

AVEVA PI WORLD

Online Simulation

Why Covestro is ready for the next leap

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Supported By: Kristian Voelskow, Jochen Steimel, Philipp Frenzel, Franz Krichhoff

AVEVA



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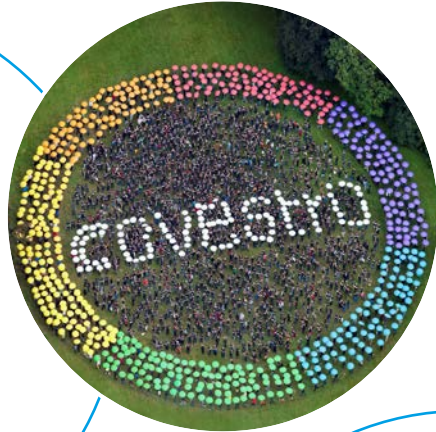
Online Simulation: Why Covestro is ready for the next leap

Covestro – leading in the world of plastics



Strong

- €10.7 bn in sales
- 16,500 employees¹



Useful

- Plastics, pre-products and solutions
- For many industries



Global

- 33 production sites globally
- Close to customers and partners



Innovative

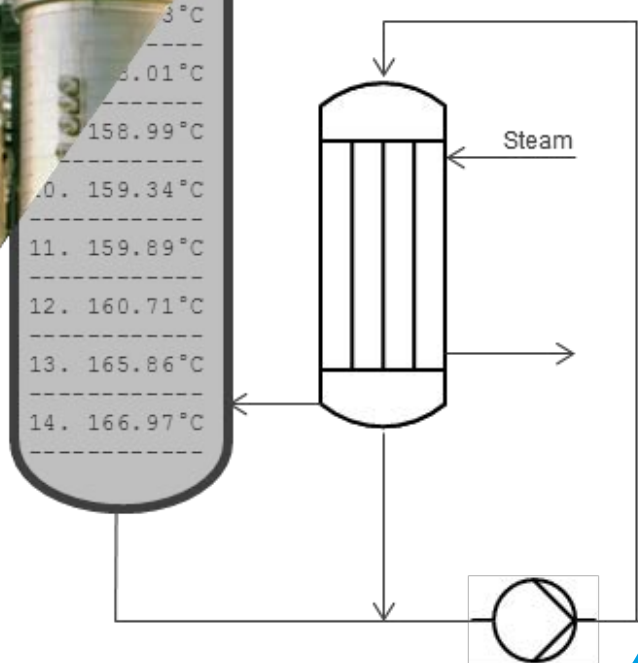
- 1,200+ employees in research and development
- 80 years of ideas and inventions



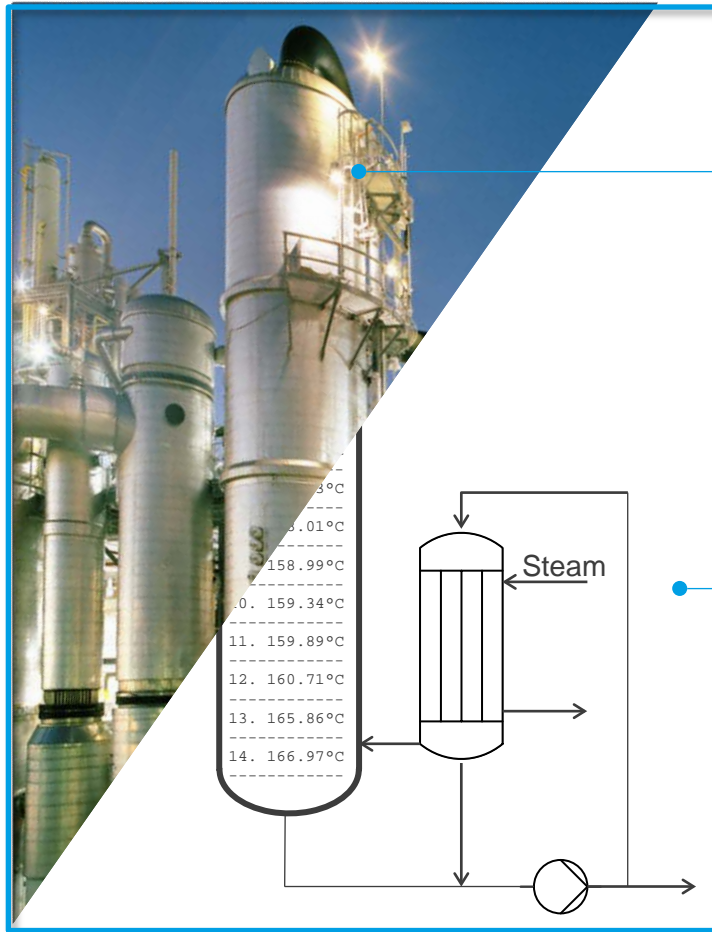
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Online Simulation: Definition

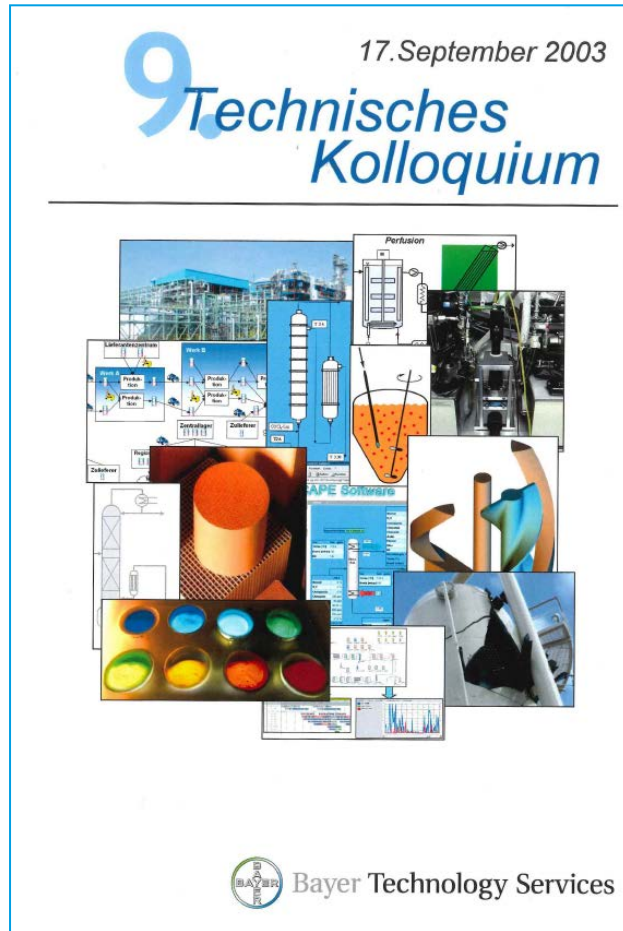


Process with live measurements

Mass & energy balance model

Online Simulation

Proven Digital Technology



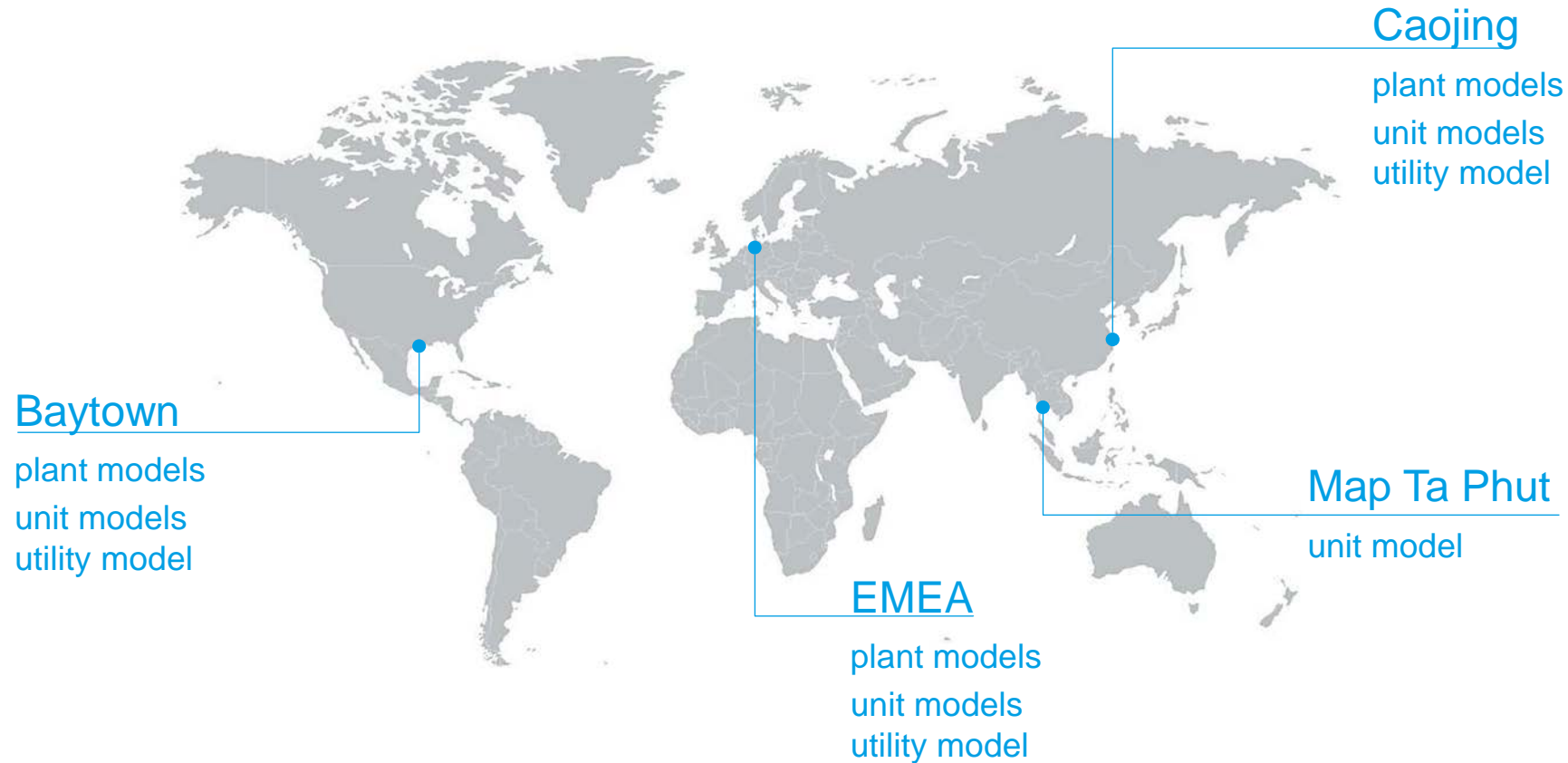
Established 2003

Napster

Ronaldo's debut at Manchester

Yao Ming 2nd season in NBA

Worldwide Presence



XX

online models
worldwide

~45%

plant models

~50%

unit models

~5%

utility models

Worldwide Presence

Baytown
plant models
unit models
utility model

Plant models

- ~50 unit operations
- 100-200 equilibrium stages
- 100k+ equations and variables
- Many recycles and design specs

Unit models

- ~5 unit operations
- Monitoring and KPIs

Utility models

- Utilities only
- Multiple plants
- Many recycles

XX

online models
worldwide

~45%

plant models

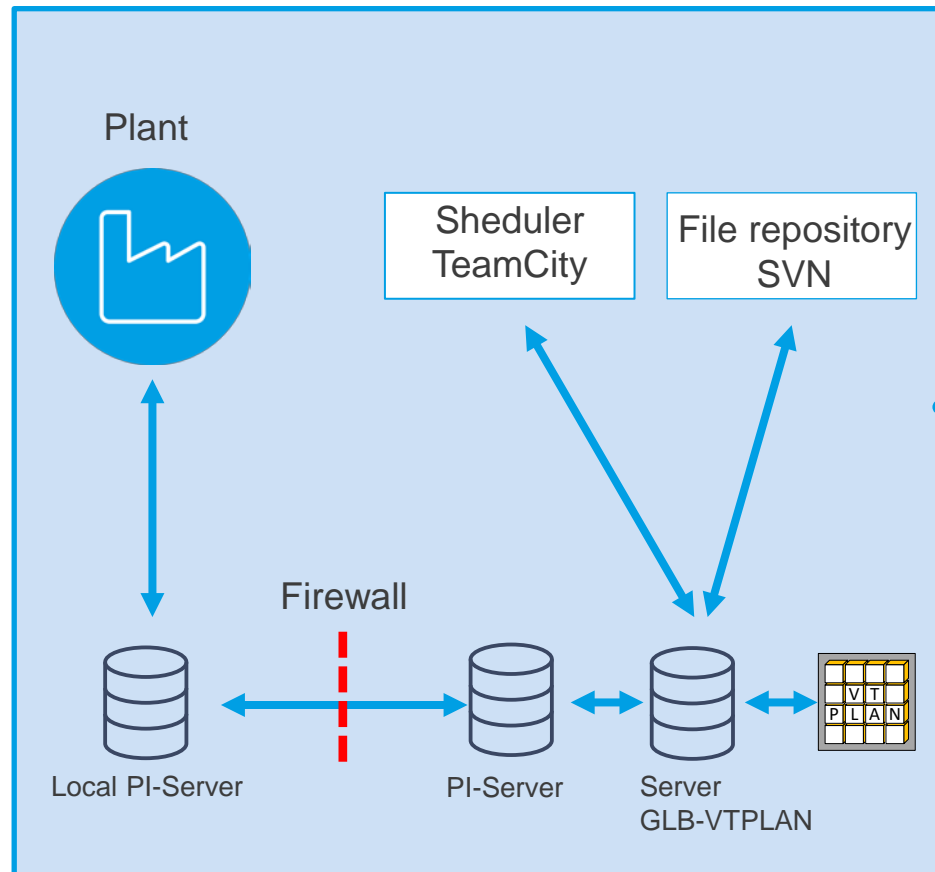
~50%

unit models

~5%

utility models

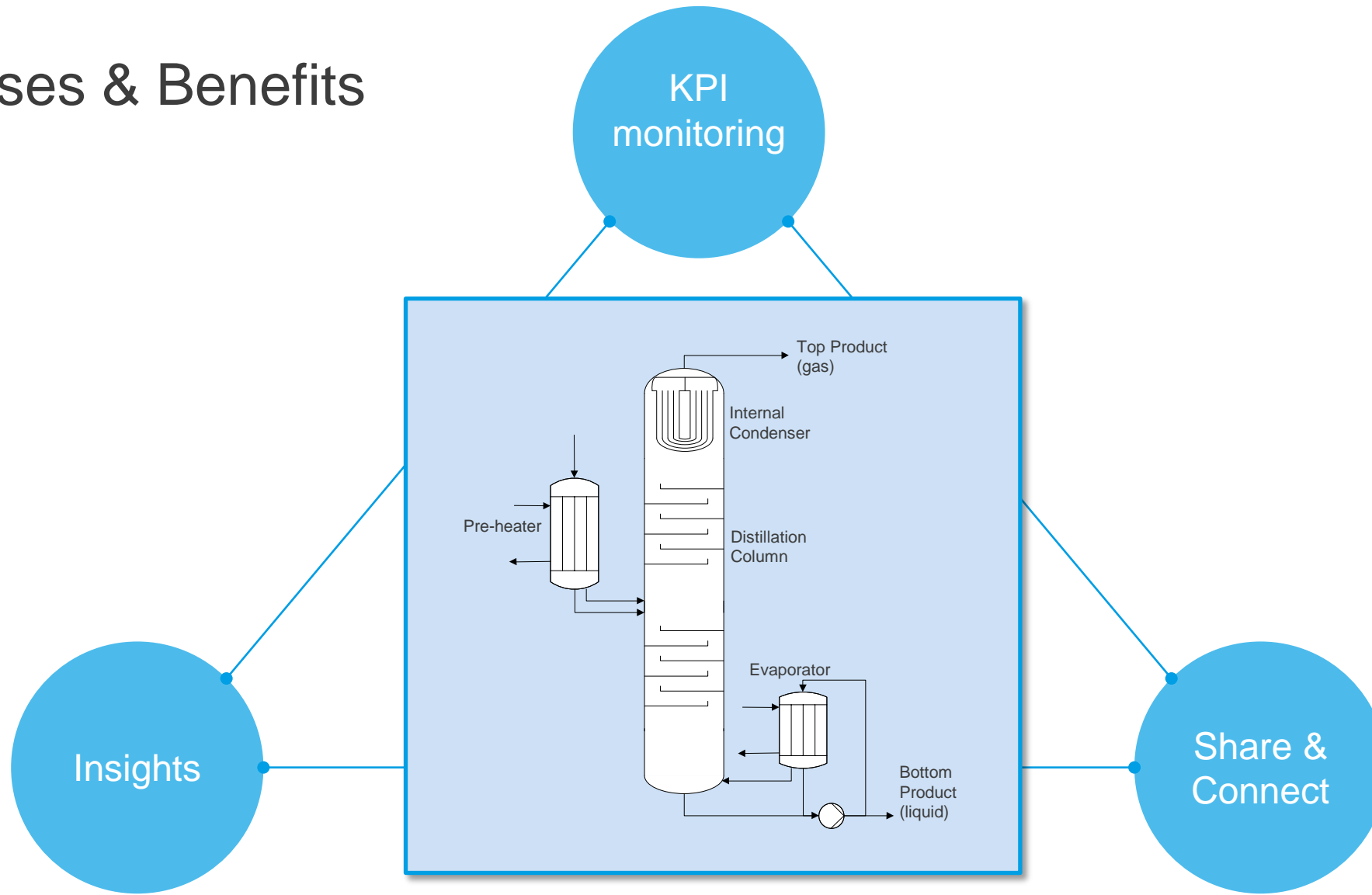
Established Infrastructure



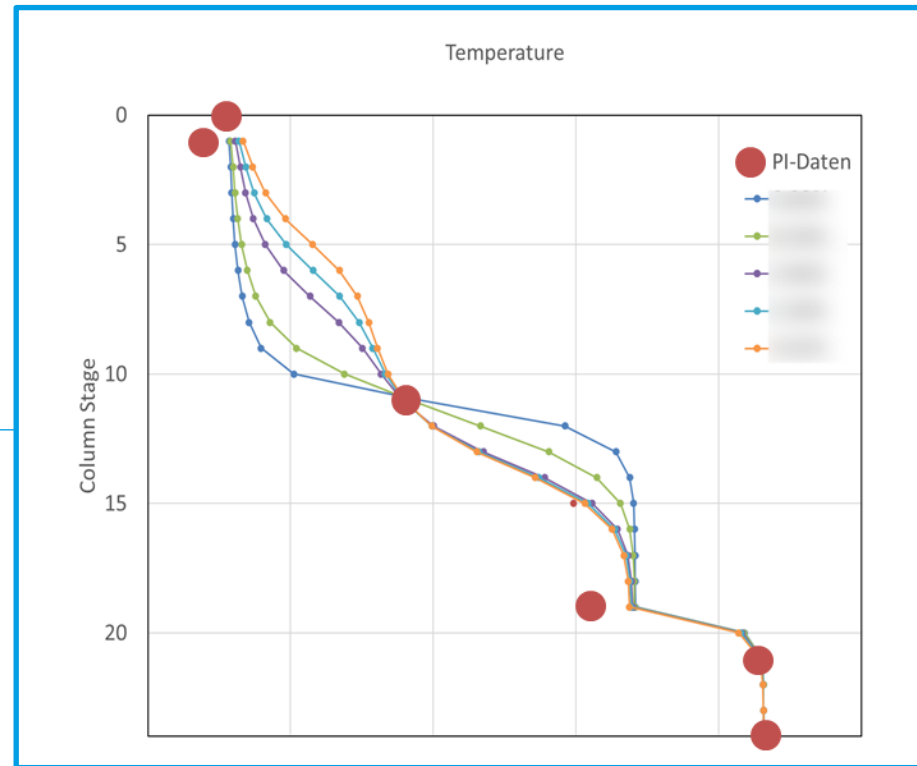
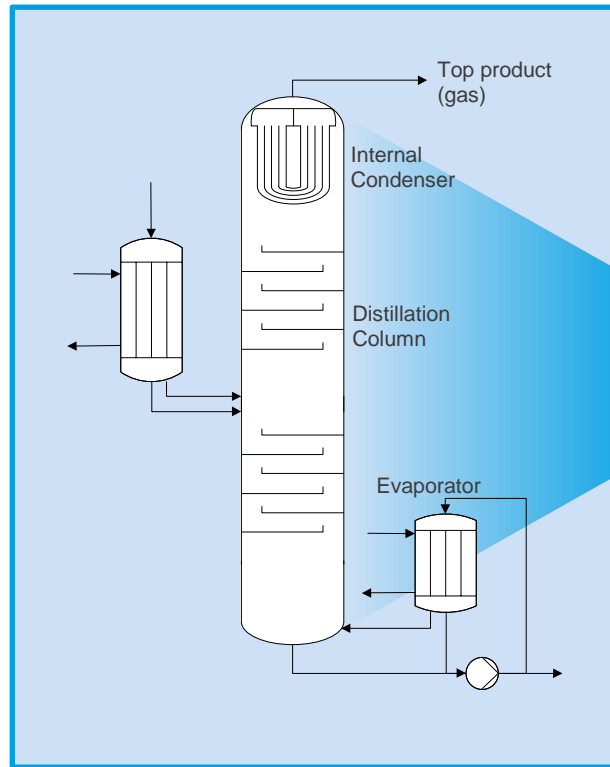
Live

Executing
right now!

Use Cases & Benefits



Insights



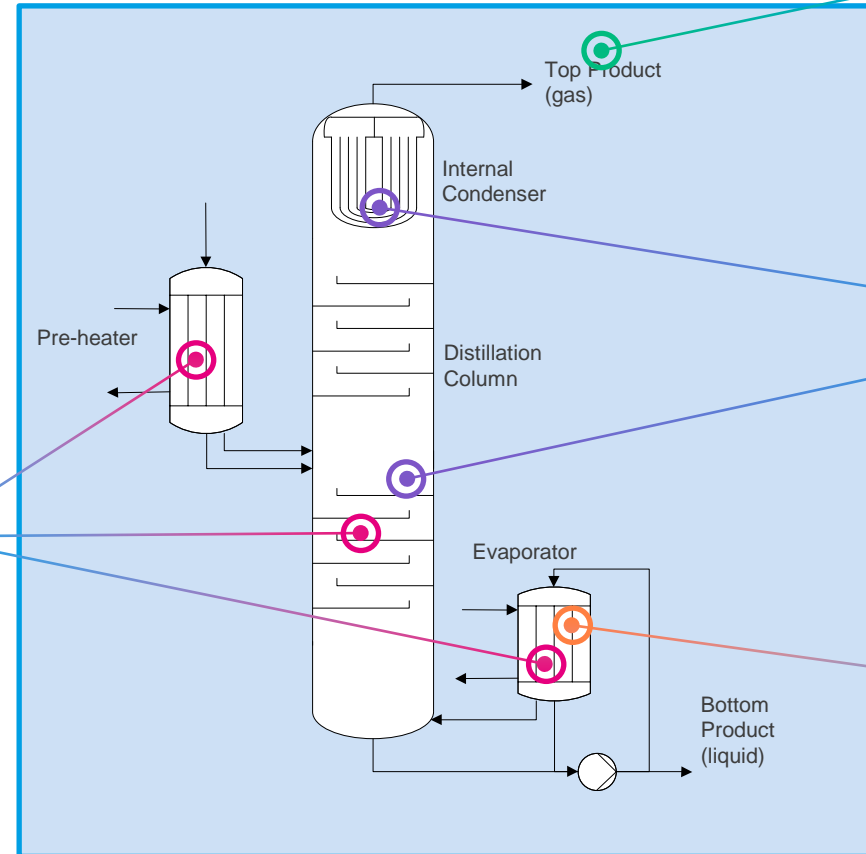
Insights

- Models are physically sound
- Transparency on model quality
- Capture non-measurable phenomena

KPI Monitoring - Examples

Fouling

Anticipate cleaning intervals for heat-exchanger & column



Product purity

Monitor the amount of undesired side-components

Internal Flows

Reflux & vapor; maintain correct operating range for trays

Energy Demand

Get direct conclusion on minimum steam consumption

Share & Connect

Search

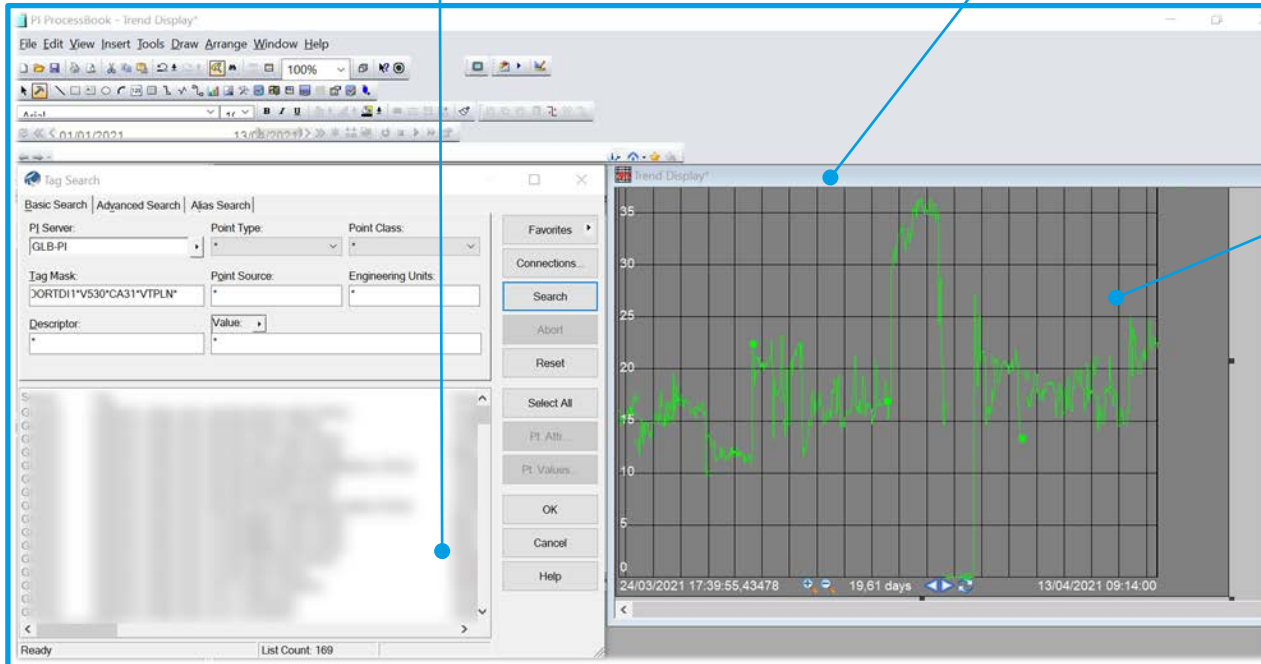
Calculations
available

Monitoring KPIs

Fouling,
concentrations,
energy demand, ...

Optimization

Get operational
recommendation

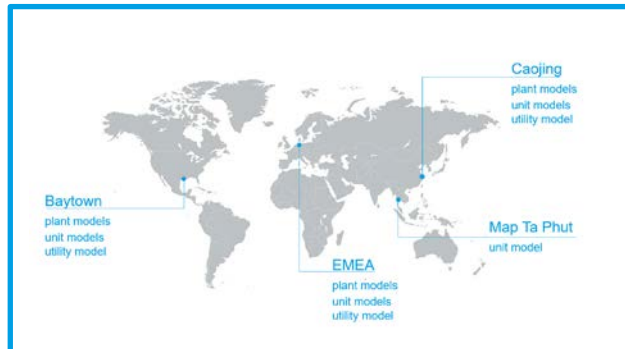


→ KPIs can directly be accessed by plant operation

Challenges

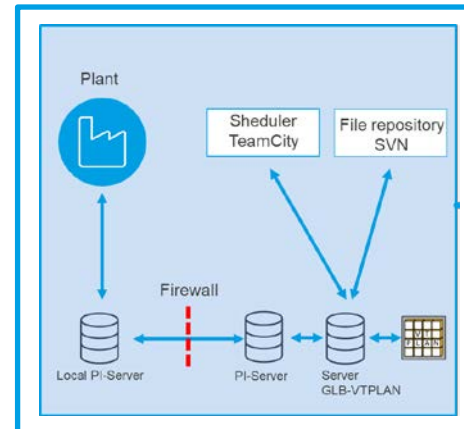
Maintenance

Many more plants not covered
Time-consuming



Set-up

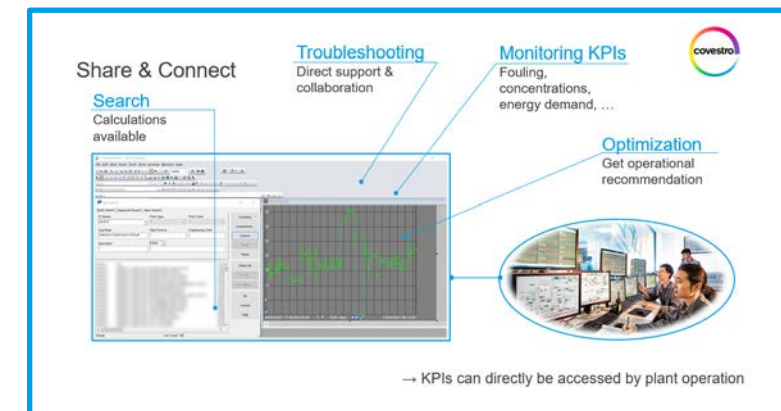
Tedious & complex set-up
In-house simulation tool has no GUI



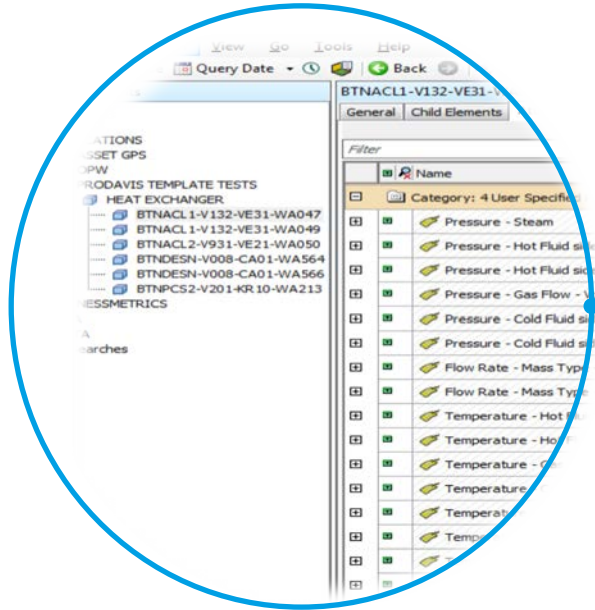
Interpretation

Lack of transparency:

- What calculations are available?
- What are the assumptions?
- Can I trust these results?



New Opportunities

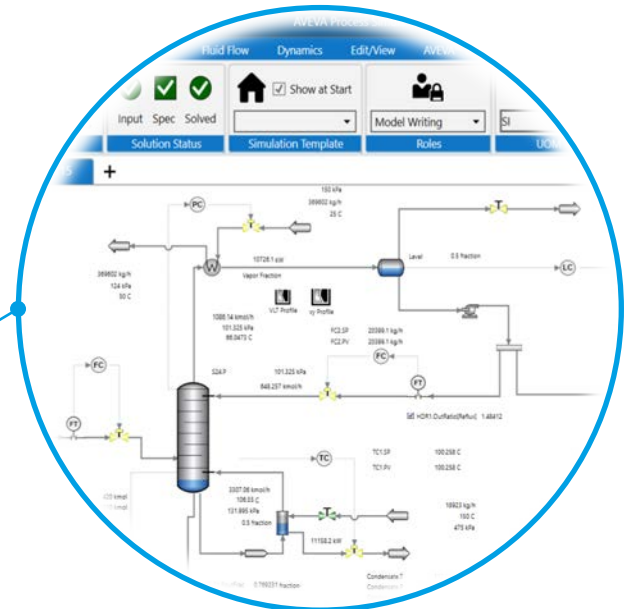


PI-Asset Framework & PI-Vision

- Structure information by template design
- Additional asset information as input (e.g., geometry, SAP)
- Advanced visualization

Aveva Process Simulation

- Graphical user interface
- Python interface to control model
- Plenty additional features



PI-AF & Model Integration

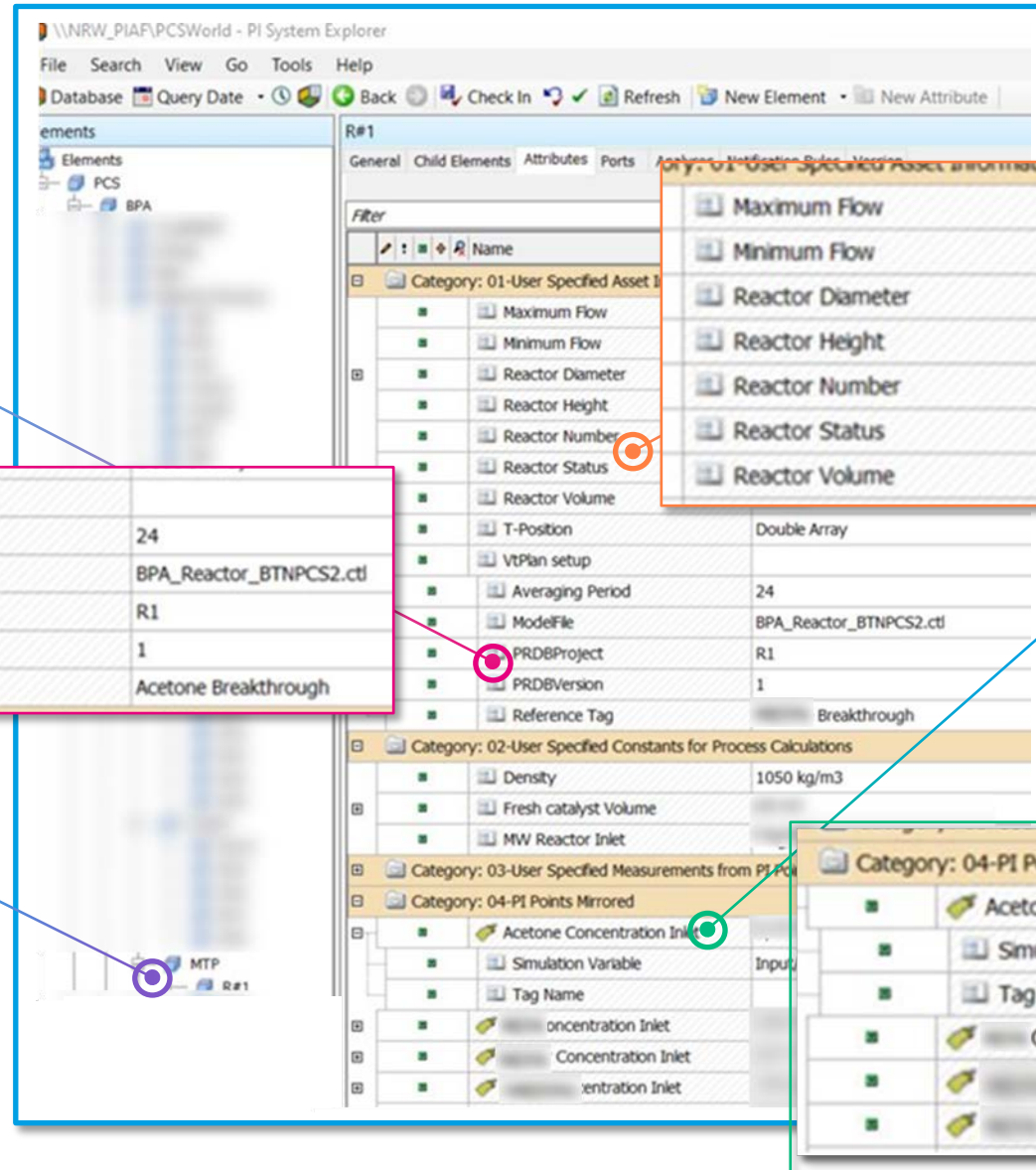
Model Attributes

Stored together with input and output

■	VtPlan setup	
■	Averaging Period	24
■	ModelFile	BPA_Reactor_BTNPCS2.ctf
■	PRDBProject	R1
■	PRDBVersion	1
■	Reference Tag	Acetone Breakthrough

Model Template

Easy extension to models of similar type



Asset Information

Combination of additional information, e.g., from SAP or sizing

Variable Template

Links model variables and the actual value, e.g. PI tag, PI AF attribute

Advanced Visualization



PI-Vision Opportunities

- Advanced visualization by PI-Vision
- Reusability: Templates leverage the similarities of models

Comparison of Simulation Tools

```

3. Iteration -----<Conti>-----1.000000 *
4. Iteration -----<Conti>-----1.000000 *
5. Iteration -----<Conti>-----1.000000 *
6. Iteration -----<Conti>-----1.000000 *

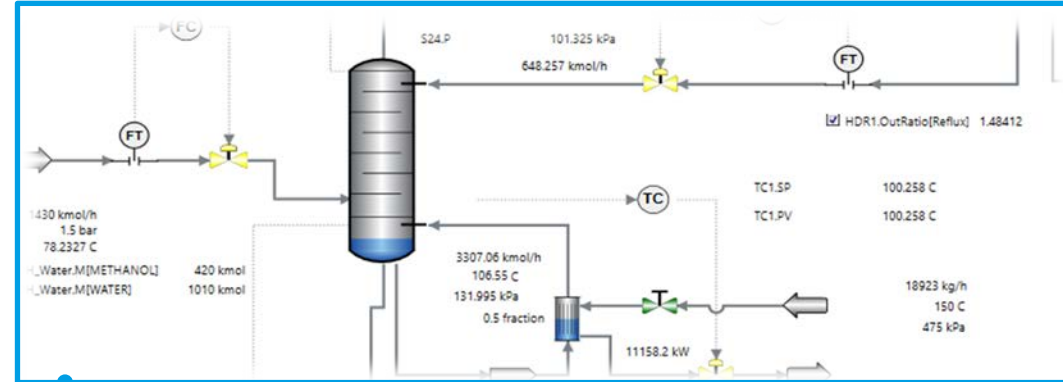
FILL
QUIT

PROPERTIES COND; COMPONENTS 2      ! Stoffdaten von Wasser und
                                     ! und Stickstoff

NEED; ENTHALPIE IDEAL;
      WEG TOPT;
  
```

In-house Simulation - Challenges:

- No graphical user interface
- Complex maintenance of Online connection
- Very specific applicability to Covestro's core processes



Aveva Process Simulation - Opportunities:

- Graphical user interface
- Python interface to control model
- Plenty additional features, e.g.,
 - Electrolyte thermodynamic
 - Data reconciliation
 - Optimization
 - Specification switch (fixed, free)

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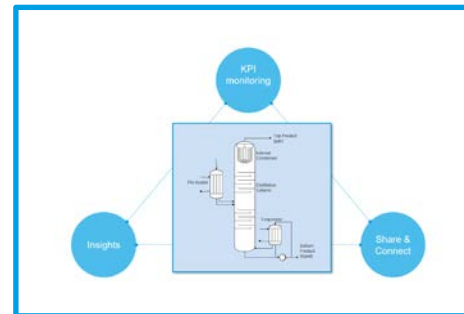
Background

Proven digital technology
Utilized worldwide at
Covestro



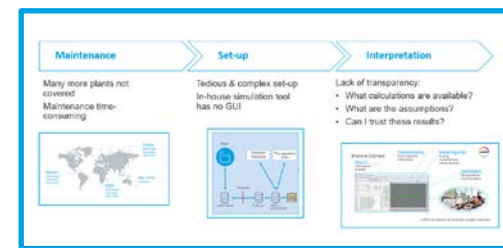
Benefits

Up-to-date models
Insights into process
KPI monitoring
Collaboration



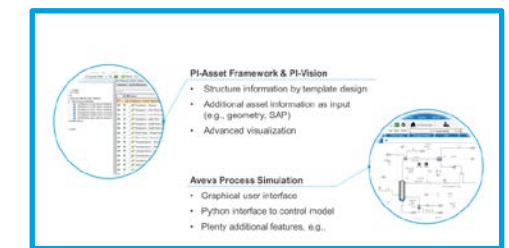
Challenges

Tedious & complex set-up
Time consuming
maintenance
Interpretation challenging



Opportunities

PI-Asset Framework & PI
Vision to simplify set-up
and interpretation.
AVEVA Process Simulation
to reduce maintenance
effort of models by ~20%.



Forward-looking statements

This presentation may contain forward-looking statements based on current assumptions and forecasts made by Covestro Deutschland AG.

Various known and unknown risks, uncertainties and other factors could lead to material differences between the actual future results, financial situation, development or performance of the company and the estimates given here. These factors include those discussed in Covestro's public reports, which are available on the Covestro website at www.covestro.com.

The company assumes no liability whatsoever to update these forward-looking statements or to adjust them to future events or developments.

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 ありがとうございます
 SIPAS JI WERE
 TERIMA KASIH

THANK YOU