



AVEVAWORLD
PARIS

AVEVAWORLD

OCTOBER 2024

Lighthouse Project

For a Data Analytics Platform at F. Hoffmann-La Roche

Jointly presented by ROCHE - CAPGEMINI - AVEVA



AVEVA



CEO,
Thomas Schinecker

“

Roche focuses on innovation for people's health around the world. With Pharmaceuticals and Diagnostics under one roof, we are uniquely positioned to improve care along the patient journey.

”

Roche at a glance

Who we are and what we do

127 years
founded in Basel in 1896



**3 Nobel prizes and 44
Prix Galien, since 1974**



CHF 58.7 billion* in
Roche Group sales in
2023



**A leader in
healthcare R&D**
with CHF13.2 billion
invested in 2023



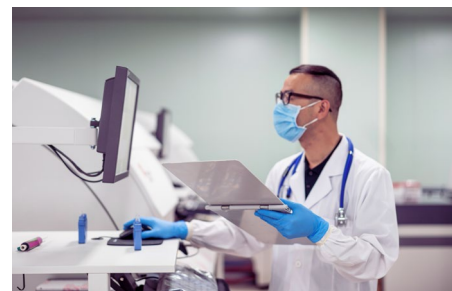
>22 million people
treated with our
medicines in 2023



**Multiple Roche
medicines & diagnostics**
on the WHO List of
Essential Medicines &
Tests



103,000+ dedicated
employees worldwide



29 billion tests
conducted with our
Diagnostics products in
2023

*Unless otherwise stated, all growth rates and comparisons to the previous year are at constant exchange rates (CER; average rates 2022) and all total figures quoted are reported in CHF.



F. Hoffmann-La Roche requires a reliable cloud-based data platform

Pharma & Life Sciences | Switzerland - Global

Challenges

- **Availability** of relevant data for business analysts of ROCHE
- Terabytes in the PI System become petabytes in a commercial datalake
- **Complex server landscape** to aggregate data at global scale
- **High skill set** and expertise **required** to work with data
- Demonstration of project results in **less than 3 months** (target milestone: Hannover Messe)

Solution

- Leverage CONNECT Data Services (aka AVEVA Data Hub) as **industrial** data enablement infrastructure
- Leverage **AVEVA Advanced Analytics** for rapid implementation of **self-service data analytics**
- **Partnership approach:** Client – Vendor – Integrators

Results

- End-to-End data availability
- Major reduction of data consumption cost (petabytes become terabytes again 😊)
- Potential reduction by approx. up to 70 servers within the entire system landscape
- accelerated time-to-market for industrial data-products

“

We didn't expect to have tangible results within such a short time frame. CONNECT data services supported by a strong partner (Capgemini) accelerates the time-to-value of a cloud-based data infrastructure significantly.

Heiko Trefzger, ROCHE, Product Manager – Data & Insights

”

[Learn more](#)

AVEVA

Business success objectives



Collaborative efficiency

Sharing contextualized data product for further analysis or optimization can eliminate redundant efforts and promote collaborative efficiency resulting in substantial savings. **This includes data engineering and data platform cost.**



Scalability

Adopting this data-driven approach prepares the manufacturing setup for future expansions and innovations. The goal is to achieve a reduction in integration costs for other production sites.



Validation

ROCHE will evaluate how AVEVA Data Hub can be embedded into their FDA-validated data infrastructure and provide validation requirements to be fulfilled by AVEVA as well as feedback on those requirements.



Architecture

Create a blueprint architecture to consolidate and harmonize the overall data architecture.



Use cases during the Lighthouse project

Use Case 1 - Data Mesh – Collaboration enablement

1. **Centralizing** manufacturing data from different distributed PI Systems in a global cloud-hosted repository
2. **Sharing** data from Operations to various tools and applications for data analytics and reporting
 - Snowflake (Enterprise Data Hub)
 - Data analytics (Dataiku, Seeq, **AVEVA Advanced Analytics**)

Use Case 2 - Digital maintenance using AVEVA Advanced Analytics

- Centrifuge condition monitoring

Optional use cases

- Net-Production-Time KPIs
- Energy Monitoring

Success criteria



Rapid Data
Integration from On-
Premise to Cloud

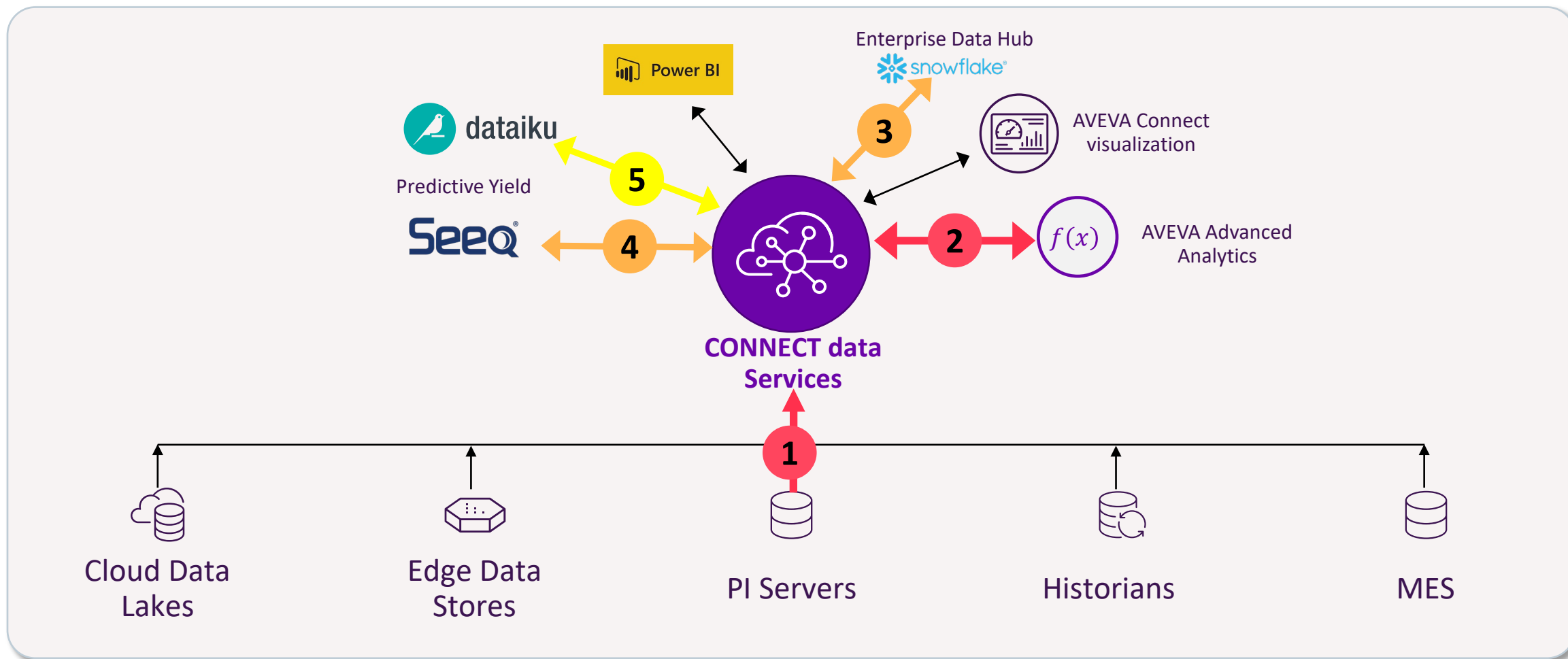
Establish Data Mesh
– integrate with
existing applications

Digital Maintenance
– Experience Self-
Service Data
Analytics as an after-
work experience

Improve availability
of manufacturing
data and its ease-of-
use

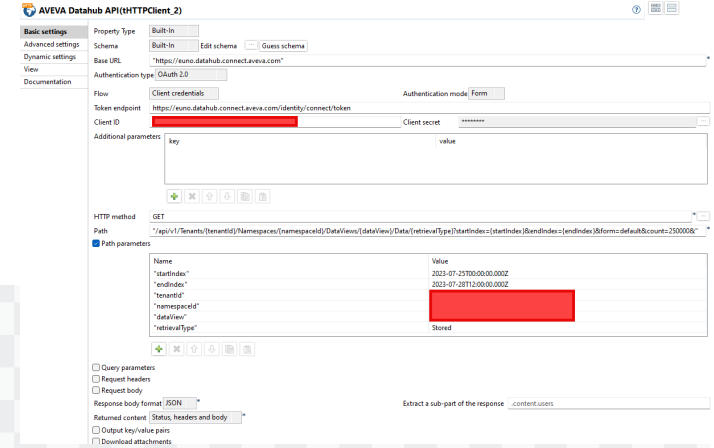
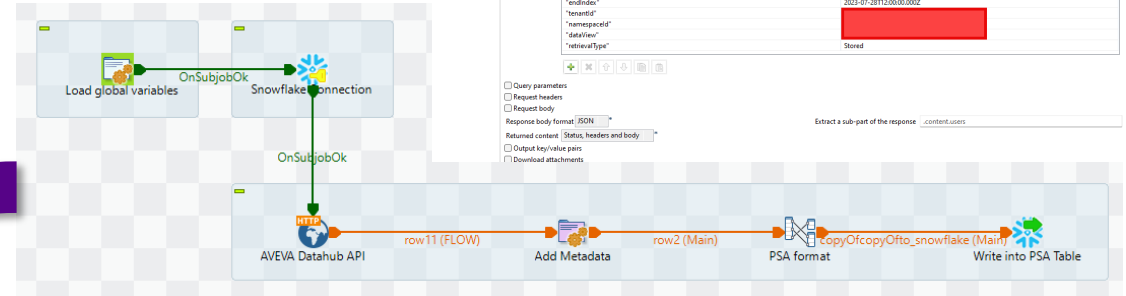
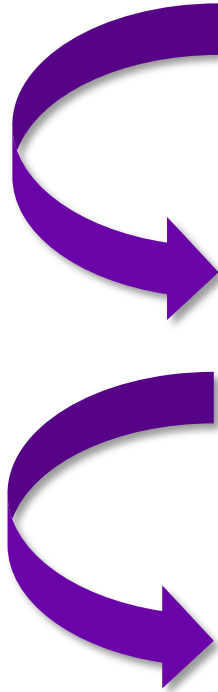
Achieve rapid
deployment and
scale-up to
production

Use case 1 – Data mesh



Integration with snowflake®

- Snowflake being used as central IT Data Warehouse at ROCHE
- Data Analytics tools using Snowflake as common data source
- Combination of OT and IT data
- ROCHE's original approach:
 - PI SQL Client ⇒ Talend Data Pipeline ⇒ Snowflake
- Lighthouse approach:
 - PI ⇒ CONNECT data views ⇒ Talend Data Pipeline ⇒ Snowflake
- Future:
 - PI ⇒ CONNECT ⇒ Snowflake virtual table – no more data replication



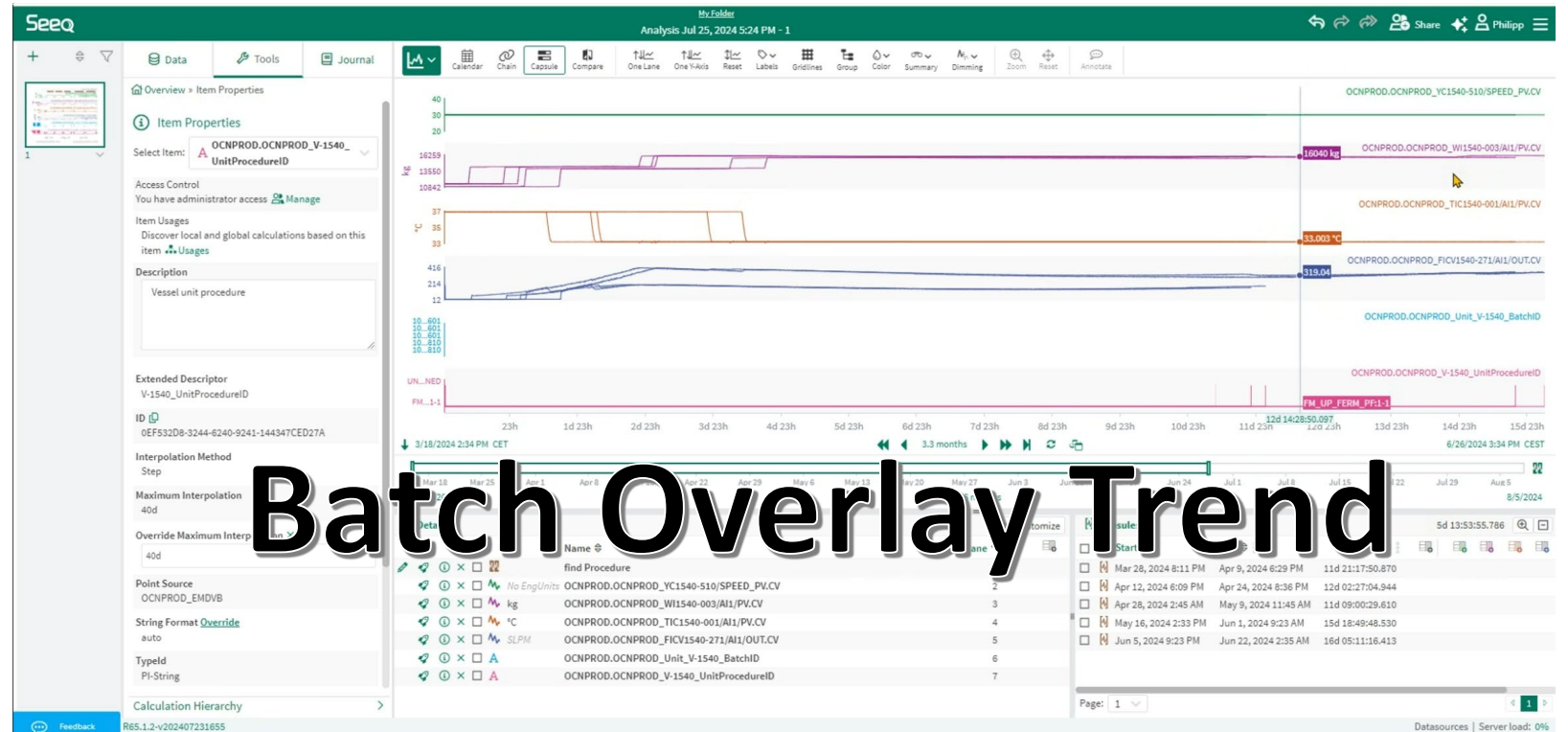
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Integration with Seeq®

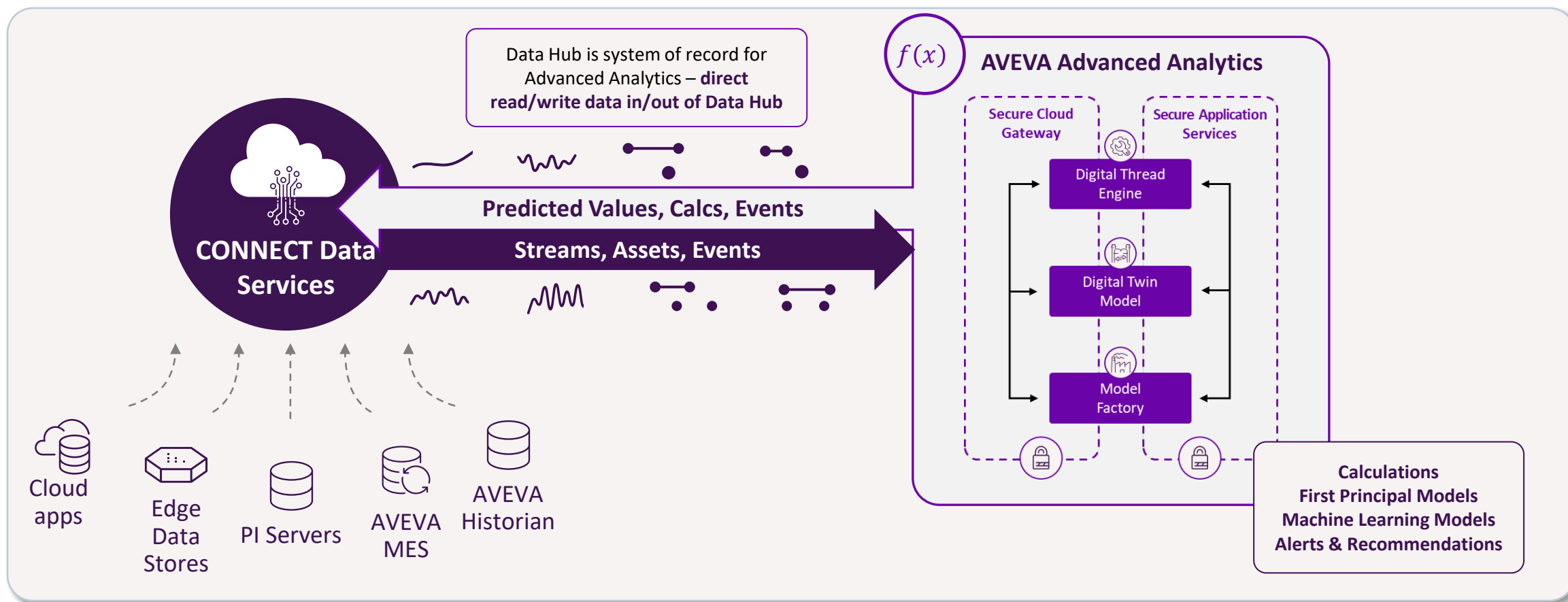
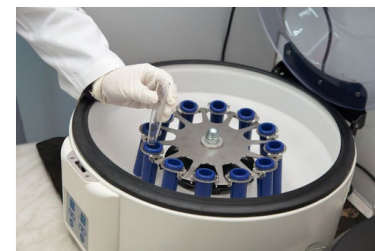
Bioreactor V-1540 Production Analysis

- Seeq is used at ROCHE to analyze data from PI System
- Upgrade to Seeq SaaS provides native CONNECT integration
- Visualization and data Analytics through cloud-native connection



Use case 2 - Digital maintenance

From calendar-based maintenance to predictive as an afterwork experience



Use case 2a – Condition-based centrifuge maintenance

Physical equipment:

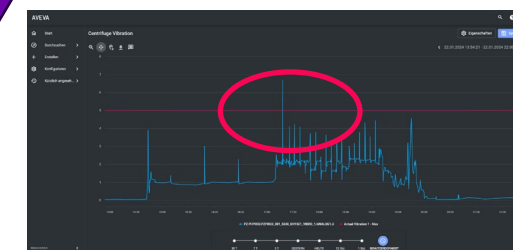
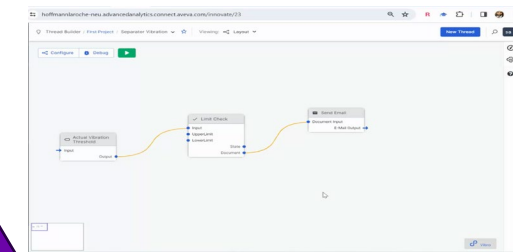
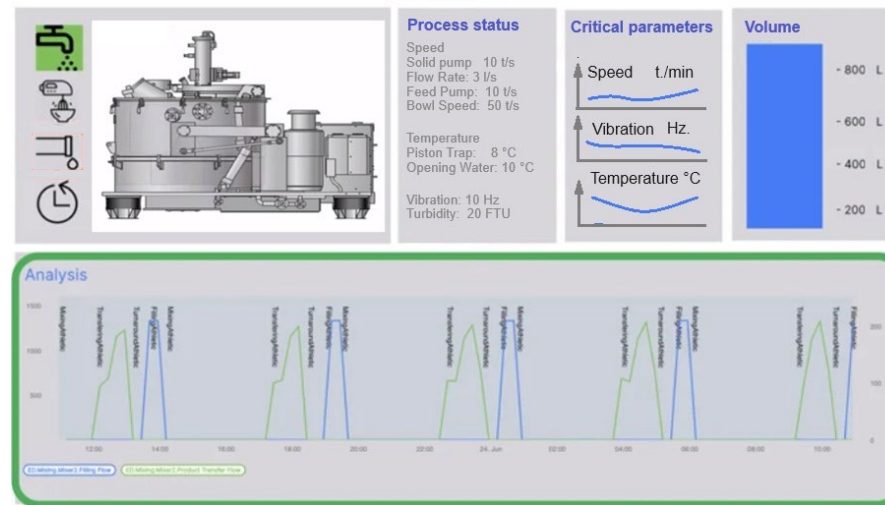
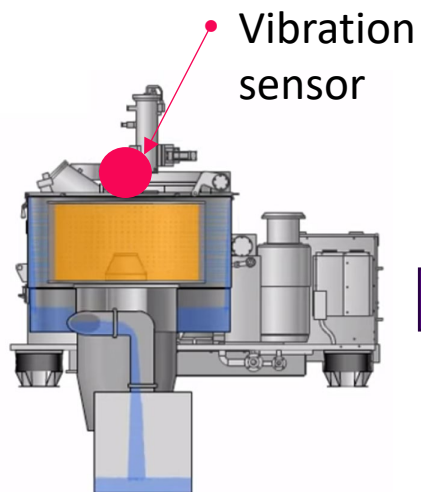
- Centrifuge CN-1610 after harvest in BioPharma Process

Problem statement:

- Condition-based maintenance shall replace calendar based punctual inspections
- Increase efficiency to detect and alert deteriorations before a breakdown that generates damage, delay and high cost

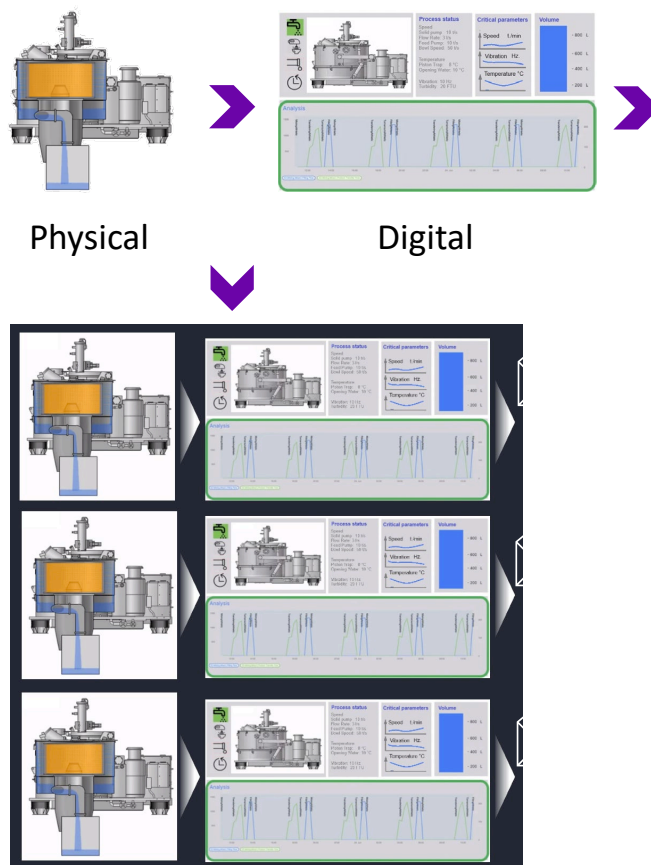
Advanced Analytics:

- Rapid development of model
- Monitor threshold on vibrations to trigger actions



Use Case 2b – Centrifuge process monitoring

Anomaly detection in centrifuge data



Physical

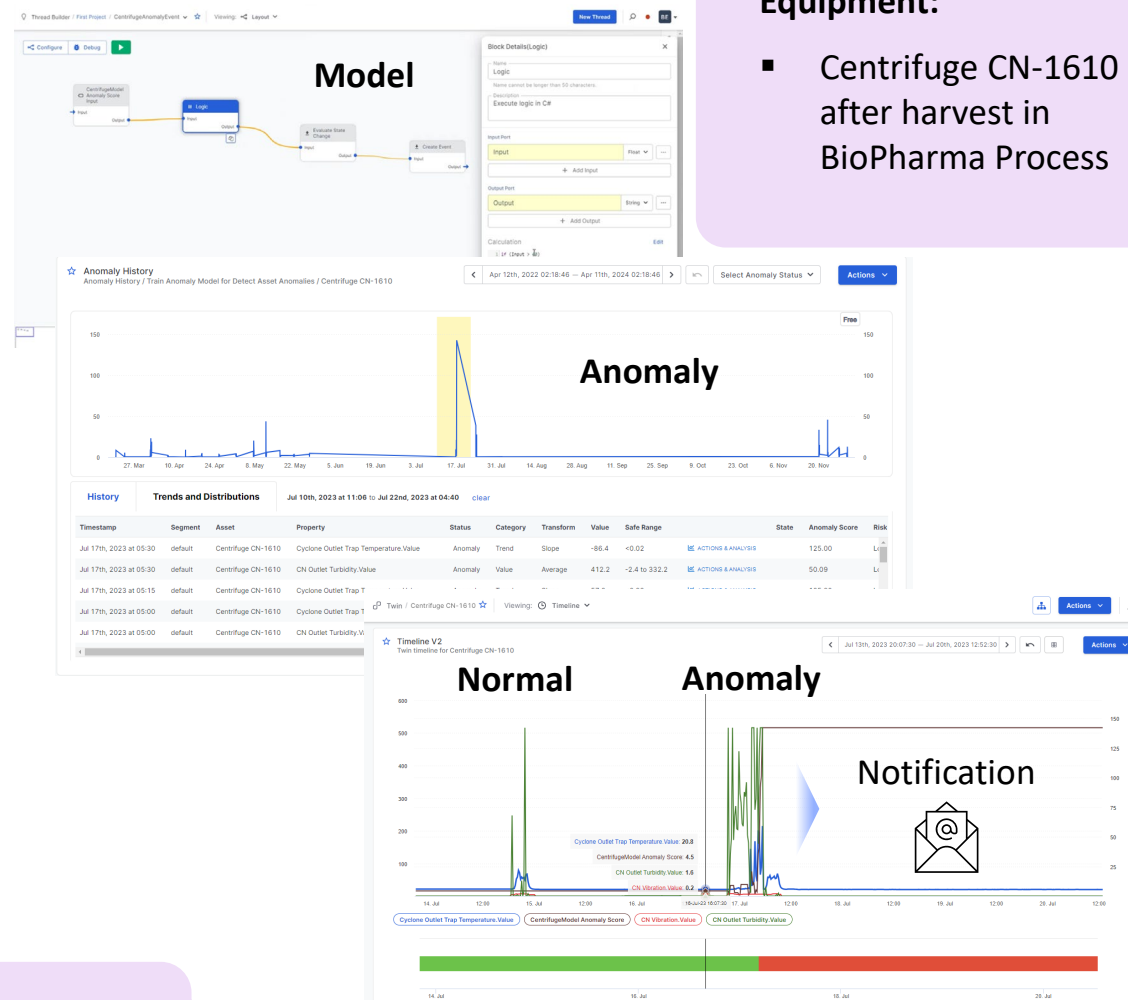
Digital

Anomaly detection with AVEVA Advanced Analytics

- Twin for digital representation of asset
- Anomaly detection model out of the box
- Multi variable observation
- Self-learning with history
- Notification

Benefits AVEVA

- Access to all tags from Connect Data Services
- No-code model out-of-the-box
- Days not weeks to solution



Equipment:

- Centrifuge CN-1610 after harvest in BioPharma Process

Scaling to fleet:

Create model once, train, tune, **replicate easily**

Use Case 3 - Net Production Time of a Bioreactor

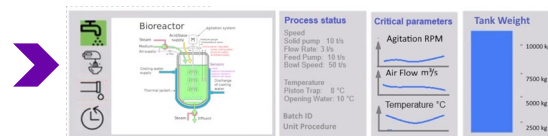
Using the Thread Engine to create production events in CONNECT

Equipment:

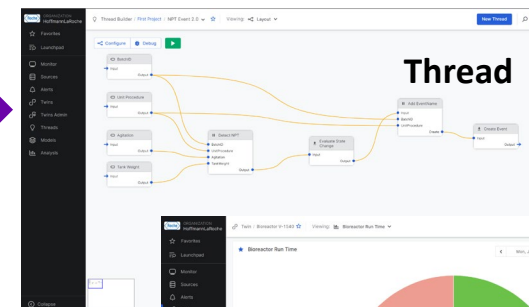
- Bioreactor V-1540 BioPharma Process



Physical

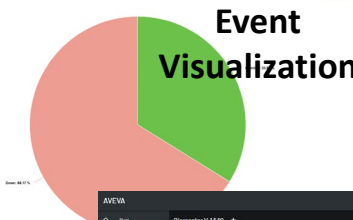


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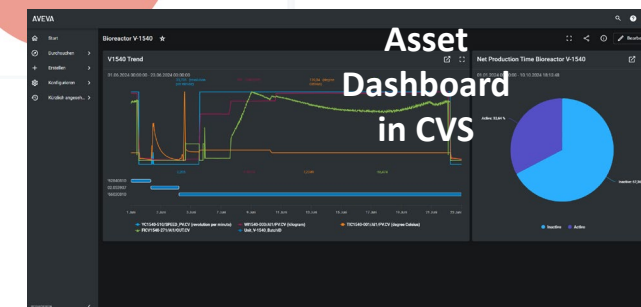


Scaling to fleet:

Create Thread once, train, tune, **replicate easily**



Notification



Net Production Time with AVEVA Advanced Analytics

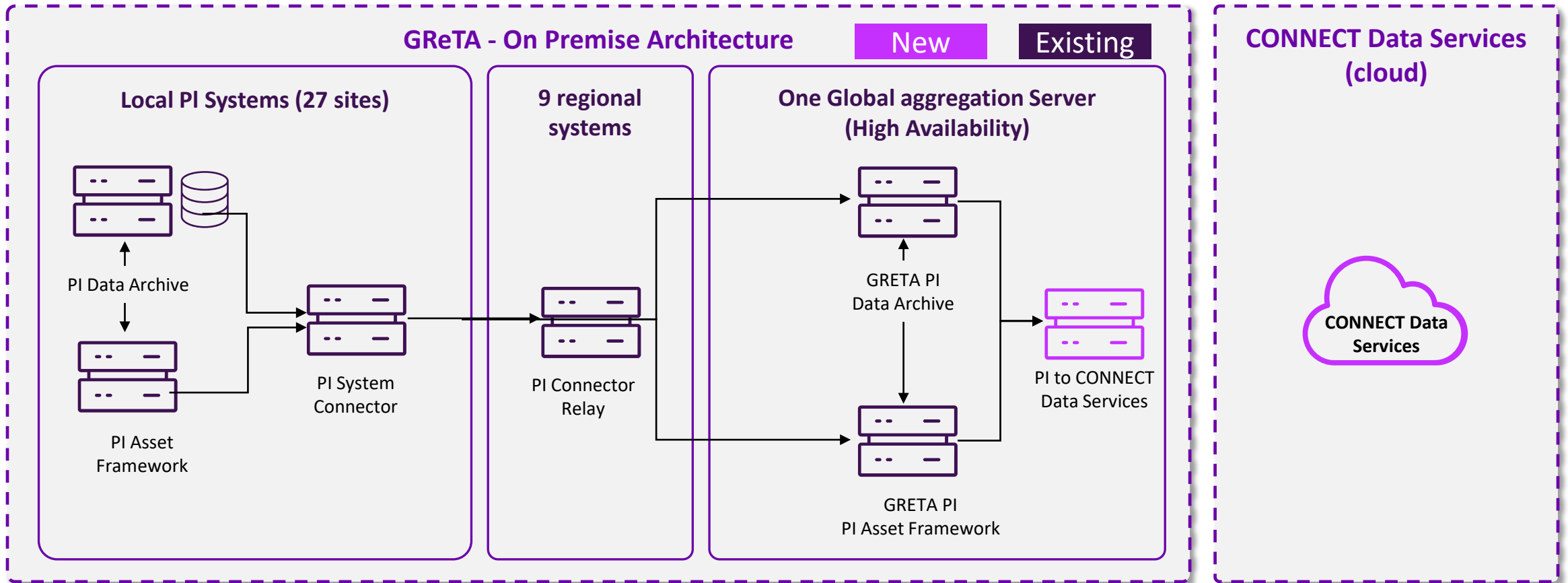
- Twin for digital representation of asset
- Easy configuration of threads (Node-Red Style)
- Multi variable observation
- Backfilling of Production Events
- Notification on Event
- Using the NPT as potential input to a Predictive Uptime Model

Benefits AVEVA

- Access to all tags from CONNECT data services
- Use Event Data Store
- Visualization of NPT Score using CONNECT visualization Services
- No-code model out-of-the-box

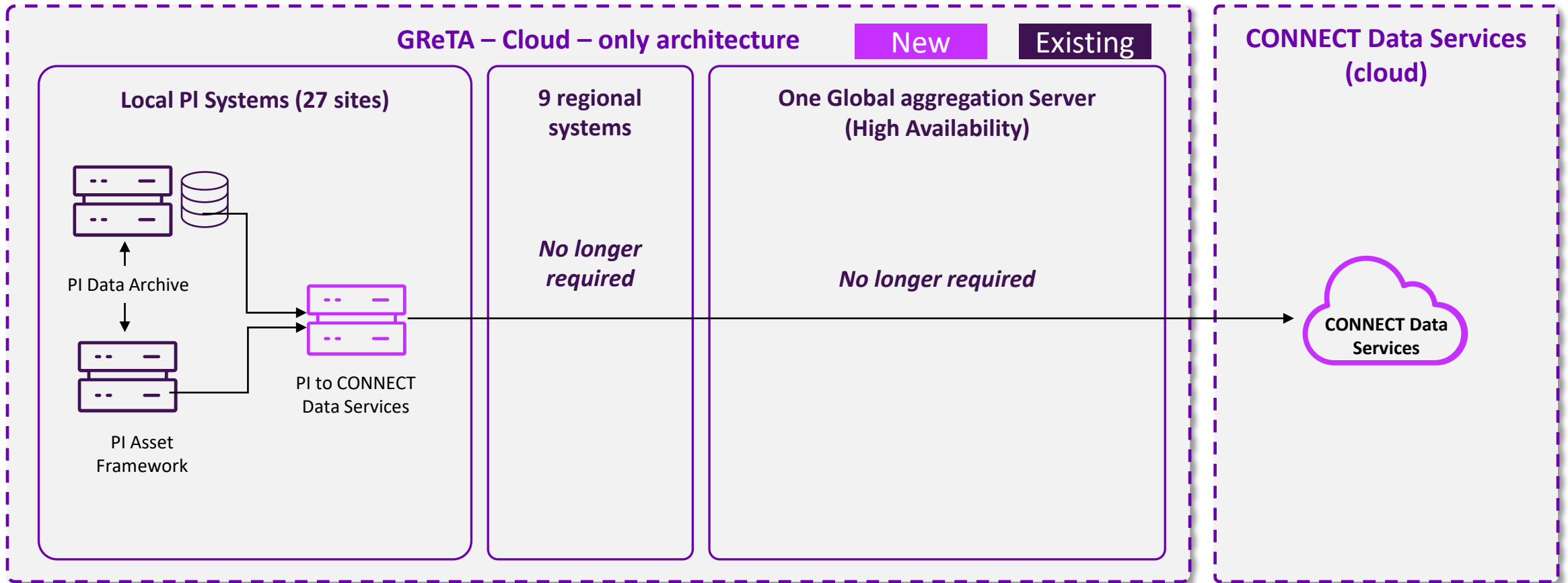
Solution to-be architecture (through central GReTA PI System)

Replacing potentially up to 70 associated Servers for a centralized Data Infrastructure



Solution to-be architecture

Cloud-only (Future consideration)



The CONNECT effect in practice

What have we achieved as partners in three months ?

Streamlined and accelerated the data-to-value for manufacturing

BEFORE

PETABYTES

- ❑ Various data silos/pipelines
- ❑ Heavy IT infrastructure
- ❑ Unstructured data lake
- ❑ Data scientist only analytics

AFTER

TERABYTES (major \$ reduction)

- ✓ Single source of truth/end to end
- ✓ Direct-to-cloud / SaaS approach
- ✓ Industrial contextualized data hub
- ✓ Accelerated scalable analytics

AVEVA CONNECT DATA SERVICES ENABLES ALL:



Low code **out-of-the box** analytics with AVEVA Advanced Analytics



Future **Dataiku** connectivity for Predictive Yield and other Machine Learning use cases



Connectivity to **Enterprise Data Lake Snowflake** and many more data consumers

“We didn’t expect to have tangible results within such a short time frame. CONNECT data services supported by a strong partner (Capgemini) accelerates the time-to-value of a cloud-based data infrastructure significantly.”

Heiko Trefzger, ROCHE, Product Manager – Data & Insights

Lessons learned

1

Data Engineering is fundamental at the very beginning:
Data selection, data quality, data governance, data contextualization



2

Think big, start small: Lighthouse Project architecture as blueprint for ROCHE Industry 4.0 Roadmap



3

Regular cadence calls to ensure collaboration efficiency



4

Life science as the key expertise of all project stakeholders



5

Involve the product consumers from business side internally at ROCHE



6

Crossfunctional stakeholders from manufacturing, IT, data science



7

Experience of **Build vs. Buy**



Acknowledgements

ROCHE

Bernd Sessler - Senior Automation Engineer, Global Engineering & Technologies, Global Business Process Owner Data Historian Solutions

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Sumanth Artham - Data Analytics Specialist



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Gopal Gopalkrishnan - Senior Director, Portfolio – Global Digital Manufacturing CoE

Philippe Loup – Senior OT and Data Engineer



Octavesoft

Phillipp Sutter - PI System SMEs



Actemium

Pascal Nass - PI System SMEs



AVEVA

Hans-Otto Weinhold - Principal Solutions Architect

Reinhold Ehrle - Industrial Software Solution Sales Expert

Fabio Dani - Software Developer Engineer

David Hoven - Business Value Consultant

Erik Prins – Customer Success Manager

Brandon Ekberg - Data Analytics Expert



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ABOUT AVEVA

AVEVA is a world leader in industrial software, providing engineering and operational solutions across multiple industries, including oil and gas, chemical, pharmaceutical, power and utilities, marine, renewables, and food and beverage. Our agnostic and open architecture helps organizations design, build, operate, maintain and optimize the complete lifecycle of complex industrial assets, from production plants and offshore platforms to manufactured consumer goods.

Over 20,000 enterprises in over 100 countries rely on AVEVA to help them deliver life's essentials: safe and reliable energy, food, medicines, infrastructure and more. By connecting people with trusted information and AI-enriched insights, AVEVA enables teams to engineer efficiently and optimize operations, driving growth and sustainability.

Named as one of the world's most innovative companies, AVEVA supports customers with open solutions and the expertise of more than 6,400 employees, 5,000 partners and 5,700 certified developers. The company is headquartered in Cambridge, UK.

Learn more at www.aveva.com

Project results in <3 months

Reduce data consumption cost significantly

“

We didn't expect to have tangible results within such a short time frame.

CONNECT data services supported by strong partner Capgemini

accelerates the time-to-value of a cloud-based data infrastructure significantly.

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Product Manager – Data & Insights

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Roche