Exploring SAP Data Warehouse Cloud from A to Z
Session ID ANA161

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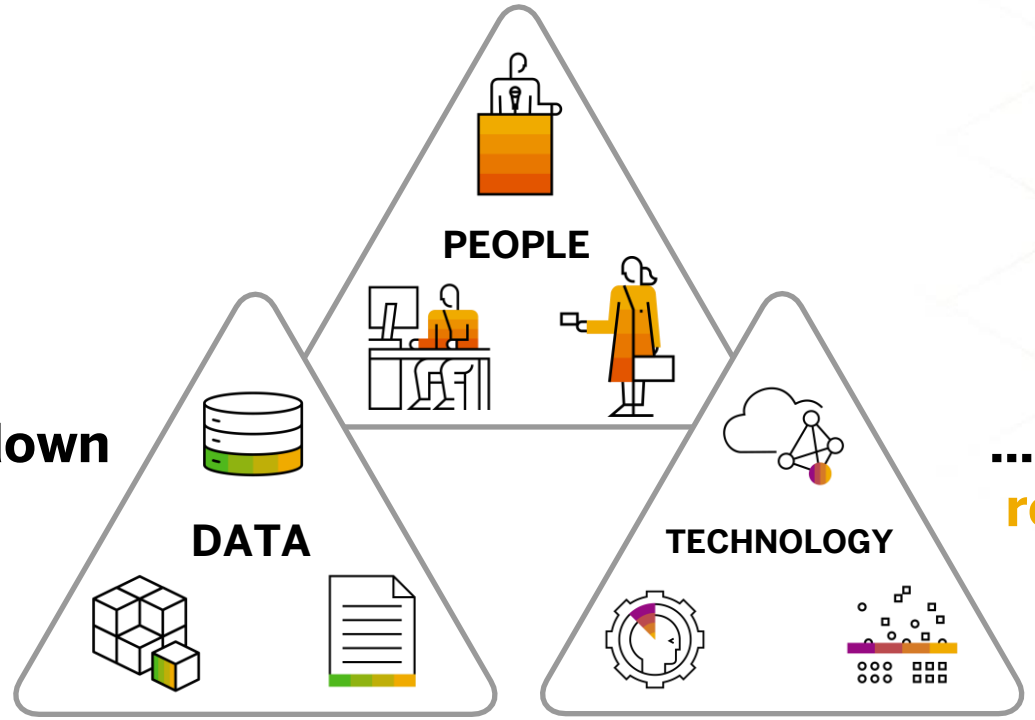
The Challenge: Data and Analytics

...How to empower all stakeholders?

...How to break down data silos?



... How to get results faster?

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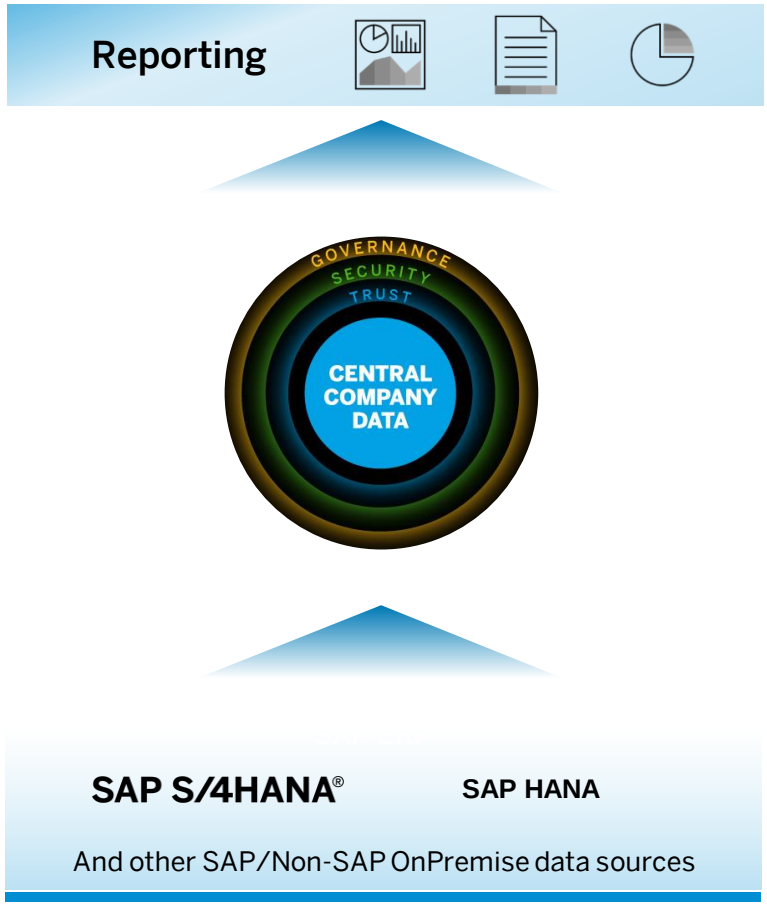
Data management trends and challenges

By 2022, 75% of all databases will be deployed or migrated to a cloud platform[1]

Legacy Data Landscape



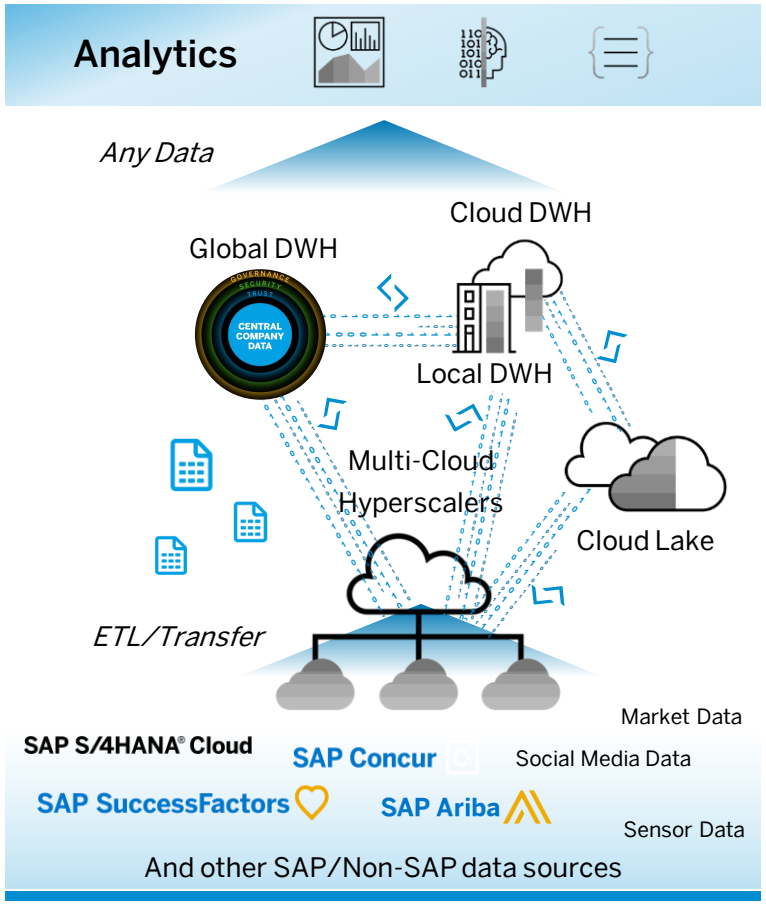
Data Explosion

Move to Cloud

Deliver Intelligence

Data Sources

Current Data Landscape



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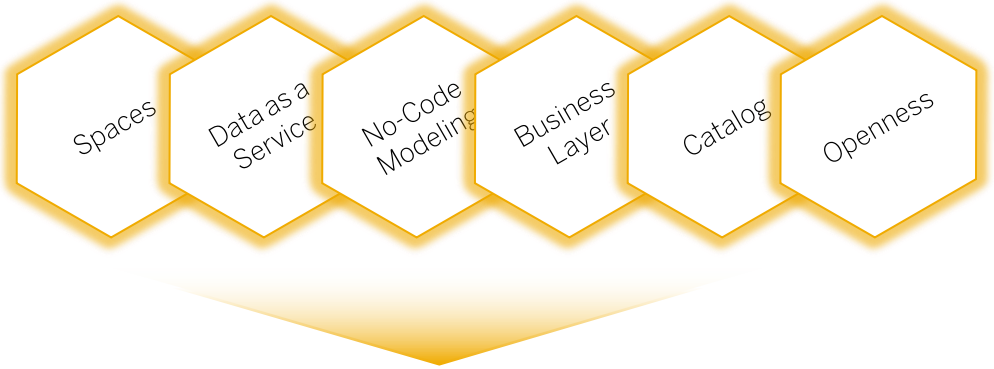
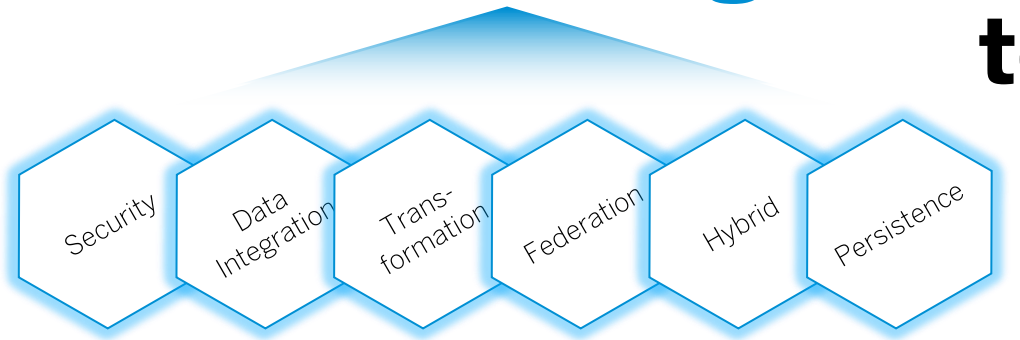
How SAP Data Warehouse Cloud can help



SAP Data Warehouse Cloud goes beyond classical Data Warehousing and brings IT and Business together



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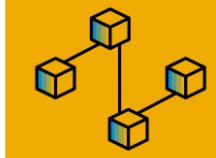
SAP Data Warehouse Cloud. Use Cases

Self-Service Data Modeling & Analytics

Empower business users **with self-service, top-down** driven **analytics** in an **IT governed environment via spaces**. Instant access to business applications via **pre-built adapters to integrate any type of data** from any source, SAP and non-SAP data sources, on-prem and in the cloud.

Enabling Data Democratization

Accelerate time-to-insight via **rapid onboarding of resources**. Lower adoption barrier with a **business semantic layer** abstracting data layer from underlying physical data sources. Leverage data catalog and pre-built **business content** (industry-data models, KPIs) and deliver **enterprise-wide collaboration** via space concept to support **end-to-end decision-making**.



End-to-End Data Warehousing

Leverage existing SQL skills, SAPIDEs, open-source and/or in-built tooling for data integration, governance, harmonization and Big Data historization to provide a **consolidated view across the enterprise**. Extract **maximum investment from existing on-prem investments via hybrid scenarios** e.g. SAP HANA for SQL DW, SAP S/4HANA, SAP BW/4HANA etc.

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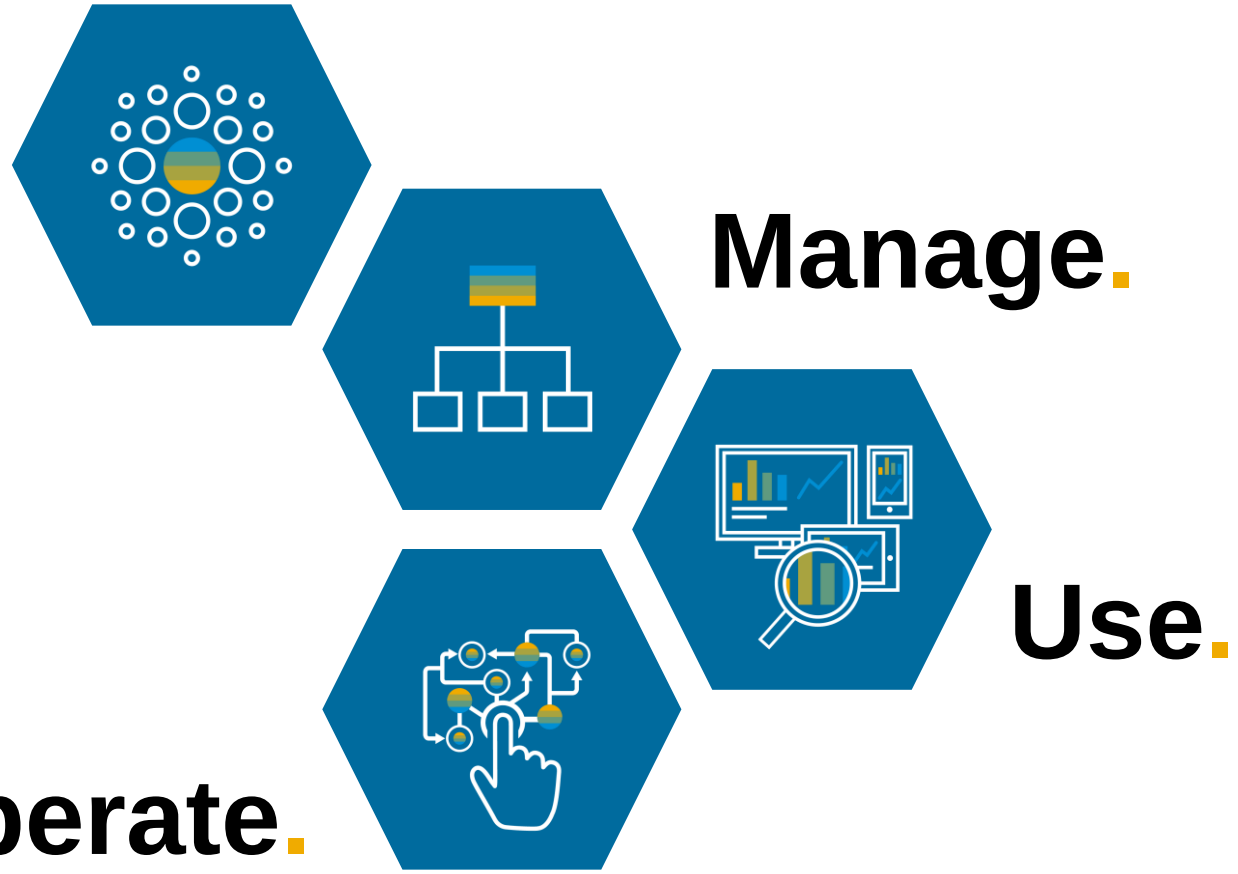
SAP Data Warehouse Cloud. Ready for Your Data Journey

Integrate.



Manage.

Use.

Operate.

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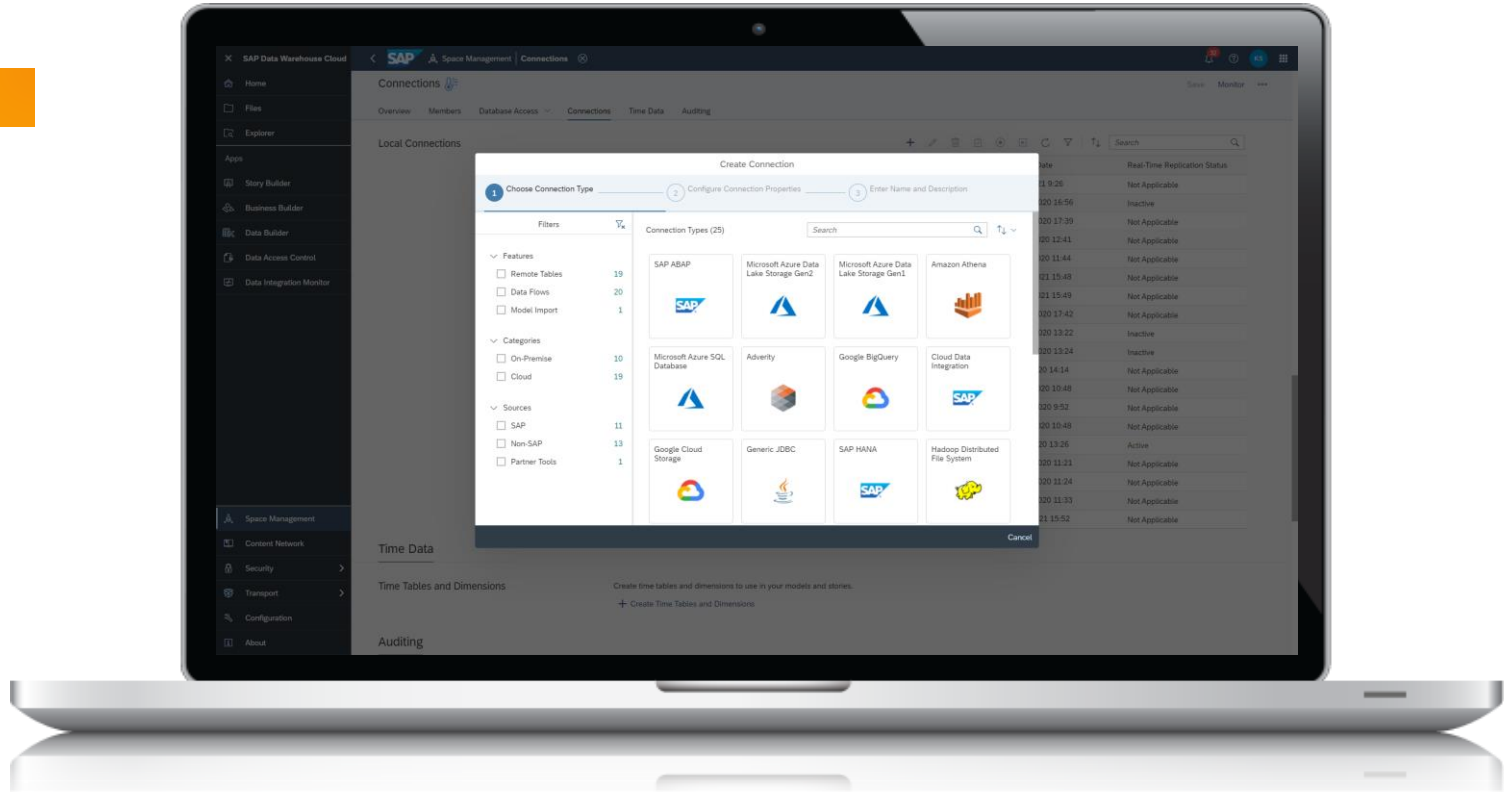
Integrate.

Integrate. Unify data silos to understand your business

CONNECT DATA WITH BUSINESS CONTEXT

- ✓ Broad Connectivity & Openness
- ✓ Data Virtualization, Replication & Persistence
- ✓ Hybrid Scenario



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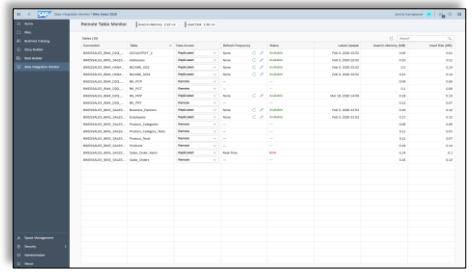
Integrate. Open for Virtual Access and Persistence

REMOTE TABLES

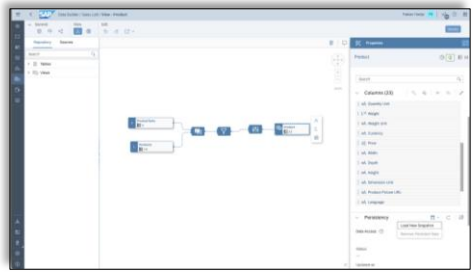
Virtual Access



Realtime virtual data access

- Leave data in the source system and access remotely when needed
- No upfront data movement
- Federation is supported across various sources and hyperscalers

Persisted

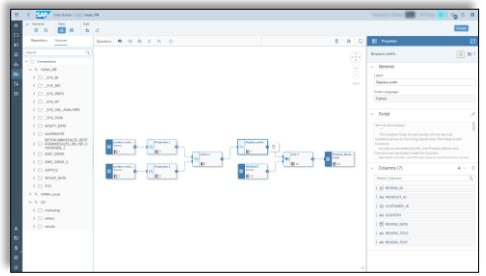


Single table replication

- Real-time table replication for up-to-date data
- Materialize views and update snapshots using automated, scheduled data loads

CLASSIC DATA INTEGRATION

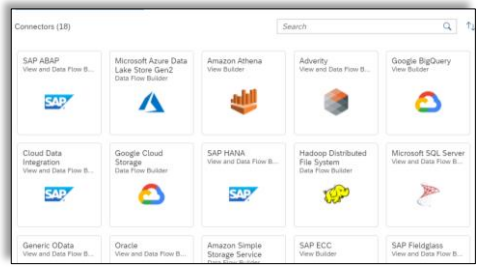
Data Flow



ETL beyond view modeling

- Combine structured and semi structured data while defining ETL processes
- Advanced transformation capabilities leveraging Python 3

External Tools



Integrate with all data sources

Allow external data movement tools like SAP Data Services, SAP Data Intelligence, SAP Open Connectors, SnapLogic, Precog, Adverity, etc. to bring data into SAP Data Warehouse Cloud using SQL interfaces

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Integrate. Data Sources Overview

Current

Connection Tiles

SAP ABAP | SAP HANA on-prem & Cloud | SAP S/4HANA | SAP S/4HANA Cloud

SAP ECC | SAP BW | SAP BW/4HANA Model Transfer | SAP Marketing Cloud

SAP Fieldglass | SAP SuccessFactors | SAP Open Connectors | Local CSV File

Generic JDBC | Generic OData | Generic Cloud Data Integration

Adverity | Precog | Amazon Athena | Amazon Redshift | Amazon S3

Azure Data Lake Store Gen1 | Azure Data Lake Store Gen2 | Azure SQL Database

Google Cloud Storage | Google BigQuery | Microsoft SQL Server | Oracle | HDFS

2021 and beyond*

New Connection Tiles

SAP Concur | SAP Ariba

SAP Cloud 4 Customer | SAP Cloud 4 Commerce

SAP HANA Data Lake | SAP Sybase IQ

SAP BPC | SAP IBP

Azure Synapse | Azure Analysis Services

SFTP | RESTful Webservices | Snaplogic

IBM DB2 | mySQL | PostgreSQL | Teradata

SAP and partner tools supporting data ingestion via Open SQL Schema

APOS | Datazeit | Informatica | Precog | Snaplogic

SAP Data Intelligence | SAP Data Services | SAP HANA Smart Data Integration | SAP Landscape Transformation

SAP Help: Connection Overview

Available | Planned* | Partner

* According to the SAP Data Warehouse Cloud Roadmap

Note: The shown sequence does not reflect priority and timewise planning

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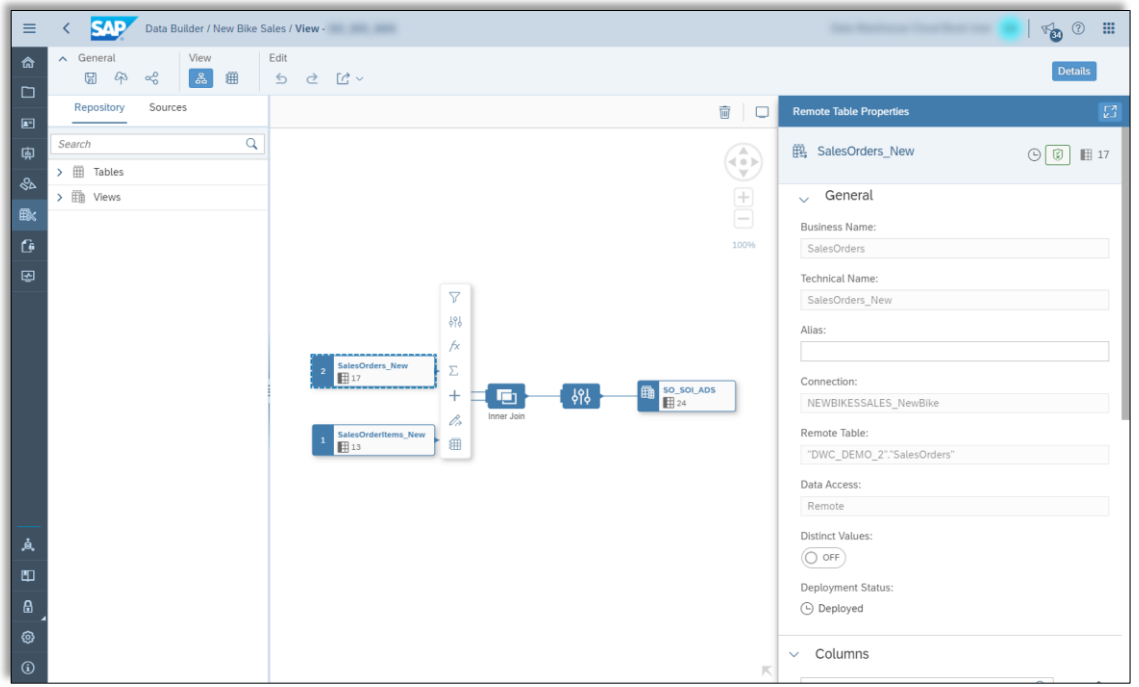
Integrate. Virtual Data Access

- Virtual Access using remote tables, which points to a table in an external system
- Access remote data as if it was stored in local tables
- Remote tables access data without copying the data
- Data needs to be transferred through the network each time a query is executed
- Seamless switching between remote access and data replication or snapshots without the need to change the data models



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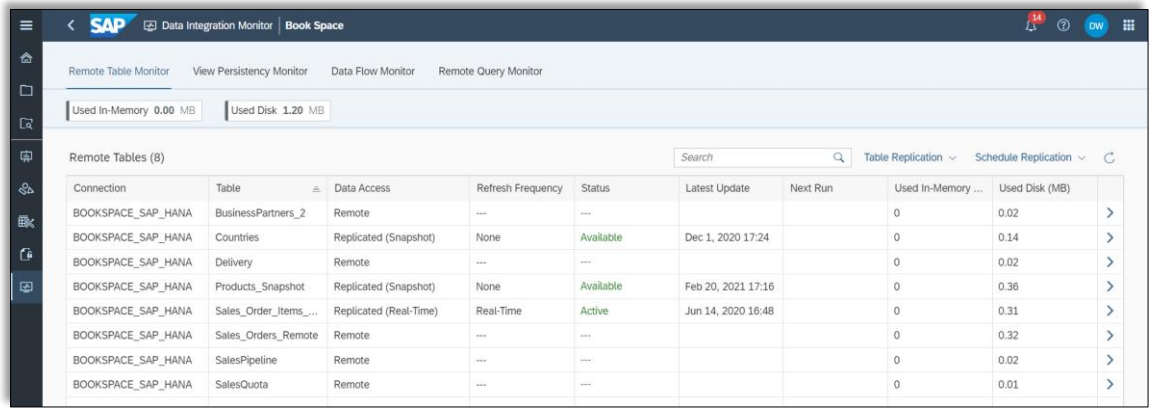
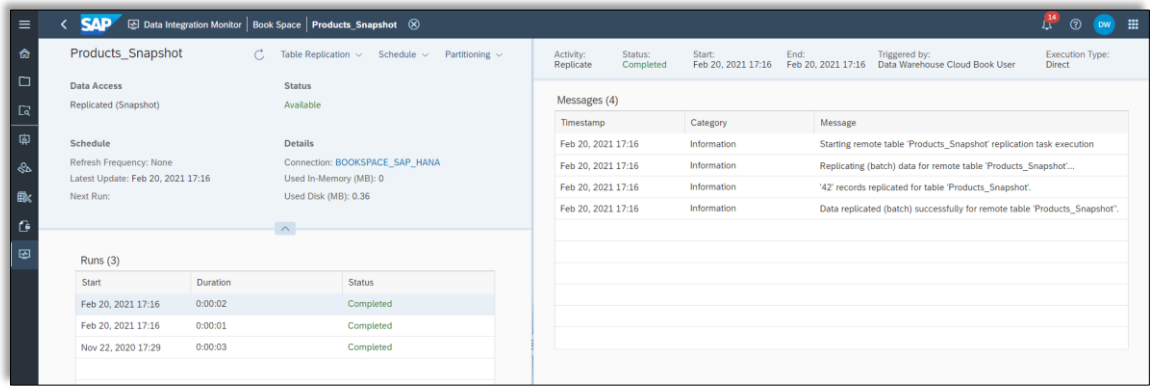
Integrate. Real-time Replication & Snapshots

- Switch from remote access to snapshots or real-time replication for change-data-capture (CDC) enabled tables
- Schedule snapshot loading for remote tables
- Create partitions for snapshot and real-time replication to split larger data transfers and execute these single transactions in parallel
- Ability to start & stop, pause & resume, and cancel real-time replication
- Seamless switching between remote access and data replication or snapshots without the need to change the data models





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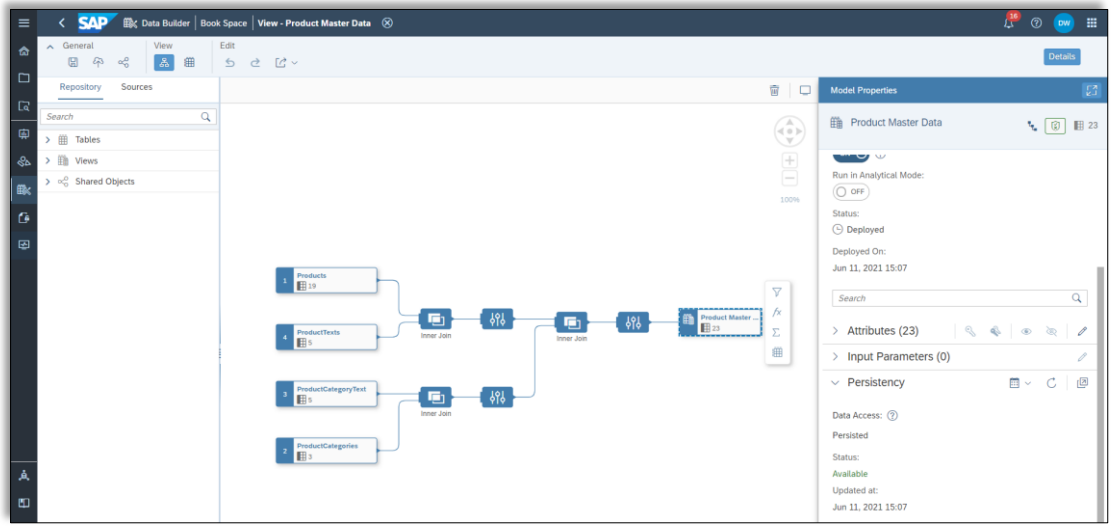
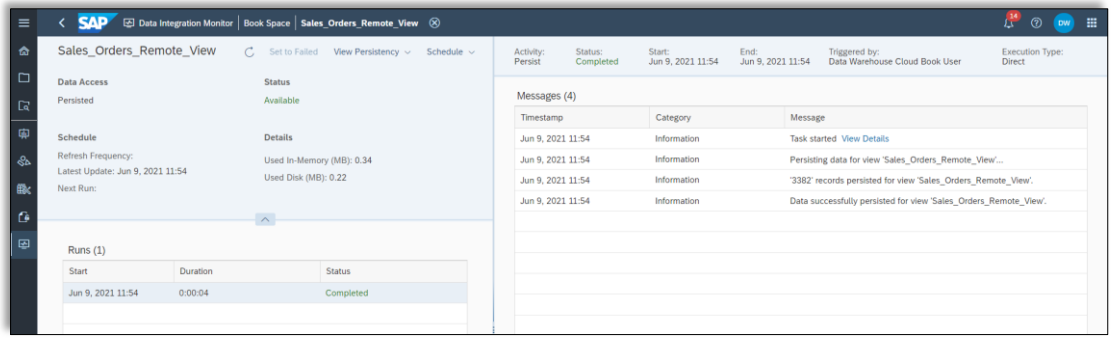
Integrate. View Persistence

- Graphical & SQL-views can be configured as persisted views to materialize the output result
- The result set is persisted similar to remote table snapshots or data flow target tables, and supports partitioning
- Store only required data in SAP Data Warehouse Cloud instead of full 1:1 remote table replication
- Improve performance for views with heavy transformations or slow remote sources
- Monitoring and scheduling via the Data Integration Monitor





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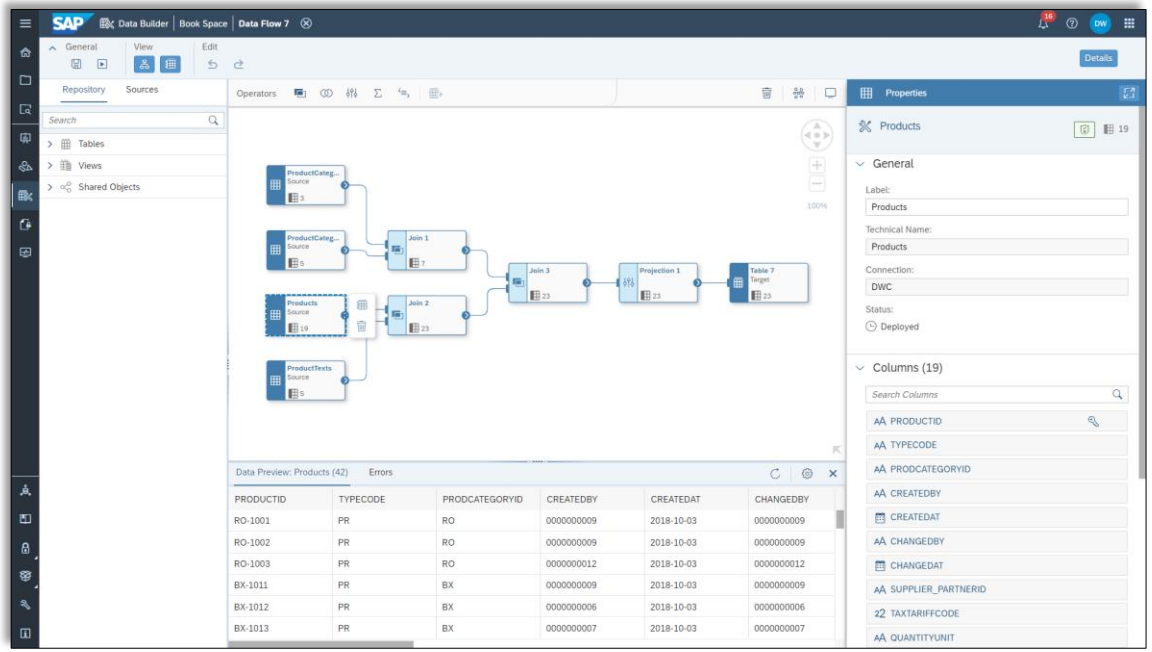
Integrate. Data Flow

- Data integration from variety of data sources
- Easy to use data flow modeling experience for ETL requirements
- Load and combine data from different data sources (SAP and non-SAP) like file storages, DBMS or SAP S/4HANA
- Standard transformation capabilities and scripting for advanced requirements
- Apply a generic filter-based delta to reduce the amount of data that needs to be transferred



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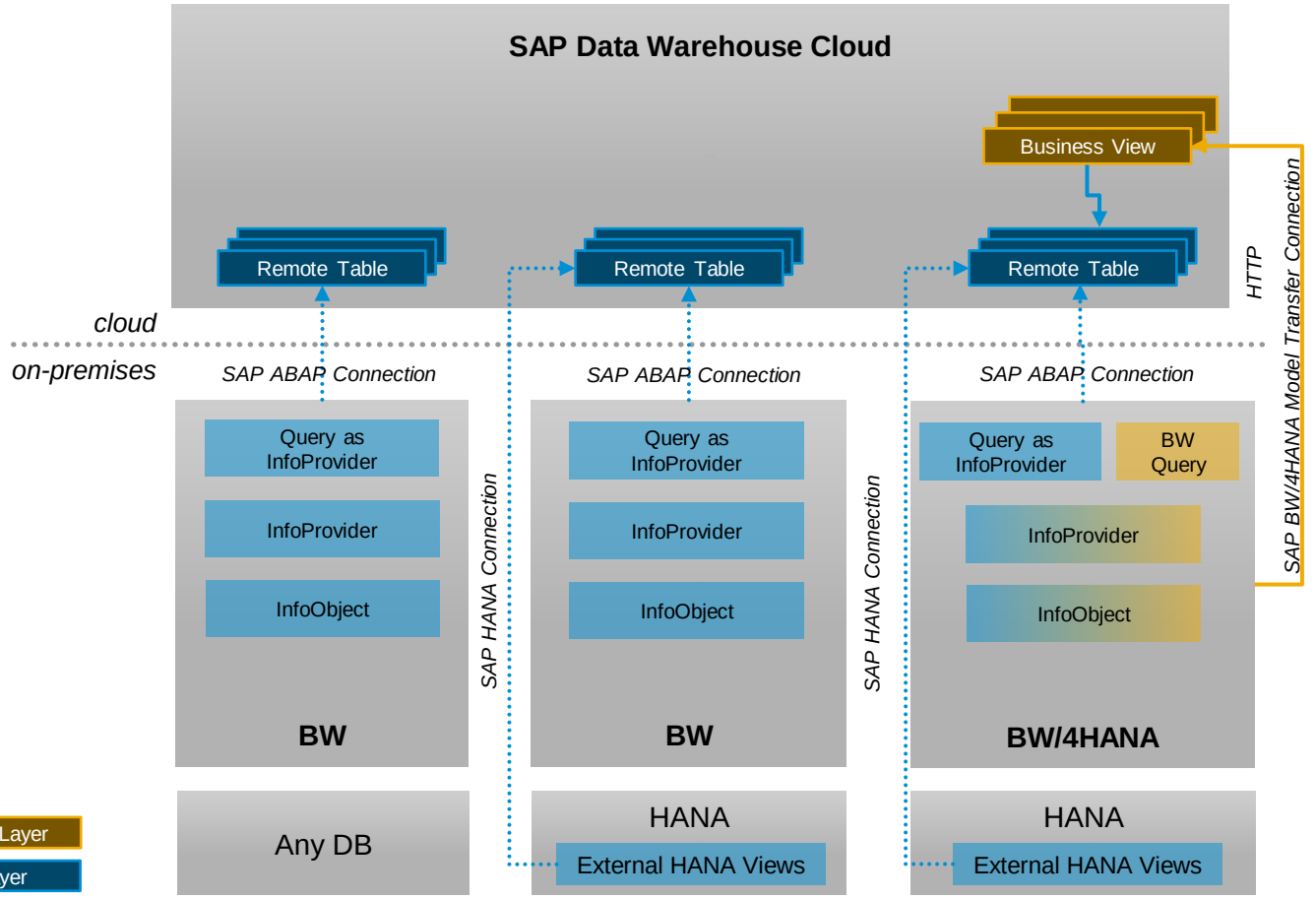
Integrate. Hybrid SAP BW Integration Overview

- Two different ways available for integrating SAP BW & SAP BW/4HANA systems:
  - Federated/replicated data consumption scenarios via
    - Operational Data Provisioning framework (SAP ABAP connection)
    - External SAP HANA Views (SAP HANA connection)
  - Federated/replicated business semantics integration scenarios via SAP BW/4HANA Model Transfer connection
- Differences in support of consumable entities, supported entity features, federated or replicated scenarios, location & usage of calculation engine
- Remote or replicated data consumption scenarios supported with SAP BW & SAP BW/4HANA
- Business semantics migration support for SAP BW/4HANA only via SAP BW/4HANA Model Transfer connection



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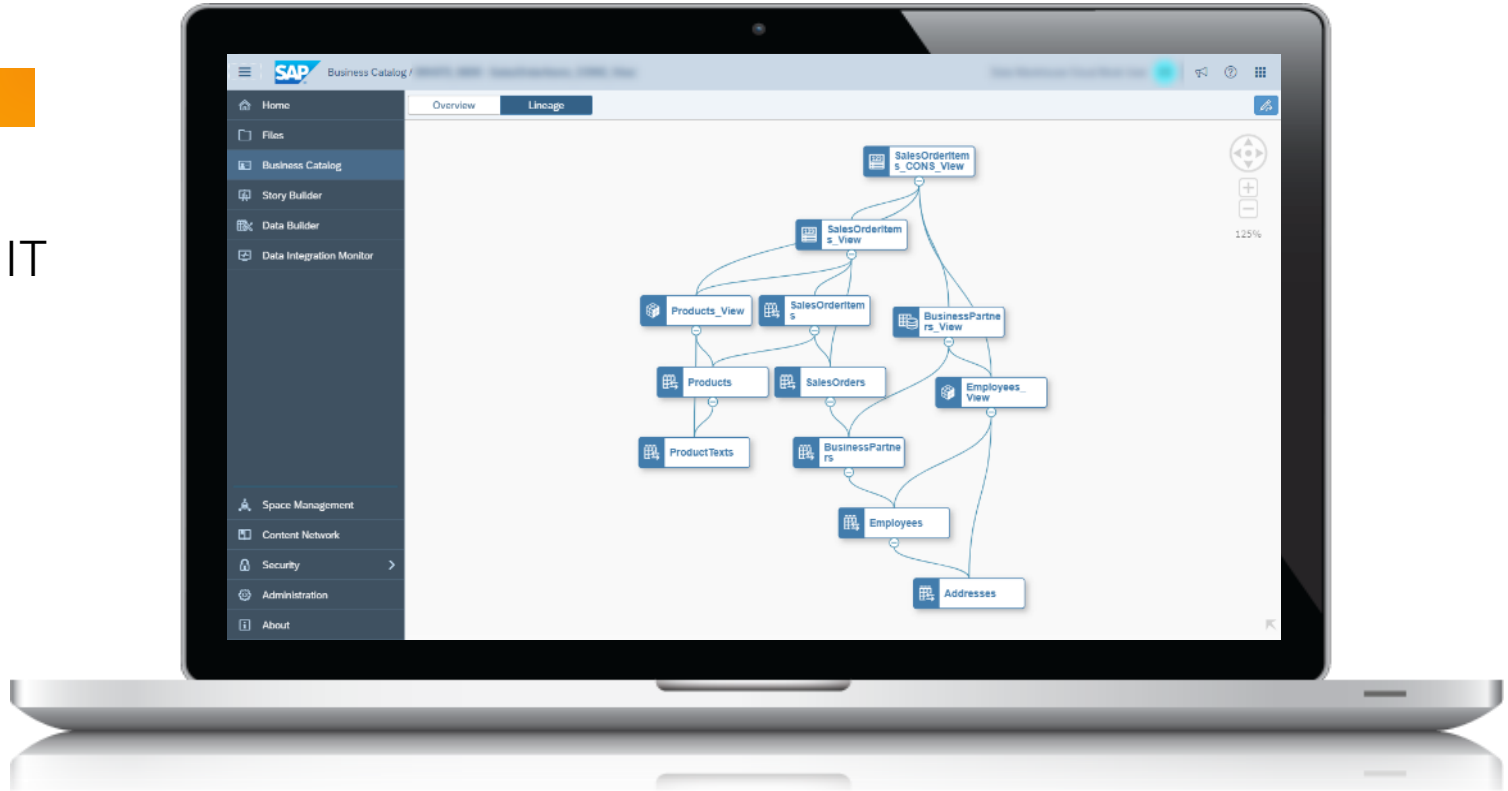
Operate.

Operate. Accelerate outcomes without complexity

ENSURE GOVERNANCE AND EFFICIENCY

- ✓ Virtual working areas governed by IT
- ✓ Enterprise-wide collaboration
- ✓ Access to global & local data
- ✓ Openness for Hyperscalers



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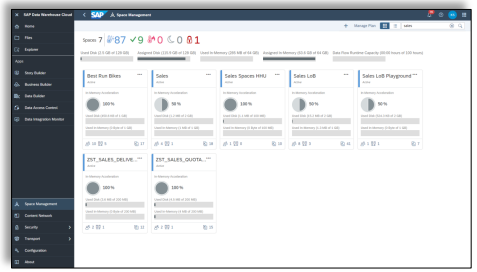
Operate. Unlocking data insights with integrity

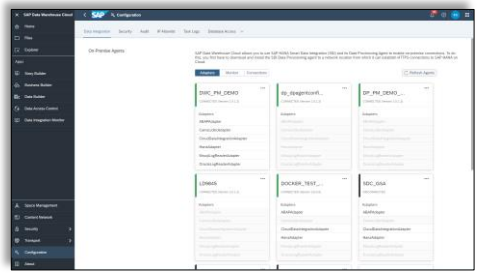
Space Management



Collaboration across spaces

- Access to globally managed data without export & import
- Work independently with your local data and create new insights
- Share your results with others
- Governed by IT

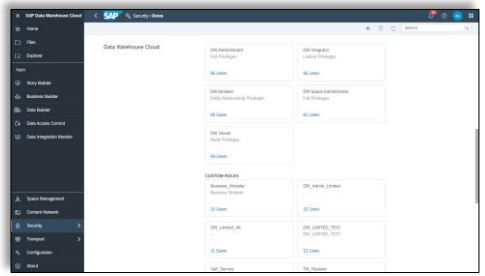
Configuration



Manage your system settings

- IP-Allowlisting
- Data Provisioning Agents monitoring & configuration
- 3rd Party driver & certificate Management
- Access HANA Cloud Cockpit
- Auditing & Resource Monitoring

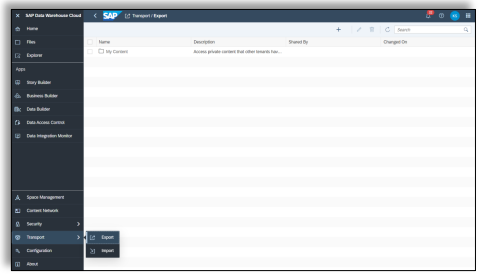
Security



Security on all layers

- User Management
- Row-level Security
- Remote Authorizations from SAP BW/4HANA
- Secure Source System Connections
- Data Anonymization & Data Masking

Transport



Transfer content between tenants

- Move your own content between different tenants
- Export content packages and share with other tenants

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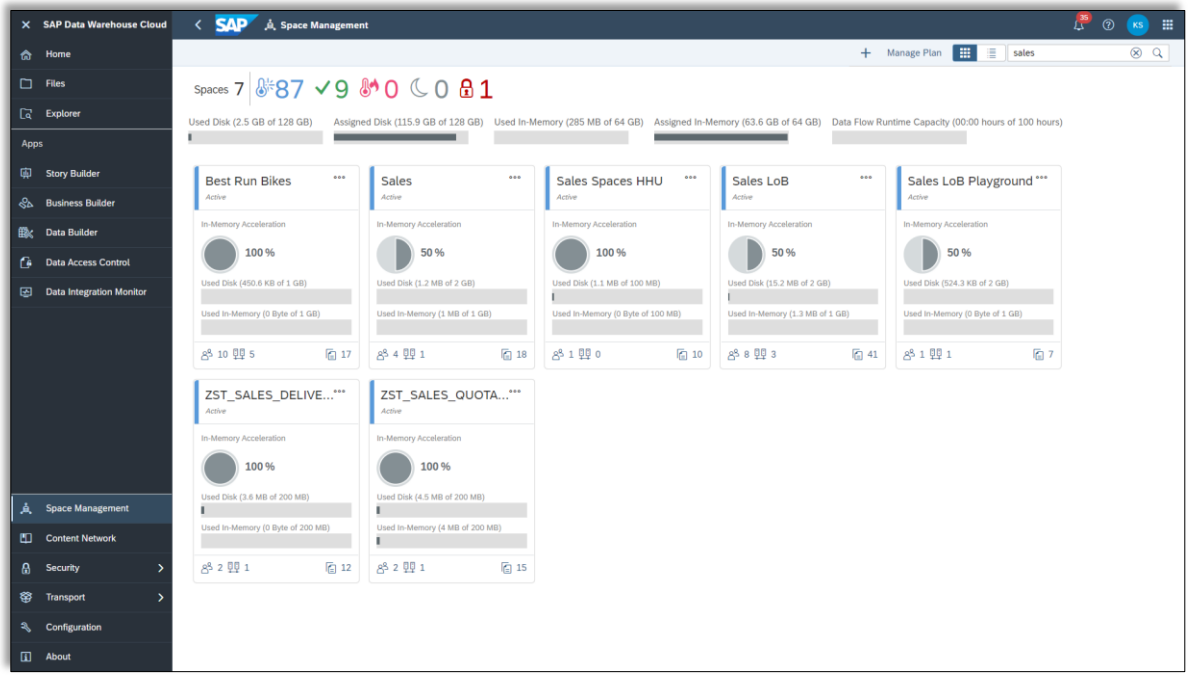
Operate. Space Management

- Spaces are secured virtual work environments which
  - provide isolation for metadata objects and space resources
  - define space storage quota and control resource usage
  - enables sharing of data with other spaces
- Transparent monitoring & statistics
- Manage user access for space members
- Maintain source system connections
- Define workload class settings per Space
- Database users for
  - read access from other applications
  - write access to an Open SQL Schema via external tools
  - deployment of SAP HANA Deployment Infrastructure (HDI) containers
- Time dimension
- Optional Auditing for read and change operations
- Optional SAP HANA Data Lake Integration



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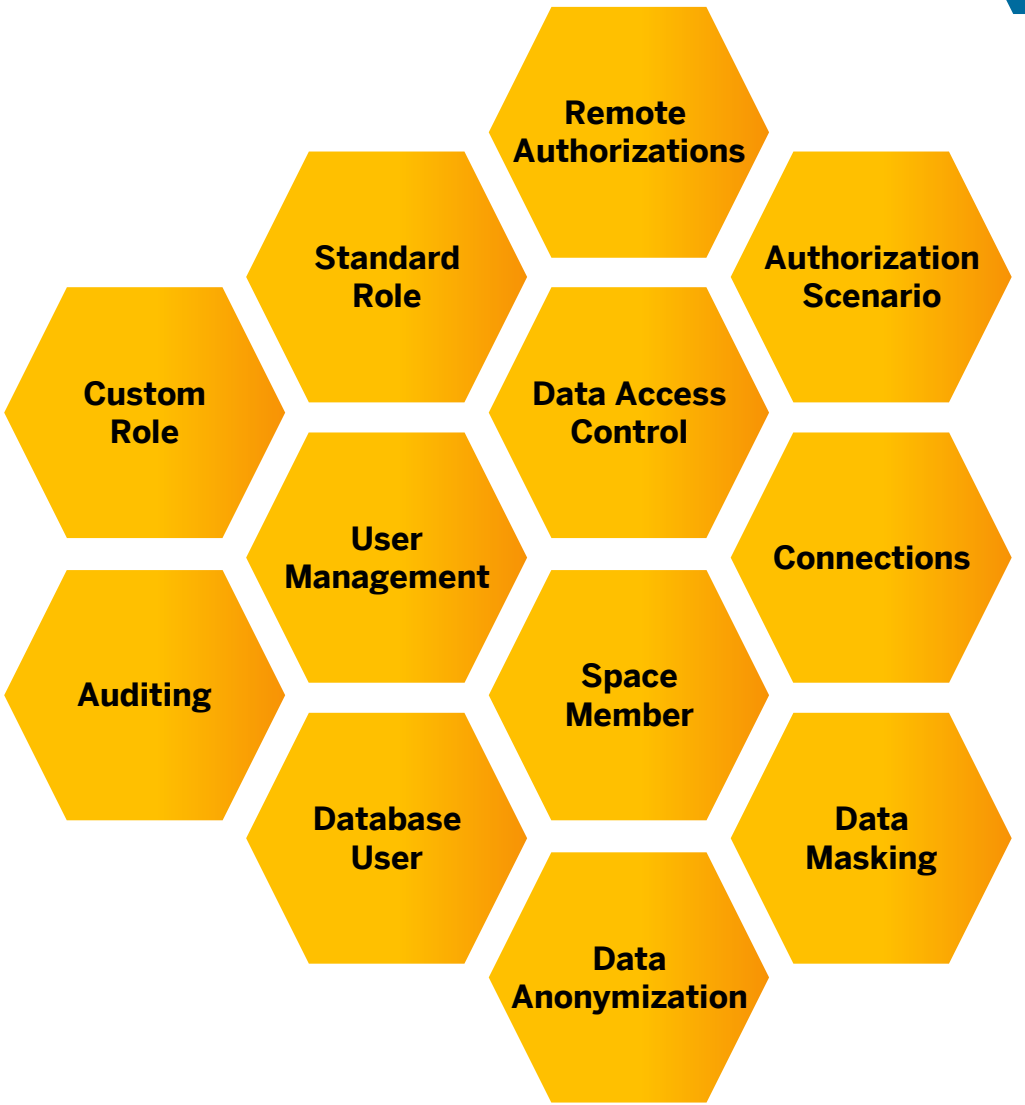
Operate. Security on all layers

- Access on tenant level handled by user management
- Functional access managed by standard and custom application roles
- Space level access granted for members only
- Row-level security managed by Data Access Controls on data and business layer via authorization scenarios
- Reuse Remote Authorizations from SAP BW/4HANA
- Secure Source System Connections
- Define database user privileges
- Data anonymization & data masking features of SAP HANA Cloud can be leveraged in an Open SQL Schema
- Auditing for read and change operations
- Certifications: ISO 27001 / 27017/ 27018, ISO22301 , SOC1 Type 2 , SOC2 Type 2 , CSA STAR registry / CSA STAR Certificate , EU Cloud CoC available on SAP Trust Center as part of the SAP Business Technology Platform



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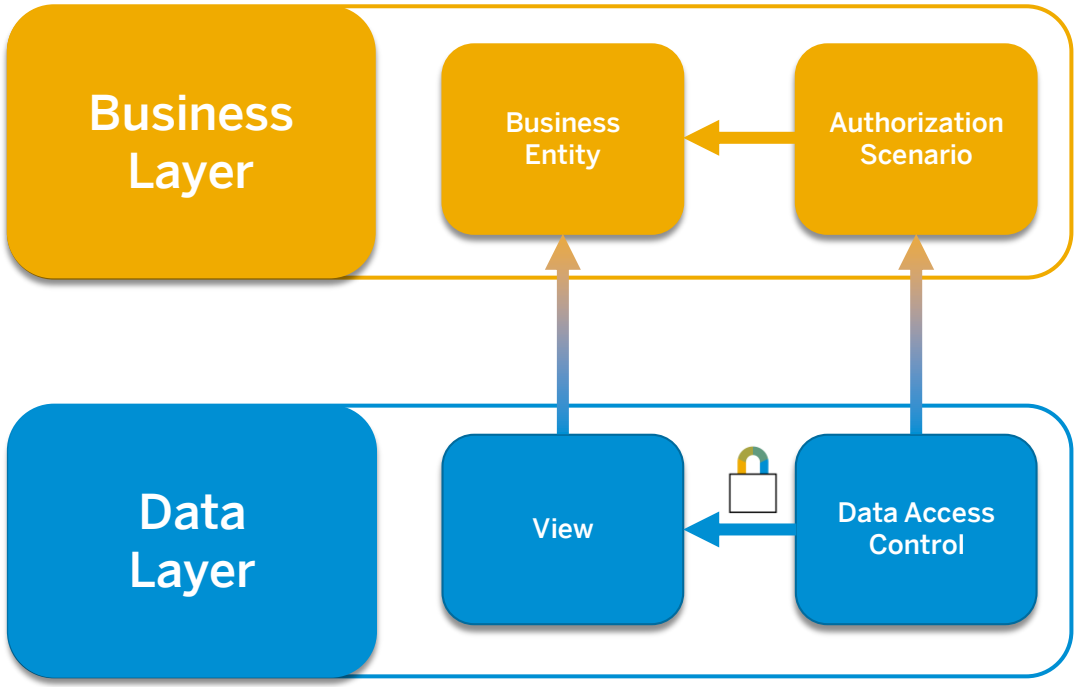
Operate. Data Access Controls & Authorization Scenarios

Data Access Controls

- Allow more granular access to data on row level
- Applied on artifacts in the Data Layer
- Cannot be overruled
- Data Access Controls are defined once and can be applied to multiple artifacts in Data Layer

Authorization Scenarios

- Authorization Scenarios in Business Layer define the context in which data is consumed and which Data Access Control is applied
- Consuming objects in Business Layer need to leverage one of the Data Access Controls assigned to the underlying source object in Data Layer



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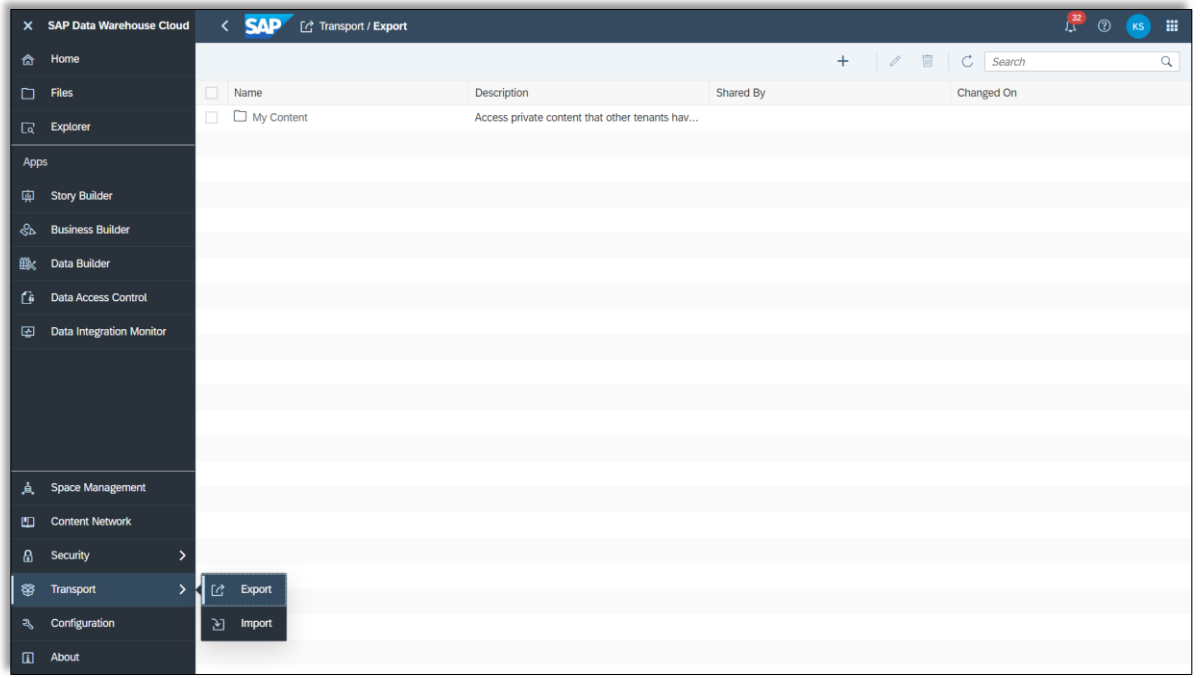
Operate. Transport content between tenants

- Export and import your own content using the content network
- Collect and build your own content package based on one or multiple spaces
- Provide export package for transport to other systems
- Import content from other systems into an existing Space (same technical name)
- Alternatively, import and export metadata of modelling artifacts as a CSN file containing the definition and description of the SAP Data Warehouse Cloud metadata



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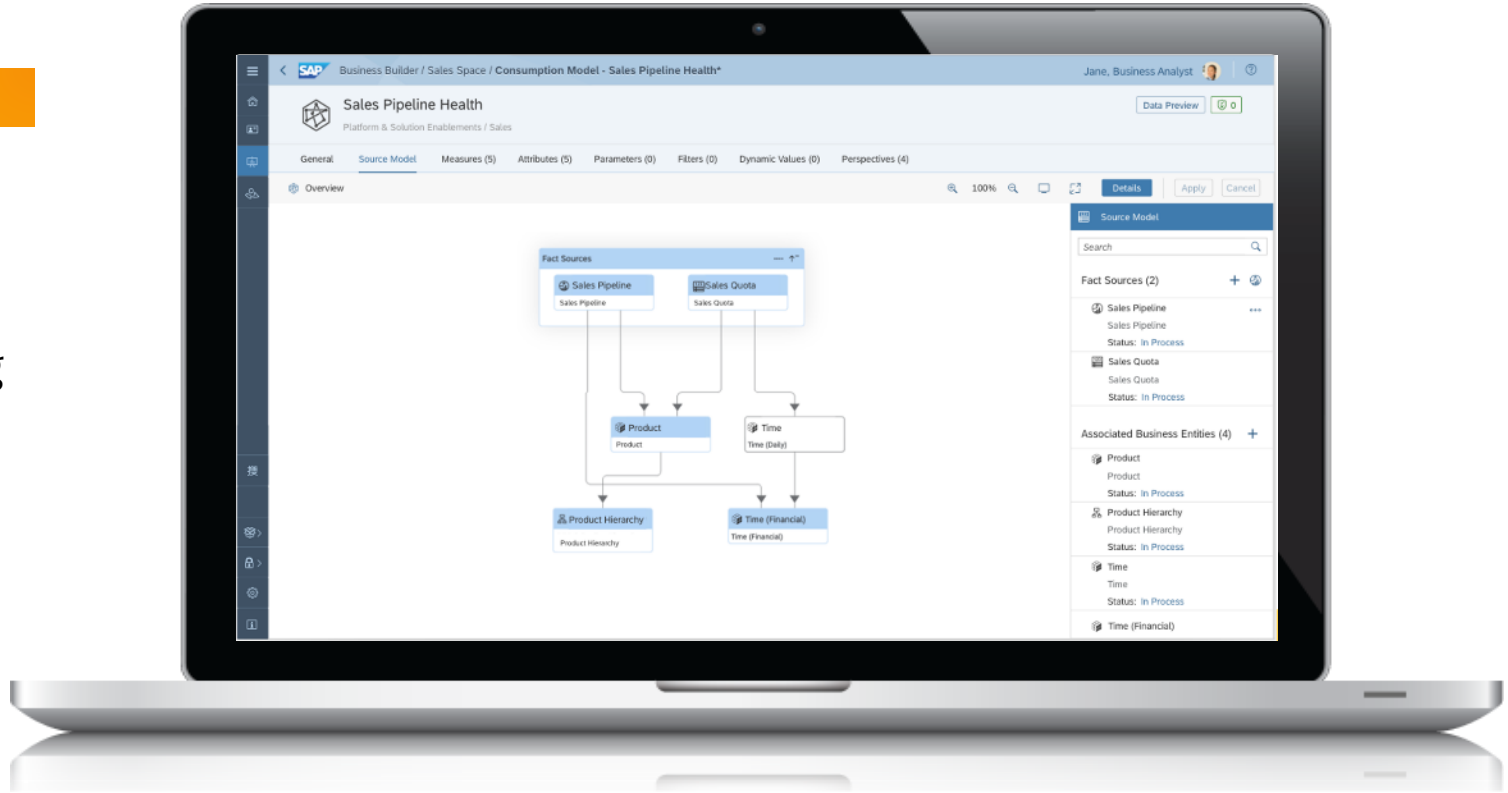
Manage.

Manage. Unlock data insights with integrity

EMPOWER BUSINESS USERS

- ✓ Semantic Business Layer
- ✓ No-code/Low-code Data Modeling
- ✓ Designed for Business & IT
- ✓ Open for External Tooling



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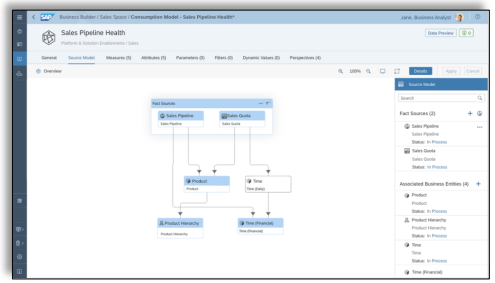
Manage. Modeling for Everybody

Business Analyst
(no-code/low-code)

Developer
Power User

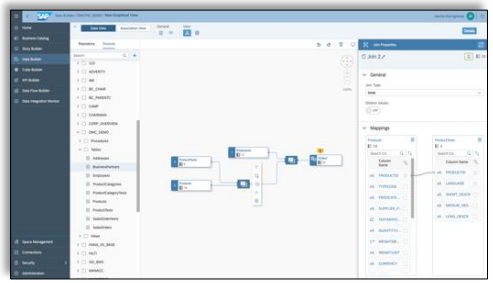
BUILT-IN EDITORS
modeling for all users

Business Modeling



- Allow for a greater degree of self service
- Non-disruptive environment for business scenarios – independent from the data integration layer

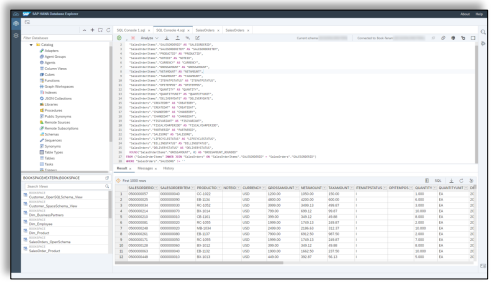
Graphical & Scripted



- Collection of no-code/low-code editors to support Graphical Modeling
- Model E/R-models, Tables, Views, SQL & SQL-Script Views
- Focuses on most commonly used modeling operators

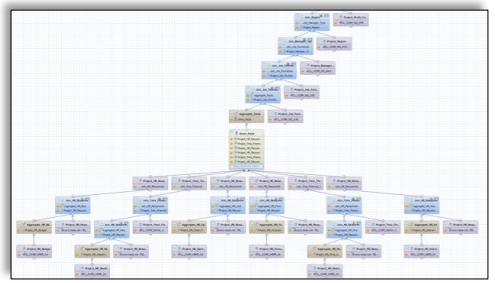
EXTERNAL EDITORS
integrated SQL Data Warehousing

Open SQL Schema



- Option to use SQL DDL & DML leveraging e.g. SQL Views, Tables, Procedures, etc.
- Leveraging existing SQL-tooling & skillset
- SAP Database Explorer

SAP HANA Deployment Infrastructure



- SAP HANA Cloud Modeling capabilities leveraging Calculation View, Flowgraph, Synonym, etc.
- Simply re-use HANA based Modeling within SAP Data Warehouse Cloud

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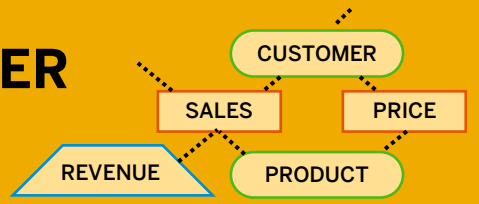
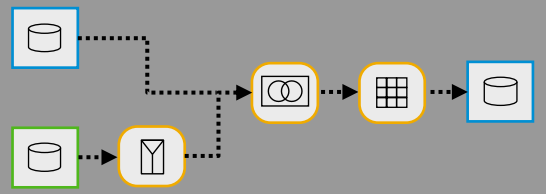
Manage. Collaborate in business terms

BUSINESS LAYER
Users work in business terms



"What were the key margin drivers for my product? What if I reduce the price by 10%?"

DATA LAYER
IT models underlying relationships



"How can I assure queries will perform with data coming from heterogenous systems?"

BUSINESS CATALOG
Users discover available assets & work on common KPIs

"How is the margin of the product calculated? Where do I find it?"

- Business entities and relationships with business language
- Model standardization and reuse for efficiency
- Independence for business users from IT

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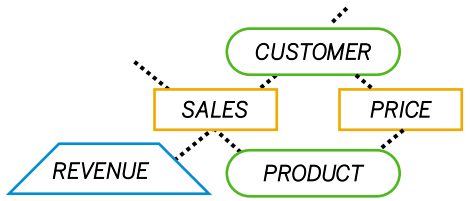
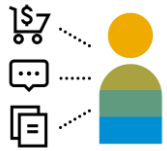
Manage. Business Modeling

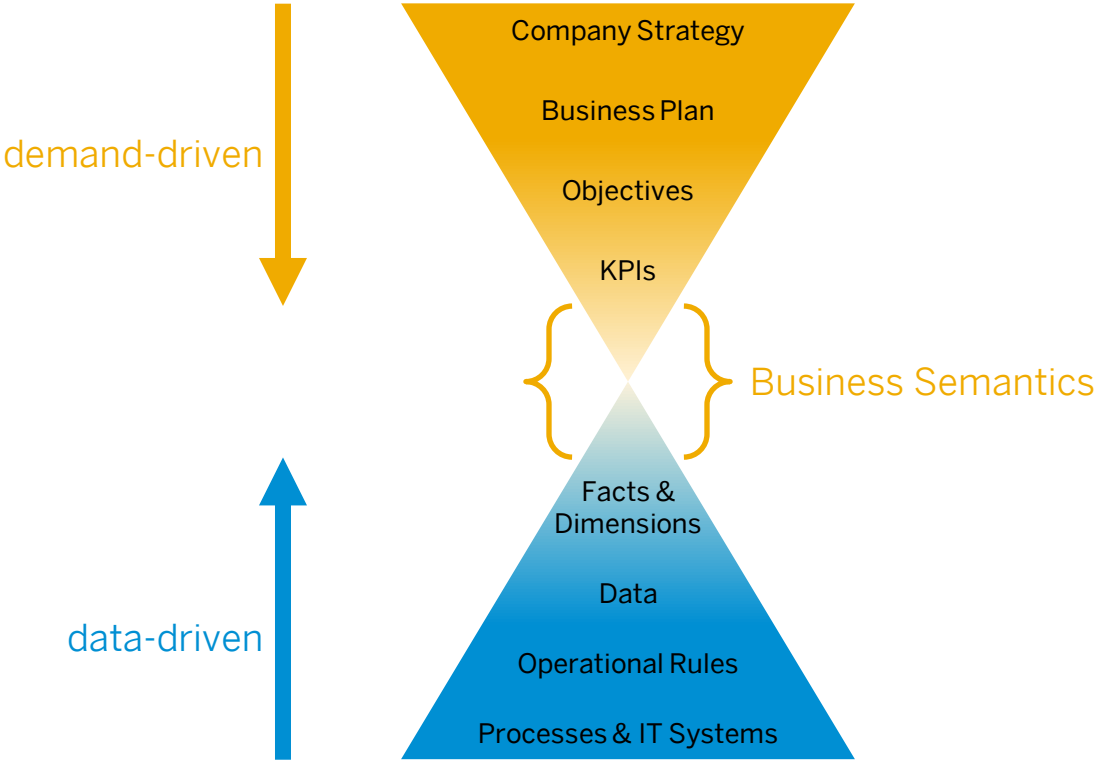
The business layer will empower BI analysts to model using business terminology and allow for **demand-driven modeling** in addition to **data-driven modeling**.

- Enables business users to model their business scenario without knowing the underlying data models
- Self-service modeling for Lines of Business
- Hides data complexity through using business language terminology
- Business model independent from data layer





Users Work in Business Terms



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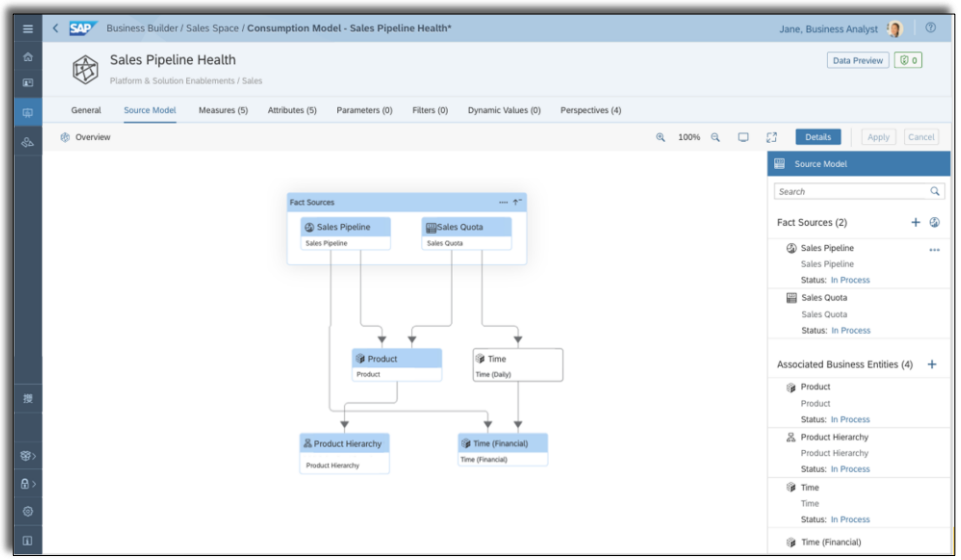
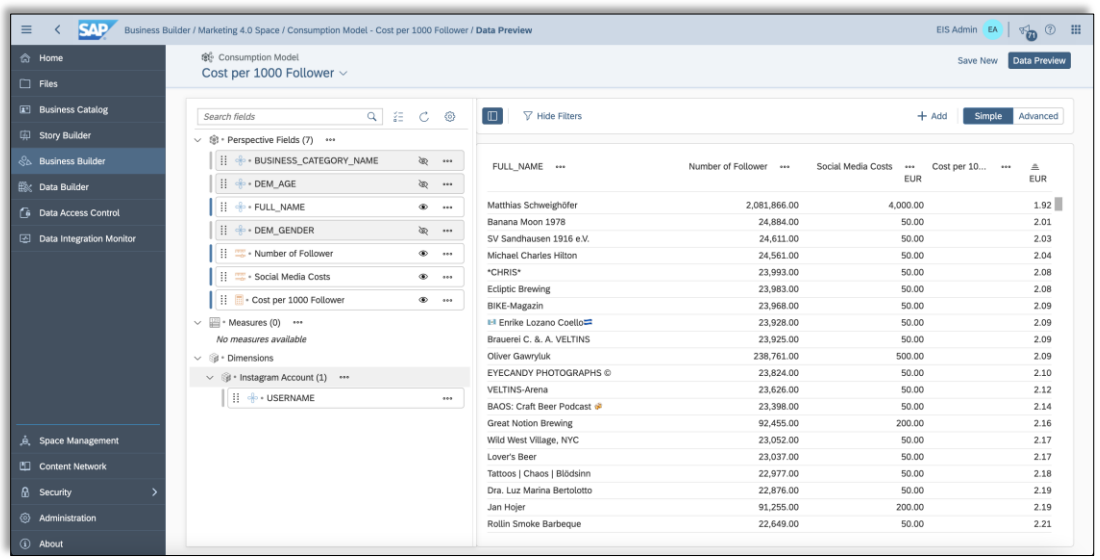
Manage. Business Modeling



Fact and Consumption Modeling



Interactive Data Discovery

- Build **one semantic layer** for all your consumers
- Flexibly **change the underlying data layer** when needed (i.e. changes in source systems) without disrupting your consumers
- Run **advanced data preview** with filtering, sorting and parameterization* capabilities, to validate the modeled business logic immediately

* According to the SAP Data Warehouse Cloud Roadmap.

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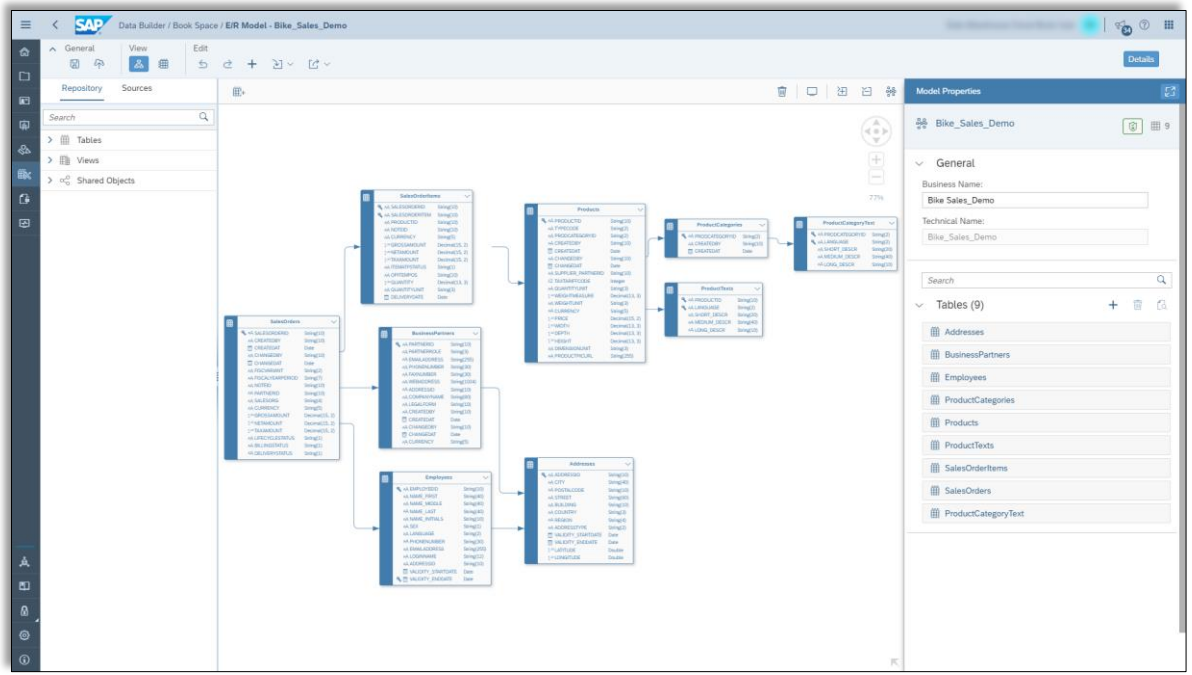
Manage. Entity-Relationship Modeler

- Definition of entity-relationship models
- Design physical or remote database models
- Reverse model engineering
- Re-use existing entities (table, view) from Data Builder
- Add new entities on-the-fly
- In-editor real time data preview
- Model Import / Export



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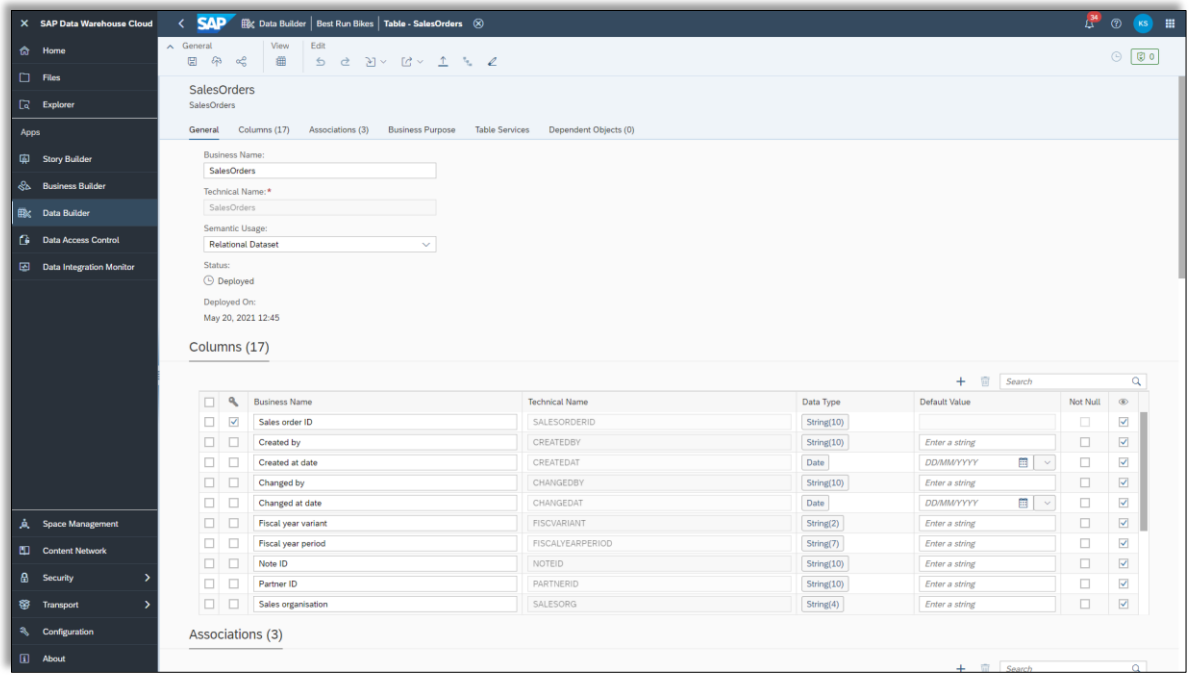
Manage. Table Editor

- Define general properties like technical and business name, as well as semantic usage
- Provide business purposes for easy re-use and search capabilities
- Customize field list by adjusting descriptions, field names, data types and semantics
- Maintain associations and check on dependent objects when changing tables
- Define primary keys, default values and column visibility
- Delete current and upload new data from files
- Share tables with other spaces
- Allow to refresh the meta data for the remote tables definition



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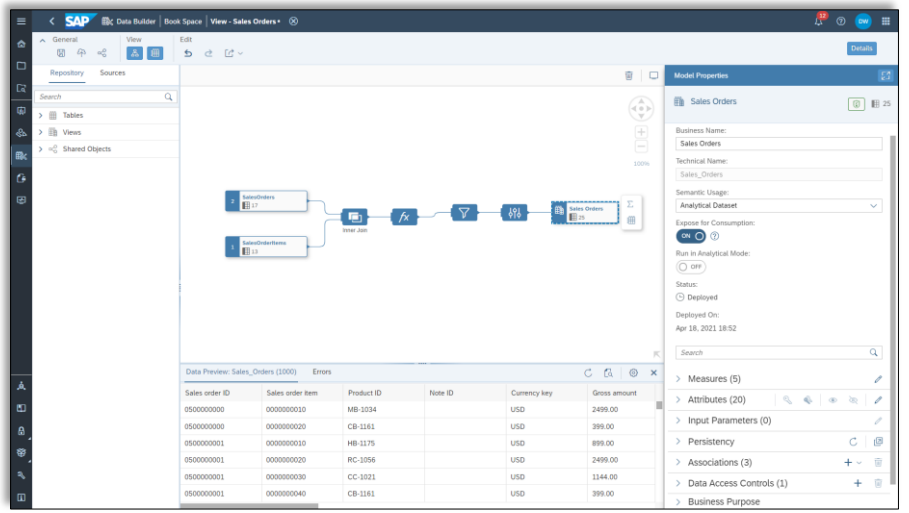
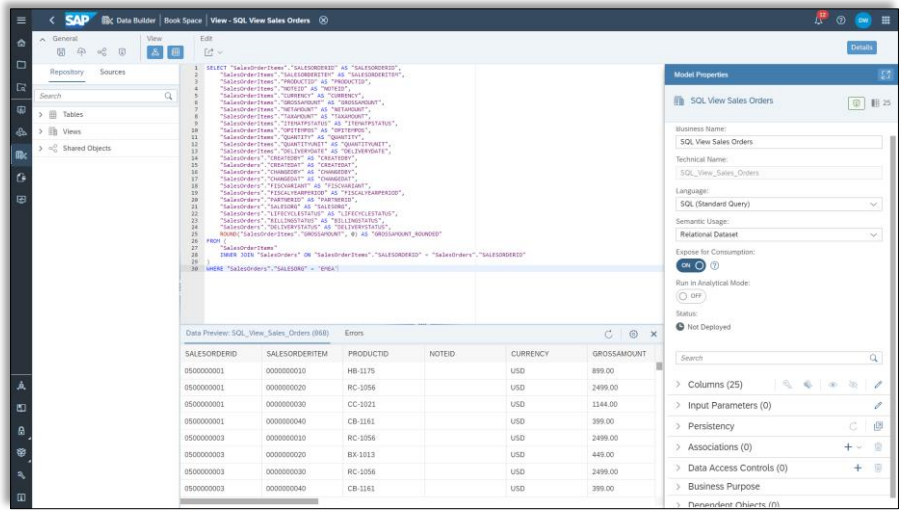
Manage. Graphical & Scripted View Editors

- Define views on top of remote, replicated or local tables
- Create views of type: Analytical Dataset, Dimension, Text, Hierarchy or Relational Dataset
  - Define measures & attributes in Analytical Datasets
  - Create Parent-Child or Level-based Hierarchies in Dimension Views
  - Support multi-language text fields
- Define Exposure for Consumption & Sharing with other spaces
- Apply Data Access Controls and Input Parameters
- Create and Schedule View Persistency
- Graphical View Editor
  - Define unions, joins and aggregations, rename and remove columns, add calculations and filters
  - Preview the data at each node and display the corresponding SQL Statement
- SQL & SQL-Script Editor for Developers





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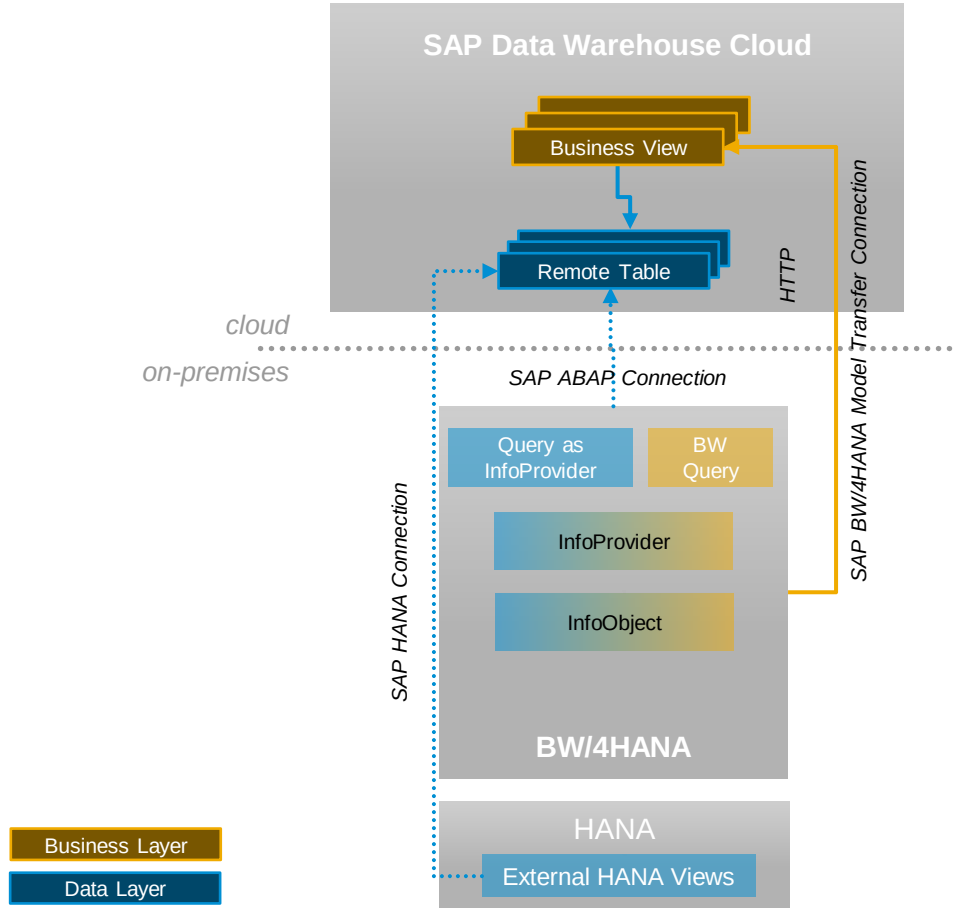
Manage. SAP BW/4HANA Model Transfer

- Provide SAP BW/4HANA business semantics to SAP Data Warehouse Cloud
- Enable staging scenarios for SAP BW/4HANA data & virtual models
- Transfer BW Query as native entity (KPI, analytic model)
- Support BW Analysis Authorizations in SAP Data Warehouse Cloud*
- Hierarchy Support (virtual, available via semantics, native SAP Data Warehouse Cloud dimension with hierarchies)*
- SAP BW/4HANA system only acts remote data source, calculation engine execution (via MDS) happens in SAP Data Warehouse Cloud
- More information about supported features in SAP Note 2932647



* According to the SAP Data Warehouse Cloud Roadmap.

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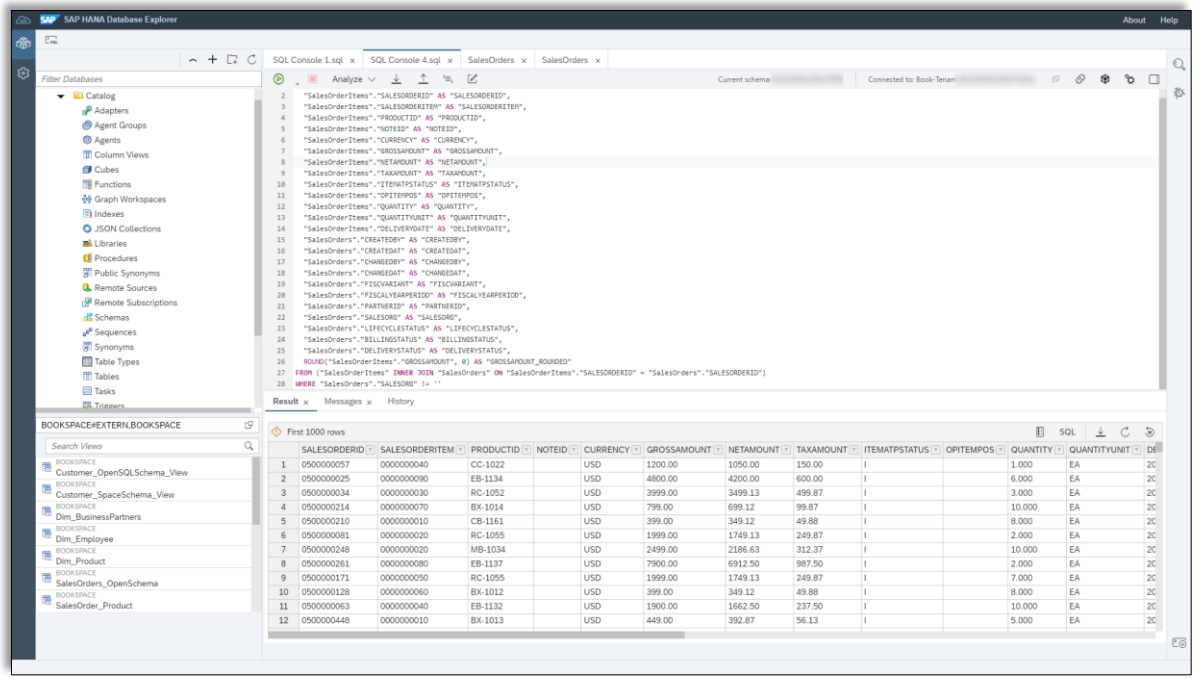
Manage. Open SQL Schema Modeling

- External tools can create artifacts in an Open SQL Schema of a Space
- Connect via 3rd party SQL client like SAP Database Explorer directly from Space Management
- Usage of SAP HANA SQL capability (DDL & DML)
  - Create views, tables
  - Define & execute stored procedures
  - Leverage Data Anonymization and Data Masking
  - Automated Predictive Library (APL) and Predictive Analysis Library (PAL), if enabled in Space



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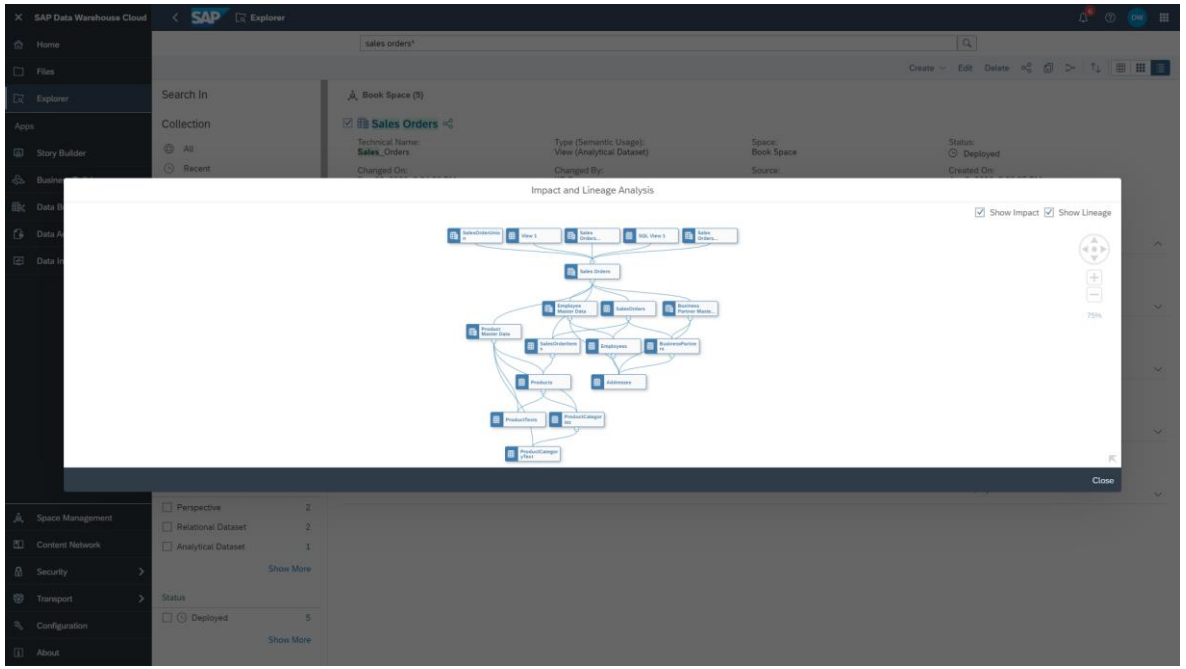
Manage. Repository Explorer

- One entry point for all Business and Data Layer objects
- Start all modeling activities from one place
- Get an instant overview on all available objects
- Intuitive Fuzzy Search Function
  - Sorting, Filtering, Grouping
  - Favorites list
  - For spaces, tags, business purpose,
- Governance and Modeling Life Cycle Management
  - Show Impact and data lineage
  - Artifacts comparison*
  - Approval and review workflows*



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Use.

Use. The Unified Data and Analytics Service

ENABLING DATA DEMOCRATIZATION

- ✓ Integrated Analytics
- ✓ 3rd Party Tooling supported
- ✓ Business Content

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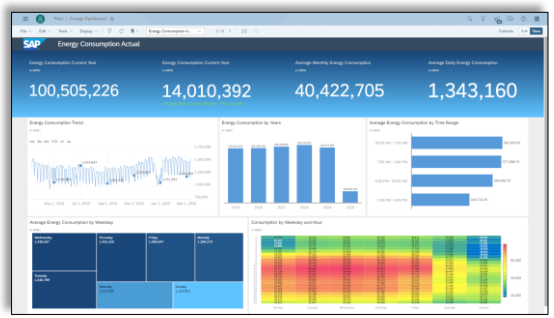
Use. Choice and openness with prebuilt business content

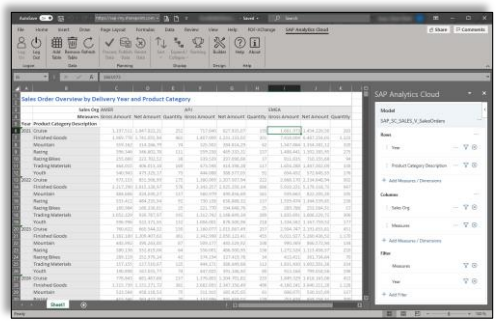
SAP Analytics Cloud



One seamless user experience

- Direct consumption of models in SAP Analytics Cloud (live connection)
- Any number of SAP Data Warehouse Cloud systems can be connected to any number of SAP Analytics Cloud systems

MS Office Add-in



Live Connection to MS Excel

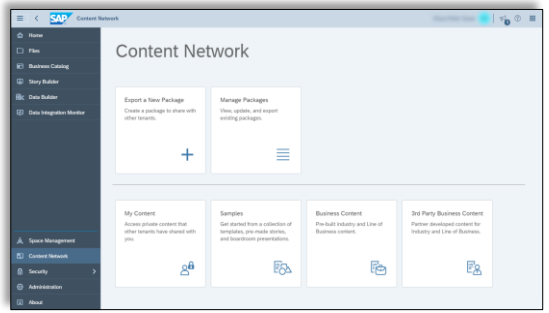
- Direct consumption of models in SAP Analytics Cloud, add-in for Microsoft Office (live connection)
- Use Microsoft Office 365 online or desktop version
- Add-in available via Microsoft Store

3rd Party API

3rd Party API for consumption

- Freedom of choice
- Use consumption interface to connect any 3rd-party front end tool to your exposed views
- Make your data models accessible for consumption tools & applications

Business Content



Business accelerators

- Content packages ready to use and accelerate your project
- Packages SAP and partners for various LOB and industry scenarios
- Separate packages for data models and visualizations

* According to the SAP Data Warehouse Cloud Roadmap

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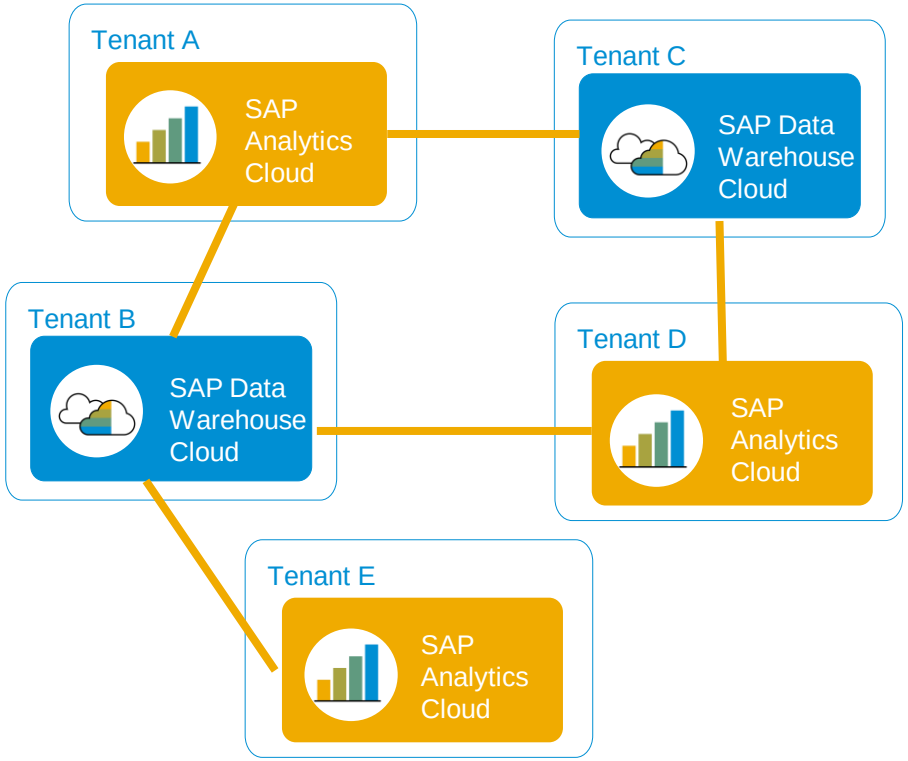
Use. SAP Analytics Cloud & SAP Data Warehouse Cloud

- Regardless of the tenant any SAP Data Warehouse Cloud can be connected across tenants to any SAP Analytics Cloud
- SAP Data Warehouse Cloud systems are connected via Live Connector
- The live connectivity needs to be set up manually
- SAP Data Warehouse Cloud remote connections can also be set up for SAP Analytics Cloud NEO tenants
- SAP Analytics Cloud and SAP Data Warehouse Cloud can run in different release cycles



SAP Note: 2832606 - Limitations with Live Connections

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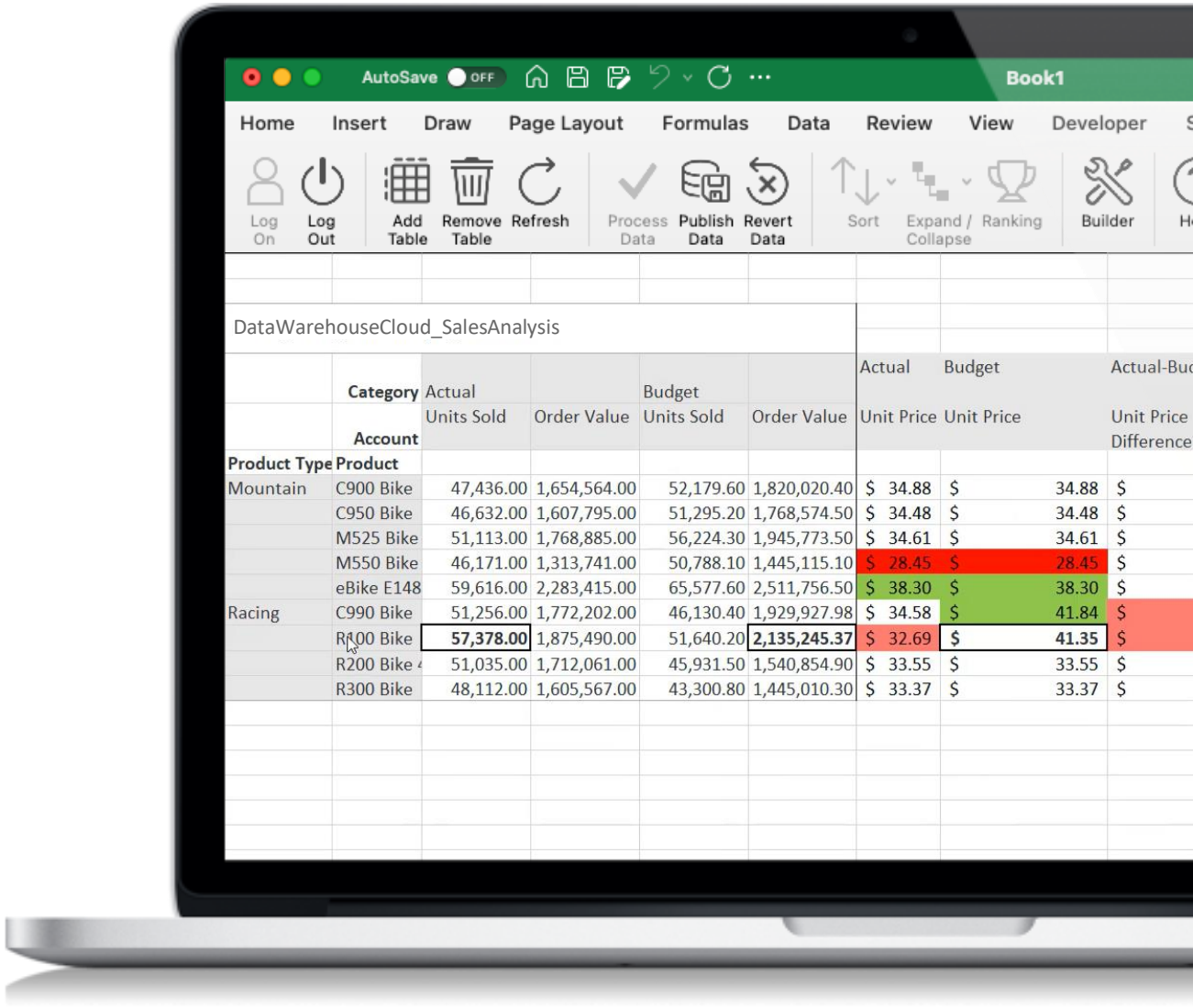
Use. SAP Analytics Cloud, add-in for Microsoft Office

- Live connection support for SAP Data Warehouse Cloud via the SAP Analytics Cloud, add-in for Microsoft Office
- Ability to connect live to source data sets in SAP Data Warehouse Cloud and create Excel reports.
- Use Microsoft Office 365 online or desktop version
- Add-in available via Microsoft Store

- Find more information
  - SAP Community for the SAP Analytics Cloud, add-in for Microsoft Office
  - Learn how to use it: A perfect couple: SAP Data Warehouse Cloud & SAP Analytics Cloud, add-in for MS Office



	Category	Actual		Budget		Actual	Budget	Actual-Bud
	Account	Units Sold	Order Value	Units Sold	Order Value	Unit Price	Unit Price	Unit Price Difference
Product Type	Product							
Mountain	C900 Bike	47,436.00	1,654,564.00	52,179.60	1,820,020.40	$ 34.88	$ 34.88	$
	C950 Bike	46,632.00	1,607,795.00	51,295.20	1,768,574.50	$ 34.48	$ 34.48	$
	M525 Bike	51,113.00	1,768,885.00	56,224.30	1,945,773.50	$ 34.61	$ 34.61	$
	M550 Bike	46,171.00	1,313,741.00	50,788.10	1,445,115.10	$ 28.45	$ 28.45	$
	eBike E148	59,616.00	2,283,415.00	65,577.60	2,511,756.50	$ 38.30	$ 38.30	$
Racing	C990 Bike	51,256.00	1,772,202.00	46,130.40	1,929,927.98	$ 34.58	$ 41.84	$
	R100 Bike	57,378.00	1,875,490.00	51,640.20	2,135,245.37	$ 32.69	$ 41.35	$
	R200 Bike	51,035.00	1,712,061.00	45,931.50	1,540,854.90	$ 33.55	$ 33.55	$
	R300 Bike	48,112.00	1,605,567.00	43,300.80	1,445,010.30	$ 33.37	$ 33.37	$

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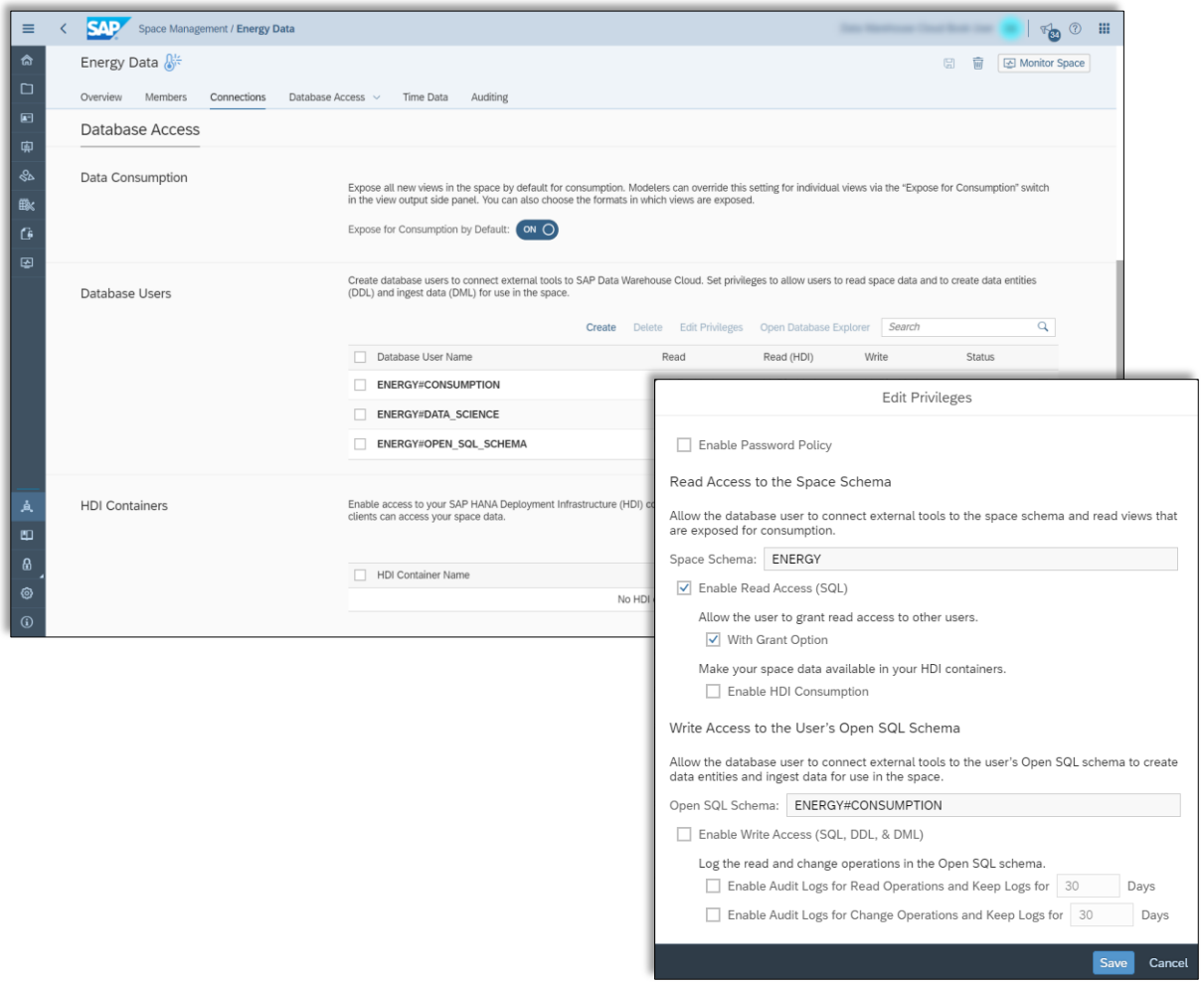
Use. 3rd Party Data Consumption API

- Enabling read access for external consumption tools or applications via a database user with read privileges
- Consume exposed data models from your space
- Provide SQL endpoint to dedicated space schema
- Connect with 3rd party SQL client



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Use. Business Content

SAP Business Content

- Enterprise Analytics for Procurement — SAP Ariba
- Spend Analytics — SAP Ariba
- Responsive Supply Network, Sales and Inventory — Automotive
- Revenue Growth Management — Consumer Products
- Finance for — SAP S/4HANA Cloud
- Financial Analytics Dashboard for SAP Analytics Cloud — SAP S/4HANA
- POS Analytics — Retail
- Life Science Dashboard — SAP SCM
- Statistical Process Control — SPC
- Customer Value Management — Telecommunication
- Meter to Cash — Utilities
- Outcome-based business Insights* — OBBI* — New
- Sample Content — Finance, HR, Sales — New

Partner Business Content

- Marketing Analytics — Adverity
- Customer Service Insights — Bitech
- E-Commerce - Cross Marketplace Insights — datazeit
- Procurement Cockpit — CubeServ
- Sales Dashboard — IBSolution
- Optimizing Order Fulfillment with ML — Inspired Intellect
- Analytics for Effective Inventory Optimization — ISR — New
- SuccessFactors / Attendance Tracker — KPC
- Product Cost Simulation — mib:NDC — New
- Sales Insights (SAP BW & Salesforce) — PWC
- MOSAIC – Margin-Optimized Sales Intelligence — Reply
- Lyra Integrated Capacity Planning (EAM & HCM) — Rizing
- Financial Reporting for SAP Business One — s-peers
- EWM Insights — Westernacher

More information about the Business Content the SAP Data Warehouse Cloud Community.
Partner Content also listed on SAP Store.

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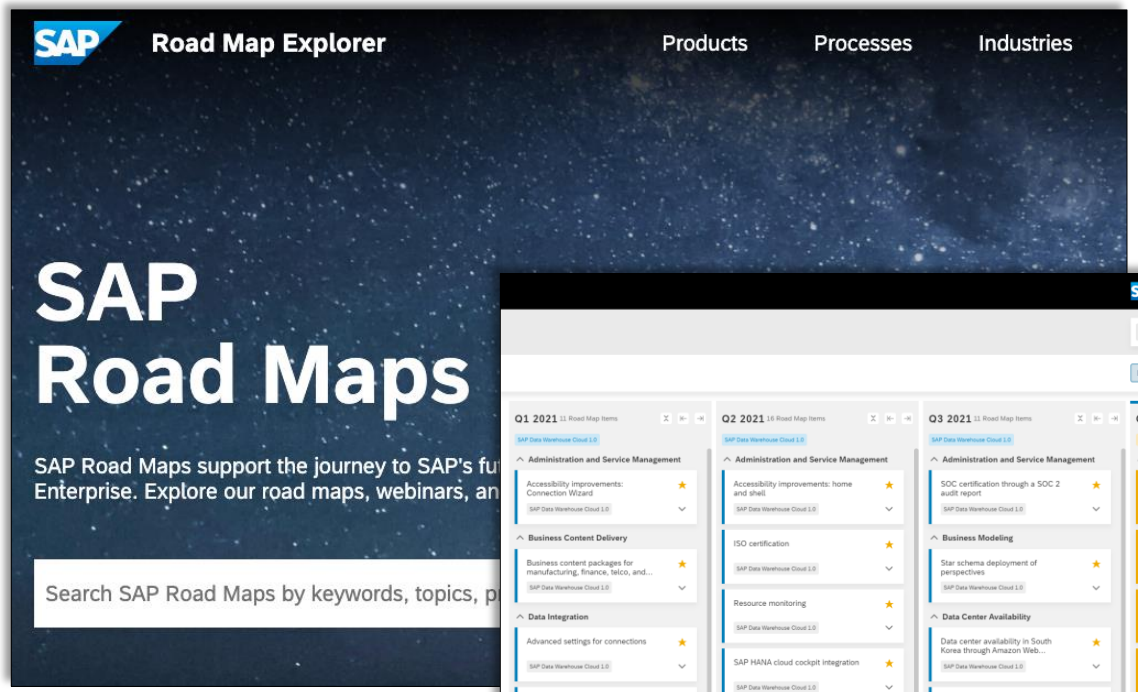
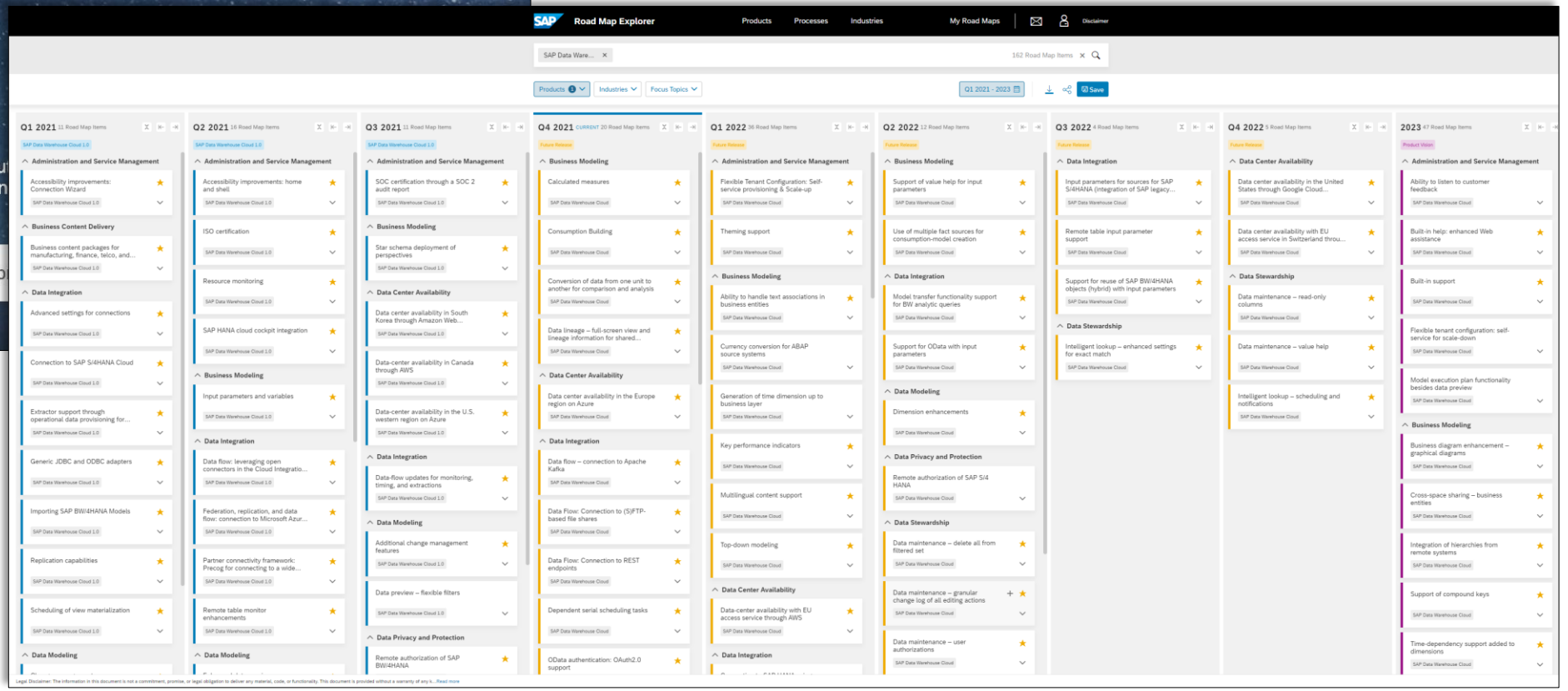
* The content is based on the upcoming The SAP® Outcome-Based Business Insights (OBBI) application, which is targeted for Q4 2021.

SAP Data Warehouse Cloud. SAP Road Map Explorer





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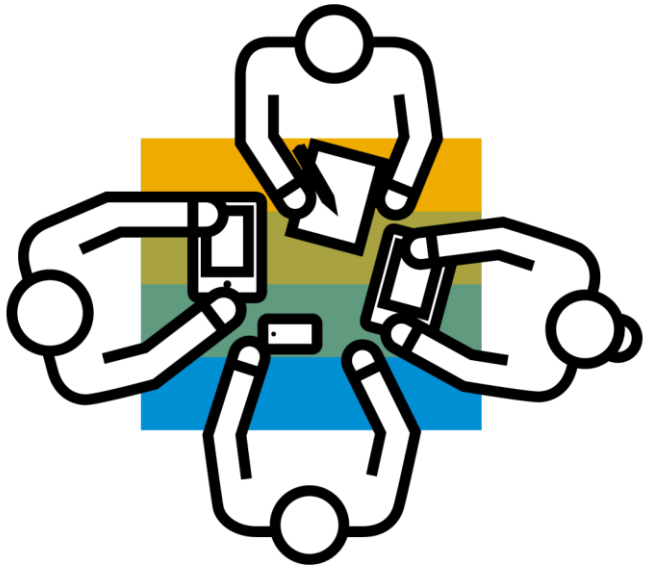

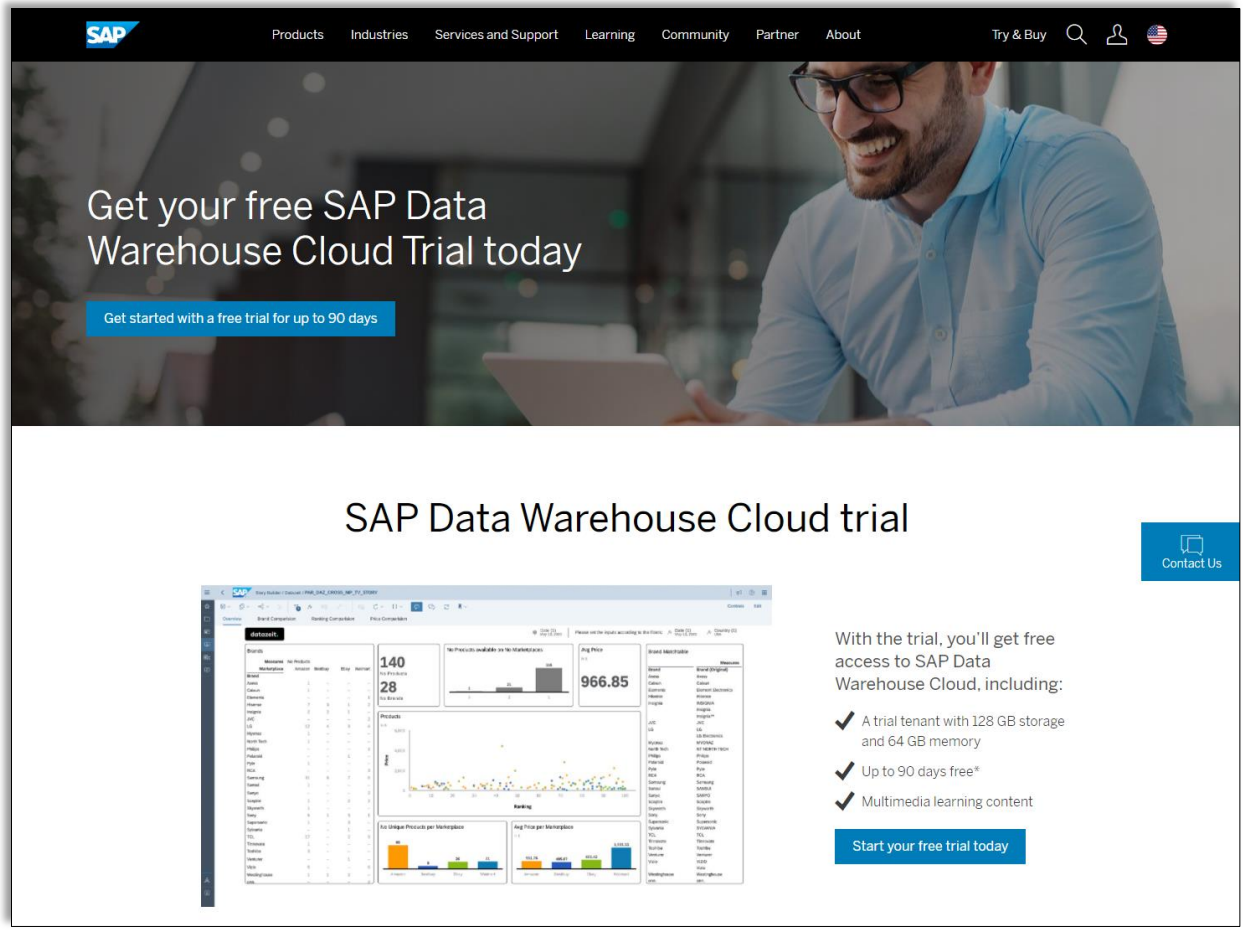

https://www.sap.com/products/data-warehouse-cloud/trial.html

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SAP Note on Trial restrictions 3007887

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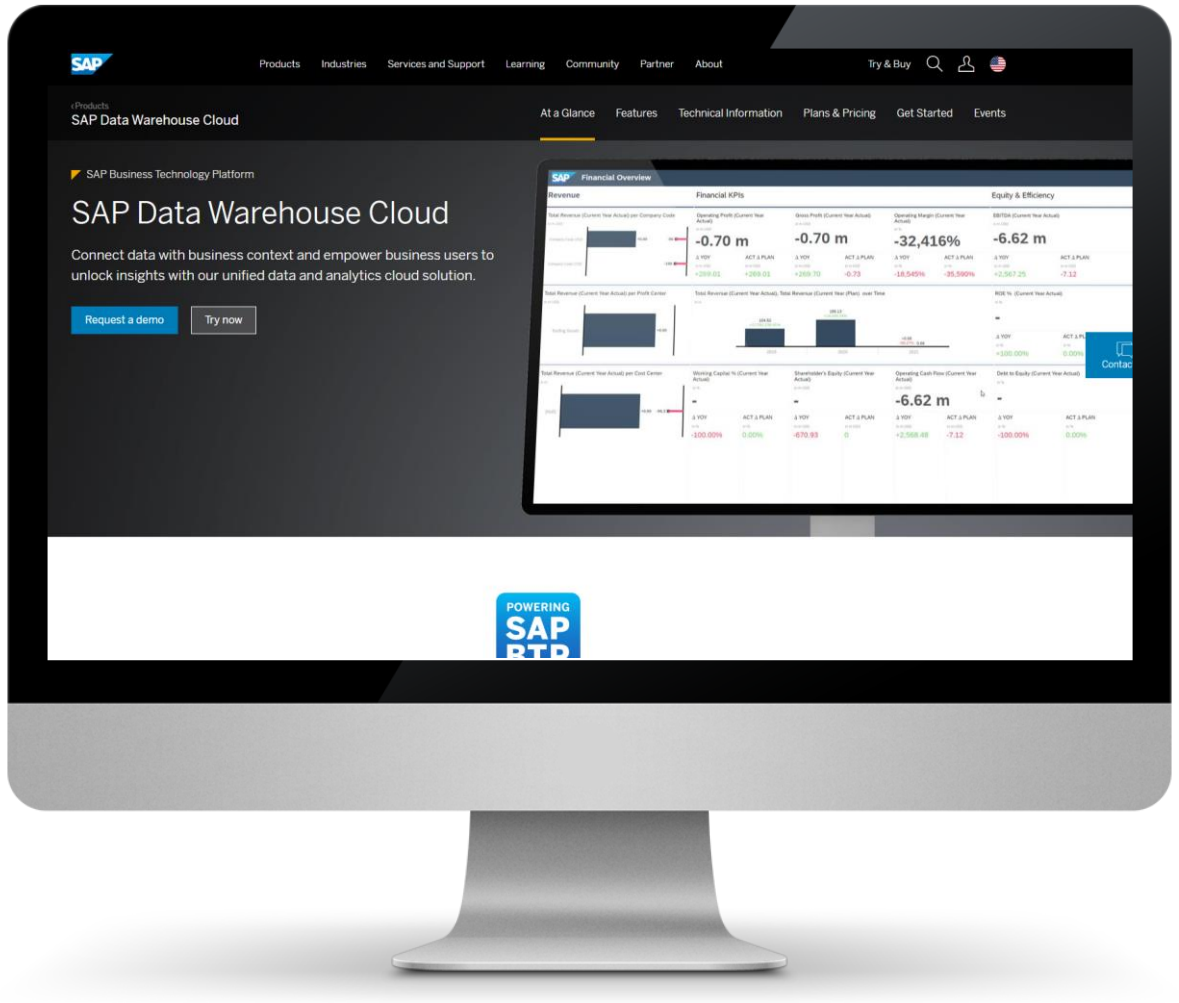

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* Pearson VUE, Study Reveals Value of IT Certification in Challenging Times, 2021.

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Thank you.

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