# RECONNECT

## SYMPOSIUM 2022

KNOWLEDGE • OPTIMIZATION • INNOVATION

Stamicarbon 75 YEARS

# Stami Digital

## Stami Digital Products & Services to optimize your plant performance

Leo Rams

17 May 2022

Jaarbeurs, Utrecht

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# Agenda

- Digitalization
- Stami Digital Products & Services
- Stami Digital Process Simulator (Operator Training Simulator)
- Stami Digital Process Monitor & Advance Consult™
- Stami Digital Optimizer
- Q&A

# Digitalization

Maire Tecnimont

Stamicarbon

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# Digitalization

## Stami Digital

- State-of-the-art software & quality services
- To control and optimize production
- With well-trained and well-informed personnel
- To reduce waste, save energy and produce
- in a safe, cost-effective and profitable way

# Stami Digital Products & Services

STAMI DIGITAL

Stami Digital Process Simulator (Operator Training Simulator)

Advance Consult™

Stami Digital Process Monitor

Stami Digital Process Optimizer

# Stami Digital Process Simulator (OTS)

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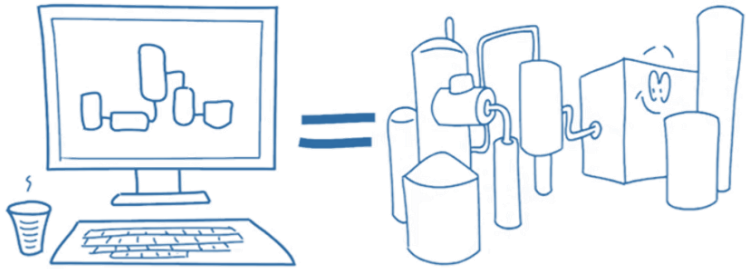
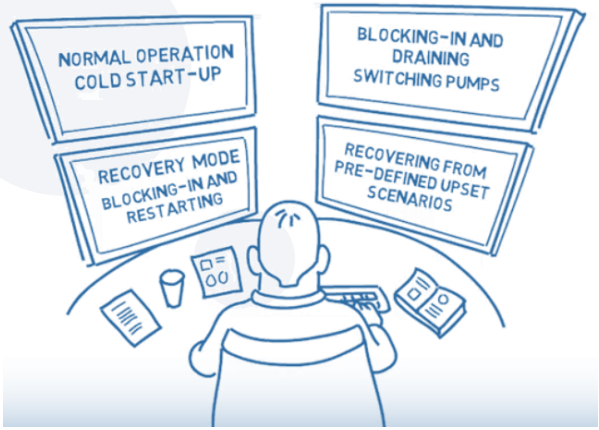
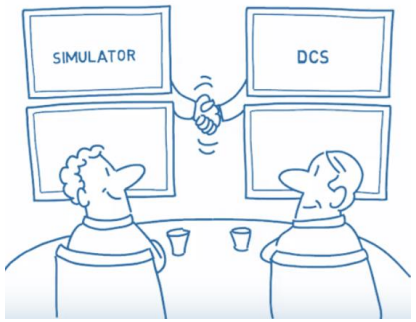
OTS operates as a real plant in a large operating window…






…emulating the DCS functionality




…allowing to simulate realistic operating scenarios with high fidelity accuracy of Stamicarbon design…

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PROTOMATION by STAMI DIGITAL

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# Stami Digital Process Simulator (OTS)

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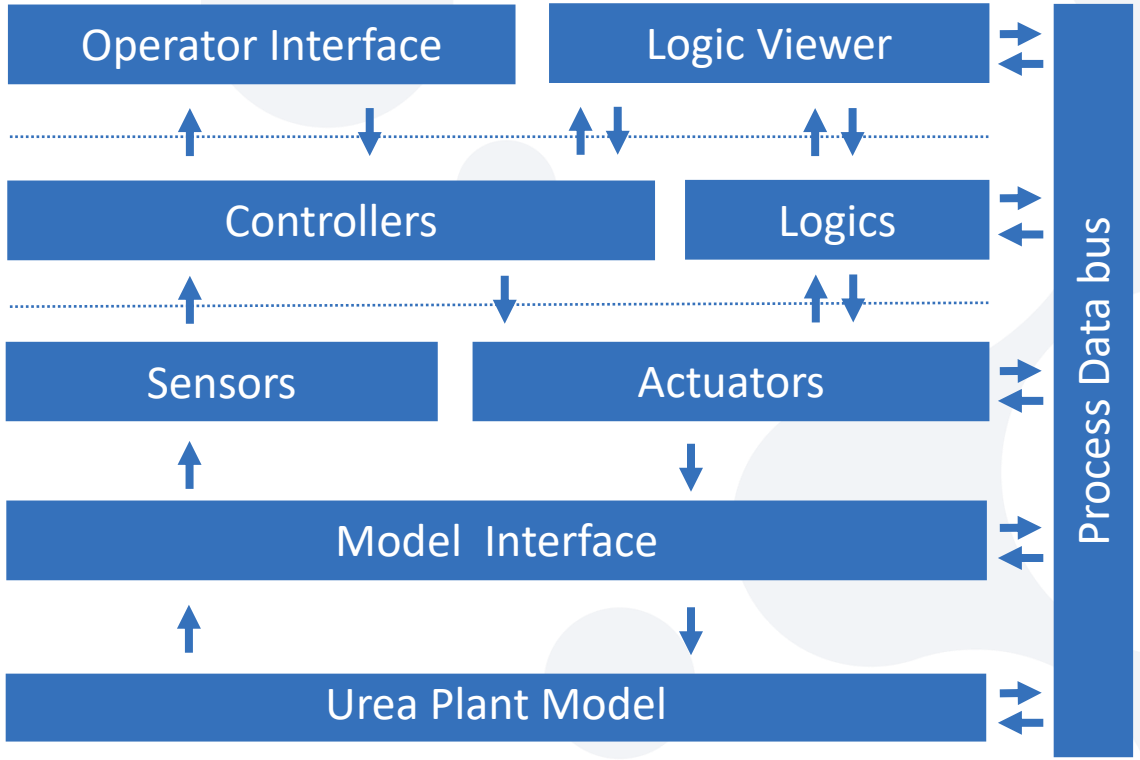
## CORPORATE NETWORK

## ARCHITECTURE PROCESS STUDIO DCS EMULATION

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PROCESS SIMULATOR by STAMI DIGITAL

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# Stami Digital Process Simulator (OTS)

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## High fidelity

## Real-Time Dynamic Model:

- First principles model
- Stamicarbon Thermodynamics & Reaction Kinetics
- Heat & Material Balances
- Equipment data, etc.
- Accuracy > 98% of Instrument Range
- Typical cycle time 1 second

## Stamicarbon:

Urea Melt Granulation

Nitric Acid

Ammonia

# Stami Digital Process Simulator (OTS)

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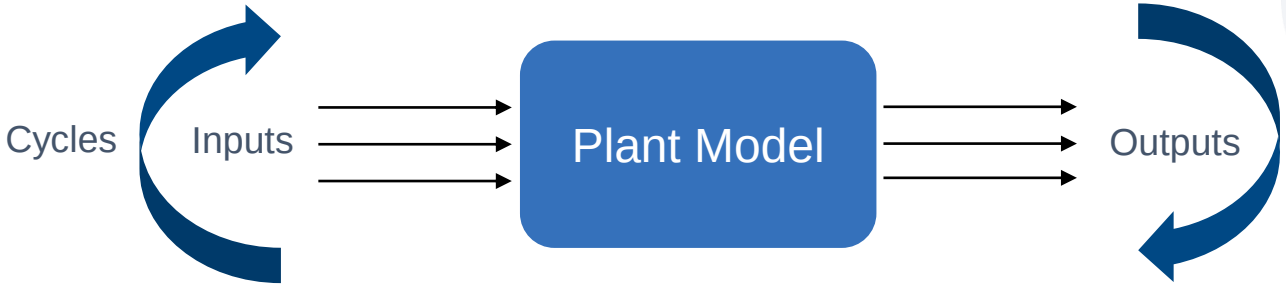
## High fidelity




Real-Time Dynamic Model

## Other:

Ammonia
Methanol
Propylene Oxide
Chlorine
Hydrogen
Sulfur Recovery

# Stami Digital Process Simulator (OTS)

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## Benefits:

Faster startup
Less unplanned shutdowns
Faster upset recovery time

Prevent equipment damage

Higher on-stream time = $$$

Licensor certified!

Well trained personnel

Safety

Return On Investment < 1 year!

Best in class OTS

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# Stami Digital Process Monitor

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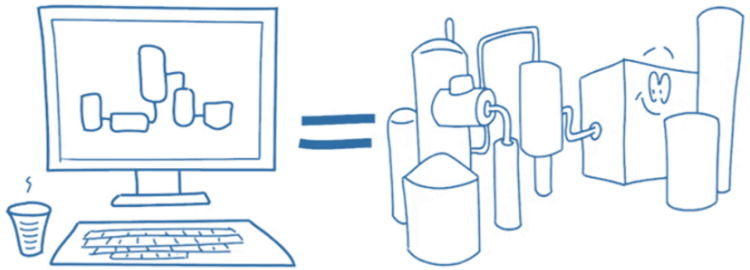
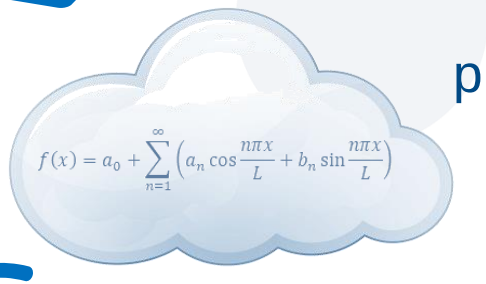
Stami Digital Process Monitor…






… is a “tailor made" process plant model running in parallel to the real plant based on Stamicarbon’s original plant design …

… providing real time continuous insight in urea plant performance…

… by producing soft sensor info (key variables not measurable directly) using DCS input data.

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PROCESS MONITOR by STAMI DIGITAL

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# Stami Digital Process Monitor

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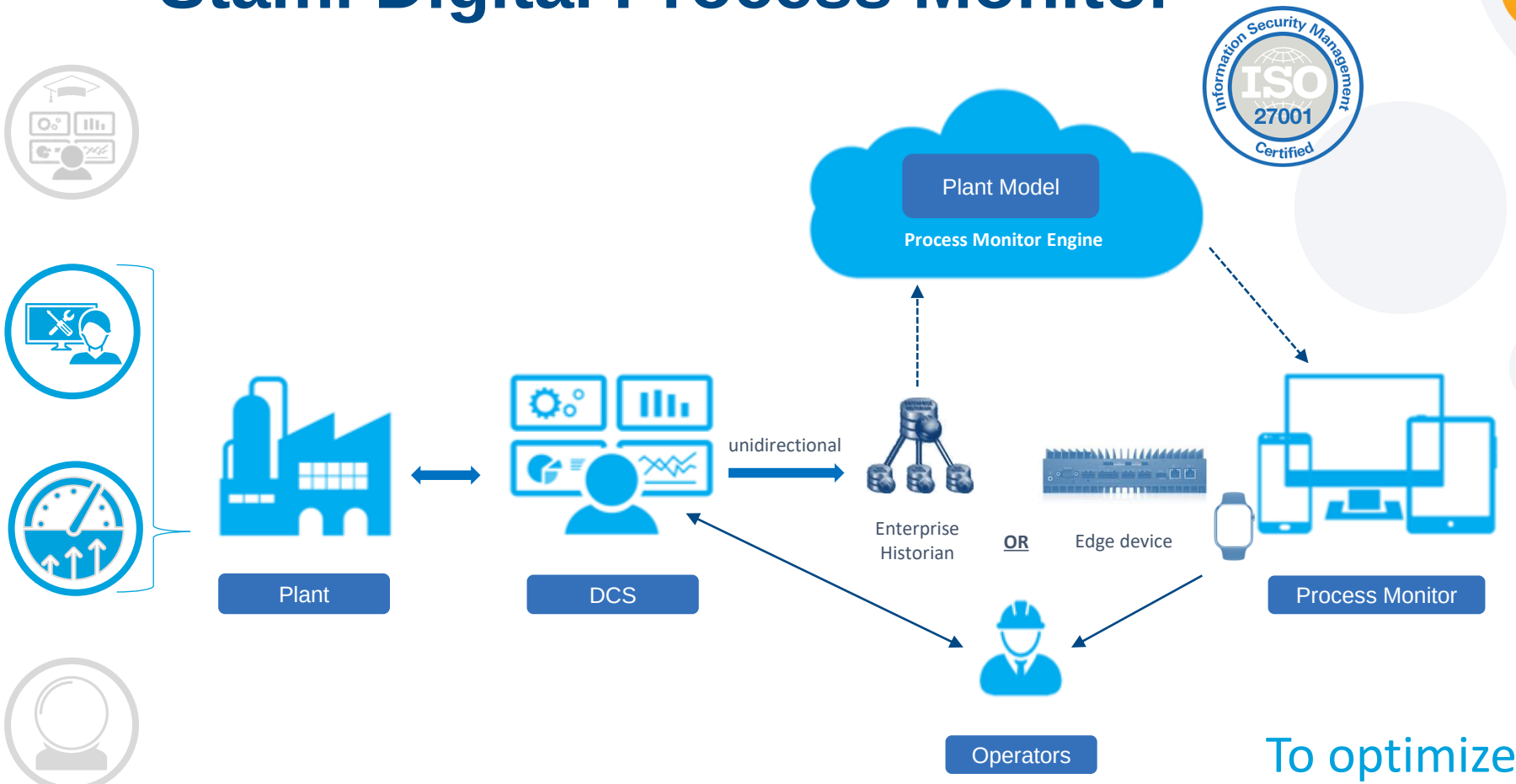


## Stamicarbon:

Urea Melt
Granulation
Nitric Acid
Ammonia

To optimize plant performance

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# Stami Digital Process Monitor

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## Extremely accurate

### Steady-State Model:

- Same model as used for the design of the plant
- Stamicarbon Thermodynamics & Reaction Kinetics
- Typical cycle time 1 minute

## Stamicarbon:

Urea Melt

Granulation

Nitric Acid

Ammonia

# Stami Digital Process Monitor

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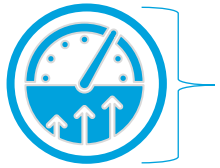
## Advance Consult™ & Process Monitor project:

Develop and tune simulation model based on historical data



Deliver Process Monitor with Key Performance Indicator's (**KPI**'s) and Key Variables Soft Sensors (**KV**'s), including training.



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# Stami Digital Process Monitor

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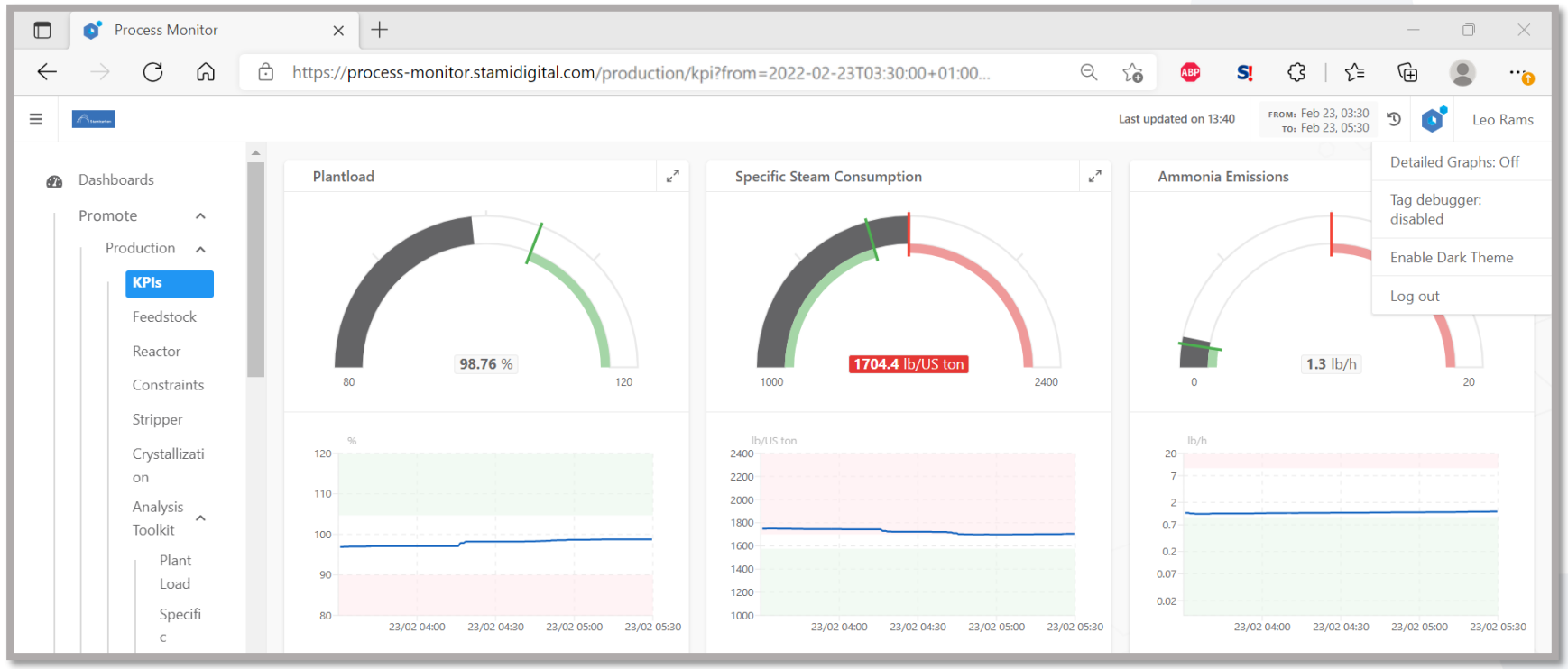
## Dashboards with KPI's and Key Variables (example)




Plant load | Steam consumption | Ammonia emission

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# Stami Digital Process Monitor

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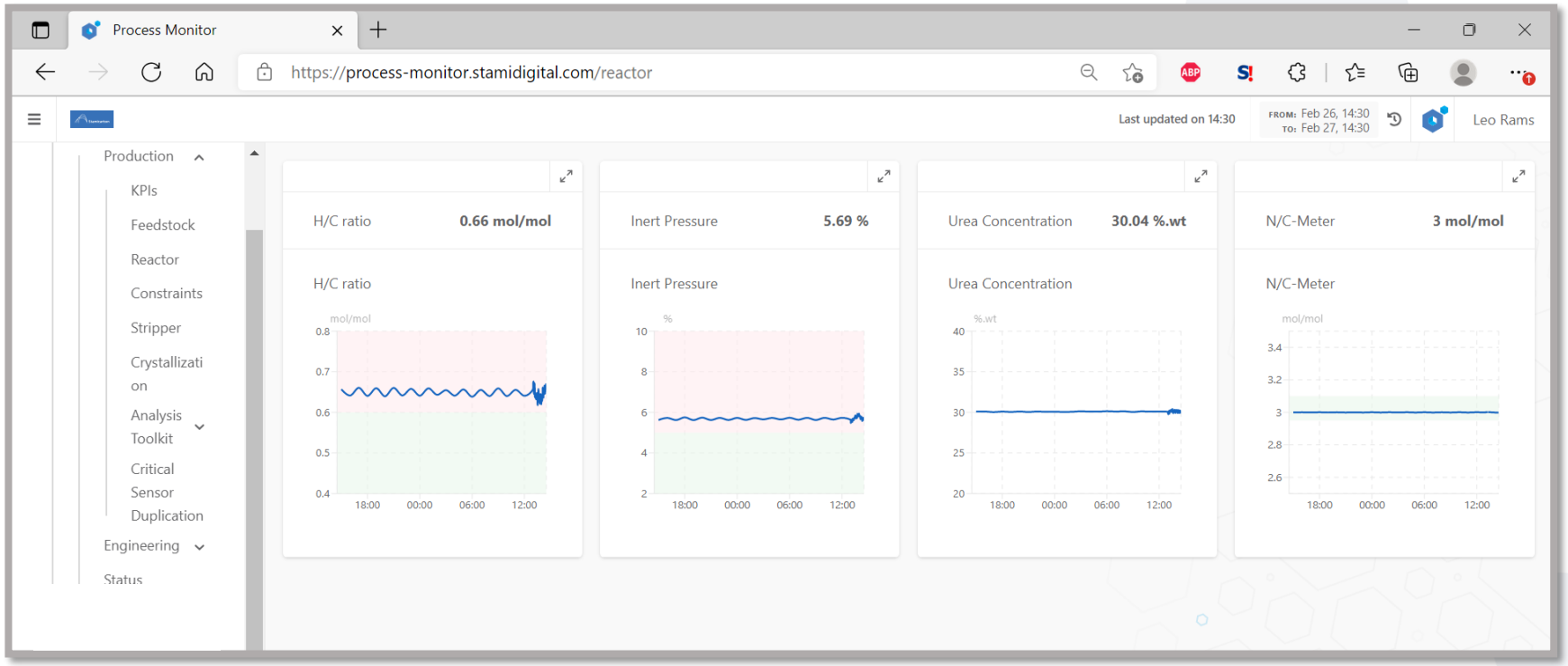
## Dashboards with KPI's and Key Variables (example)




Water/Carbon Ratio  Inert Pressure  Urea concentration

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# Stami Digital Process Monitor

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## Benefits:

Additional key plant information
Better process insight
Better control of the plant

Enables operators to optimize plant

Minimize emissions

Safety, Health, Environment!

Optimized plant operation = $$$

Return On Investment < 1 year!

Licensor certified!

Extremely accurate!

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# Stami Digital Process Monitor

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## More information:

Presentation: Luc Dieltjens:

**Experience with a Digital Process Monitoring System at Nutrien Borger**

Today
15:00 hours

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# Stami Digital Process Optimizer

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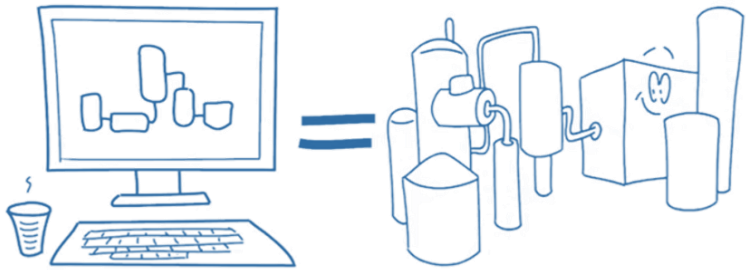
Stami Digital Process Optimizer…



$$f(x) = a_0 + \sum_{n=1}^{\infty}\left(a_n \cos\frac{n\pi x}{L} + b_n \sin\frac{n\pi x}{L}\right)$$

… is a Stamicarbon's most advanced solution, on top of, the Process Monitor …

… that feeds real-time optimized values to a model predictive controller…

… automating operator handling, acting as an auto pilot.

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# Stami Digital Process Optimizer

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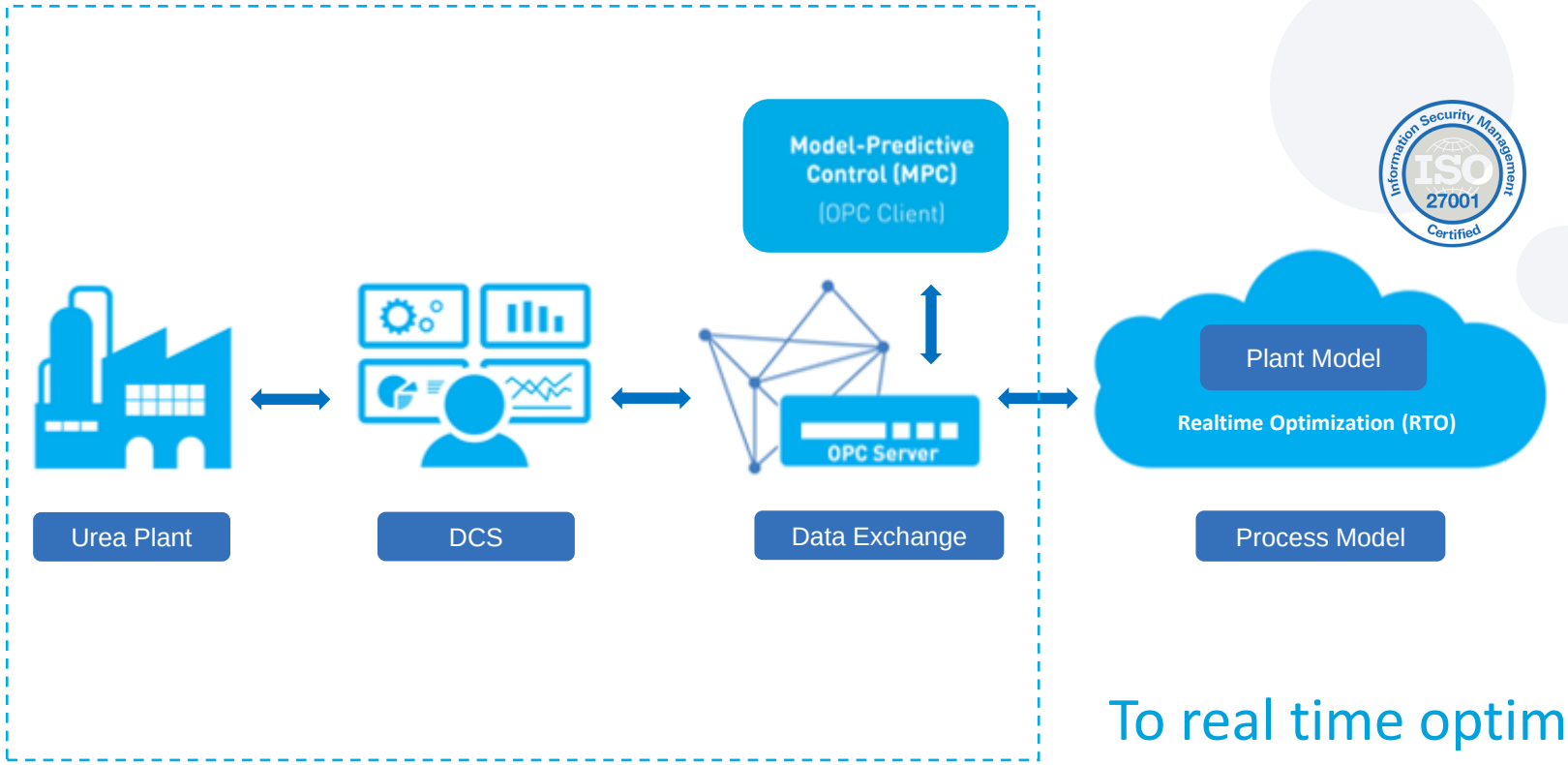


## Stamicarbon:

Urea Melt

To real time optimize plant performance

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PROCESS OPTIMIZER by STAMI DIGITAL

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# Stami Digital Process Optimizer

## Only suitable for particular plants:

To be determined based on Advance Consult Feasibility Study

To check if all required “enablers” are present

# Stami Digital Process Optimizer

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## More information:

Presentation: Gabriele Genyte:

**Enablers/disablers for digitalization**

Today

13:30 hours

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PROCESS OPTIMIZER by STAMI DIGITAL

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# Stami Digital Process Optimizer

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## Benefits:

- Better control of the plant
- Auto pilot
- Minimize emissions
- Safety, Health, Environment!
- Optimized plant operation = $$$
- Return On Investment < 1 year!
- Licensor certified!
- Extremely accurate!

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PROCESS OPTIMIZER by STAMI DIGITAL

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# Demo room

## OTS demo for Urea Melt & Granulation

OTS Instructor Station

OTS Trainee Station

OTS Field Operator Station

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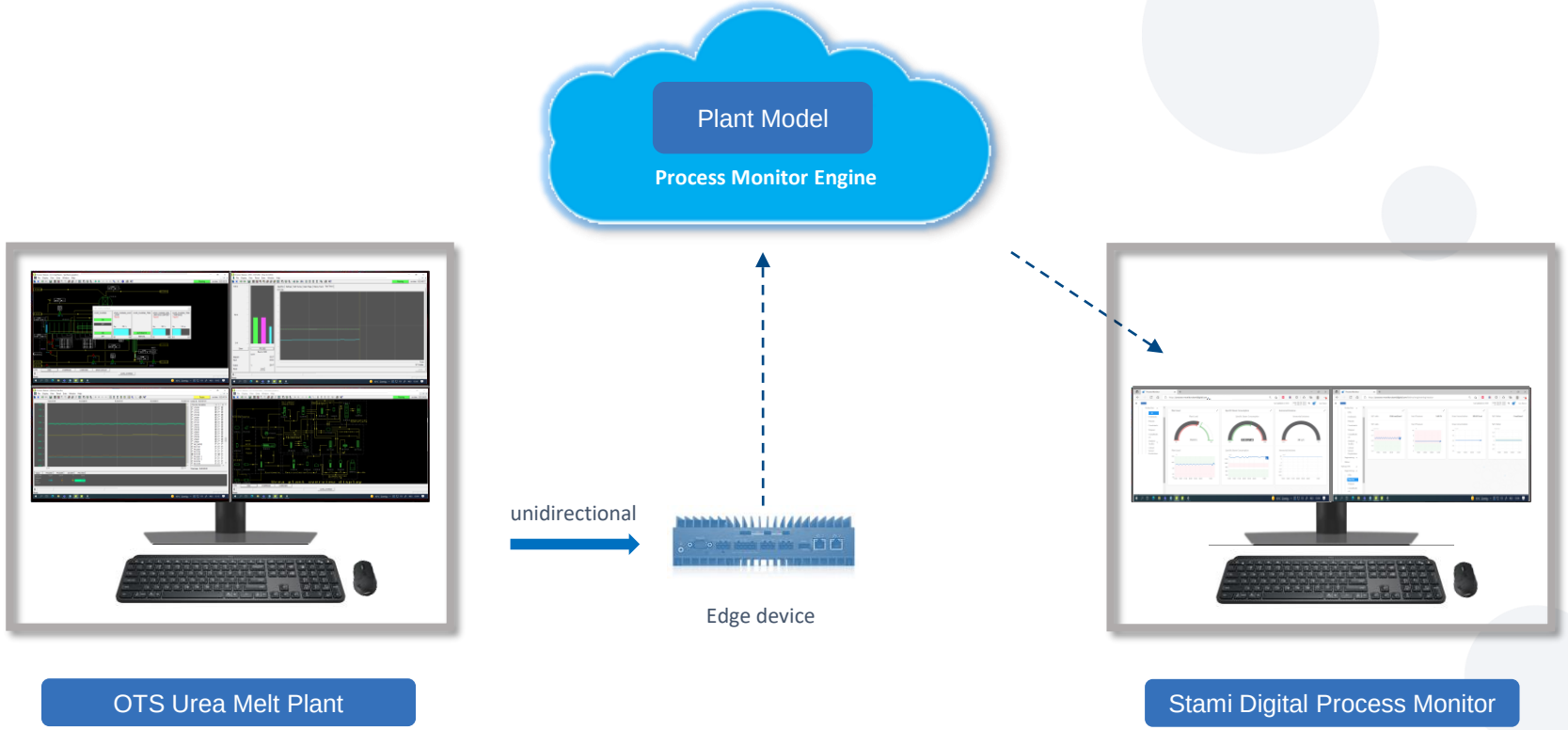
# Demo room

## Process Monitor demo in combination with an OTS



# Demo room

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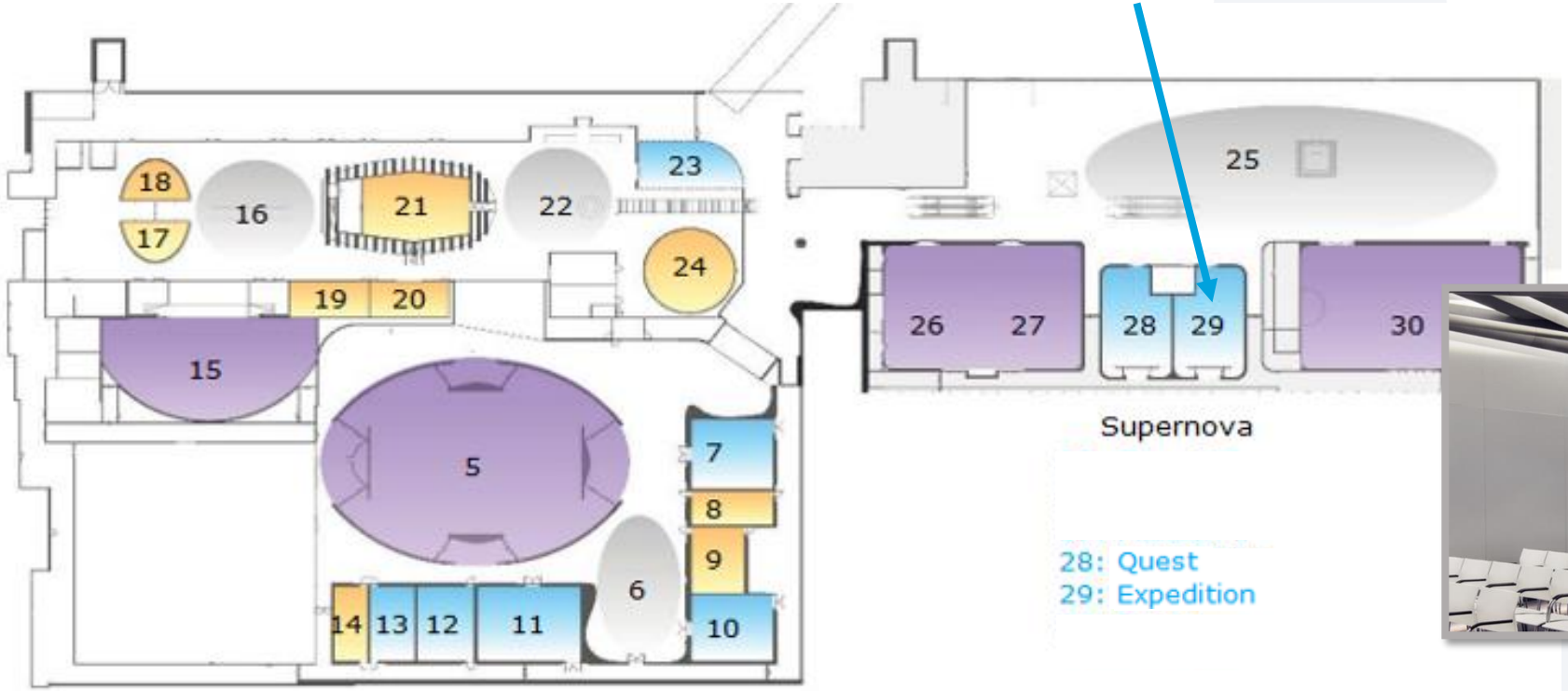
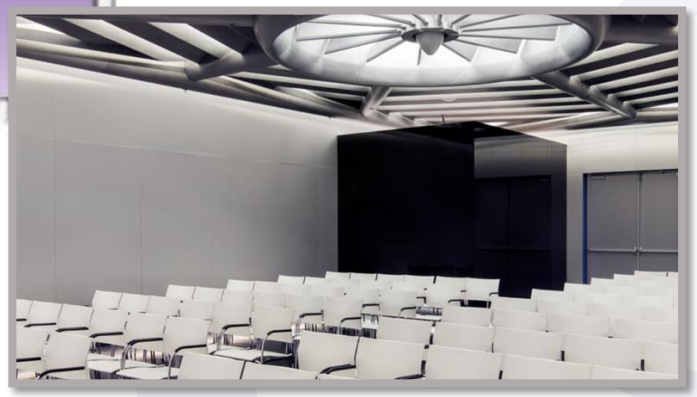
You are most welcome in room: Quest



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# Thank you!

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# Q&A

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