



# Added Value along the Chemical/Pharmaceutical Production Chain

Photonics Technologies to Improve Pharma Processes

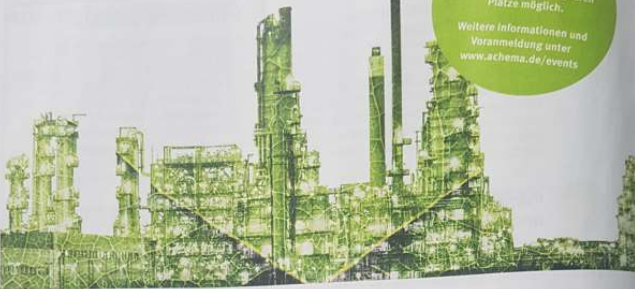
Prof. Dr. Marcus Rieker  
Director Innovation  
**HORIBA Europe GmbH**

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**EPIC Online Technology Meeting April 8<sup>th</sup>, 2024**

# Market Trends

10 | Highlights: Eröffnung



... von allen AICHEMA-Teilnehmern im Rahmen der verfügbaren Plätze möglich.  
Weitere Informationen und Vorausmeldung unter [www.achema.de/events](http://www.achema.de/events)

## ERÖFFNUNG

### Climate-neutral chemical industry 2050

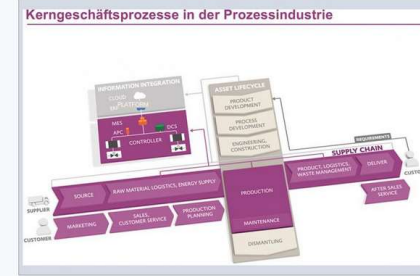
Cefic Facts & Figures 2022

## Foreword

With most of all manufactured goods relying on chemicals, Europe's chemical industry is a crucial element of almost all value chains and a vital part of Europe's economy.

## Modularization changes business processes in the chemical and pharmaceutical industry

15.10.2020 - Nachhaltigkeit, Digitalisierung und Modularisierung sind die großen Trends, die vor allem die Spezialchemie und Pharmaindustrie im nächsten Jahrzehnt verändern werden.



Neben der Umstellung auf eine nachhaltige Produktion und der Digitalisierung ist die Umstellung auf modulare Produktionstechnologien der dritte Trend, der die Prozessindustrie, vor allem die Spezialchemie und Pharmaindustrie, in den nächsten Jahrzehnten nachhaltig verändern wird.

## Smart Factory to bring medicines to market faster



Eine Smart Factory des Pharma-Unternehmens Boehringer Ingelheim soll die Marktreife von Medikamenten beschleunigen. Die digitalisierte Produktion in der neuen Tablettenfabrik soll effiziente Fertigungsabläufe entwickeln, bevor die Medikamente an unterschiedlichen Standorten hergestellt werden.

Deutschland und Europa wollen bis 2050 klimaneutral werden. Auch die chemische Industrie arbeitet an Technologien, um dieses Ziel zu erreichen. Wo liegen die Chancen, Herausforderungen und Hürden für eine klimaneutrale Chemie und Gesellschaft? Was sind die notwendigen politischen Rahmenbedingungen und Anreize, welche finanziellen Instrumente werden benötigt?

Nach der Begrüßung und Eröffnung durch Klaus Schäfer, Technologievorstand der DEHEMA e.V., wird Martin Bruder Müller im Anschluss an einen Impulsvortrag im Anschluss an die Eröffnung der CEFC - The European Chemical Industry Council, AISBL, Brüssel, Belgien, anschließend werden offene Fragen diskutiert. Er ist Development Director von North German Chemical Development und Chief Climate and Geo Scientist bei Dechema.

Control & Automation - Dechema Unveils 'Process Simulation - Fit for the future?' Position Paper

### Germany: Digitalization

## Dechema Unveils 'Process Simulation - Fit for the future?' Position Paper

22.04.2021 | Editor: Ahlam Rais

Dechema's latest position paper 'Process Simulation - Fit for the future?' by the Processnet working committee Process Simulation, Process Synthesis and Knowledge Processing focuses on the relevance of today's tools to meet the demands of the digitalized chemical, biotechnology and pharmaceutical industries.



**Dr. Klaus Schäfer**  
CTO, Covestro AG, Leverkusen, Deutschland



**Dr. Martin Bruder Müller**  
Präsident des CEFC - The European Chemical Industry Council, AISBL, Brüssel, Belgien



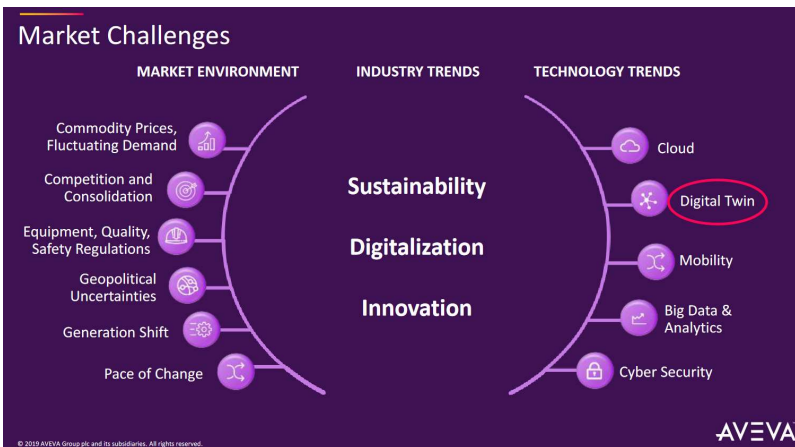
**Ernst Rauch**  
Chief Climate and Geo Scientist, Munich Re Group, München, Deutschland

Director, Northern Lights, Stavanger, Norwegen

# Technology Trends

## Improvements of the production processes (Chemical and Pharmaceutical Industry)

### Data Analytics and Digitalization



## What is Digital Twin Technology — Use Cases, Solutions, and Examples

### What is a Digital Twin?

A digital twin, in simple terms, is a virtual model of a product, process, or service. By pairing the virtual and physical worlds, digital twins enable data analysis, system monitoring to alert problems, downtime prevention, and future planning via simulations.

1. Shift towards small batch production (personalized cancer drugs)
2. To support sustainable production, it could be essential to move production plants back to Europe
3. Digitalization and Virtualization to plan and optimize production processes (energy/cost savings and time to market)
4. Product quality and accuracy are key

# New production and brownfield digitalization



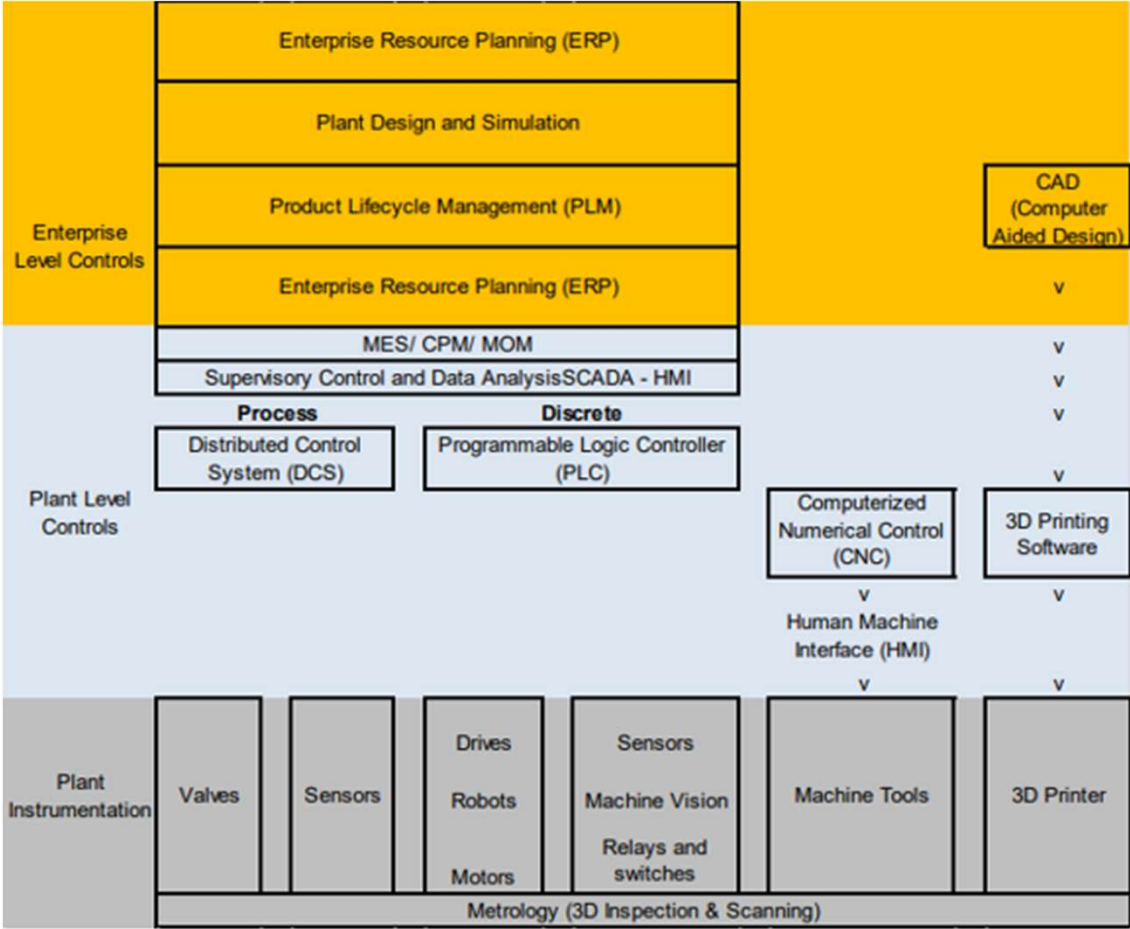
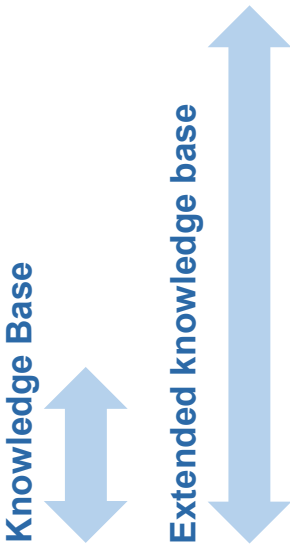
<https://de.wikipedia.org/wiki/Zuckerindustrie>

[https://www.forschungsnetzwerke-energie.de/news/de/chemische\\_verfahrenstechnik\\_5\\_enpro\\_tag#&gid=1&pid=1](https://www.forschungsnetzwerke-energie.de/news/de/chemische_verfahrenstechnik_5_enpro_tag#&gid=1&pid=1)



# Customer Requirements?

Sensors/spectrometers already generate data which are analyzed during the process



# NAMUR

## User Association of Automation Technology in Process Industries

**NAMUR** bundles the expertise of automation and digitalization in the process industry. It contributes to the added value of companies with the aim of more efficient (costs, availability), sustainable, safe processes. NAMUR further develops the application of automation and digitalization and promotes qualified young talent.

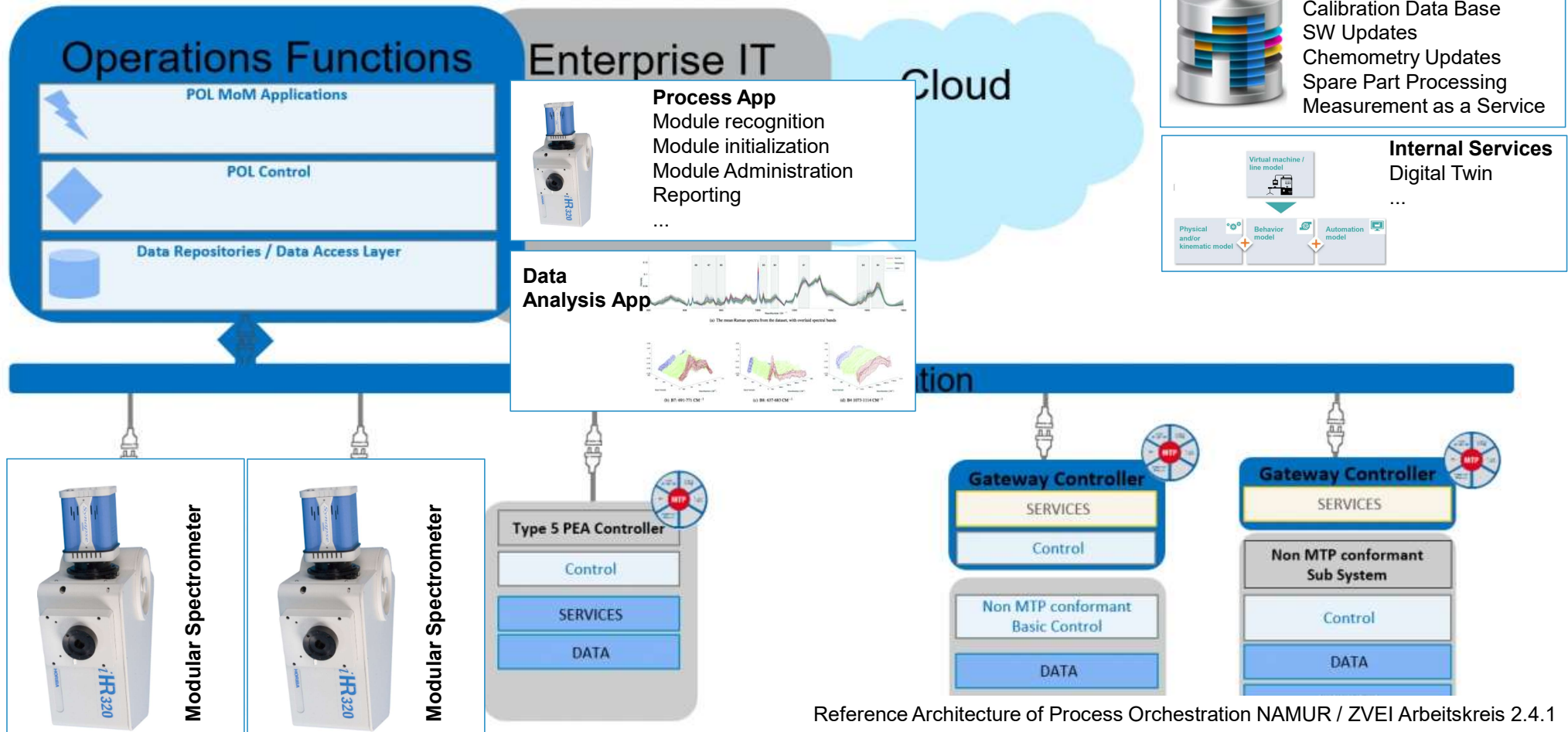


<https://www.chemanager-online.com/news/nachhaltigkeit-energieeffizienz-und-herstellerunabhaengige-automatisierung>

# Reference Implementation

MTP: Modul Type Package  
 POL: Process Orchestration Layer  
 PEA: Process Equipment Assembly  
 MoM: Manufacturing Operations Management

Chemical/Pharmaceutical Production Process infrastructure



Reference Architecture of Process Orchestration NAMUR / ZVEI Arbeitskreis 2.4.1

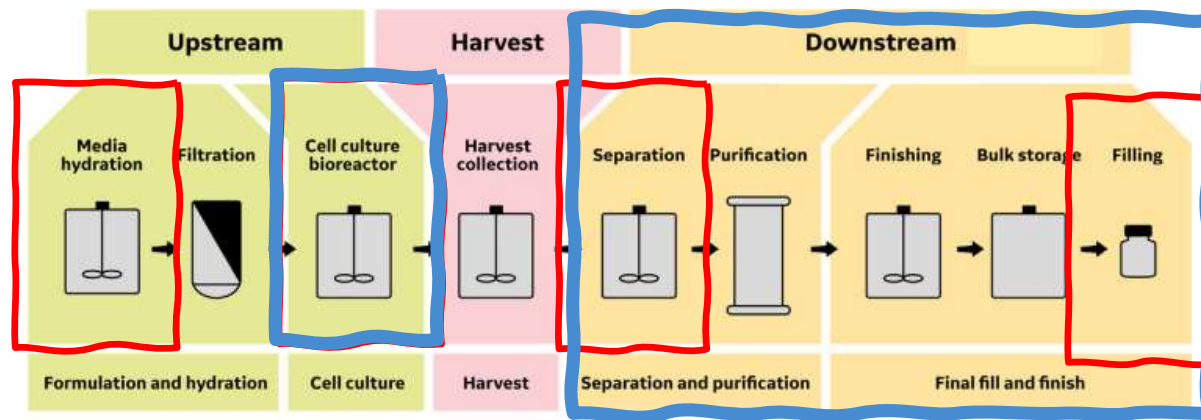
# Vertical (Dedicated) vs Horizontal (General) Products

## Development



**Raman Plate Reader  
&  
A-TEEM**

## Manufacturing



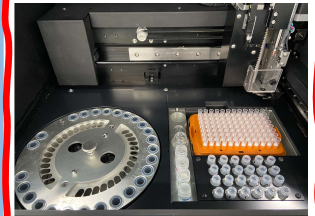
**A-TEEM  
&  
Process Raman**

**ViewSizer**

**A-TEEM**

Provide measurement from the Lab to scale up to production.  
HORIBA to provide engineering and products  
We provide engineering and measurement from research to process  
Instrument integration

## QC



**Rapica  
&  
A-TEEM**



# How to get from then to now

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## As critical, if not more critical than the spectrometer

- **Advanced sampling options**
- **Automation**
- **Automation software**
- **Standard Operating Procedures and Workflows**
- **Data analysis and integrity/compliance software**
- **.....and so many more things**

# Partner & Collaborate & Grow

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## Bolstering industrial process monitoring technologies through the acquisition of Process Instruments, Inc. in the United States

03.10.2023

This acquisition will expand business ventures by leveraging Process Instruments' industrial process instrument business oriented primarily around refinery and petrochemistry solutions in the United States and HORIBA's global sales network.

The integration of Process Instruments' robust devices and data analysis capabilities cultivated in oil markets with HORIBA's lineup of highly accurate spectroscopy solutions is expected to realize the high-precision real-time monitoring that has typically been difficult to achieve in industrial processes. Even outside of the oil industry, we will create new value in process monitoring for pharmaceutical, material, and other such sectors, with the goal of accelerating our growth in these important markets.



Left: Jai Hakhu, HORIBA Instruments Incorporated / Right: Lee M Smith,

# Clinical

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- **Potentially most difficult translation of all**
  - With all due respect it's relatively easy to get some funding the rest is hard
  - Work backwards from the ultimate desired solution (base grants on this)
  - Understand not just the problem properly but the acceptable solution
  - One doctor is easy to convince, many are not
  - Clinical trials are bloody expensive
  - 10-year minimum PoC requirement in medical
  - FDA etc. regulatory requirements are a business killer
  - Just because Raman and A-TEEM are cool doesn't mean it should be used when there are established or cheaper even less reliable(?) options
  - Insurance – who will pay for this?
  - There is some great work being done with spectroscopy in biomedical but there is also a lot of funded terrible work out there



Omoshiro-okashiku  
Joy and Fun

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Thank you

감사합니다

Cảm ơn

Dziękuję

ありがとうございました

धन्यवाद

Grazie

Merci

谢谢

ขอบพระคุณ

நன்ற

Obrigado

Σας ευχαριστούμε

شُكْرًا

Tack ska ni ha

Danke

Большое спасибо