Plant-wide monitoring and control of data-intensive processes

Research activities should address all of the following areas:

- Extension of the model based control techniques to the level of plant or site-wide control and scheduling by the use of dynamic overall plant models, ensuring a robust real-time optimisation of the plant's operations.
- Integration of local control systems into an overarching real-time plant and/or site optimisation and scheduling system, taking into account geographic and logistic constraints, potential malfunctions and providing the necessary interfaces for real-time communication between systems.
- Cross-sectorial transfer of the technologies developed.
- Model Based Predictive Control frameworks taking into account the Operators Training Systems in their design.
- Plant level LC management tools (integrated or possibly as a plug-in to the control system) and robustness of the real-time optimisation tools.

Solutions should consider the “data-intensive” nature of the process chains (data reliability, handling of huge amounts of data in real-time, extraction of decisions from large data-sets. Proof of concept in terms of at least one demonstrator should be delivered before the end of the project, excluding commercially usable prototypes, but convincingly demonstrating scalability towards industrial needs and making a clear case for the safety of the worker under all circumstances.

The project can make use of pre-existing commercially available plant optimisation and scheduling solutions, making all the required adaptations. In order to ensure the impact of the project, standardisation is to be addressed.

Activities are expected to focus on Technology Readiness Levels 4 to 6.

This topic is particularly suitable for SMEs.

The Commission considers that proposals requesting a contribution from the EU between EUR 4 and 6 million would allow this specific challenge to be addressed

appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

All current plants in process industries have control systems managing their production processes. Distributed Control Systems (DCS) and Programmable Logic Controls (PLC) are present all across production sites with continuous semi-continuous or batch processes. However, there is still a lack of integration of local control systems dedicated to unit processes into an overarching real-time optimisation and scheduling system controlling and monitoring the operations of the whole plant. This plant or even site-wide integration is especially challenging for production processes where monitoring involves the collection and evaluation of large amounts of data.

Future plant monitoring and control systems will have to integrate lower scale model based control frameworks into plant scale scheduling, or even geographic and logistic optimisation tools. The generalisation of model based predictive control techniques to plant-wide and possibly site-wide monitoring and control should be developed using overall plant models, and optimised solutions should be demonstrated.

Compared to the current practice in the sector:

- Decrease of on-site material handling time by 10%
- Decrease of resource consumption by 10%
- Decrease the global use of energy on-site by 10%.
- Decrease of the Green House Gases emissions by 10%.
- Strengthen the global position of European process industry through the adoption of the new technologies related to plant-wide and/or, if possible, site-wide process control.
- Contribution to standardisation activities.

Proposals should include a business case and exploitation strategy, as outlined in the Introduction to the LEIT part of this Work Programme.

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