



**Sunday 23 June 2024**

**11:00 – 12:30**

**Room - Moorfoot**

## **From Lab to Industry: Enable quality by control through automation, AI and computational fluid dynamics**

**Organiser:** Dr Wolfgang Sommeregger, QUBICON AG, Dr Mark Duerkop, Novasign GmbH and Dr Christian Witz, SimVantage GmbH

This workshop addresses the challenges and benefits of transferring learnings from laboratory experiments to manufacturing processes, specifically focusing on overcoming scale-up issues and implementing automated and advanced process control. It highlights the scarcity of FDA-approved products in the biotech industry that are manufactured using completely automated processes and proposes potential solutions. The goal of the session is to demonstrate how these integrated strategies can facilitate in-silico optimization and scale-up, alongside prospects for fully automated process control.

Digital technologies already accelerate the development and scale-up of cell culture processes today. However, so far, mostly encapsulated areas have been looked at and attempted to be optimized. In this workshop we try to establish a connection between digital technologies such as streamlined data acquisition from Design of Experiments, hybrid modelling and computational fluid dynamics to transfer as much as possible from the learnings of laboratory scale into production. Participants will get an idea of how digital techniques can be interlinked to accelerate process development. Additionally, in-depth discussions are planned regarding the reasons behind the current underutilization of these solutions.

### **Format of the workshop:**

Additional speakers are: Dr Mark Duerkop, Novasign GmbH, Vienna, Austria and Dr Christian Witz, SimVantage GmbH, Graz, Austria

1. **Lab Scale – Process Understanding and Data Aggregation**  
Attendees will discover methods for digital transformation in lab and production settings, focusing on the integration of data from diverse analytical and processing equipment. Furthermore, the workshop will showcase workflows designed to accelerate learning from experiments, highlighting the principles of model-based and intensified Design of Experiments. Additionally, the integration of Computational Fluid Dynamics (CFD) results, derived from an innovative solver adds a deeper understanding of the reactor characteristics.
2. **Scale-Up with Process Know-How from the Lab**  
Enhancing process understanding together with the in-depth equipment characterization is crucial for automating process controls, optimizing production conditions, and ensuring consistent quality during the scale-up from laboratory to industrial scale. It allows for the identification and mitigation of potential scale-up issues before they occur, reducing development time and costs.
3. **Large scale production – Automation, Process Optimization and Process Transfer**  
After successful scale-up, advanced process control should ensure consistent and cost-effective production. At its heart a digital twin, trained from reactor geometries and experimental data during late-stage development and scale-up, will allow to autonomously control the process inside certain boundaries. Therefore, the understanding of quality by design will be transformed into quality by control.