



SPIRE PPP

**Sustainable Process Industries
through Resource & Energy
Efficiency**

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A.SPIRE Executive Director

www.spire2030.eu

SPIRE
Sustainable Process Industry through
Resource and Energy Efficiency

The value chain

Raw Materials



Strengths

6.8 million jobs
450,000 enterprises
> €1,600 bn/y turnover

Process Industry:

Physical transformation and formulation of raw materials using continuous and batch processes into **Materials with new properties and functionalities**

Discrete Manufacturing:



Challenges

Resources & energy
Competitiveness

High-risks/long-term investments



WE

CERAMICS



CEMENT



CHEMICALS



WATER



ENGINEERING



1

Cut on dotted line

2

Rotate 180°

3

Be inSPIRED

STEEL



NON-FERROUS METALS



MINERALS



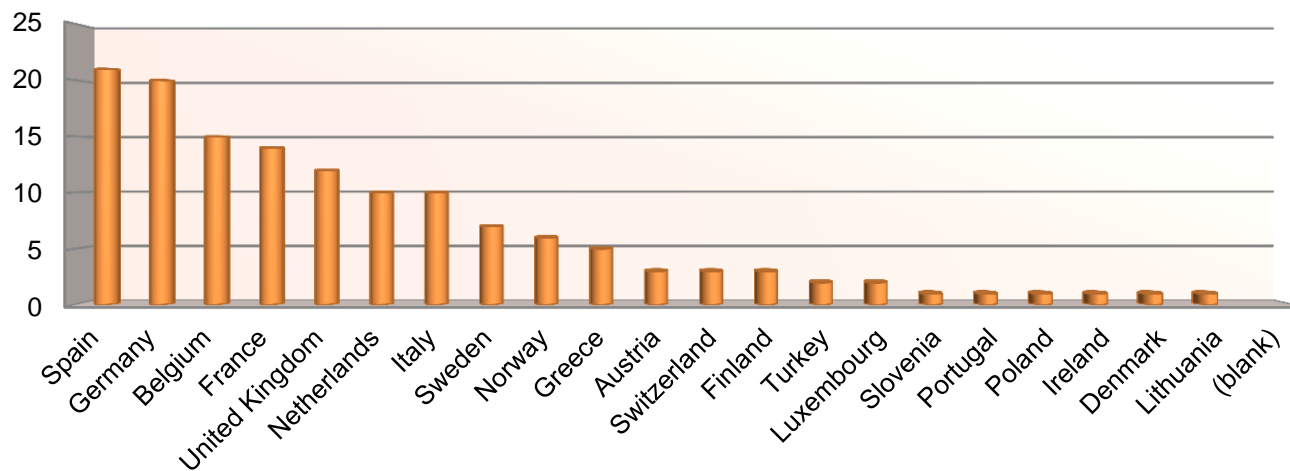


A.SPIRE MEMBERSHIP

Associate member	11
Associations	15
Industry member (intermediate)	2
Industry member (large)	28
industry member (medium)	3
Industry member (small)	13
Research member (large)	40
Research member (small)	31
Total	143



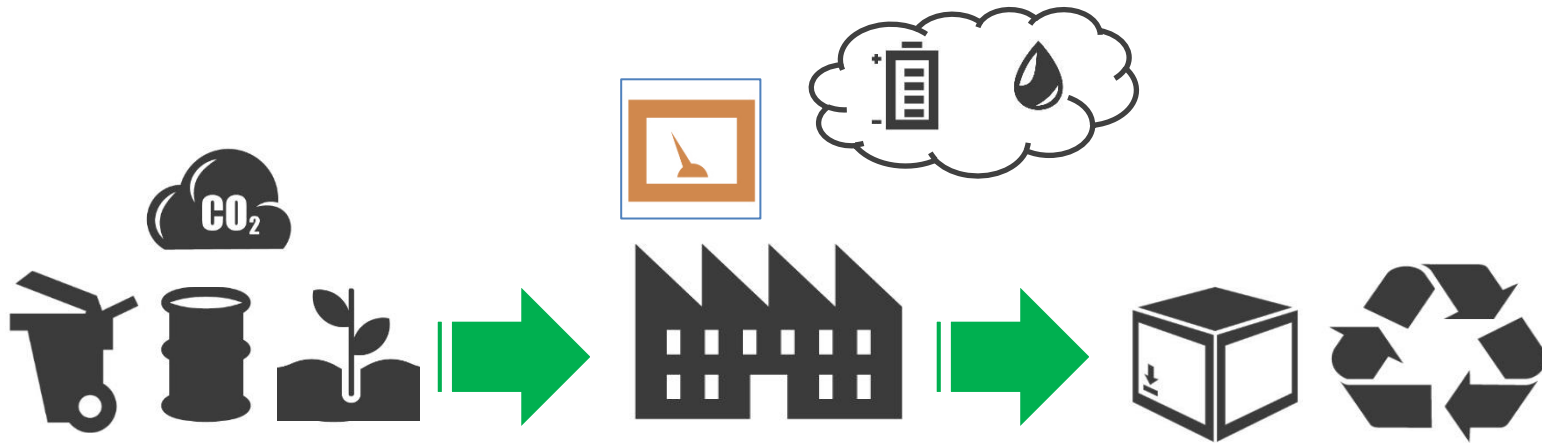
A.SPIRE membership by countries





SPIRE Public-Private Partnership

TO TOMORROW's SCENARIO:



- **(Re)invent** feedstock (waste, bio, CO₂)
- **Reduce** emissions; **(re)invent** energy & resource management concepts, incl. industrial symbiosis
- **Introduce digital devices for better monitoring and control**
- **(Re)invent** materials for optimised processes
- **(Re)invent** processes & materials with a significantly increased impact on resource & energy efficiency down the value chain: transport, housing
- **Reduce** waste & **(re)invent** technologies for valorisation of waste streams within and across sectors

DIGITIZING PROCESS CONTROL WILL MODERNISE PROCESS INDUSTRIES

Every process is affected by variation and disturbances:

- Quality of raw materials
- Environmental conditions (humidity, temperature, etc.)
- Aging (catalyst, equipment)
- Fouling
- Delays in batch operation
- Manual interventions
- Load changes



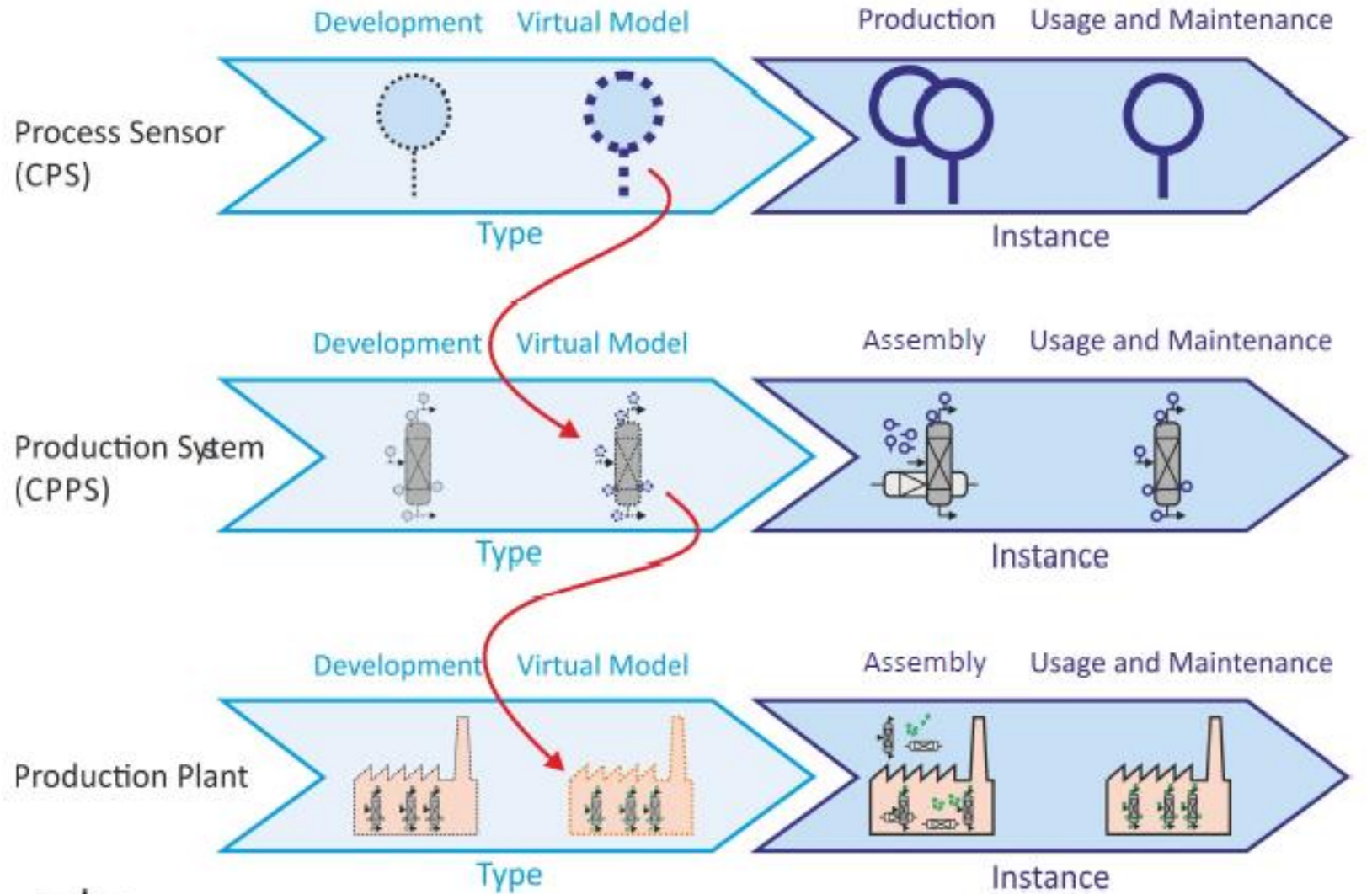
Stable
product
quality

Efficient
operation

Means to cope with variance:

- Online sensors
- Monitoring
- Process control
- Online optimisation
- Modelling and simulation

IMAGINE THE DIGITAL TWIN OF AN INDUSTRIAL PLANT





Projects are core for a PPP

54 projects awarded



Results - Impact

Synergies

SPIRE Calls & Projects on Process Control

Integrated Process Control

(SPIRE-01-2014, projects started January 2015)

- ... improved capabilities for valid, reliable and real-time measurement of the properties and quality of process streams and final products for existing and for more flexible process operation concepts.
- ... better process operations with respect to resource and energy efficiency



Plant-wide Monitoring and Control of Data-Intensive Processes (SPIRE-02-2016 , projects started end of 2016)

- ... integration of local control [...] into an overarching real-time optimisation and scheduling system controlling and monitoring the operations of the whole plant
- ... ensuring a robust real-time optimisation of the plant's operations

COCOP



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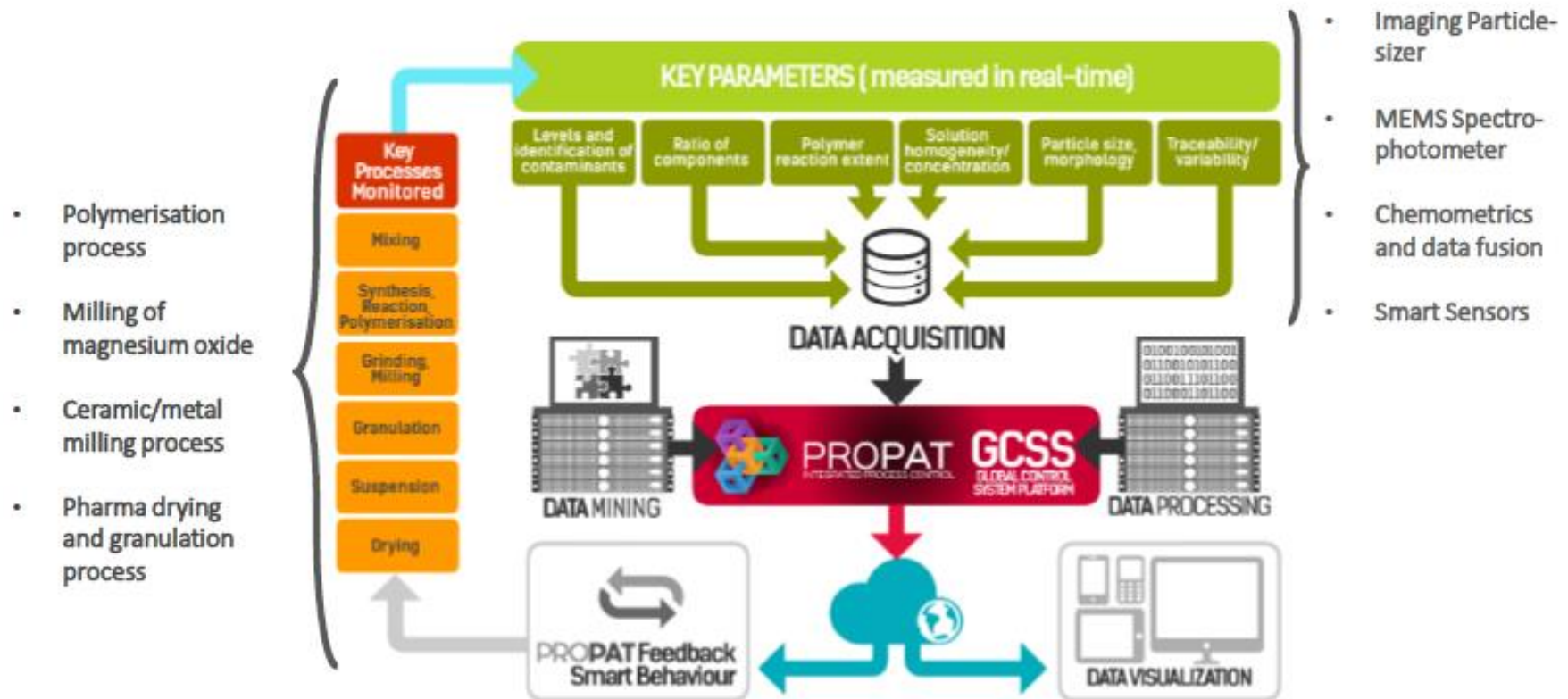


PROPAT
INTEGRATED PROCESS CONTROL

Optimising Industrial Operations

INTEGRATED PROCESS CONTROL PLATFORM:

Low cost analysers combined with smart sensors for monitoring in real time the Critical Control Parameters of key processes in the Process Industries

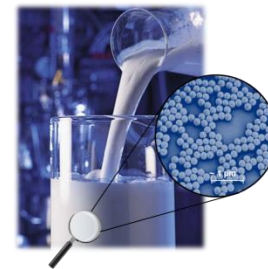


Modelling and integrated process control



Cross-sectorial REal-time sensing, advanced COntrol and optimisation of BATch processes saving energy and raw materials

Liquid steel making



Polymerisation



Silicon refining

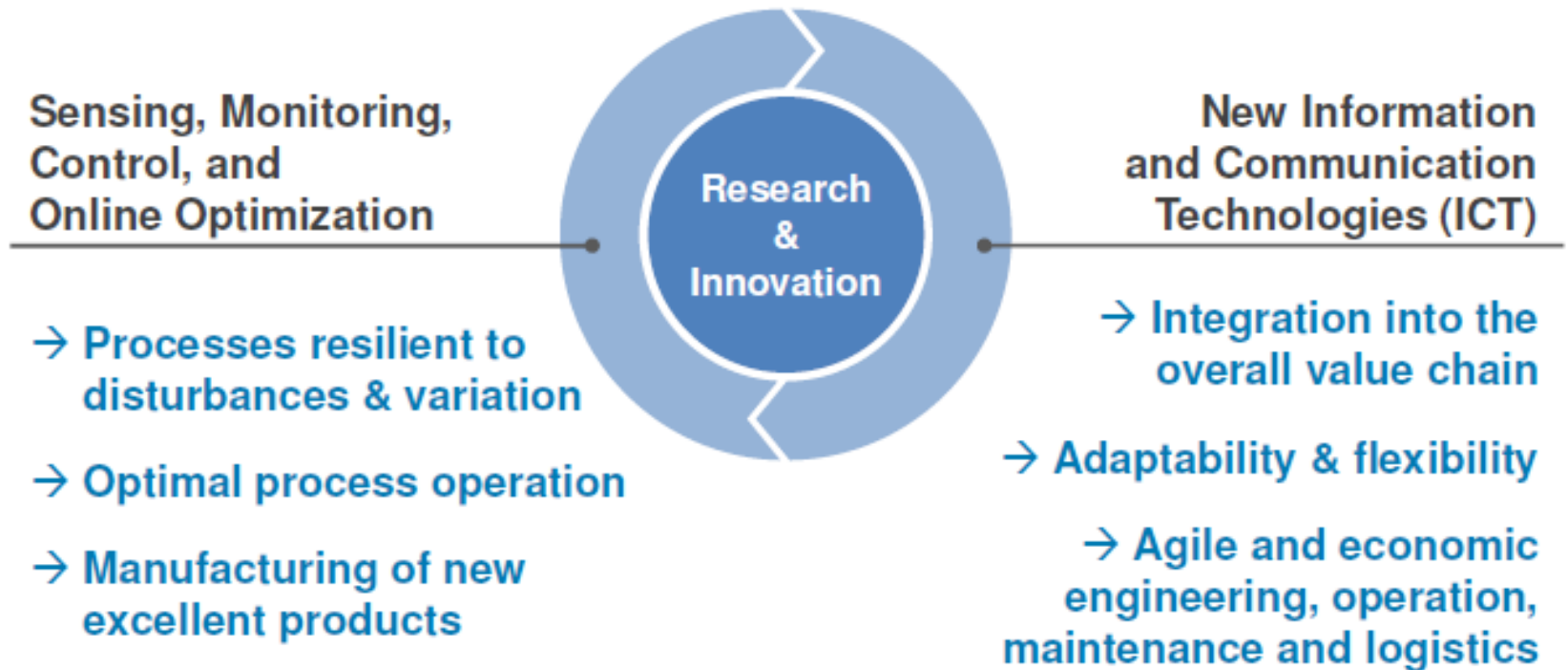
Expected impacts



Europe steel production in Europe (basis) - Expectations

- **Energy savings of around 600 GWh/a**
Converting this energy (around 600 kg/MWh depending on the energy mix) means
 - **Savings in CO₂ emissions of about 360.000 t/a**
- **Increase of the metallic yield of about 1%**
- **Reduced consumption of refractory materials by 5%**

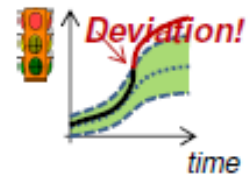
Combining Novel ICT with Sensing, Monitoring, Control, and Optimisation Creates Significant Advantages



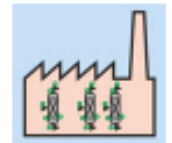
→ Sustainable and competitive process industries

Conclusions

- Novel sensing, monitoring, control and optimization technologies are **essential** to achieve **sustainable** and **competitive** process industries in Europe
- The running SPIRE projects will provide substantial progress
- **Industrial implementation** of results is most crucial!
- Unlock the opportunities of novel ICT for sensing, monitoring, control and optimization!



SPIRE



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