SPIRE and Catalysing the Circular Economy BROKERAGE EVENT

3-4 October 2017

COGNITIVE OPERATION FOR PRODUCTION PLANTS

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SPIRE
Sustainable Process Industry through Resource and Energy Efficiency

Valencia Polytechnic University (UPV)

- **Founded in 1971**
- **+ 30,000 students**
- **15 schools**
- **17 university research centres**

UNIVERSITAT POLITÈCNICA DE VALÈNCIA

Long tradition in European R&D projects

- R&D activity over 50 MEUR (2016) of which > 60% from competitive projects

Research organization at UPV. Currently 100+ researchers:

- **Process Control & Automation**
- **Industrial Informatics**
- **Artificial Intelligence**
- **Robotics**
- **Artificial Vision**
- **Computer Graphics**

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I4MS

Recognized as **Digital Innovation Hub** for Valencian Region. Spain

Cognitive Operation for Production Plants

DT-SPIRE-06-2019:Digital technologies for improved performance in cognitive productions plants (IA)

Goals:

- From "**Smart**" to "**Cognitive**"
- Towards autonomous operation facing changes in production

Methods:

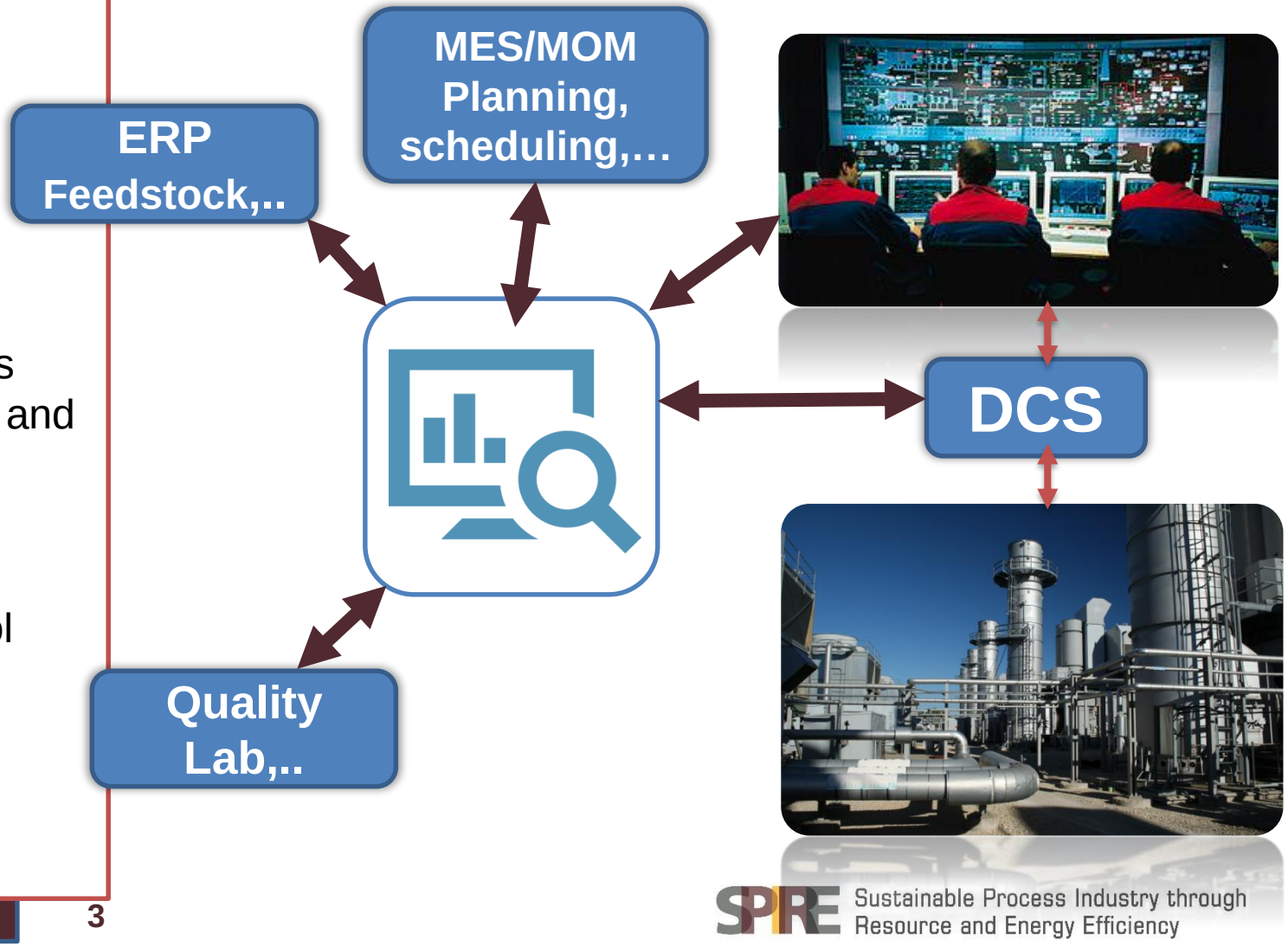
- Online Process Condition Monitoring
- Robust Adaptive Predictive Control.
- Process dynamic real time simulations
- Real time multi-objective optimization and decision making

Integrating State of art developments:

- AI optimization algorithms,…
- Multivariate Statistical Process Control
- Advanced process control,…

Expected Results:

- Modular open source platform
- SaaS for replicability and scalability



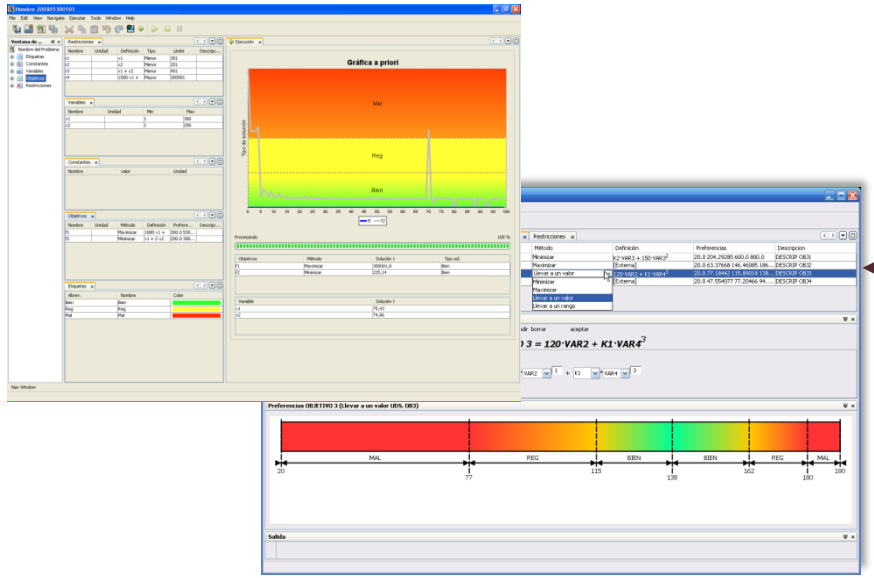
SPIRE Sustainable Process Industry through Resource and Energy Efficiency

Cognitive Operation for Production Plants

ai2-UPV scientific & tech skills: real time optimisation, model predictive control, data science for process industry…

Real time multi-objective optimization based on user preferences

- Define KPI and constraints related to plant economics, environmental, security,etc…
- Express your preferences for each objective in a user-friendly way
- Optimization algorithm selects optimum operating point according your preferences in the feasible zone
- Setpoints are sent to DCS controllers by OPC



DCS

Application in a Biodiesel Plant (Methanol recovery process)

Expected Impact

- **Show potential** of control systems provided with capabilites for **perception and judgment** in order to enable **autonomous operation**
- **Facilitate digitization** of the European process industry where the computer control manufacturing system varies **adaptively** from moment to moment depending on current goals, rather than remaining rigid and inflexible
- **Energy** and **CO2** emissions **reduction** in industrial processes via **ICT tools**
- Less **production time** and less **off-spec products** through **ICT tools**
- More **efficient operation** of production units (ovens, furnaces, boilers, pumps, separators,…) via **ICT tools**
- **Optimization**: metrics defined related to production performance, energy and resource consumption, waste, environment, etc will be improved by more than a % (to define)

Existing Project Consortium

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UNIVERSITAT POLITÈCNICA DE VALÈNCIA

Industry – academia Driver in Valencia (Spain)
Digital Innovation Hub

our regular partners in other projects…

SMC AGC FESTO OMRON ISTOBAL Automotive Cleaning Solutions ABB Dulcesol SIEMENS

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