The goal of CoPro is to develop and demonstrate methods and tools for process monitoring and optimal dynamic planning, scheduling and control of plants, industrial sites and clusters under dynamic market conditions. CoPro will provide decision support to operators and managers and automated closed-loop solutions to achieve an energy and resource efficient production. CoPro will make significant contributions towards:

- efficiently operating existing plants by integrated plant-wide planning, scheduling and control
- coordinating individually managed units in a site and within a chemical park or cluster
- buffering the effects of fluctuating electricity power production from renewables and distribution by integrating demand-side response with plant-wide scheduling and control.

"CoPro is a very ambitious project. It goes beyond traditional advanced control by addressing plant-wide and site-wide coordination as well as the integration with the scheduling of maintenance and demand-side response. We will also investigate the coordination between different companies which is a prerequisite for the exchange of resources in parks and clusters and for moving towards industrial symbiosis. CoPro assembles an excellent consortium including a wide range of end-users, top-level technology providers and leading research institutes. I am happy and proud to coordinate such a great team."

CoPro Facts and figures

- **Start Date:** 1st November 2016
- **Duration:** 42 months (until April 2020)
- **EU contribution:** 6 million €
- **Coordinator:** Prof. Dr. Sebastian Engell, TU Dortmund, DE
- **Partners:** 17 partners from 8 countries
  - 5 producing companies from different sectors (end users)
  - 6 technology providing SMEs
  - 5 universities and research institutes
  - 1 SME supporting exploitation and dissemination

CoPro Consortium @ kickoff

CoPro is a very ambitious project. It goes beyond traditional advanced control by addressing plant-wide and site-wide coordination as well as the integration with the scheduling of maintenance and demand-side response. We will also investigate the coordination between different companies which is a prerequisite for the exchange of resources in parks and clusters and for moving towards industrial symbiosis. CoPro assembles an excellent consortium including a wide range of end-users, top-level technology providers and leading research institutes. I am happy and proud to coordinate such a great team.

Industry end users and use case providers

- **Lenzing**
- **covestra**
- **Frinsa**
- **INEOS**
- **P&G**

Technology providing SMEs

- **LeiKons**
- **diis**
- **asm**
- **ORSOFT**
- **PSE**

Universities

- **tu Dortmund**
- **Universidad de Valladolid**

Research institutes

- **CERTH**
- **CSIC**
- **INNO**

Impact SME

This project receives funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 723575.
Optimal site and cracker scheduling and optimisation including demand-side response

Alexander Gammersbach
Team Leader of Site Optimisation,
INEOS Köln GmbH

We operate a petrochemical complex with many tightly coupled and interacting plants, and produce a large number of base chemicals. We need to coordinate and schedule our production complex on different time scales, from the next hour to the next year. With optimal coordination of the site and optimisation of our units we can save resources and energy.

Optimal process coordination for the recovery section of EU’s largest viscose fiber production plant

Christian Jasch
Process Engineer Recovery & Spinbath, Viscose/Modal Plant Lenzing, Lenzing AG

The recovery of the spinbath is the process step in the viscose fiber production with the highest energy demand. Especially the spinbath re concentration by evaporation requires a huge amount of heat input. In CoPro, our goal is to improve our multi-unit evaporation process, focusing on load allocation, cleaning cycles, cooling water distribution and heat recovery.

Coordination of the production and distribution of gases in a chemical site

Christine Maul
Team Lead of Advanced Process Control,
Covestro Deutschland AG

We strive to optimise the production and distribution of basic chemicals that are required in the synthesis of our polymers. By means of advanced modelling, monitoring and optimisation methods, we want to improve the energetic efficiency in the production of these gases while respecting environmental and safety regulations.

Coordination of the production and distribution of gases in a chemical site

Optimisation of production and packing of consumer goods products

Francesc Corominas
Principal Engineer,
Procter & Gamble

We produce a large number of similar consumer products in the same plant with the same equipment. Fitting all products into the daily schedule, managing product changeovers and coordinating production and maintenance is complex. Our main objective is to increase plant productivity and reach an efficient utilisation of assets, resources and energy with optimal planning and scheduling.

Cross-company coordination in chemical parks under confidentiality constraints

Lukas Maxeiner
Research Assistant,
TU Dortmund

In Chemical Parks and Industrial Clusters, chemicals and carriers of energy are exchanged across the boundaries of companies, usually based on long-term contracts. We want to coordinate the exchange of energy and materials in an agile and optimal manner while preserving confidentiality of business information. This will lead to better overall energy and resource efficiency and to a win-win situation for all parties involved.

Plant-wide control of the sterilisation and packaging of food

Jose Manuel García Lampón
FRINSA Production Manager,
Frinsa del Noroeste, S.A.

At FRINSA, we produce over 400 different products on shared production equipment. Our main challenge is to optimally plan, schedule and operate the equipment to minimise queues, idle times and consumption of energy. CoPro technology will replace manual scheduling methods and manual operation, resulting in improved energy efficiency and reduced total cost.

CoPro Technologies

- Plant-wide coordination and demand-side response
- Coordination in industrial parks by market-based algorithms
- Reactive planning and scheduling technology, including scheduling of maintenance
- Detection of anomalies by real-time data analytics
- Combination of data-based and rigorous modelling
- Integration and deployment platform to connect advanced solutions to the IT and OT infrastructure of the plants

CoPro Use cases

- Coordination of plant operation in a large petrochemical site
- Operation of gas networks in an integrated site
- Coordination of production units in an industrial park
- Spinbath recovery in cellulose fiber production
- Production, formulation and packaging of detergents
- Sterilisation and packaging of food