



fermicloud

Fermentation Production Optimisation Using Cloud Manufacturing Techniques

DIH Ecosystem Building Event

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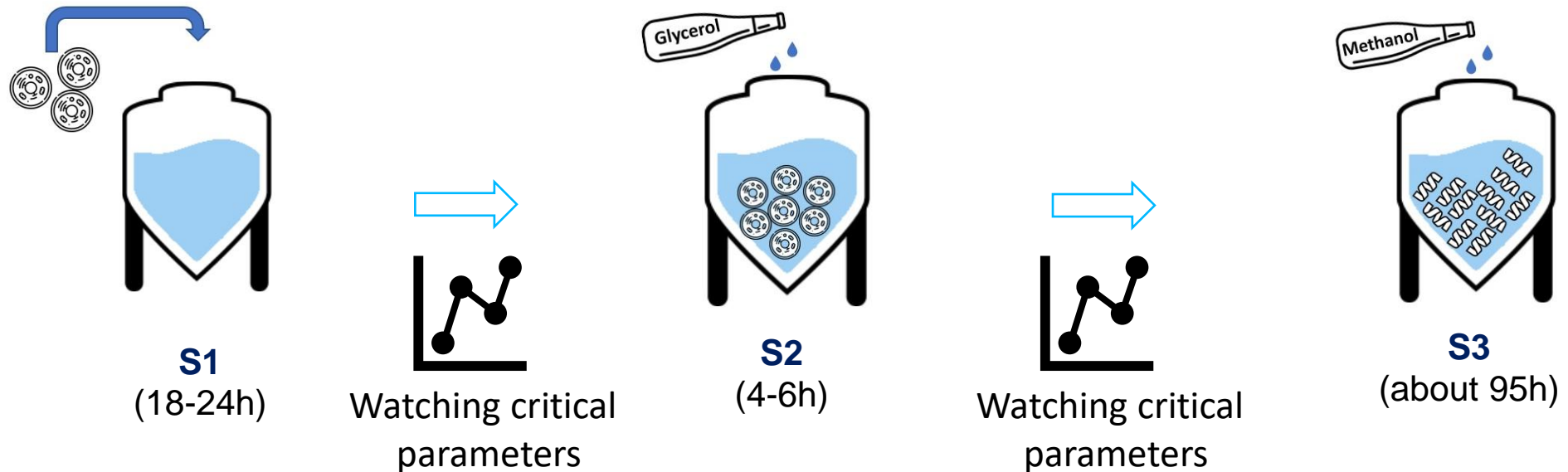
Budapest 2021

Problem statement

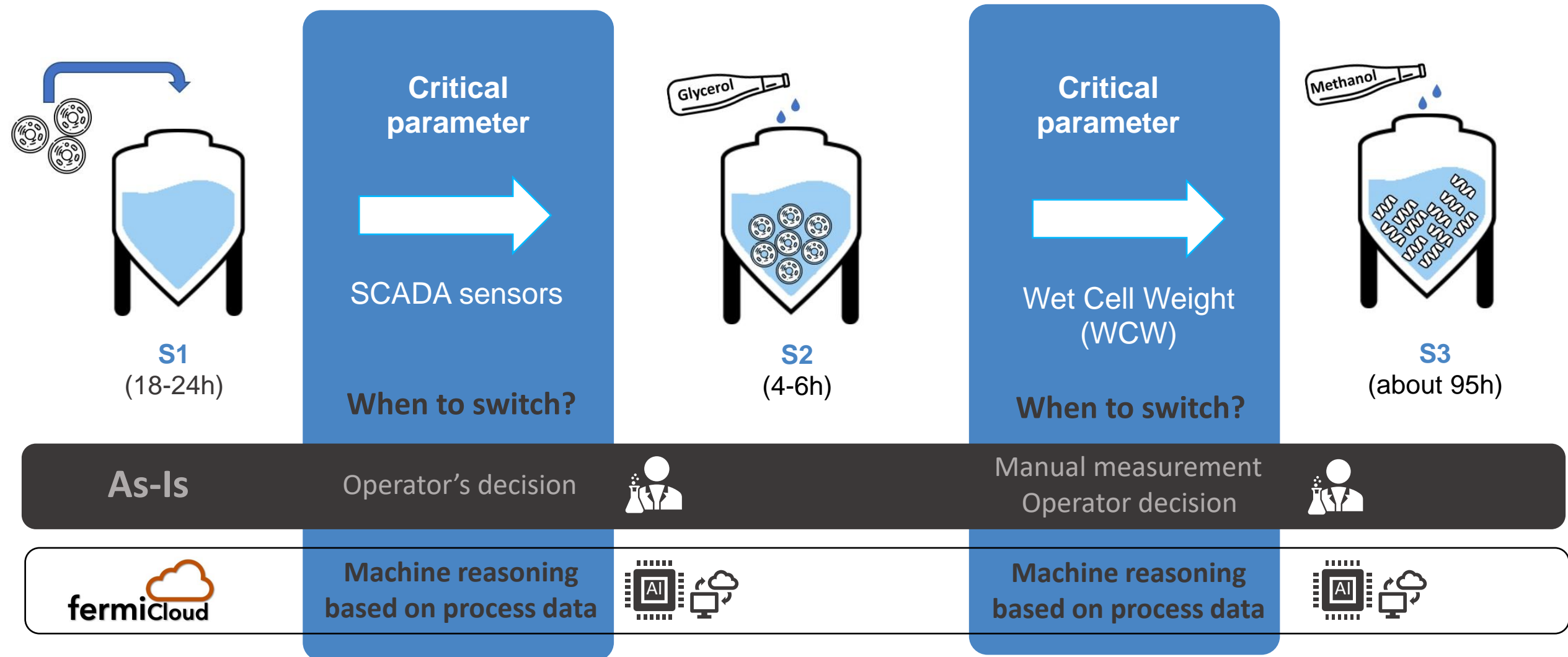
Pichia pastoris fermentation needs human assistance, which results in not accurate phases switch and **lost of the yield**

Solution: automation of the proteins production using **real time sensor data analysis**

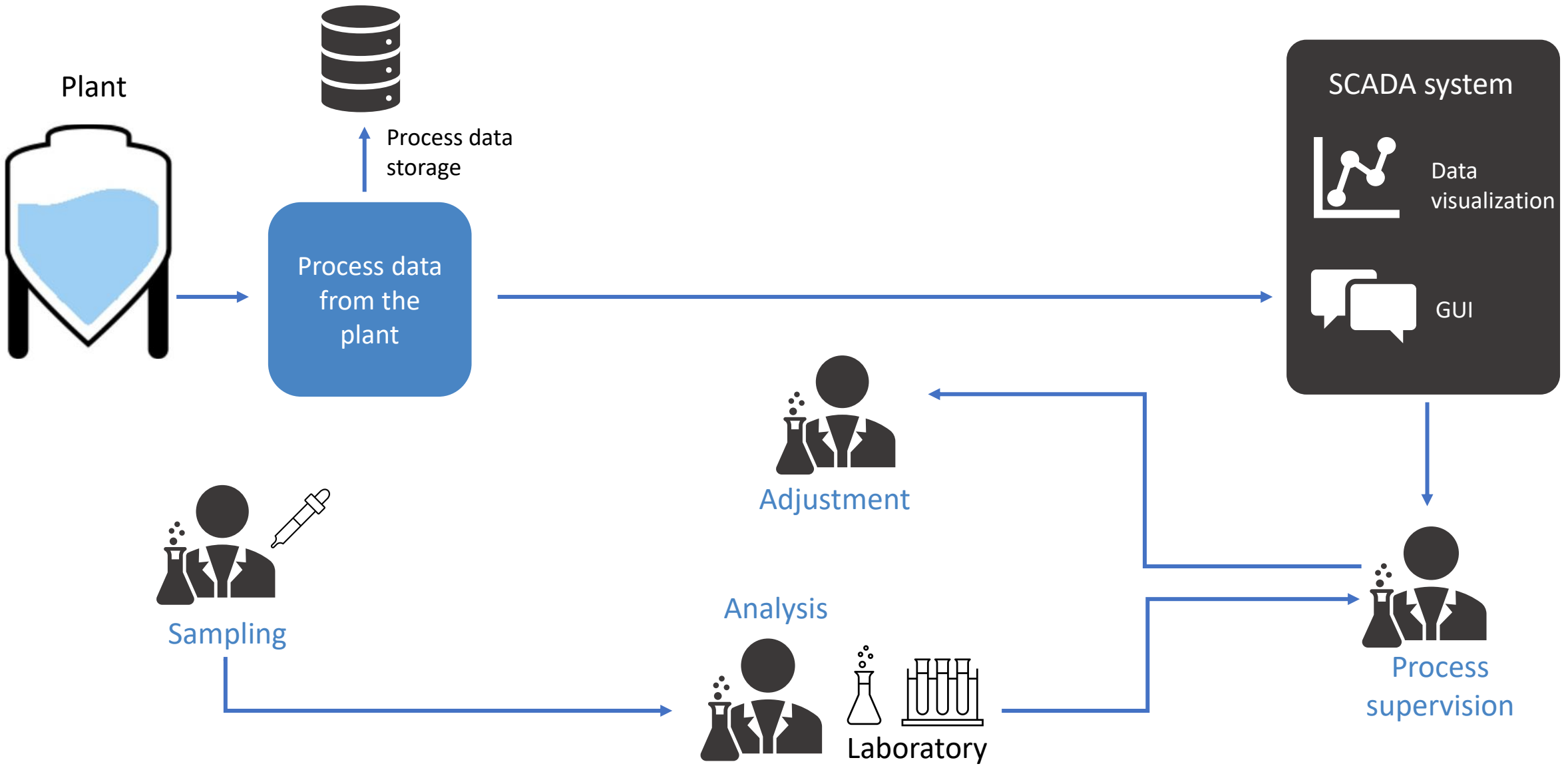
Pichia pastoris fermentation (S1-S2-S3 switch to be automated)



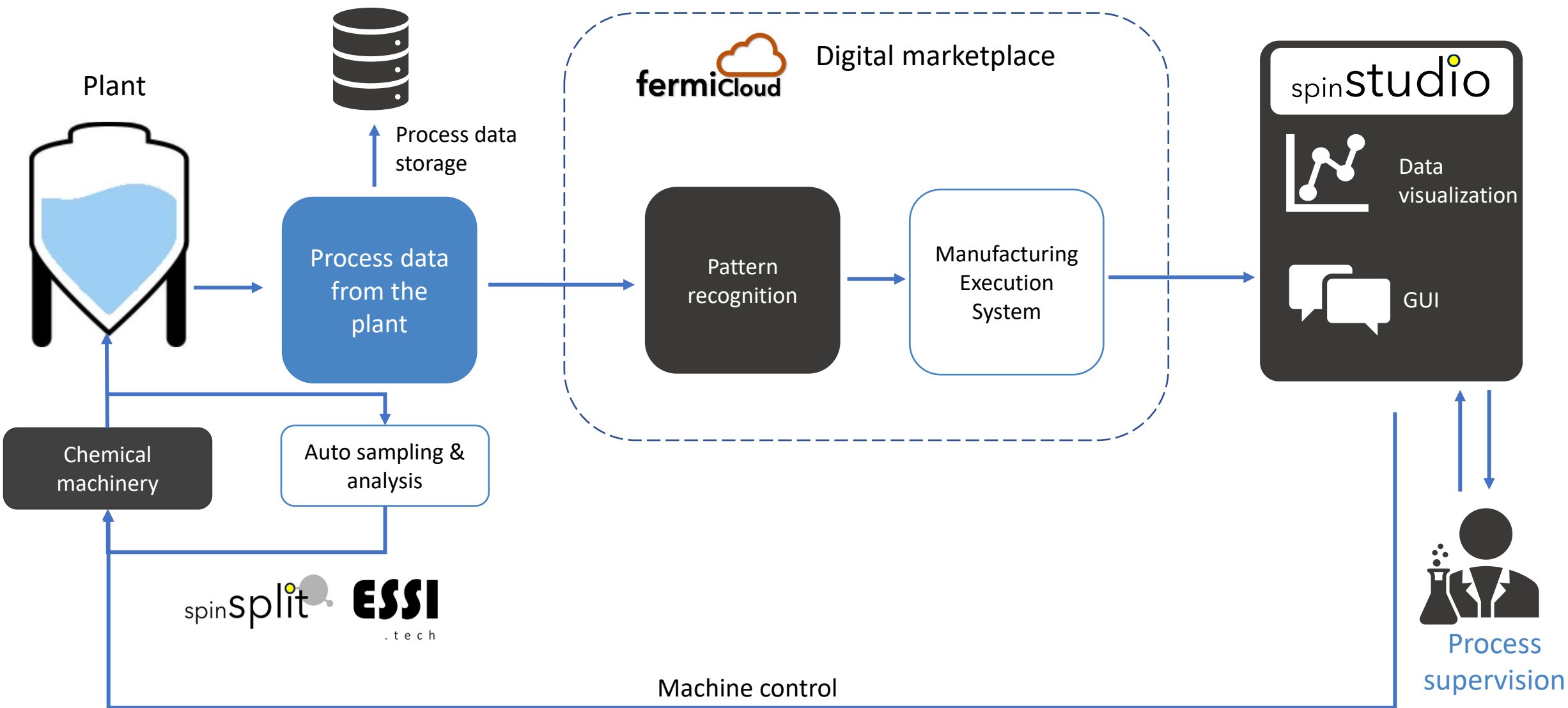
Problem statement



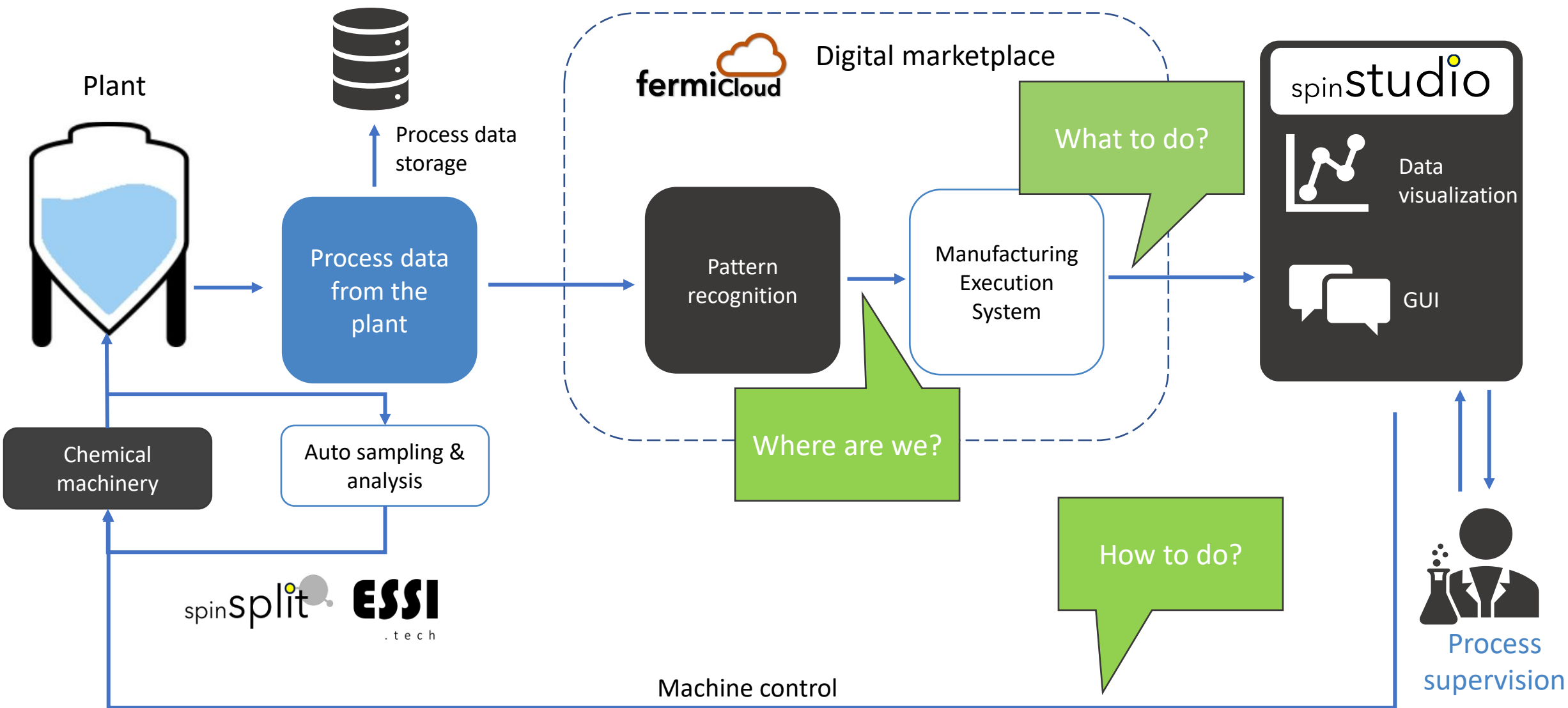
As-Is solution



Designed solution



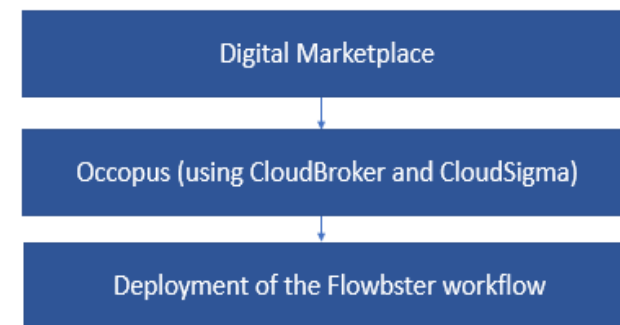
Designed solution



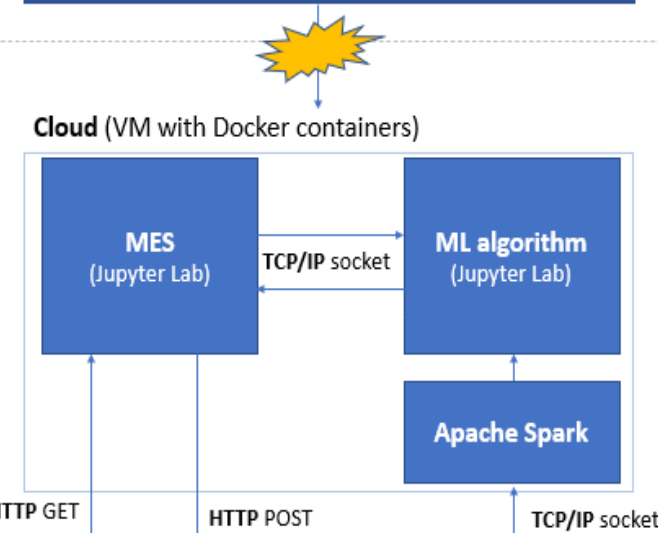
Designed solution



ClaudiFactoring infrastructure used for building the data processing architecture



Constantly running cloud services



Locally based software for data visualization & hardware supervision



Data from sensors

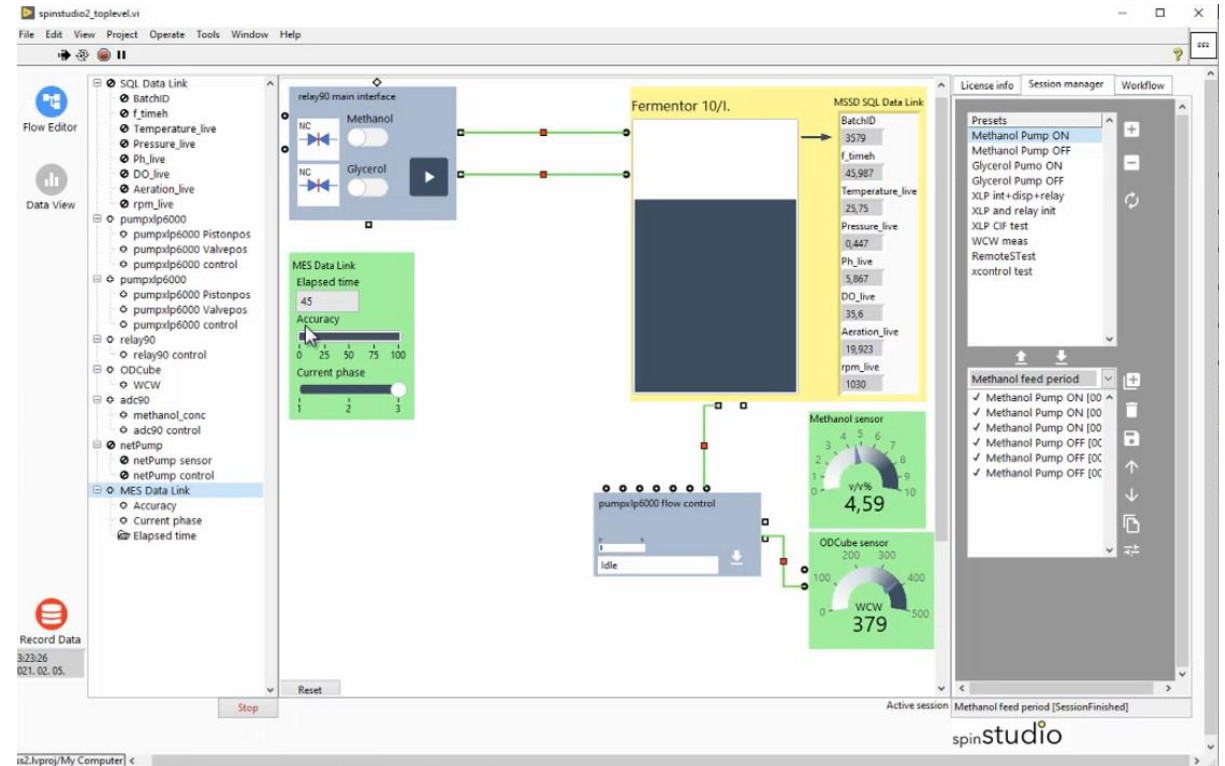


Designed solution

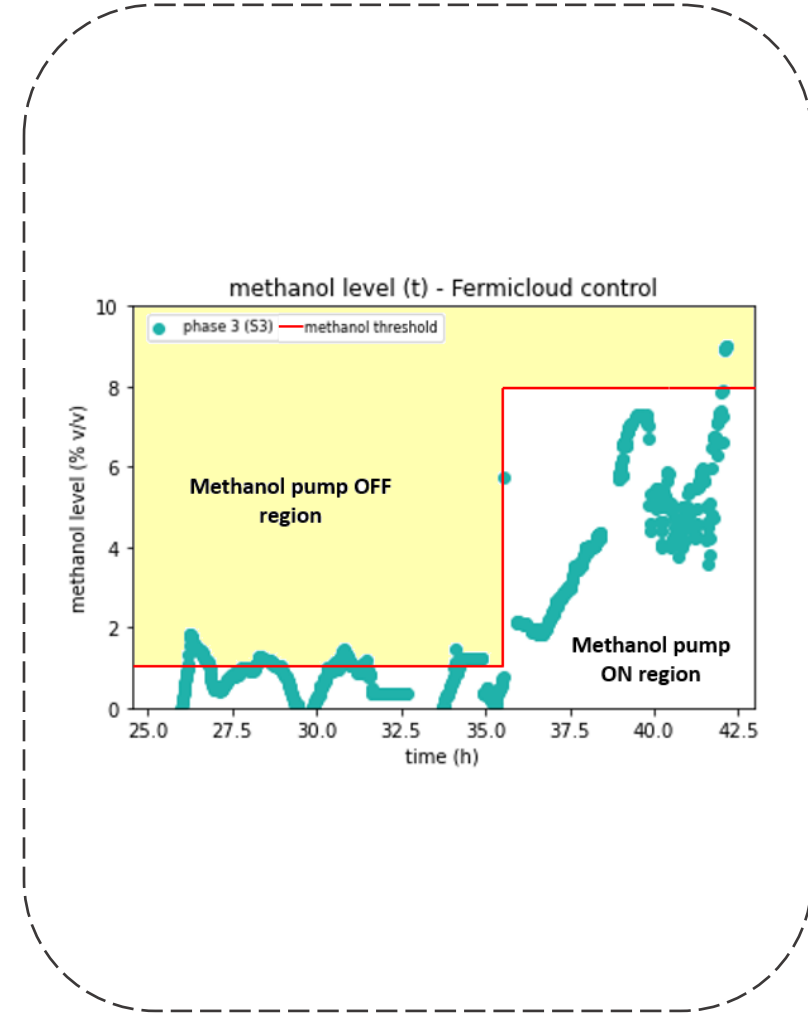
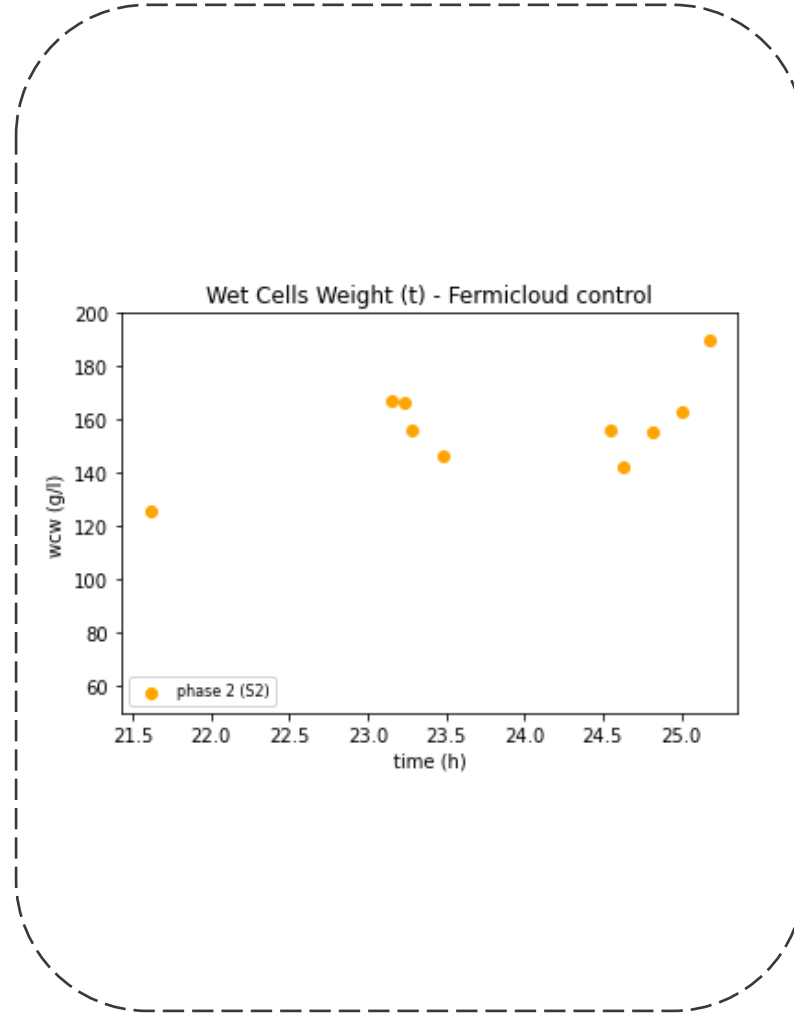
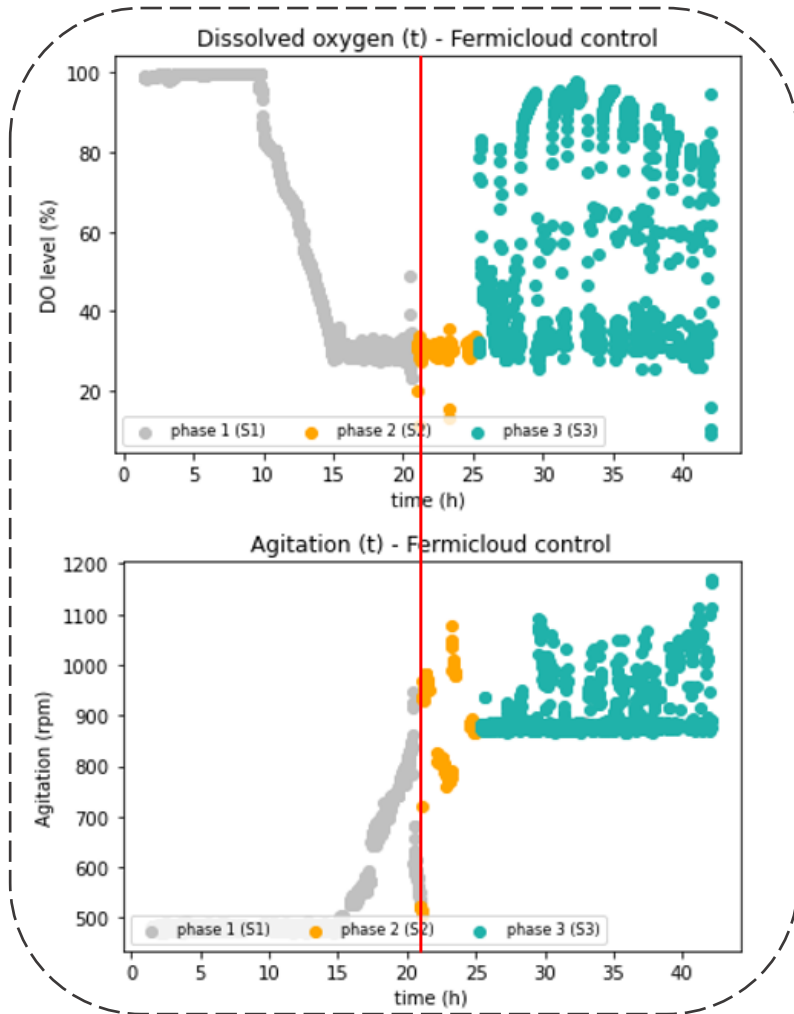
Hardware



Software



Experiment results



S1 - S2




S2 - S3



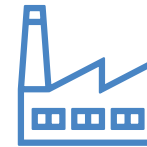
S3

Process improvement

Reduced time of human interventions (during one fermentation)

	Classic fermentation	 fermiCloud
Preparing incubation	17h	
Sampling	20h	0h
Spiking and adjusting	3h	0h
Total	40h	17h

Overall experiment achievements



System tested at the industrial plant



Phases switch guided by machine learning algorithm and Apache Spark streaming



Successful reagents addition without human intervention