

# Virtual Sensing «a closed loop digital twin to improve production performance»

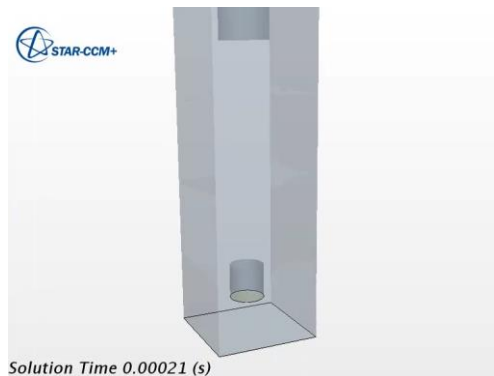
Maurizio Bossi

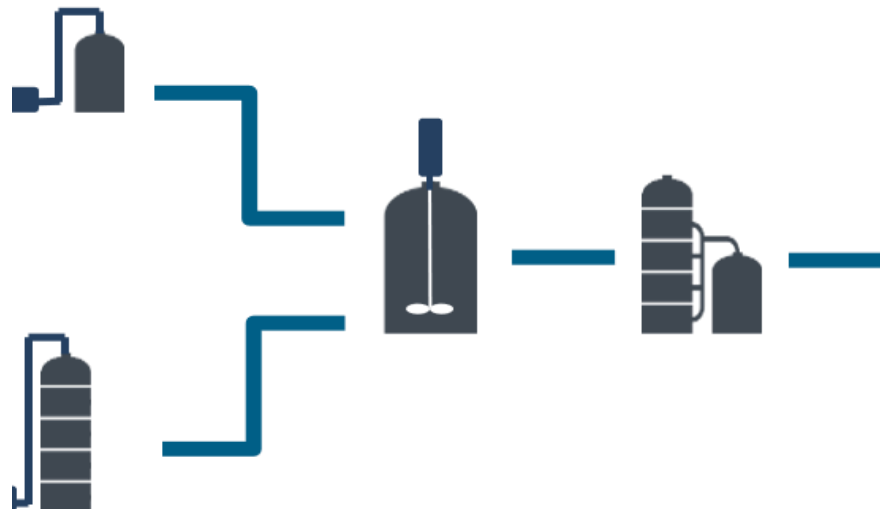
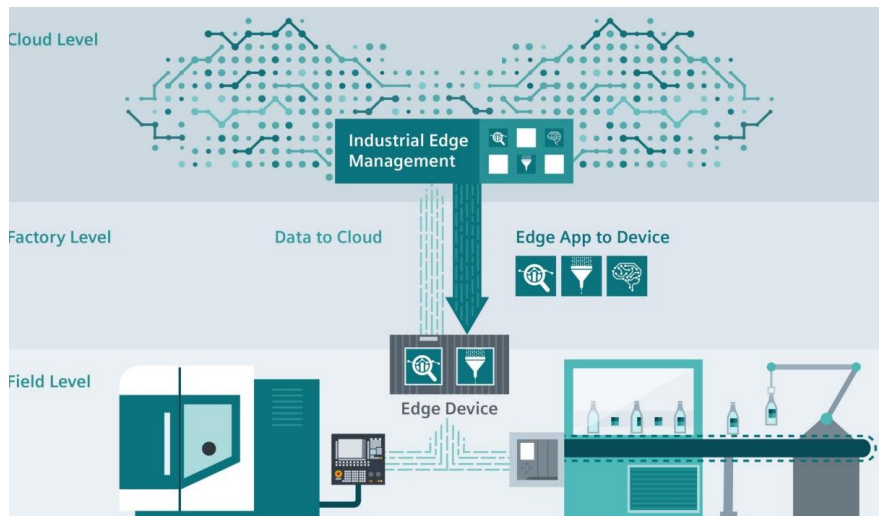
# SIEMENS



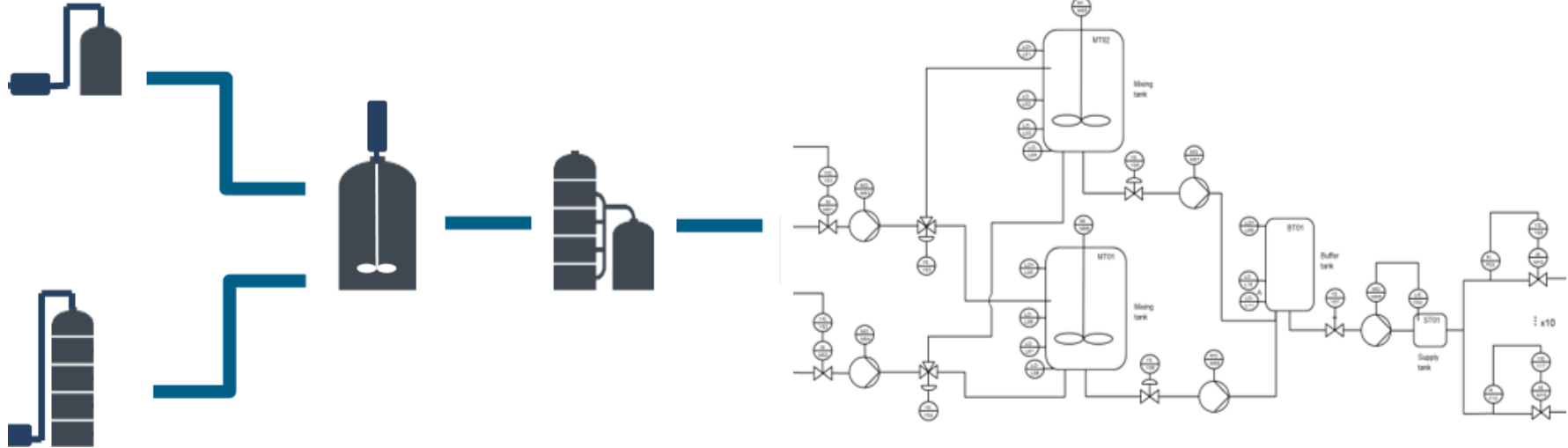
- Whole parameters can be measured virtually
- Focused on specific components
- Extensive computational time

- Performance & quality based on fluid behaviors & process parameter
- Limited data to measure directly with physical sensors

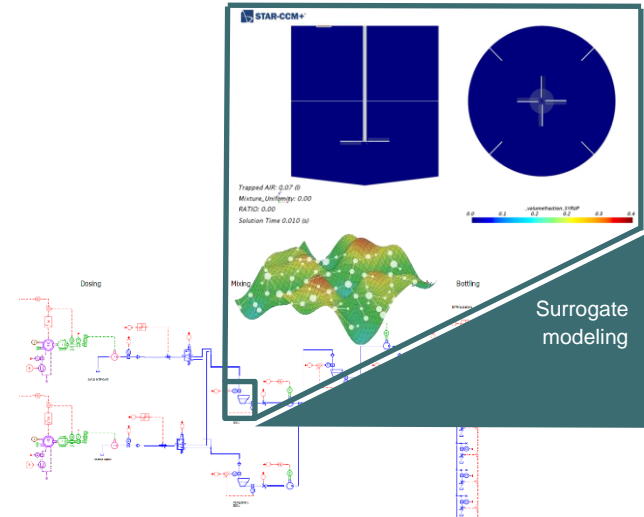
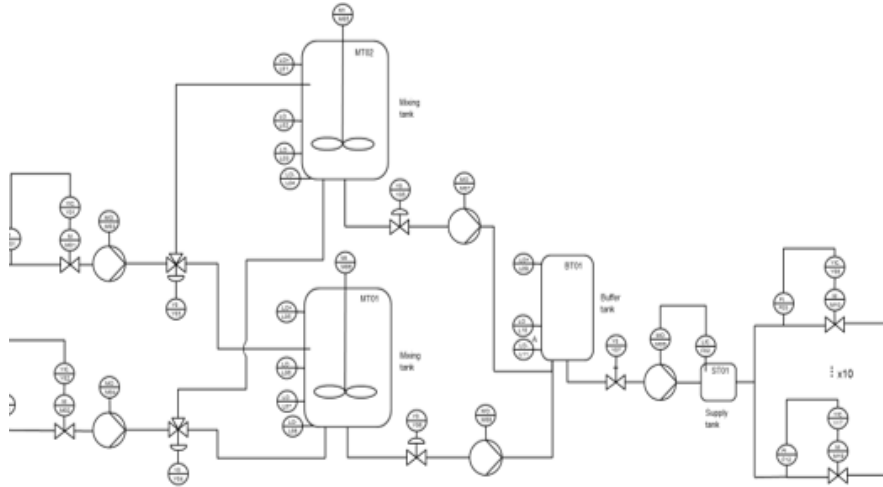




- Measure data on real production
- Collect information at all level
- Analyze & predict



- Build a virtual model
- virtual representation of real physical model



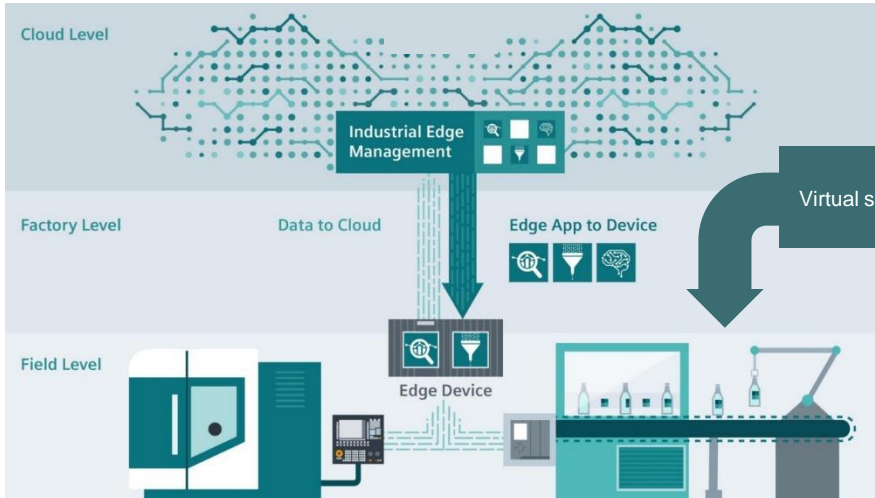
- System simulation & 3D CAE surrogate models
- Integrate measured data with simulation at any different working point
- Better prediction on how production will perform and product quality



Technologies for our future



# Live Twin



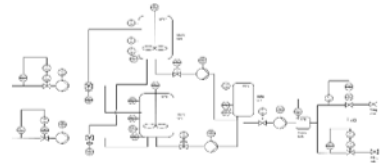
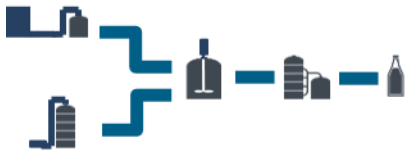
Virtual sensor

This block contains three main visual elements:

- Top Left:** A software interface showing a process flow diagram with various tanks and pipes.
- Top Right:** A circular gauge or radar chart with a central crosshair.
- Bottom:** A 3D visualization of a surrogate model, showing a green and yellow surface with data points and a "fitting" process.

Surrogate modeling

Integrate real Sensor with  
Virtual sensor  
Closed loop Digital Twin





Technologies for our future



# Comprehensive Digital Twin

## Design

Product & Production



## Realize

Product manufacturing & Operation



## Optimize

Product quality  
Plant Performance and  
Maintenance





Technologies for our future



# Comprehensive Digital Twin

Design

Product & Production

Realize

Product manufacturing & operation

Optimize

Product quality  
Plant Performance and Maintenance

Digital

Real







Technologies for our future



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## Contact

Maurizio Bossi

Simcenter Portfolio Developer

Siemens Industry Software

+39 338 6403869

[maurizio.bossi@siemens.com](mailto:maurizio.bossi@siemens.com)