IT Integration
The Challenge and the CoPro Solution

Udo Enste, LeiKon GmbH

www.spire2030.eu/copro

IT Integration – The Challenge

Thesis: Model based applications provide an important contribution to optimised plant coordination solutions

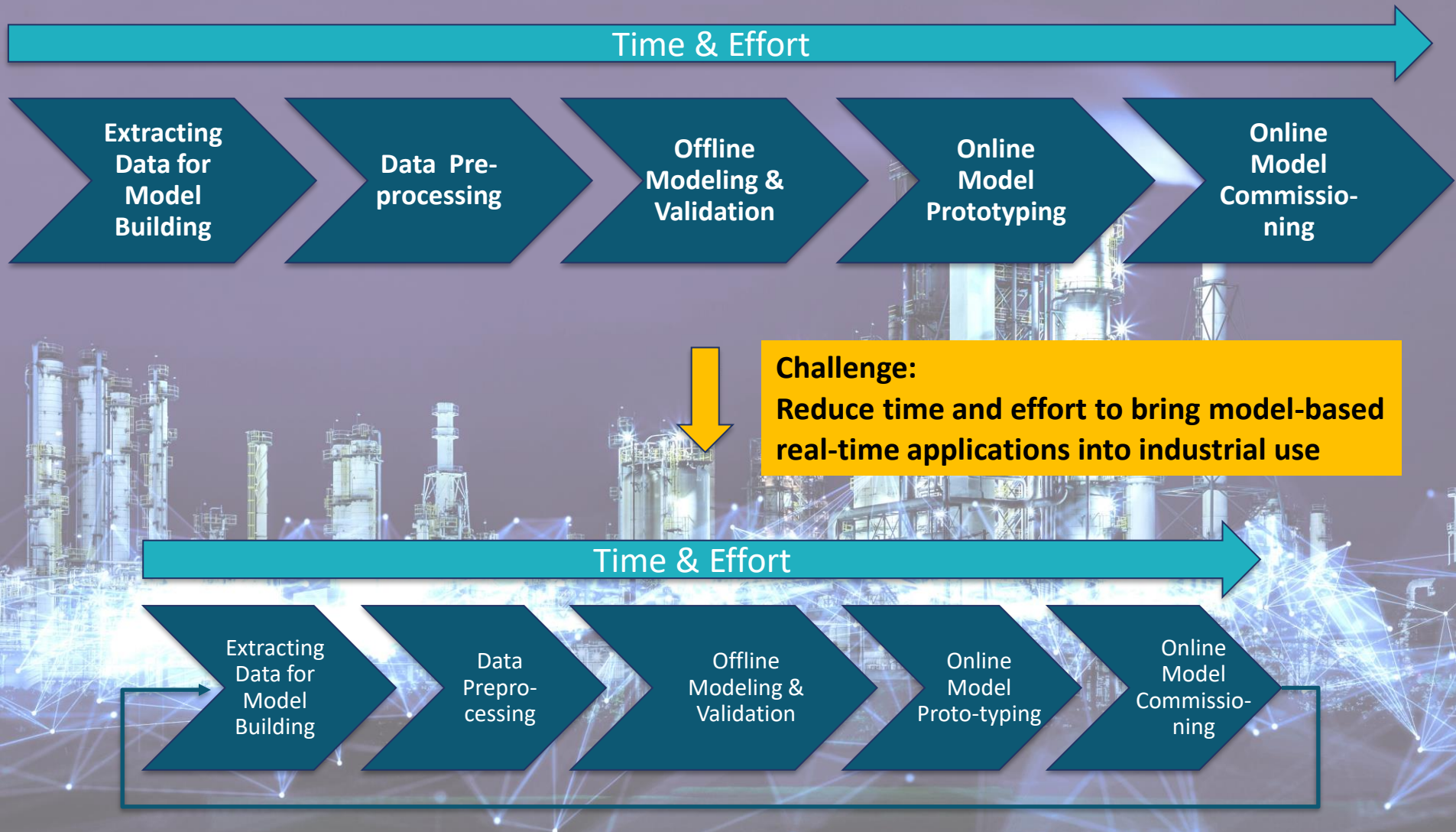**Problem:** Still a gap to integrate offline evaluated models into an online production IT System environment

Challenge: Reduce obstacles to realise model-based real-time solutions for plant optimisation and resource efficiency in process industry
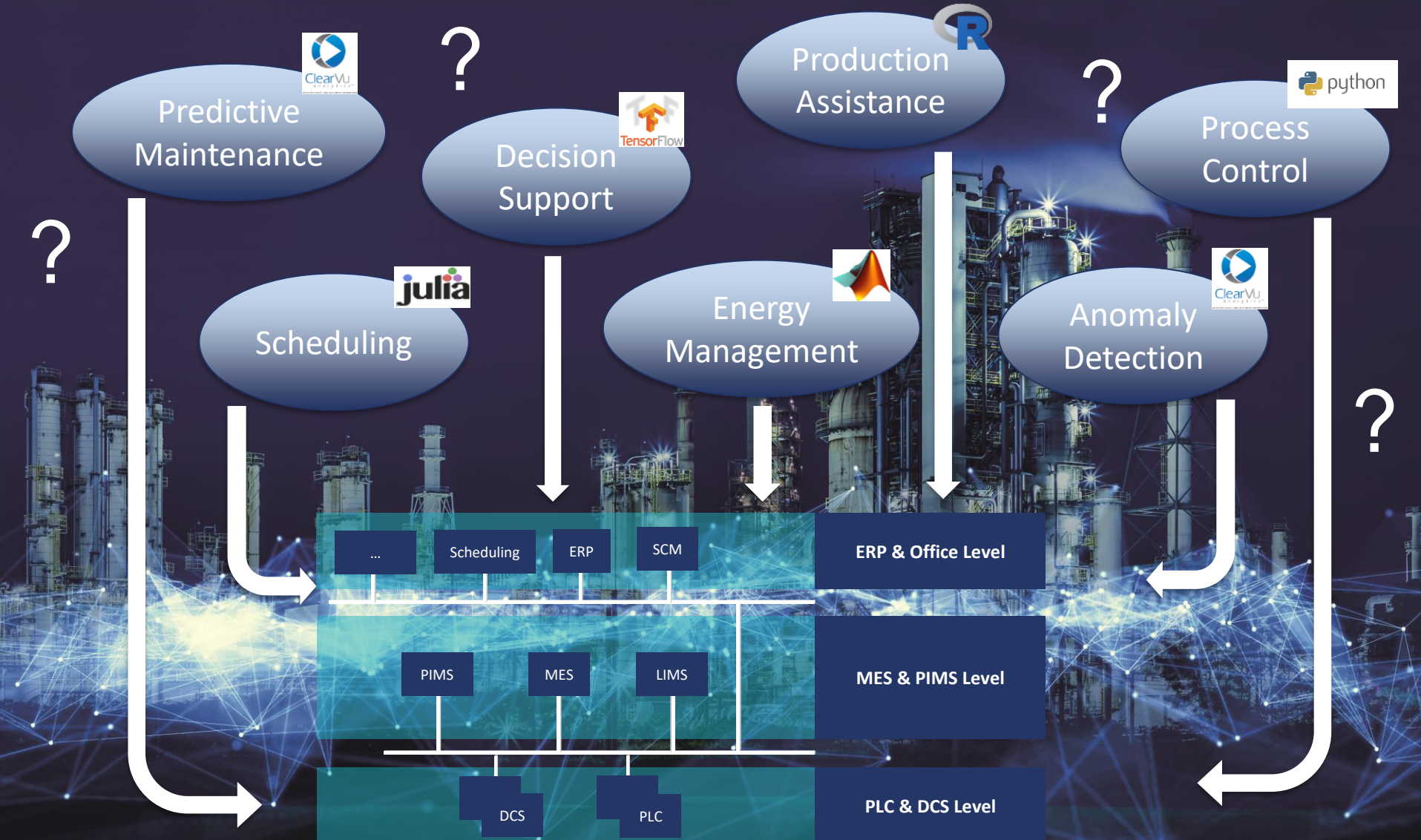
Approach: IT Solution for model integration and data orchestration of distributed real-time applications in process industries incl. model management
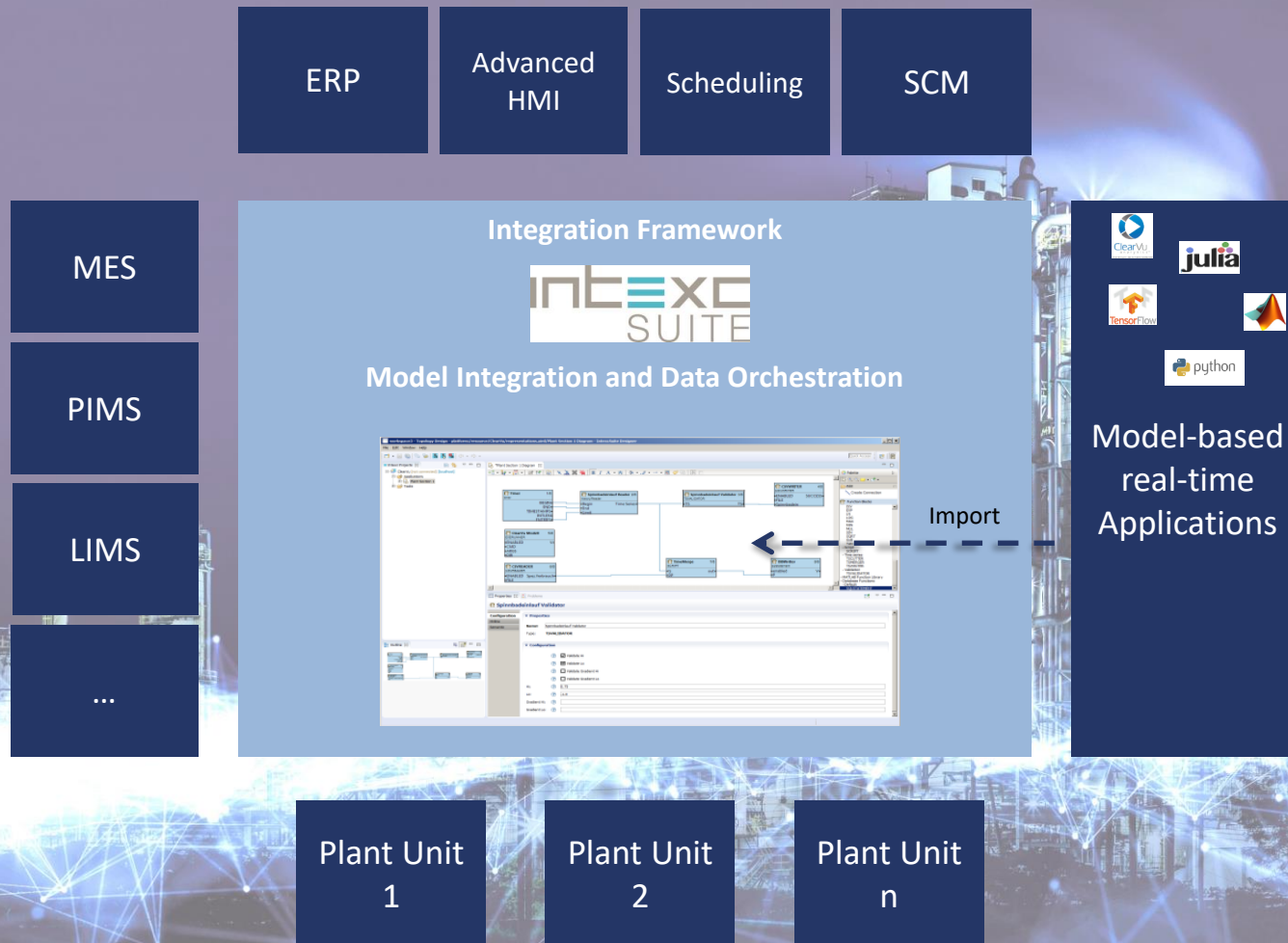
IT Integration – The Challenge

LeiKon

Time & Effort →

| Extracting Data for Model Building | Data Pre-processing | Offline Modeling & Validation | Online Model Prototyping | Online Model Commissio-ning |

Challenge:
Reduce time and effort to bring model-based real-time applications into industrial use

Time & Effort →

| Extracting Data for Model Building | Data Prepro-cessing | Offline Modeling & Validation | Online Model Proto-typing | Online Model Commissio-ning |

IT Integration – The Challenge

IT Integration – The Solution

IT Integration – The Solution
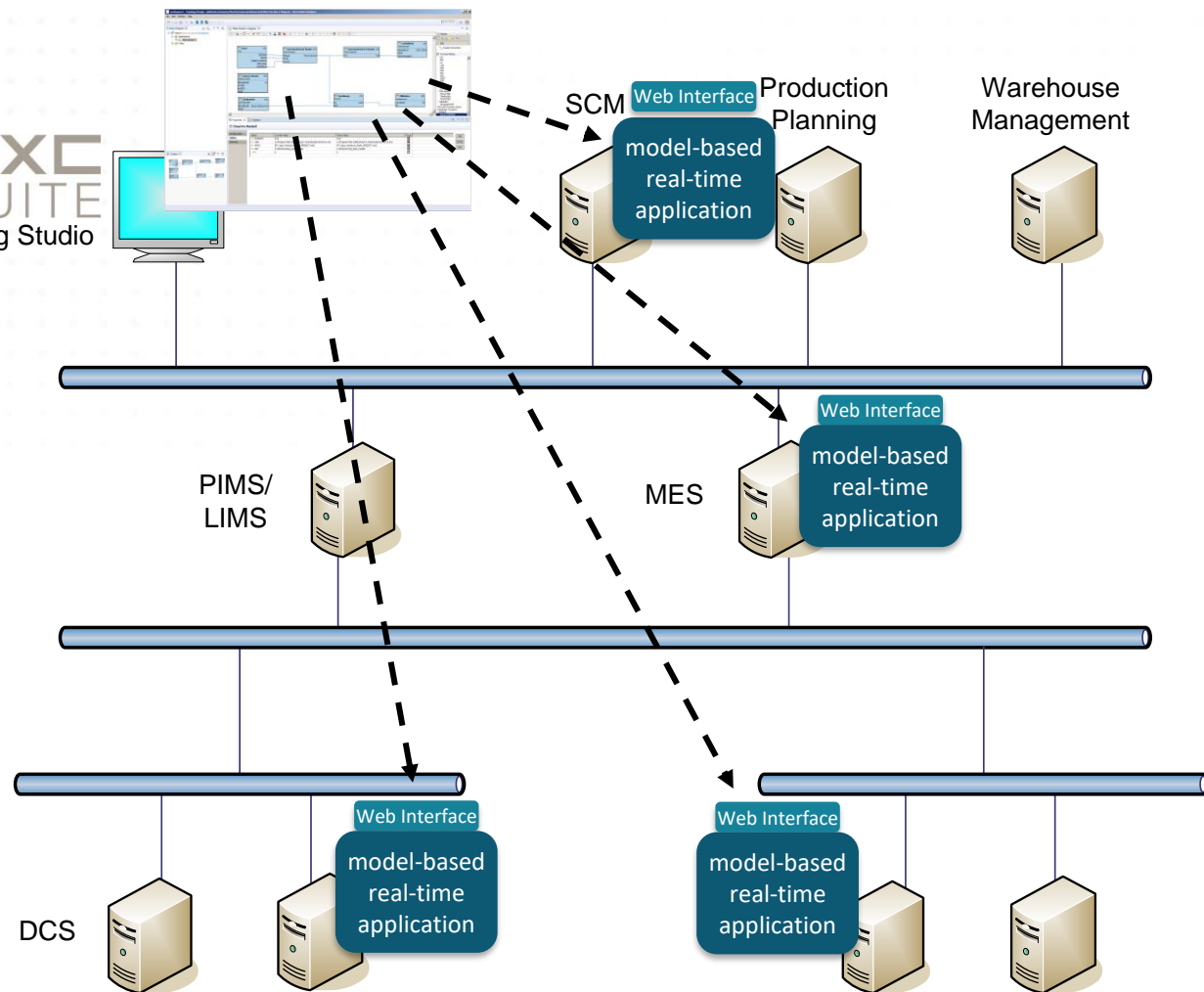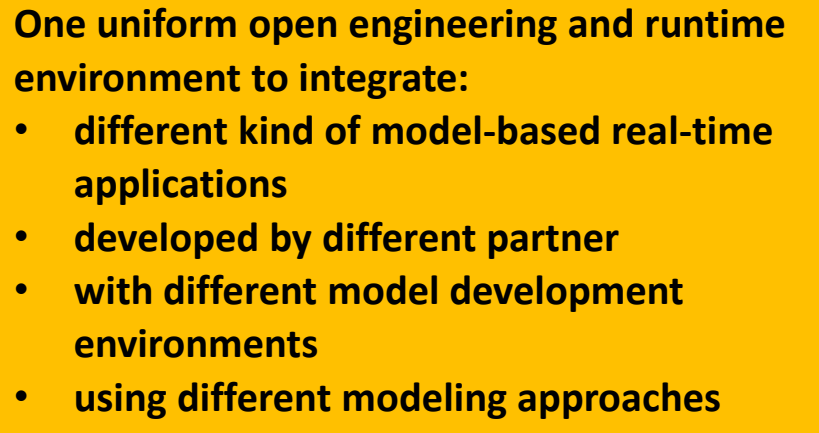
Engineering Suite

Flexible Deployment of runtime engines

Requirements:
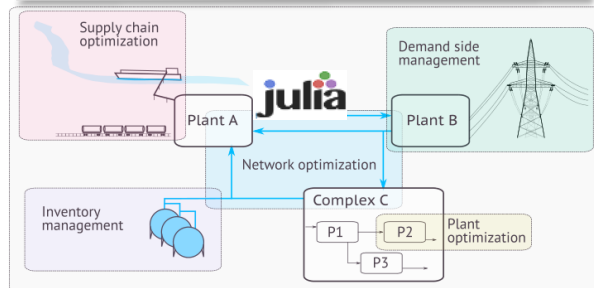- Reliability
- Performance
- IT-Security Compliance

intexc SUITE

Engineering Studio

SCM | Web Interface | model-based real-time application | Production Planning | Warehouse Management

Web Interface | model-based real-time application

PIMS/ LIMS | MES

DCS | Web Interface | model-based real-time application | Web Interface | model-based real-time application

Predictive Maintenance

Decision Support

Production Assistance

Process Control

Scheduling

Energy Management

Anomaly Detection

julia

ClearVu

... Scheduling ERP SCM

PIM S

INEOS

DCS PLC

One uniform open engineering and runtime environment to integrate:

- **different kind of model-based real-time applications**
- **developed by different partner**
- **with different model development environments**
- **using different modeling approaches**

The ammonia network at INEOS in Köln
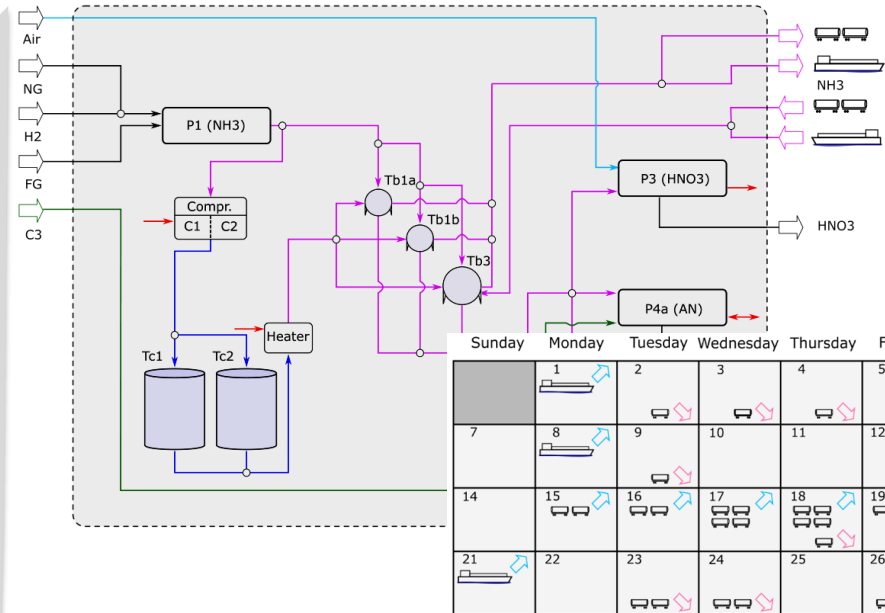
Optimizer developed by TUDO

Import

Model Integration and Data Orchestration

intexc SUITE

Scheduling

trigger

show results

Web Interface

Scheduling Tool

PIMS

Import

TUDO

Optimizer

Predict as early as possible: maximum time for countermeasures

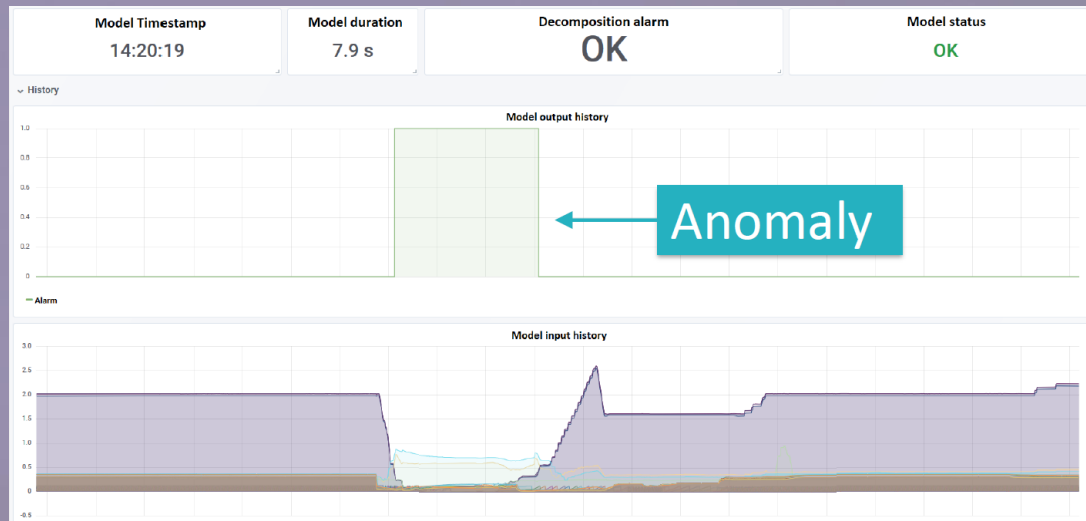Anomaly (decompositon)

divis
intelligent solutions
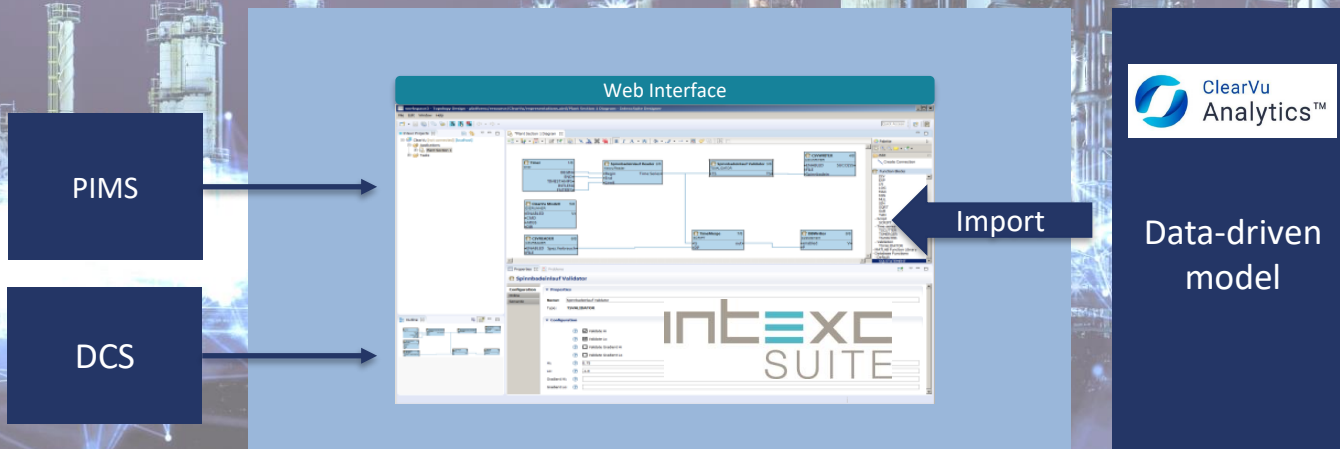
ClearVu
Analytics™
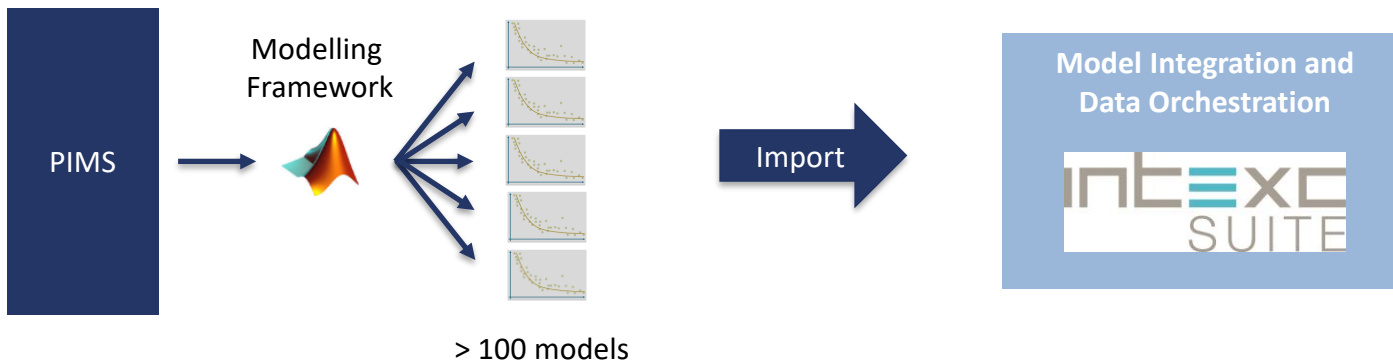
Import

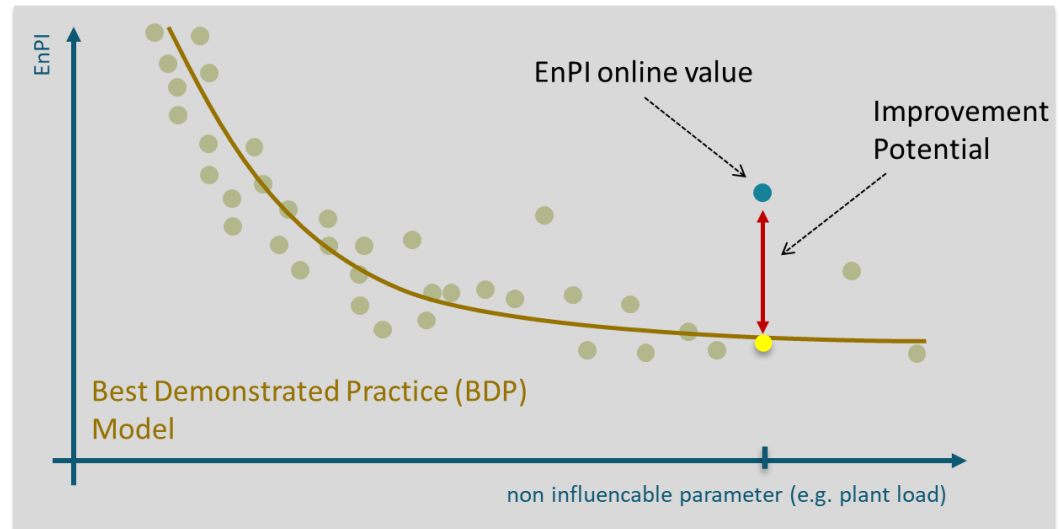**Model Integration and Data Orchestration**

intexc
SUITE

Uses cases – INEOS in Köln, Anomaly Detection
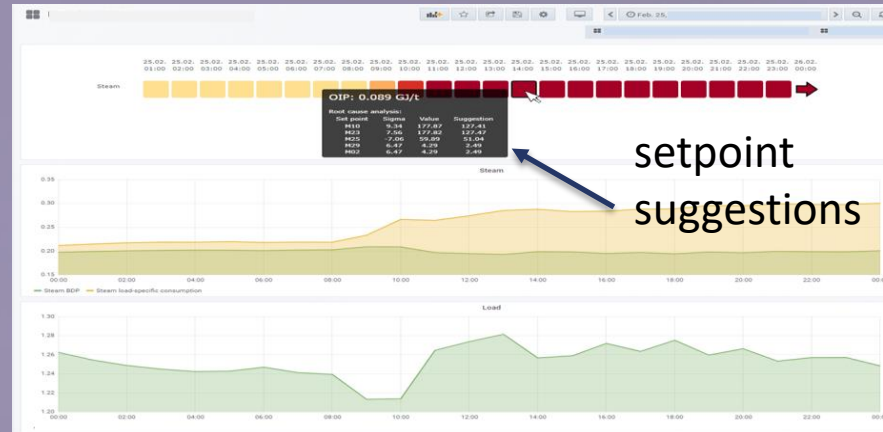
Uses cases – INEOS in Köln, Energy Management

EnPI

EnPI online value

Improvement
Potential

Best Demonstrated Practice (BDP)
Model

non influencable parameter (e.g. plant load)

PIMS

Modelling
Framework

Import

**Model Integration and
Data Orchestration**

intexc
SUITE

> 100 models

setpoint suggestions

Energy Management

Web Interface

PIMS

Import

Data-driven Models

Integration and Model Management

INEOS in Köln

just for Energy Performance Monitoring:

more than 100 Models for

13	Plants
60	Plant Units
>1200	Measurements used

Support for the whole Life Cycle of model-based real-time applications is needed:

- Managing within Projects
- Change Management & Versioning
- Documentation of Scope, Authors,…
- Reporting of Model History
- Deployment to Testing or Production Environments

IT Integration – Feasibility Studies
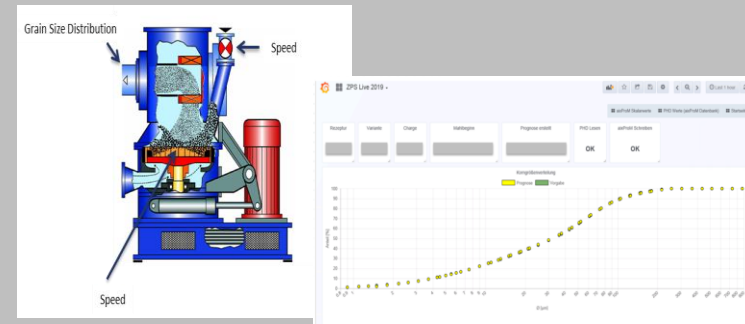

Production Assistance

Industry Sector: Mineral
Partner : aixprocess, Aachen
Modelling Tool: python
Application: Online prediction of grain size distribution

Decision Support

Predictive Maintenance

Industry Sector: Cement
Partner: aixprocess, Aachen
Modelling Tool: TensorFlow
Application: Prediction of energy consumption
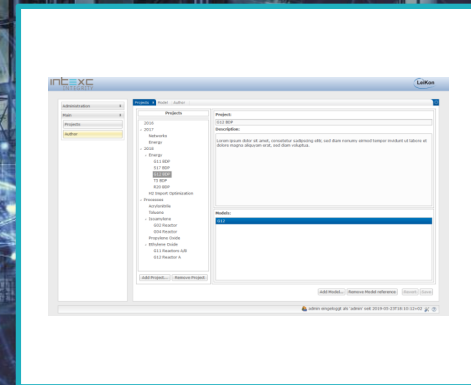Predictive maintenance of mill wear
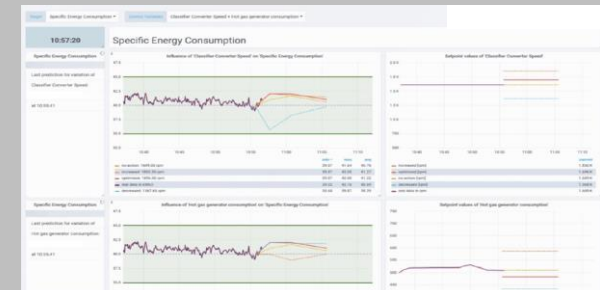
IT Integration – The Solution

- Ease of use and reduced engineering efforts to integrate model-based applications into heterogeneous IT- and OT- system environments

- Contribution to push model-based real-time solutions in industry

- Nearly all presented use cases will remain in productive operation

- **Thanks to all who made the funding possible and thanks to all CoPro partner**
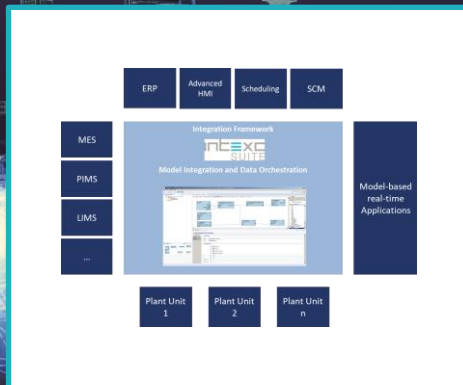
Model Integration

Model Management