

# How CDMOs Can Leverage their Most Important Asset: Data

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# Agenda

## Sartorius Data Analytics Overview

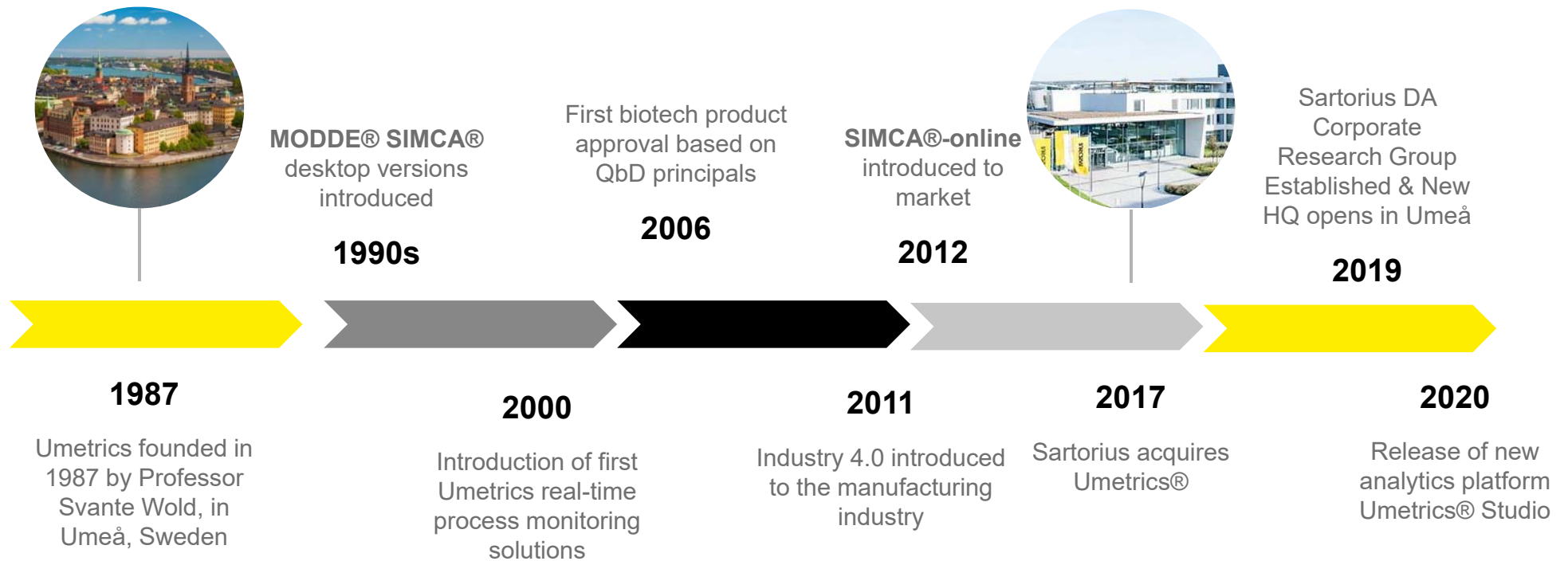
Leveraging Data to Overcome Outsourcing Challenges

Faster and More Reliable Operations: A FUJIFILM Diosynth Biotechnologies' Case Study

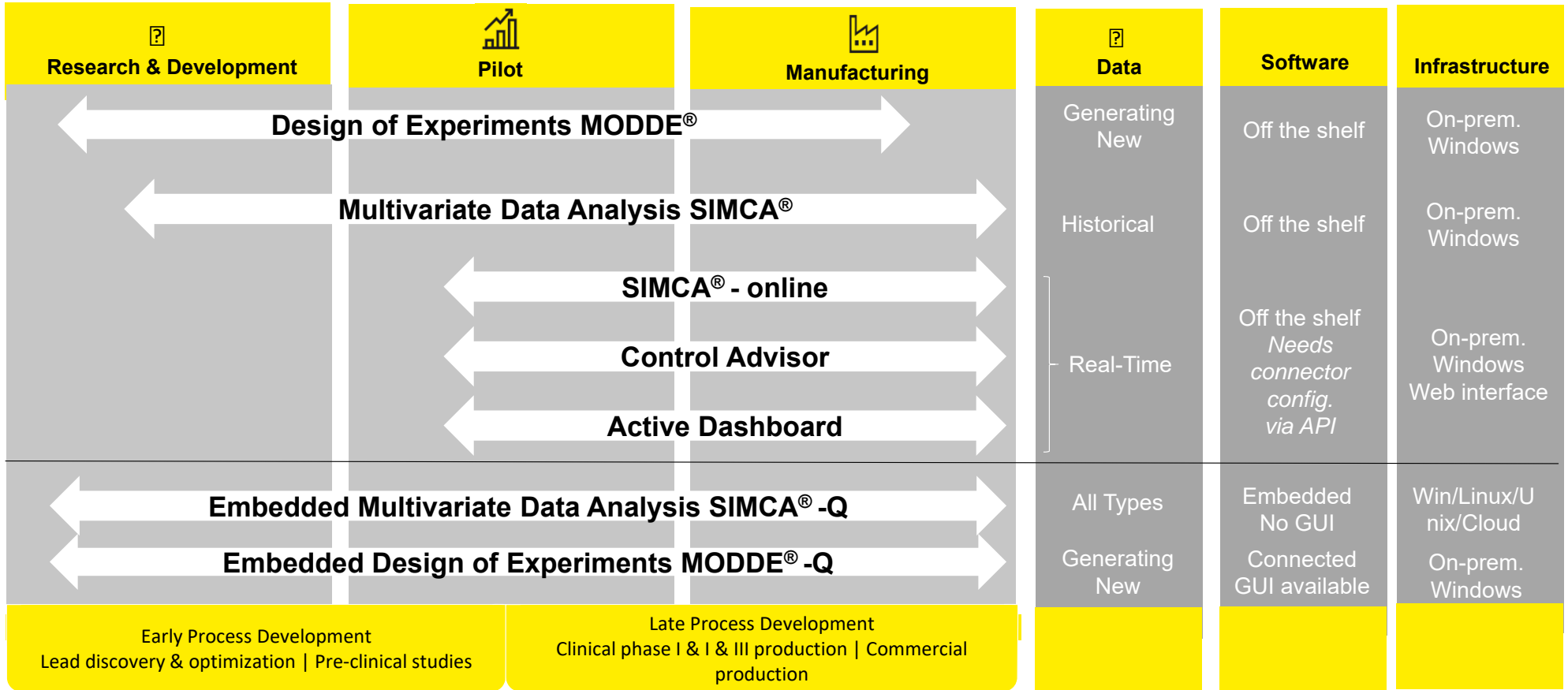
OSI and Sartorius – Partners for CDMO Success



# The Evolution of Umetrics® - Born into Data Analytics



# The Umetrics® Suite at Work





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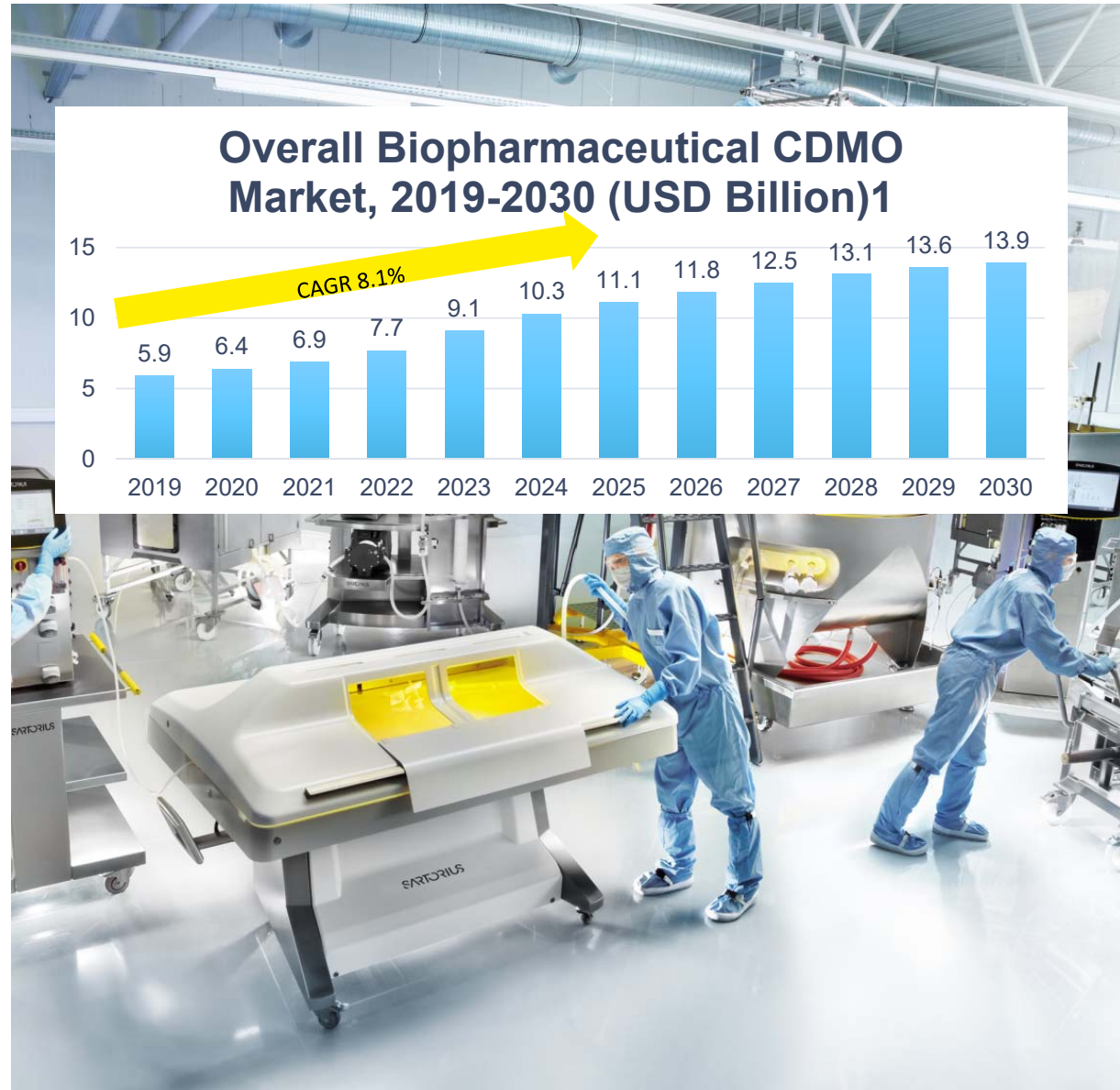
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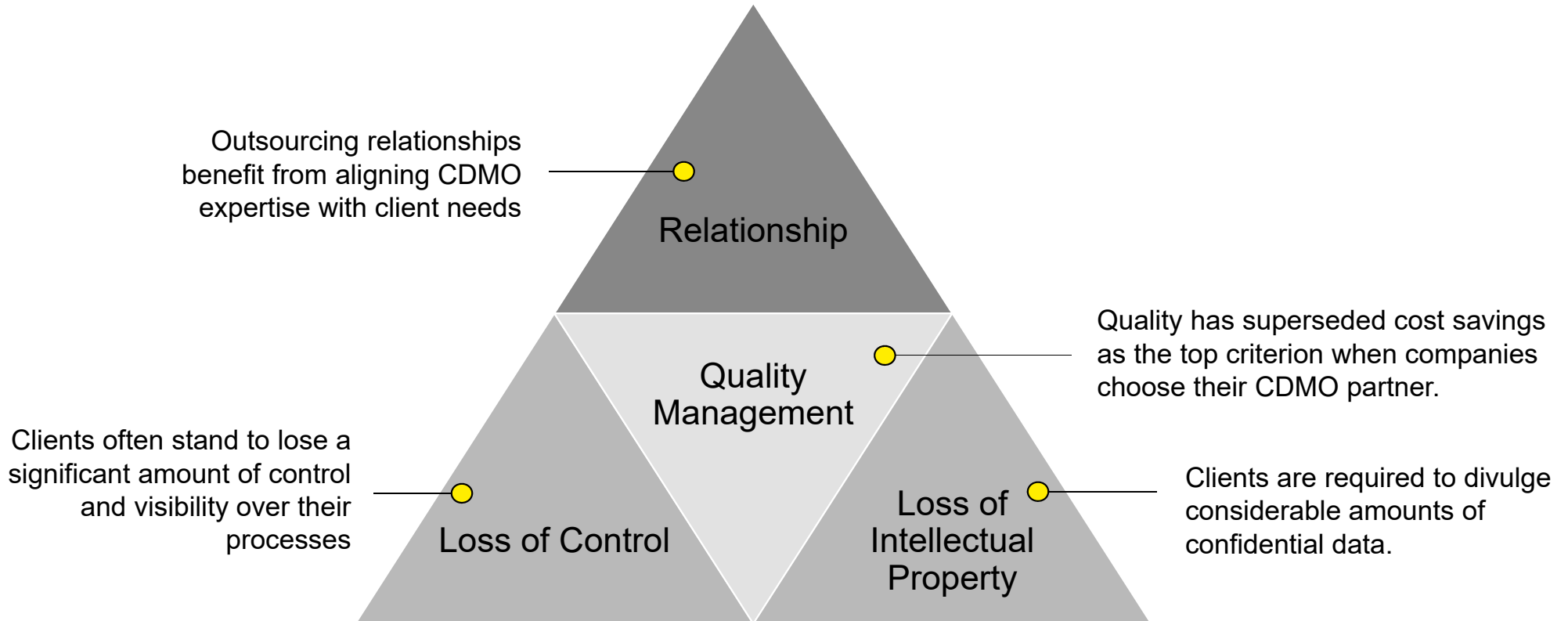
# Paradigm Shift in the Degree of Outsourcing

1. Growing capabilities of contract organizations attract both big and small biopharma companies
2. Increasing global demand for biologics and biosimilars – particularly in pandemic situations
3. High-costs of establishing in-house facilities and expertise
4. Lack of expertise in development of biologics
5. Growing demand for novel biologics, like ADCs, bispecific antibodies, cell and gene therapies
6. Entry of numerous small and startups that have limited capacities

1. Biopharmaceutical Contract Manufacturing Market (3rd Edition), 2019 – 2030, Roots Analysis

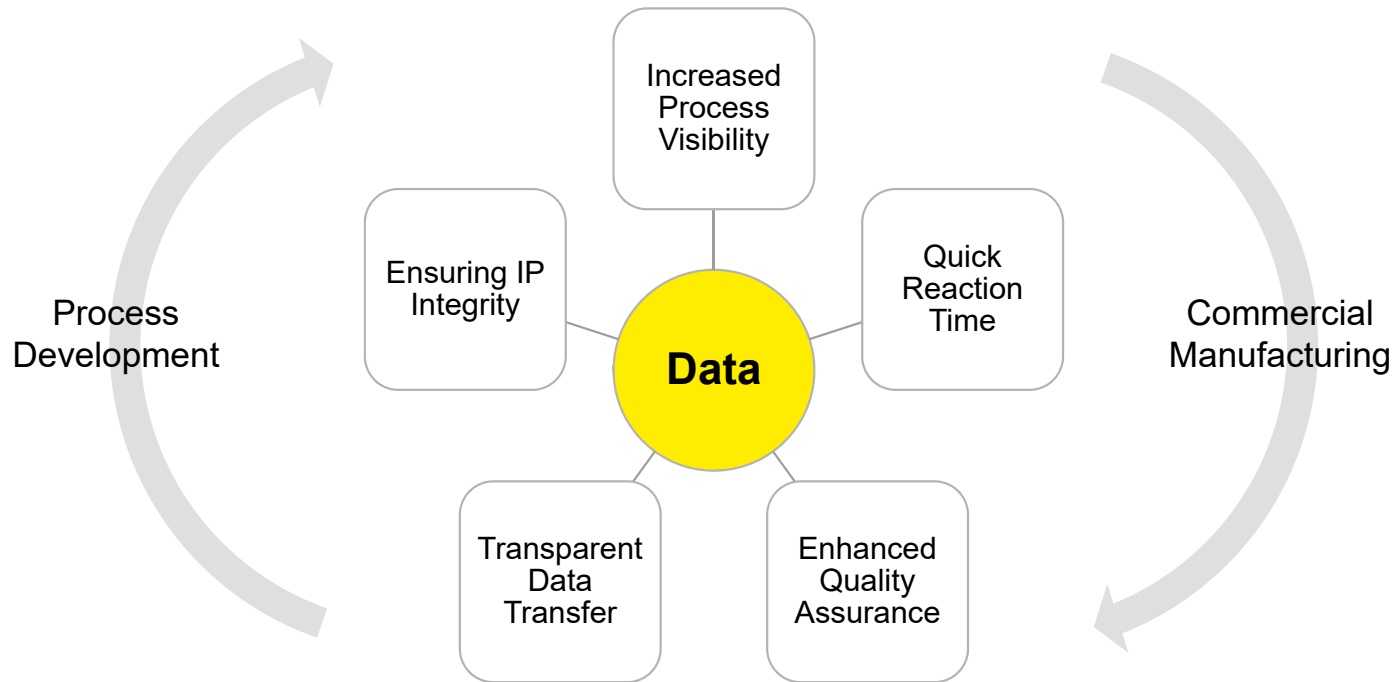


# Challenges Related to Outsourcing



Source: Roots, Biopharma Contract Manufacturing Market (3<sup>rd</sup> Edition), 2019-2030

# Data Will Play a Central Role at the Modern CDMO in Addressing These Challenges

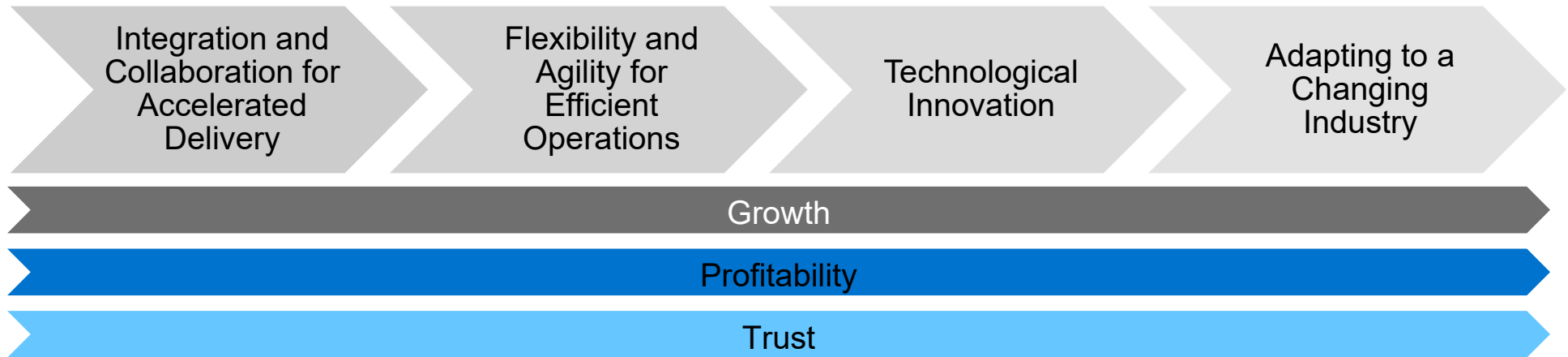




# Modern CDMOs Leverage Advanced Data Services to Achieve Growth

In order to keep up with the **increasing reliance from the industry** and to **stand out from the growing competition**, CDMOs are specializing in a number of **advanced services to provide greater agility**. <sup>1</sup>

Services which put a greater importance on:



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# FUJIFILM Diosynth Biotechnologies

- **Who:** FUJIFILM Diosynth Biotechnologies is a leading global CDMO
- **What:** Specializing in cell culture, microbial fermentation and gene therapies with world class cGMP manufacturing facilities.
- **Where:**
  - College Station, Texas, USA
  - Hillerød, Denmark
  - Research Triangle Park, North Carolina, USA
  - Teesside, UK



# Faster and More Reliable Operations: A FUJIFILM Diosynth Biotechnologies' Case Study

## Challenge

Being able to review and verify process performance is a key step in biopharmaceutical manufacturing. However, traditional chromatography review, like visually reviewing elution peaks, was a **time-consuming, error prone, and paper-intensive** process.

## Solution

Paring Sartorius Data Analytics tools with OSIsoft PI technology FUJIFILM Diosynth Biotechnologies developed a new digital chromatogram dashboard for enhanced chromatography review.

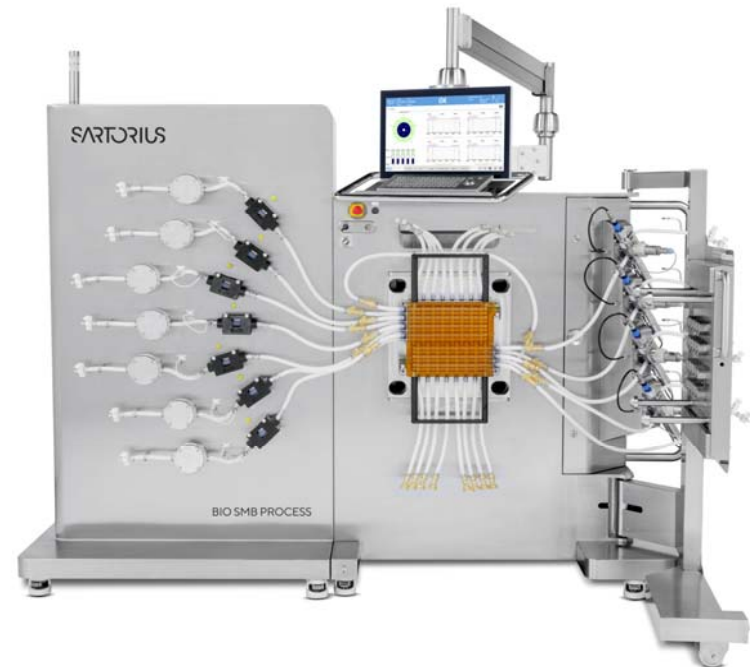
## Benefits

**Shorter** review times, resource expenditure **optimized** tenfold, paper footprint **reduced** by ~10,000 sheets/year, **on demand data** accessibility, and **increased partner trust** and collaboration opportunities.

# Using Data Analytics to Overcome Chromatography Review Challenges

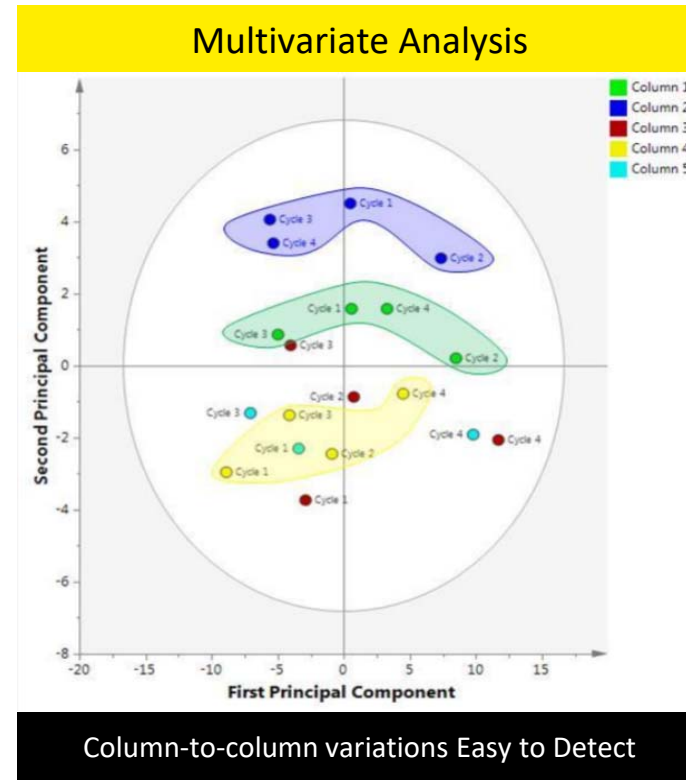
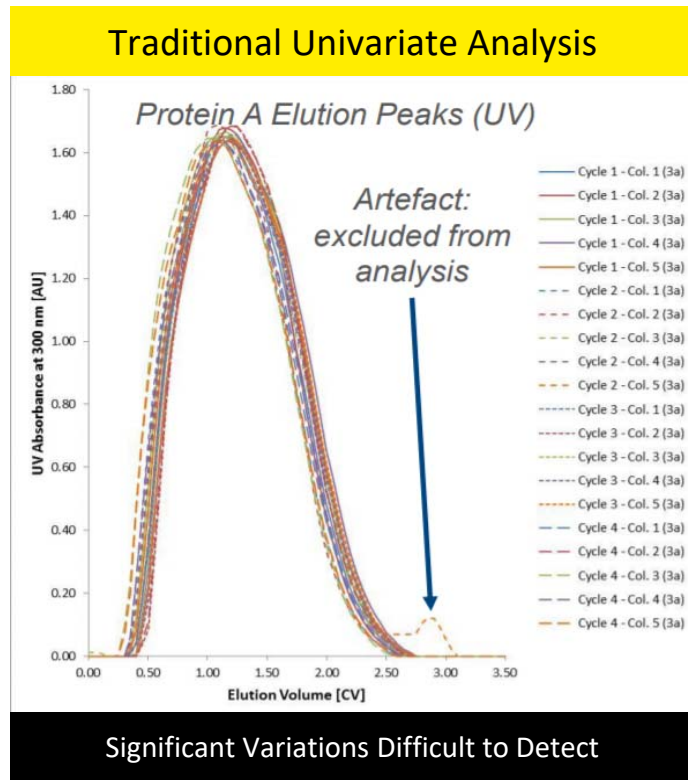
SIMCA®-online can detect small deviations in peak shapes before traditional methods can. SIMCA®-online is used to:

- Monitor cycle-to-cycle reproducibility
- Detect column-to-column or batch-to-batch variations
- Identify process failures and other trends before they become problematic



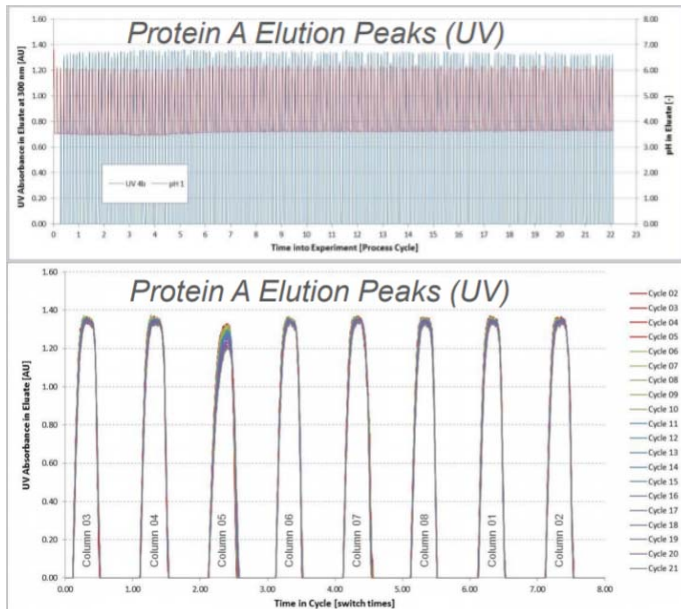


# Identify Column-to-Column Variations



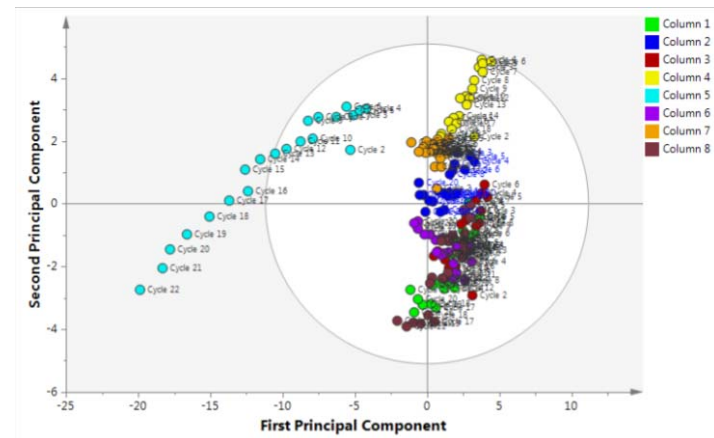
# Identify Column Malfunctioning

## Traditional Univariate Analysis



Cycle-to-cycle overlay shows some effect on column 5

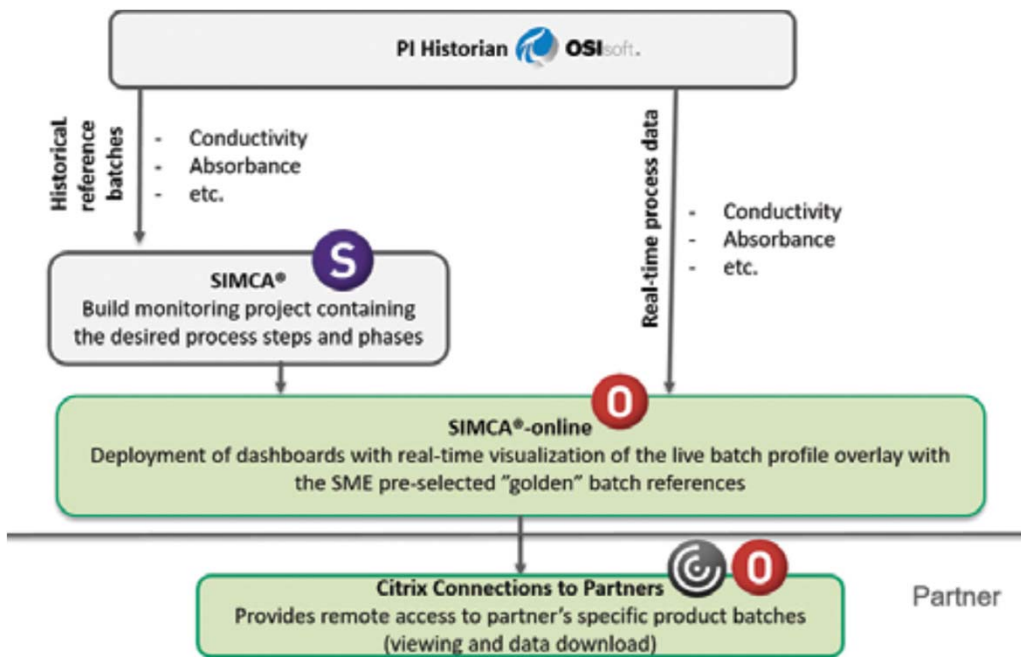
## Multivariate Analysis



Note: Performance decay was found to be related to inadequate cleaning of columns

Column 5 shows deviations from start of run






# System Communication: A FUJIFILM Diosynth Biotechnologies' Case Study



- Historical data stored in the OSI PI system were used as reference batches and to build the digital chromatogram project
- During production, data ingested from the manufacturing SCADA system to OSI PI system were transmitted to SIMCA®-online through a SimAPI at real-time frequency
- The visualization dashboard were then made available to operators, quality assurance personnel reviews, and the partner

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## Benefits Realized: A FUJIFILM Diosynth Biotechnologies' Case Study

- **Shorter** review times  Accelerated Delivery
- Resource expenditure **optimized** tenfold  COGs Optimization
- Paper footprint **reduced** by ~10,000 sheets/year  Positive Environmental Impact
- **On demand data** accessibility  Improved Process Traceability
- **Increased partner trust** and collaboration opportunities  Increased Reliability

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# Why Sartorius and OSIsoft?



## SIMCA®

### Do you have historical data?

- A tool for exploring and finding the hidden information in your data.
- Identifying and distinguish critical from non-critical parameters
- Powerful learning from historical data
- Offline root cause investigations
- Build models for process monitoring and predictions
- Play with the "What if" functionality

## SIMCA®-online

### Need added info from Real-Time production?

- Monitoring the "Golden batch"
- Real-time root cause investigation
- Forecast "what will happen"
- Anticipate process deviations
- Optimize throughput
- Stable production advisor

## SIMCA®-Q

### Want to build your own application?

- Embedded Multivariate Data Analytics
- Automate and speed up decision making
- Make complex tasks routine
- Reduce the risk of human error
- Can be used for batch, discrete or continuous data
- Validation report and documentation available

# CDMOs are Putting a Greater Importance on Data and Data Analytics

**“Data integrity deficiencies are cited in 65% of all FDA warning letters”<sup>1</sup>**

Consequently this has put pressure on CDMOs to implement data management systems that provide **transparency, preserve customer confidentiality, and meet regulatory guidelines**

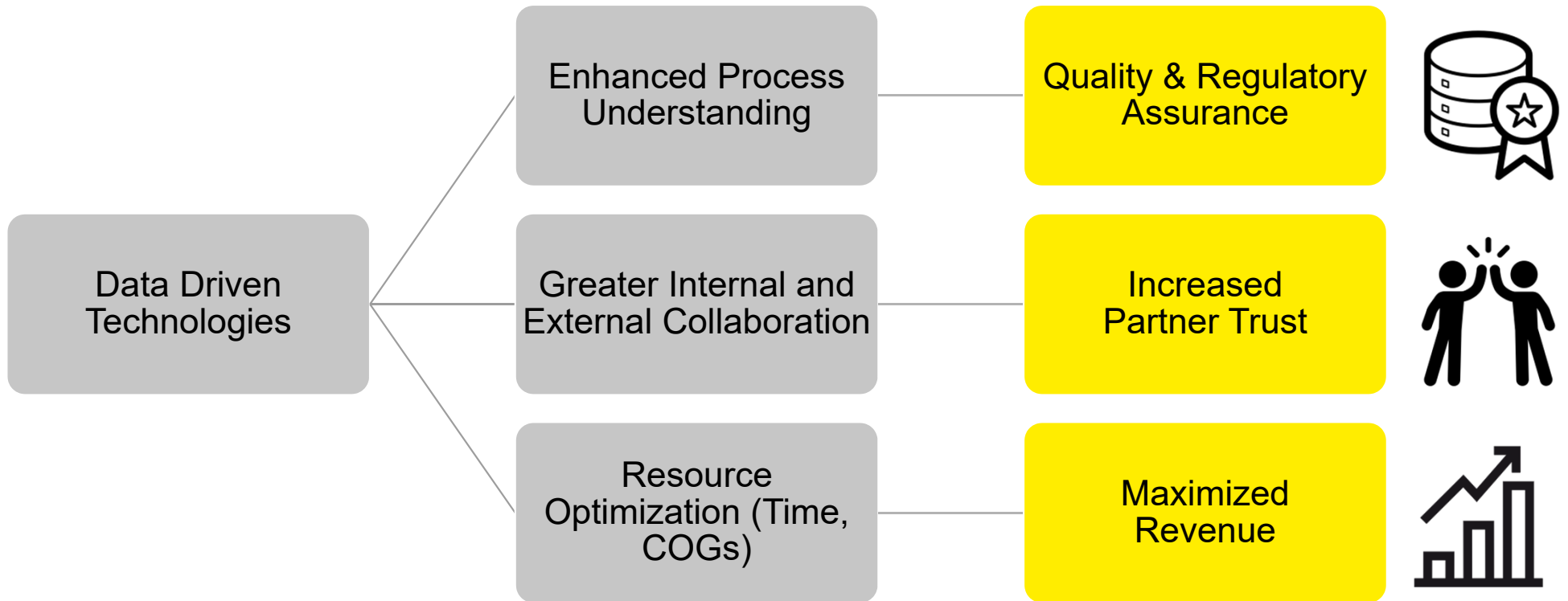
CDMOs have realized the **additional value opportunity** that comes with adopting data management systems along with data analytics tools and have transformed these new technologies into **service offerings**



SARTORIUS

1: “An Analysis Of FDA FY2017 Drug GMP Warning Letters”, B. Unger, Unger Consulting, Pharmaceutical Online (2018)

# Benefits of Adopting Data Driven Technologies at a CDMO



謝謝  
 DZIĘKUJĘ CI  
 NGIYABONGA  
 TEŞEKKÜR EDERİM  
 DANKIE  
 TERIMA KASIH  
 SPASIBO  
 ПАСИБО  
 GRAZIE  
 МАХАДСАНИД  
 GO RAIBH MAITH AGAT  
 БЛАГОДАРЯ  
 GRACIAS  
 ТИ БЛАГОДАРАМ  
 TAK DANKE  
 RAHMAT  
 HATUR NUHUN  
 PAXMAT САГА  
 CÁM ƠN BẠN  
 WAZVIITA  
 TAPADH LEIBH  
 KEA LEBOHA  
 БАЯРЛАЛАА  
 MISAOTRA ANAO  
 WHAKAWHETAI KOE  
 DANKON TANK TAPADH LEAT  
 MATUR NUWUN  
 ХВАЛА ВАМ  
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 HVALA  
 FAAFETA  
 ESKERRIK ASKO  
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 TEŞEKKÜR EDERİM  
 OBRIGADO  
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 GRATIAS TIBI  
 AČIŪ  
 SALAMAT  
 MAHALO IĀ 'ŌE  
 TAKK SKALDU HA  
 ДЗЯКУЙ  
 MERCI  
 DI OU MÈSI  
 ĎAKUJEM  
 GRAZZI  
 PAKKA PÉR  
 ありがとうございます  
 SIPAS JI WERE  
 TERIMA KASIH  
 UA TSAUG RAU KOJ  
 TI БЛАГОДАРАМ  
 СИПОС  
 KÖSZÖNÖM  
 GRACIES  
 SALAMAT  
 MAHADSANID  
 HVALA  
 DZЯКУЙ  
 FALEMINDERIT

# Acknowledgements and References

Thanks to **Martin D. Jensen** and **Ricardo F. Carço** from FUJIFILM Diosynth Biotechnologies in Hillerød, Denmark

Enabling Digital Chromatogram Review for a Faster and More Reliable Operation, M. Jensen, R. Carço, *Bioprocess International*, Industry Innovators, pg. 30, 2020-2021



Chromatogram review is a monitoring method used to verify process performance in packed-bed chromatography processes. By observing key process parameters such as chromatography column outlet conductivity or UV absorbance, it is possible to identify the signs of a poorly packed column, resin degradation, or equipment malfunction. Therefore, chromatogram review is implemented as an in-process control (IPC) to decrease variability and identify suboptimal performance, thereby enhancing yield and ensuring high product quality (1).

The industry standard practice relies on trending univariate parameters (e.g., chromatographic peak asymmetry and product yields) and on performing a qualitative visual comparison of chromatography profiles against a reference batch. The latter is set as a control check to be performed by operators before proceeding with the next stage of a process.

That assessment used to be executed by printing a physical copy of the chromatogram of a batch and then comparing that printout with a standard operating procedure (SOP) that contains the reference chromatogram. The same process would be reviewed later by quality assurance personnel. That approach led to a time-consuming, paper-intensive process that was prone to mistakes caused by the variability inherent to visual comparison of chromatogram profiles not only in different plots, but also on different sheets of paper.

Now that process has been reimagined as part of the drive toward Industry 4.0 and the desire to become a digital facility, enabled with systems that can respond to changes in real-time and act proactively with the necessary corrective behaviors.

With the new digital chromatogram dashboard, printing becomes unnecessary, and multiple phases and parameters are viewed simultaneously, leading to shorter review time. Reliability is increased because the dashboard enables monitoring of a live batch overlaid on reference batches preselected by a subject matter expert. That is facilitated by implementing the SIMCAP and SIMCAP-online software suites by Sartorius (2). As a leading contract development and manufacturing organization (CDMO), Fujifilm Diosynth Biotechnologies strives for increased partner trust and collaboration. Thus, these dashboards (and many others with multivariate models) can be accessed by a partner, providing it with a real-time window to the process (Figure 1).

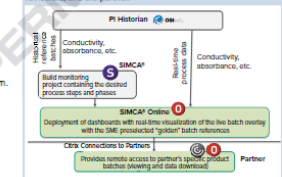
By digitalizing the existent business process and upskilling the stakeholders to use the tool, resource time

## TECHNOLOGY REVIEW

### Enabling Digital Chromatogram Review for a Faster and More Reliable Operation



Figure 1. System and data communication diagram; historical data available in the data historian are used as reference batches and to build the digital chromatogram project. During production, data ingested from the manufacturing SCADA system to the data historian (DSI-IP) are transmitted to SIMCA-Online through SIMCAP at real-time frequency (2). The visualization dashboards are made available to operators, quality assurance personnel reviewers, and the partner.



expenditure is optimized tenfold (shorter review time, fewer investigations expected), the paper footprint is reduced (~10,000 sheets/year), and data accessibility is on demand. The review process is not hidden and is readily available to different departments.

#### REFERENCES

- 1 ICH Q7: Good Manufacturing Practice Guidance for Active Pharmaceutical Ingredients. The International Council for Harmonisation of Technical Requirements for Pharmaceuticals for Human Use (ICH), 2016.
- 2 Data Analytics AB. SIMCA-Online. Technical Guide. Sartorius Stedim, 2020; <https://umetrics.com/ics/simca-online-technical-guide>.

Martin D. Jensen is engineer III, manufacturing services, and Ricardo F. Carço is a process analytics engineer at Fujifilm Diosynth Biotechnologies, Hillerød, Denmark.



# Contact Information



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## Want to learn more about the value of Data Analytics at CDMOs?

Don't miss the upcoming webinar on Nov 12, 4pm – 5pm.

Topic: How Data Analytics can Boost the Bottom Line at a CDMO

With new technologies come new business opportunities. In this webinar Sartorius will present how to data analytics can be used to maximize productivity and profitability at a contract (bio)pharma organization. On top of the more commonly known benefits, like reducing batch variability, data analytics also provides a unique upsell opportunity for CDMOs. By innovating their service offerings, CDMOs can address some of the major challenges their partners face when deciding to outsource their operations, like loss of control or quality management. In this webinar, we will propose a scenario in which a CDMO can double its' return of investment in just one year! At the end of the day, CDMO's who choose to innovate their offerings can secure higher value contracts, grow their sales pipelines, and attract long-term strategic partners.

Presenters:

Tiffany McLeod, Market Manager Pharma Biopharma, Sartorius Data Analytics

Tigran Lachinyan, Strategic Marketing Manager, Sartorius BPS