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Digital Transformation

Unlocking the power of data

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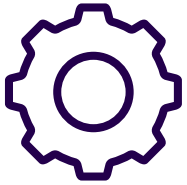
Employees: Approx. 800

Key activities: Biomanufacturing of therapeutic proteins (enzymes & monoclonal antibodies)

Capacity:
- 12,000 L perfusion cell culture capacity
- 80,000 L fed-batch cell culture capacity
- 1600 m^2 QC laboratories
- 930 m^2 MSAT laboratories

Digital Transformation – Factory of the Future



Challenge

Building a state-of-the-art biotechnological production facility with real-time monitoring and analytics capabilities.

Solution

Deployed the latest AVEVA PI System technology including PI AF/EF and PI Vision as an advanced foundation for Process Monitoring, Condition Based Maintenance & Advanced Analytics

Benefits

Increased production and operational efficiency, reduced costs, mobile inspections, exception-based surveillance, significantly accelerated ‘Time to Value’ for Advanced Analytics & Machine Learning projects

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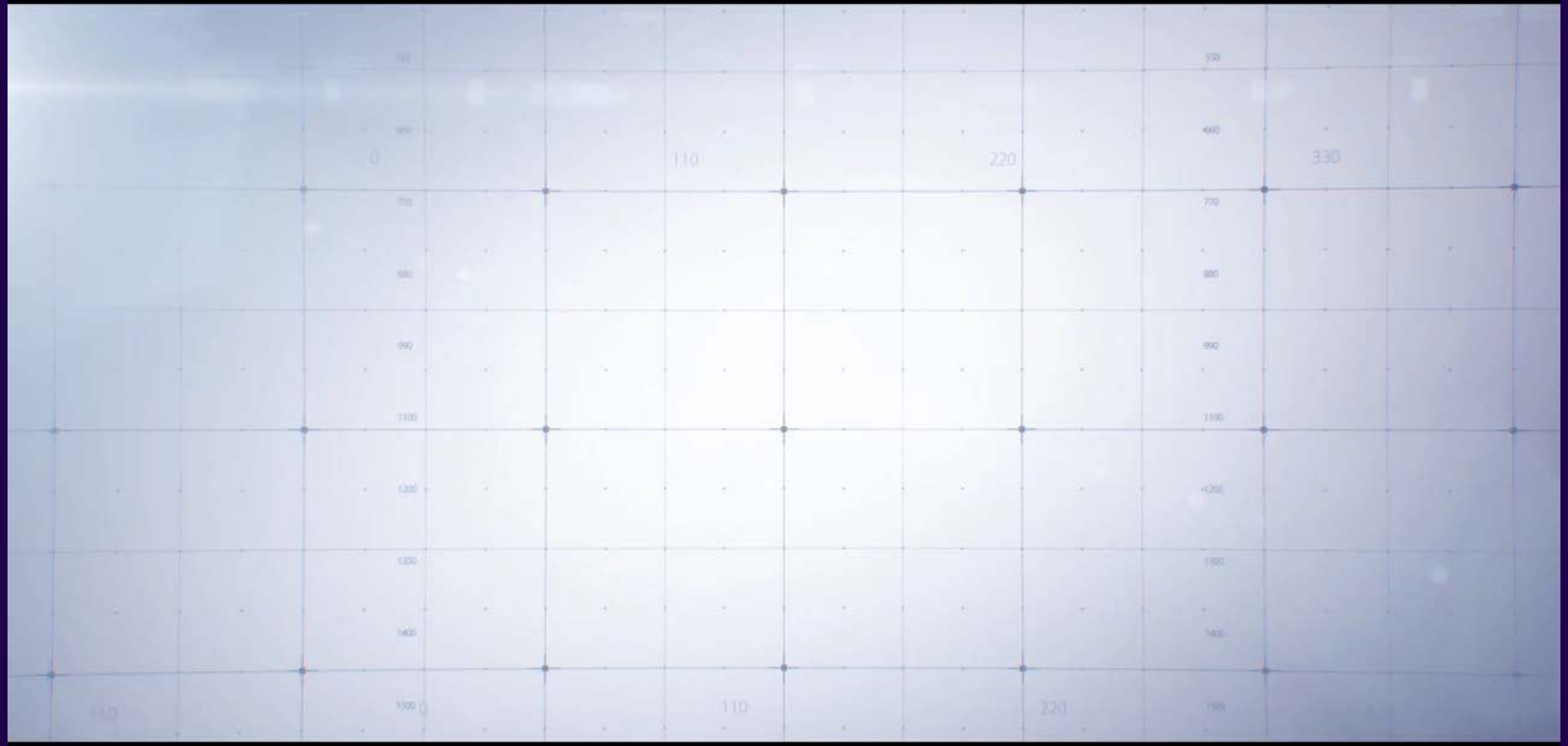
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Building Blocks

1 **Building the framework**
BUILDING THE AF/EF FRAMEWORK

2 **Run-to-Run analysis**
PROVIDING THE DATA TO THE SHOPFLOOR

3 **Raman Technology**
PROCESS ANALYTICAL TECHNOLOGY

4 **AA & ML**
MOVING TO THE CLOUD

5 **Sustainability**
GO GREEN

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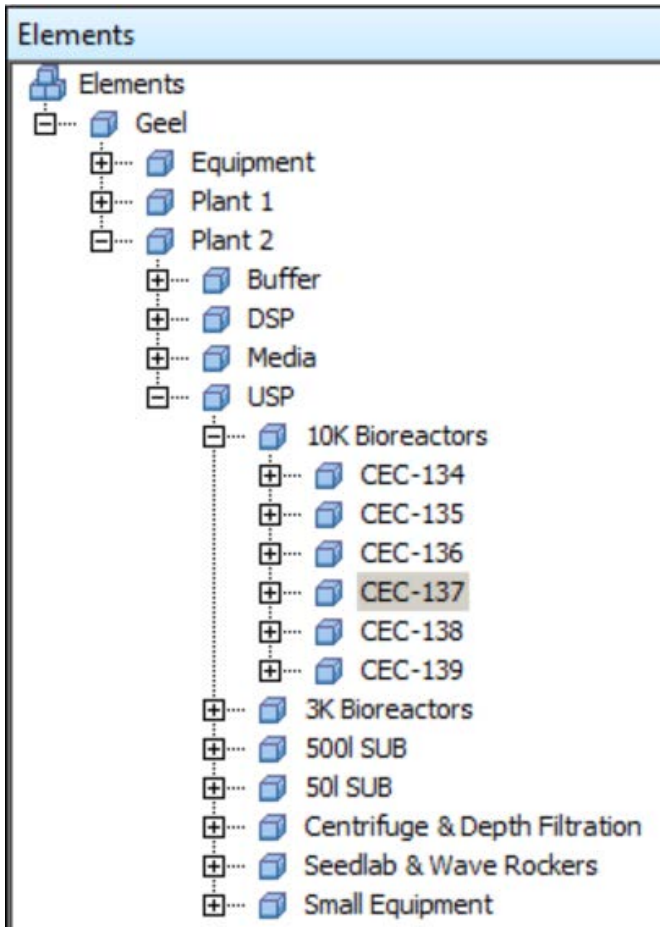
1. Building the framework



An Asset Framework was built to map the site and its processes

The following is in a validated state:

240 templates
10864 elements
79 GxP PI Vision displays
76 tables
1607 analyses based on 617 analysis templates (170 EF analysis templates & 447 expression analysis templates)
45 Event Frame Templates
3 enumeration sets
15 custom UOMs
884 formula attribute templates
1379 table lookup attribute templates

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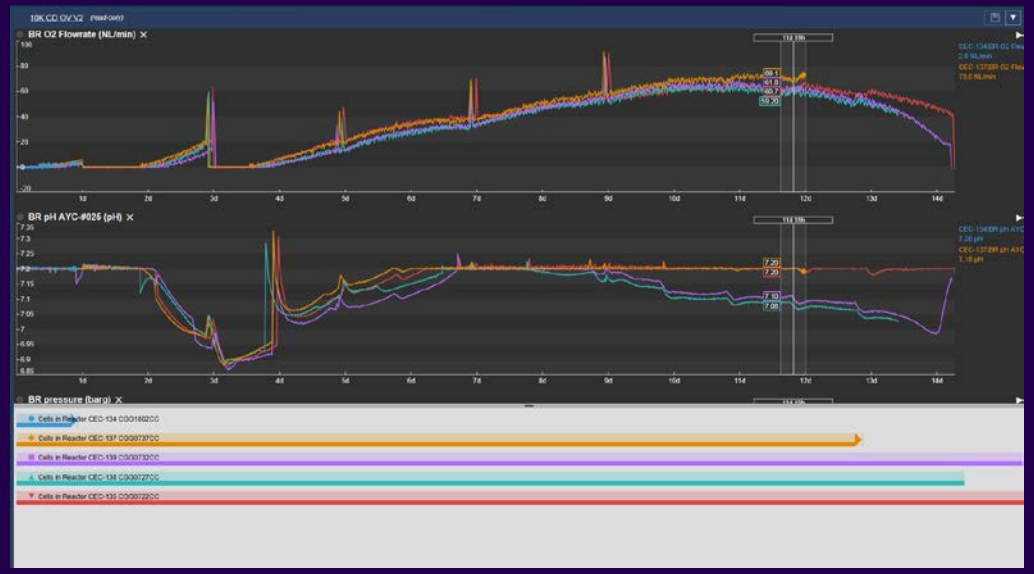
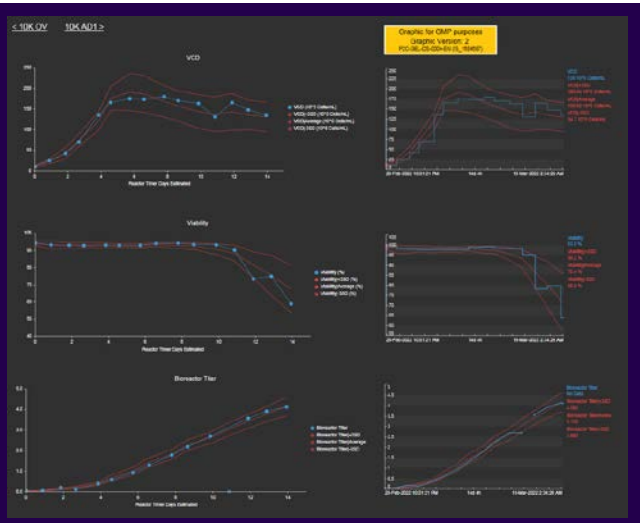
2. Run-to-Run Analysis

Replacing cumbersome manual data gathering and analysis

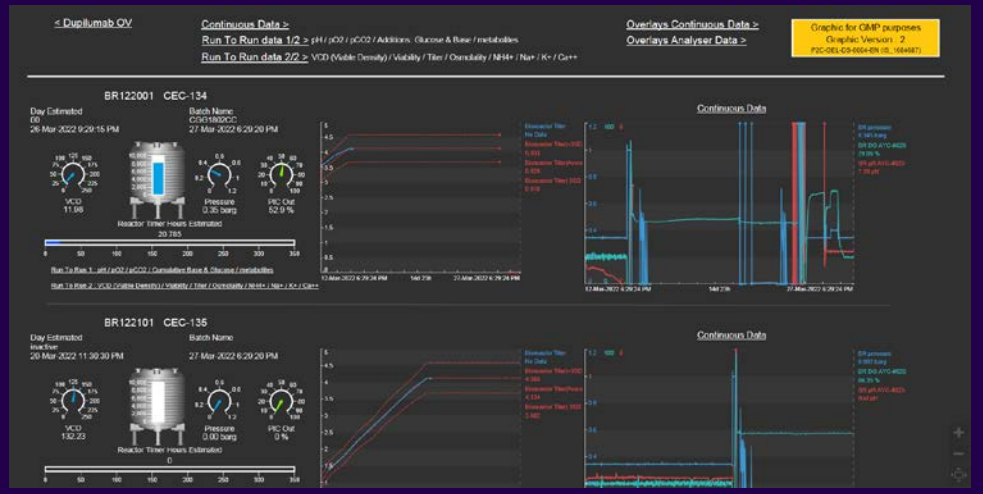


1 Data overlays to check consistency

2 Check if parameters are within acceptable limits

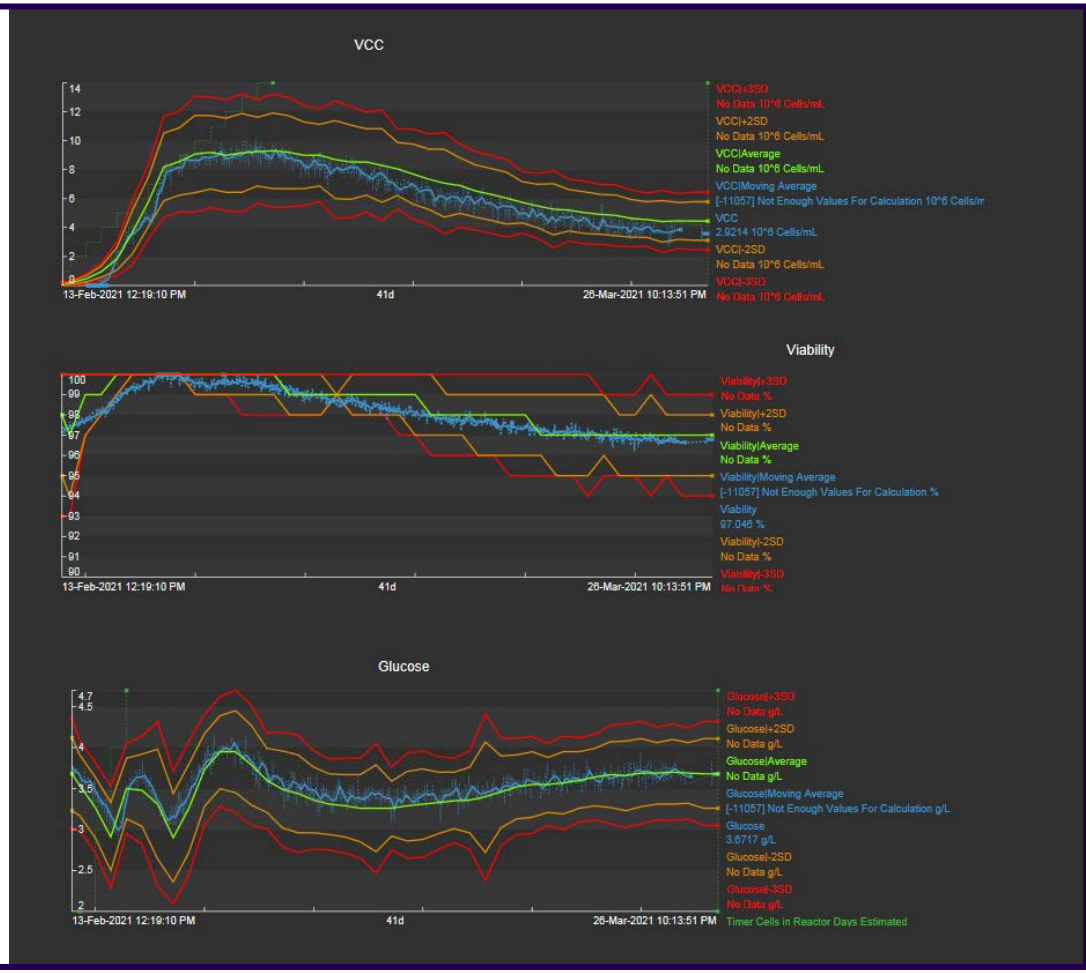


3 Overview screens

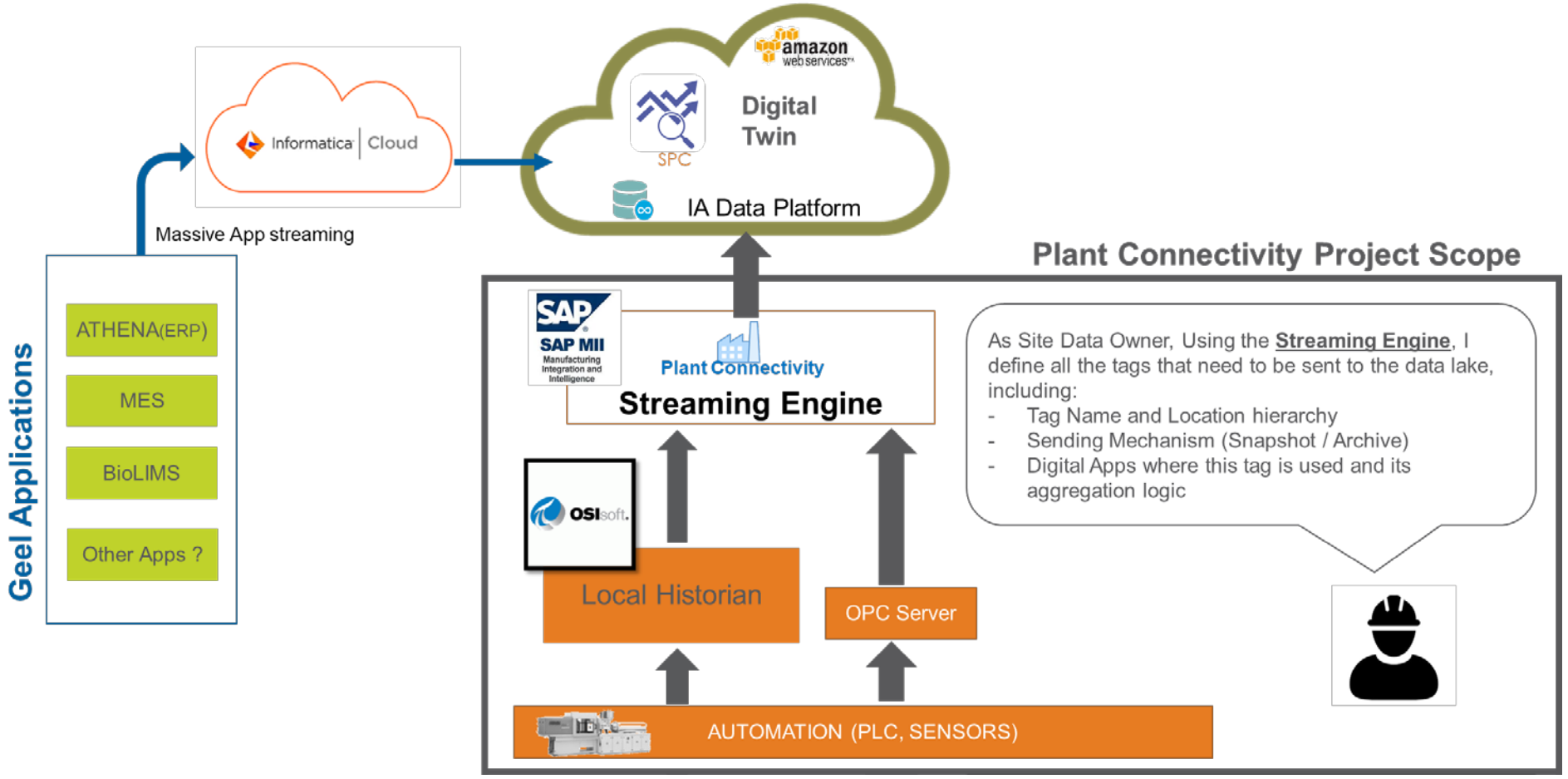


3. Raman Technology

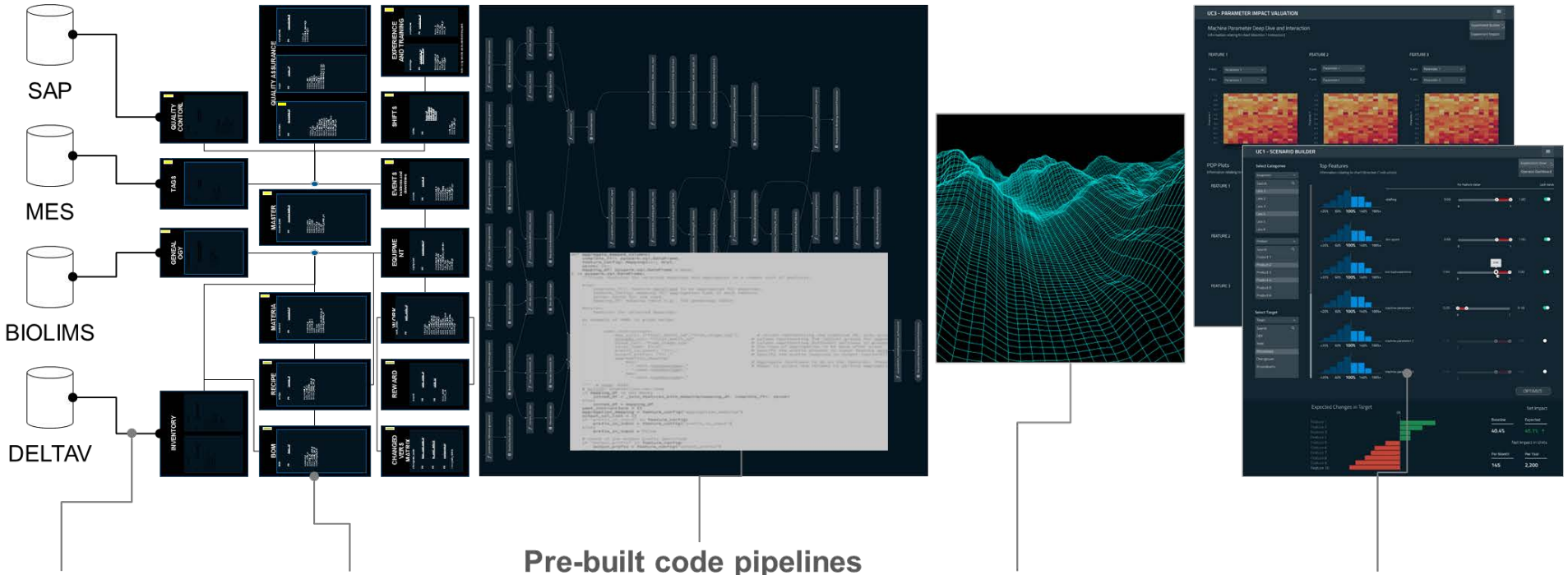
- Use of **Raman technology** (spectroscopic technique typically used to determine vibrational modes of molecules)
- Enable the elimination of offline sampling and analysis @bioreactors.
- Significantly reducing our day-to-day offline sampling & associated cost and product loss
- Direct Link with SynTQ software and PI AF.



4. Moving to the Cloud



5. Advanced Analytcs & Machine Learning



Standard connectors to source systems

Unified data model connecting all datasets into common structure

Pre-built code pipelines applied to create in silico batch model for Biologics drug substance

In silico model of the full production process

Counterfactual („what-if“) analyses optimizing production and suggesting next best action

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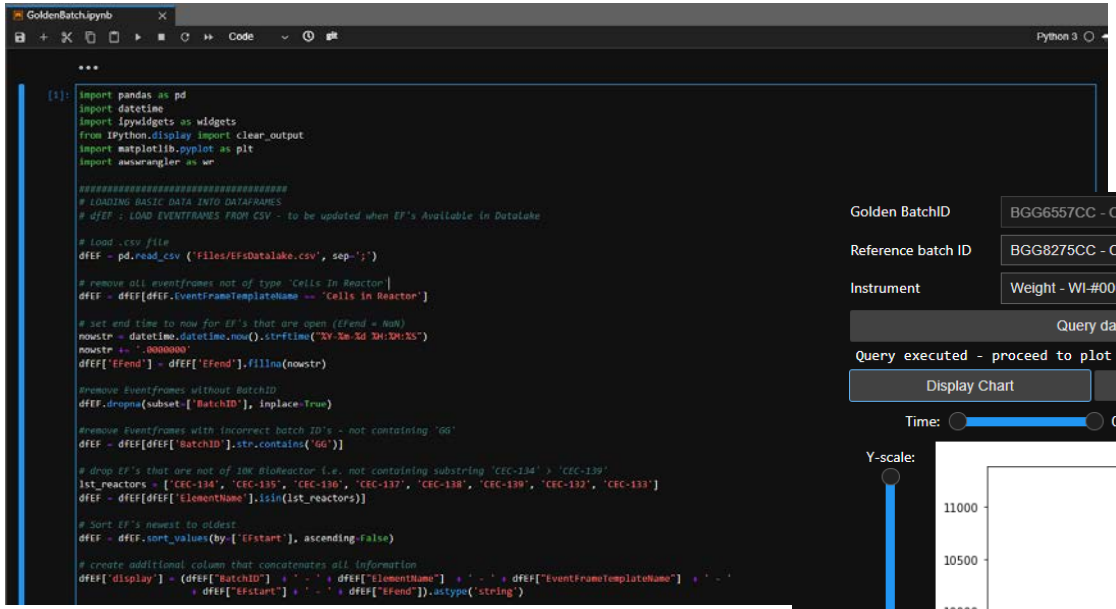
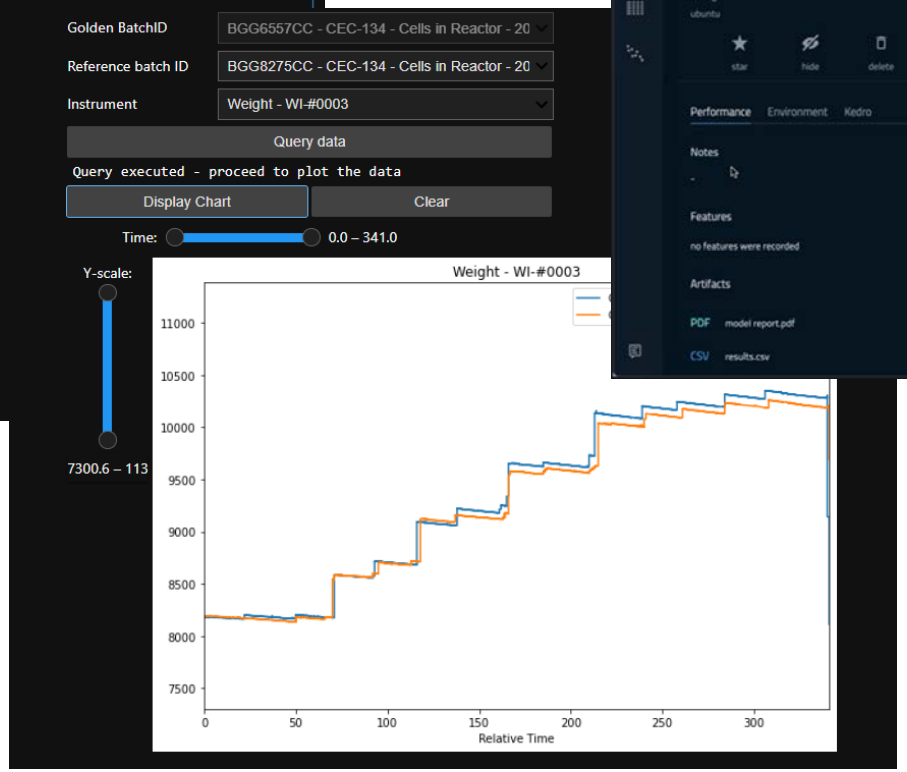
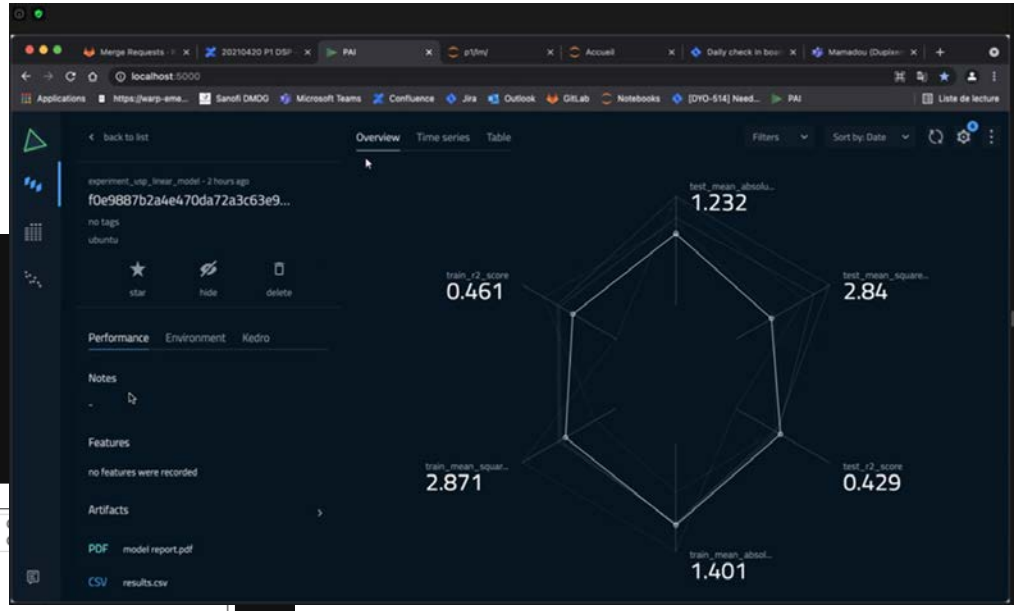
5. Advanced Analytics & Machine Learning







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6. Go Green

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Our 5 environmental commitments

Fight climate change: chase after carbon neutrality by 2030 and net zero emissions by 2050
By engaging Sanofi towards the 1,5°C global warming trajectory

Limit our environmental footprint and aim for circular solutions
By optimizing the use/reuse of resources and reducing impact of emissions

Improve environmental profile of products
By delivering eco-innovative products and fostering a sustainable use of medicines

Mobilize our people for environmental sustainability
By promoting an environmentally-conscious culture in the workplace

Engage our suppliers in our environmental ambitions
By sourcing responsibly and leading by example

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Our 5 environmental commitments

PI will be at the hart of our environmental commitments

Delivering roughly 3000 environmental parameters from our plants & facilities cleaned and contextualized before passing through our streaming engine into the datalake.

There it will be further analyzed, and diagnostics will be performed on the data. Keeping our plants in optimal condition and exposing areas for improvement.

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Information is the oil of the 21st century, and analytics is the combustion engine

Peter Sondergaard

Hannes Bram

Digital Champion

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Learn more at www.aveva.com