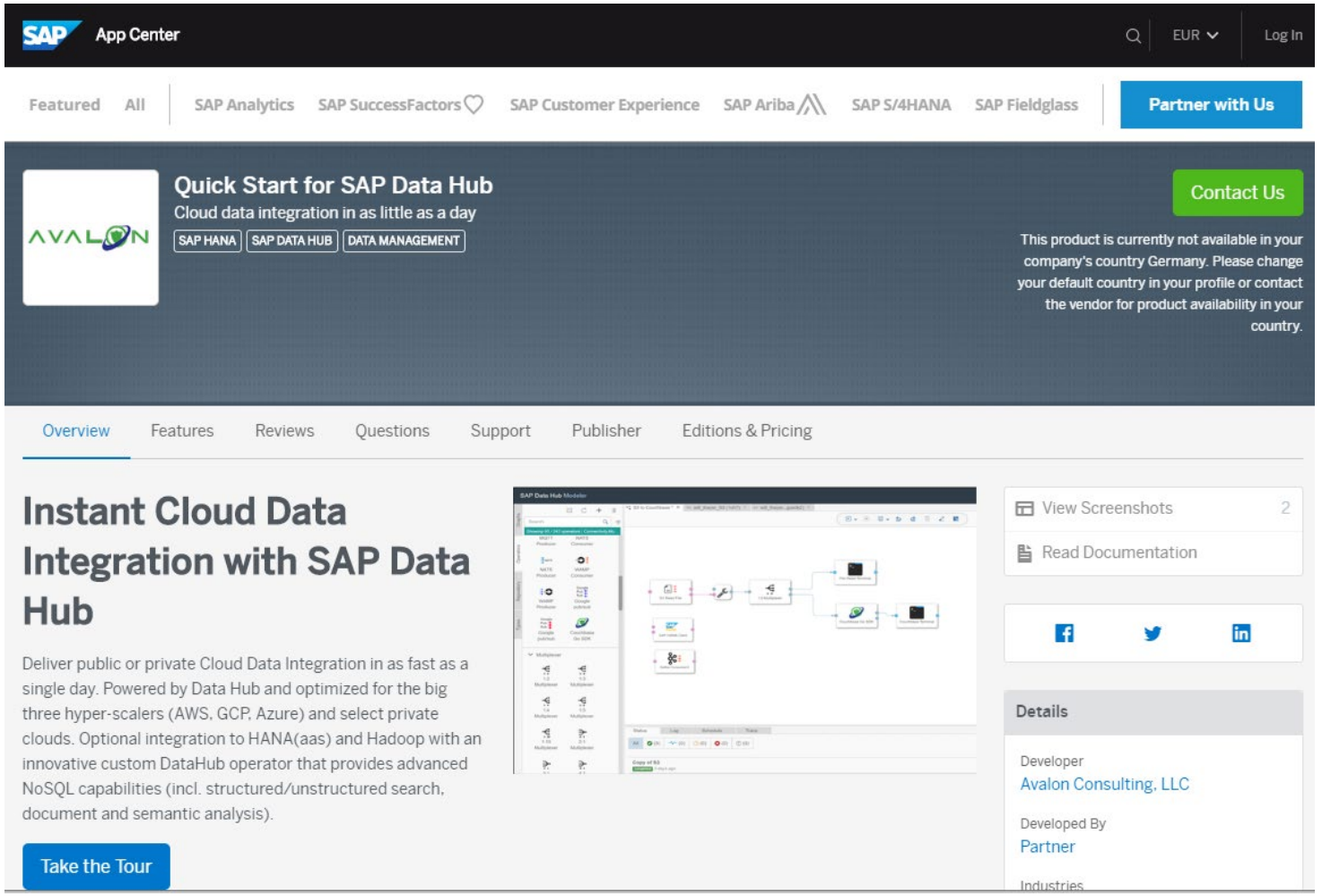
SAP Data Hub Content Delivery

Publishing Content via SAP App Center

Publish SAP Data Hub content to be monetized on **SAP App Center** in 3 easy steps:

- Become an SAP Partner
- Submit for SAP Data Hub Readiness Check
- Publish and begin Transacting



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SAP Data Hub

Integration with SAP Cloud Platform

SAP Data Hub: Integration with SAP Cloud Platform

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Integration with SAP Cloud Platform

Orchestration of SAP Cloud Platform integration to interact with processes

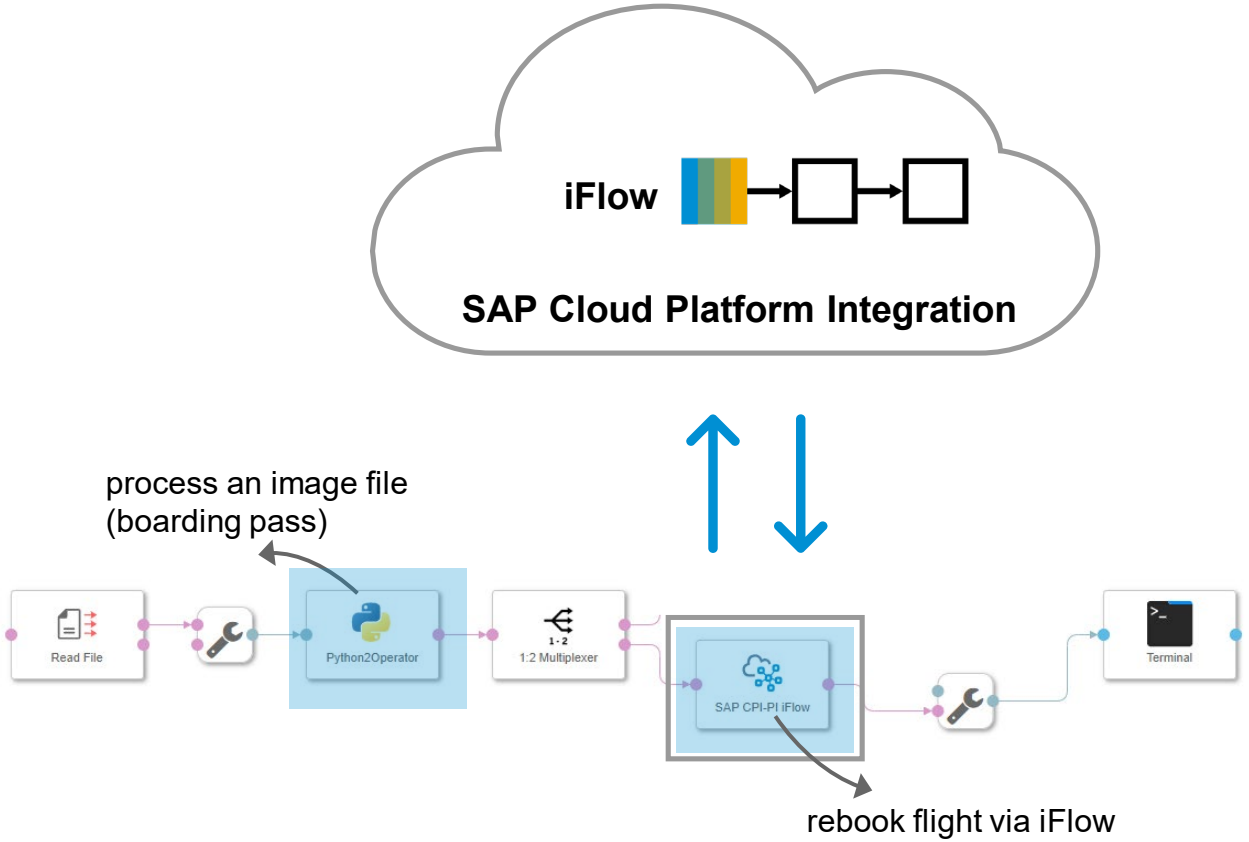
Enrichment of existing SAP Cloud Platform Integration scenarios with SAP Data Hub Modeler functionality

Main Use Cases

- Enable SAP Cloud Platform Integration – Process Integration customers with the ability to reuse existing assets (iFlow)
- Broaden scenarios by blend in complementing capabilities for example machine learning or image processing

Capabilities

- Pre-defined operator for triggering iFlows
- Smooth connection via HTTP Basic authentication
- OAUTH V2 is planned for future release



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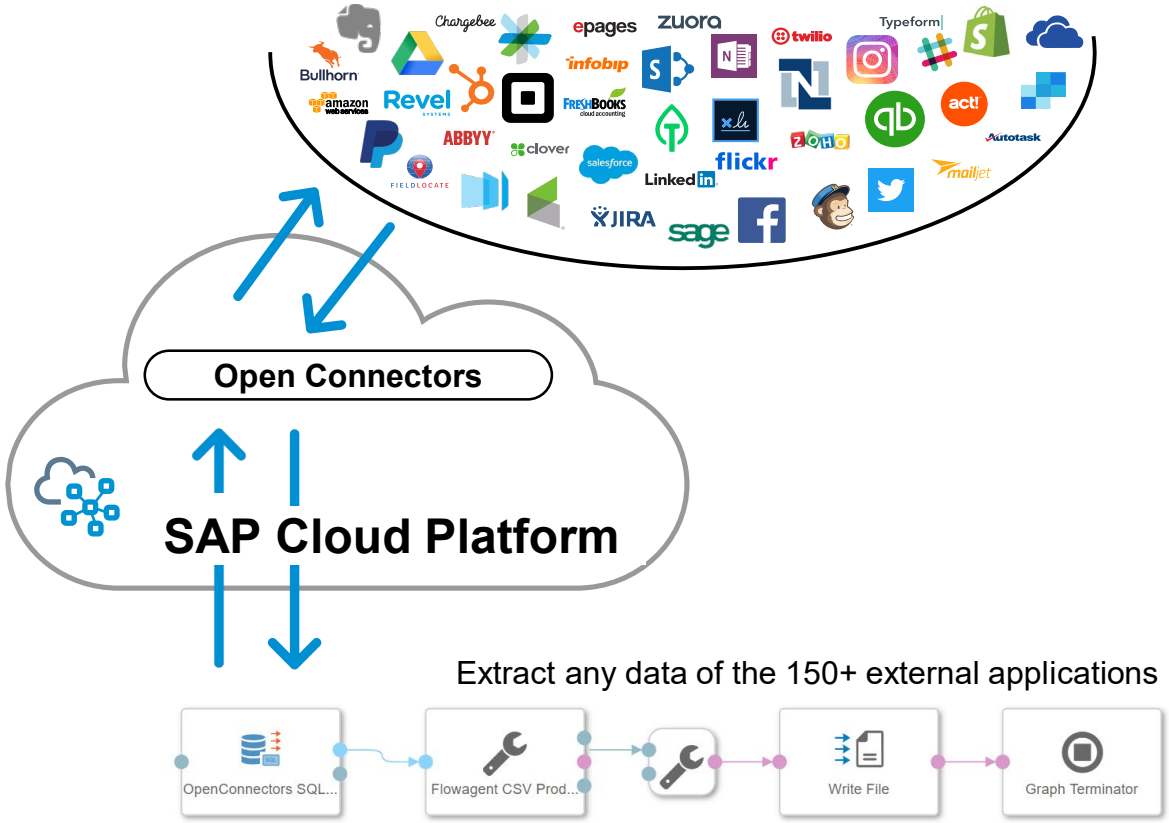
Integration with SAP Cloud Platform

Leveraging SAP Cloud Platform Open Connectors to consume external sources

Accelerate integration with external applications via SAP CP Open Connectors



Main Use Cases

- Seamless integration to over 150 non-SAP cloud application
- Embed external application and data into your process to broaden the scenario
- Develop and map canonical data model to extend pre-build connectors

Capabilities

- Easy connection through one API connector to reduce cost of third-party integration
- Normalized authentication, error handling, search, pagination, bulk support
- Support metadata extraction and data preview

Find all supported connectors here

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Demo

End-2-End Demo of SAP Data Hub Integration with SAP and non-SAP leveraging SAP Cloud Platform connectivity and adding value using SAP Data Hub’s processing and machine learning capabilities.

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- DAT302 – Introduction to SAP Data Intelligence and SAP Data Hub
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- DAT363 – Create and Manage End-to-End Data Pipelines with SAP Data Hub
- DAT162 – Metadata Exploration and Self-Service Data Preparation with SAP Data Hub
- DAT108 – Integrating SAP S/4HANA into SAP Data Hub: Overview and Use Cases

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Public SAP Web sites

- SAP Community: www.sap.com/community
- SAP products: www.sap.com/products

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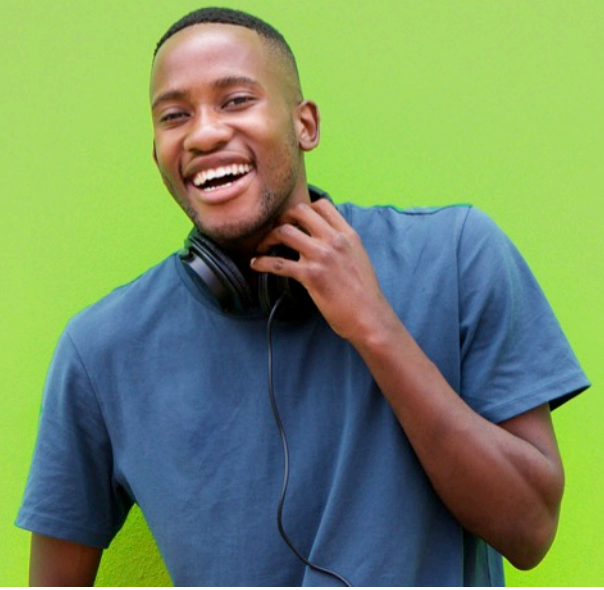

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