

Horizon2020 Information Days on Public-Private Partnerships

Brokerage event
16 October 2015

***SNELFACT (SENSOR NETWORKS FOR LARGE SCALE FAULT
DIAGNOSIS, CONTROL AND MONITORING)***

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ORGANIZATION/COMPANY

- **DELFT TECHNICAL UNIVERSITY**

- 20,000 students, 3,300 staff
- 320 PhD theses and 6000 publications per year
- **19th** in the **global** THE Engineering and Technology rankings in 2015 (was 23rd in 2014)
- **59 H2020 projects** granted at 31/08/2015
 - 20 as coordinator
 - total **budget** for TUDelft **33.2 MEur**

- **DELFT CENTER FOR SYSTEMS AND CONTROL (DCSC)**

- **cutting edge** research in automatic control
 - robotics, transportation, **process control**, optics
- 6 full professors, 3 associates, 6 assistants, 21 postdocs, 40 PhDs
- Coordinated **FP7 project** HD-MPC on **Hierarchical MPC** (2MEur)

- **MYSELF**

- 6 years **industrial R&D experience** in instrumentation and control for the steelmaking sector
- now joined DCSC as a **Postdoctoral Researcher**



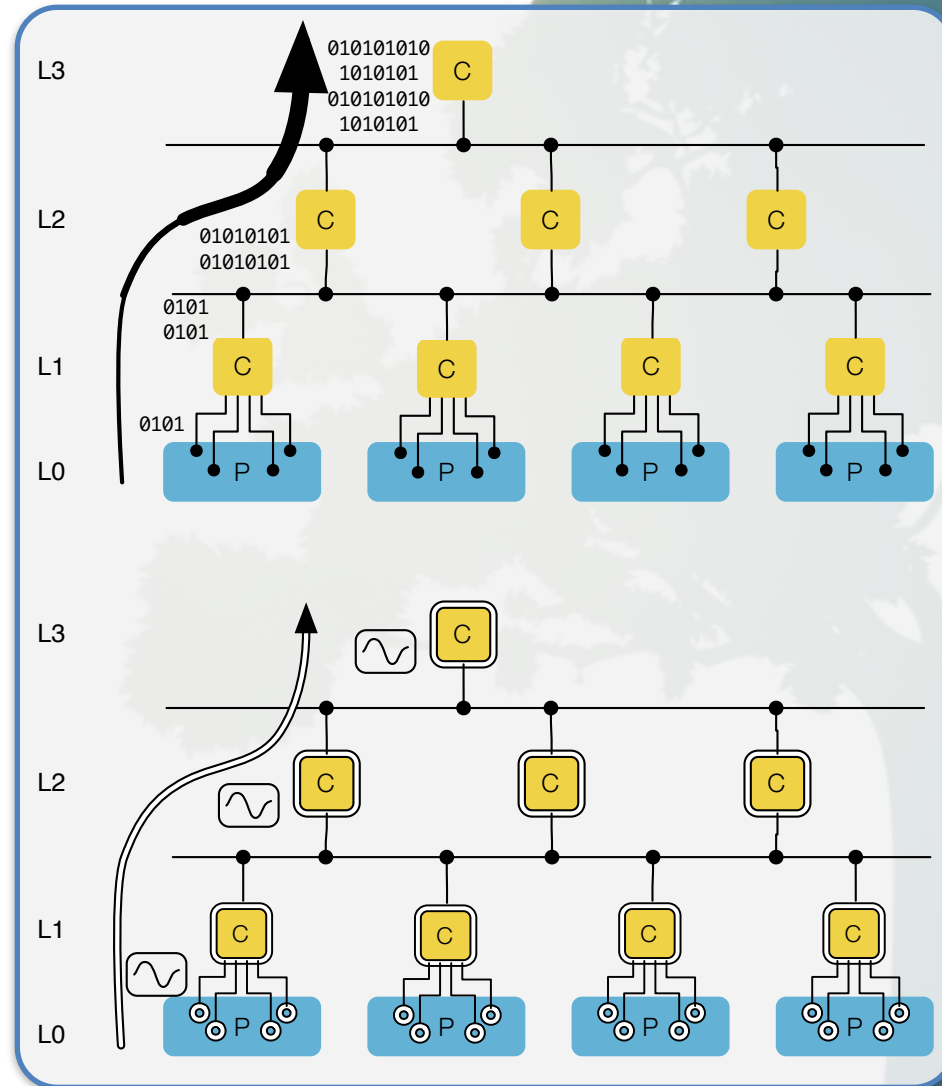
PROJECT IDEA 1/2

PROBLEM

- Applying plant/site wide advanced **diagnosis**, monitoring and control is not feasible with current architectures
- All the data coming from lower levels would **flood** higher levels!
- Current trend of adding **sensors**, availability of **Big Data**, **Industrial Internet**, **IoT**, ..., is worsening this

PROPOSED SOLUTION

- Make sensors **smarter** and let them **preprocess data**, in order to represent it in a compressed form, without losing important details but keeping only the ones needed at L1
- Apply the idea to representation of dynamical models as well, and to data exchanged at L1->L3 level
- **Scalable** multi-level/scale **approach**



PROJECT IDEA 2/2

APPLICATIONS

- *Large scale monitoring, and advanced **model-based Fault diagnosis** and control (such as **MPC**)*
- *Model-based plant-wide scheduling optimisation*

CHALLENGES

- *Making approach **work** with **existing** control, monitoring and optimisation **hardware** and **software**, limiting the use of additional components*
- *Synthesizing on-line an **overall plant model** for higher level tasks (scheduling, optimisation, monitoring) based on compressed representation of lower-level variables and models*
- *Developing a **standardised protocol** for communicating and using compressed information*

RELEVANT SPIRE COMPONENT, ACTIONS AND CALL

- *Component: **PROCESS***
 - ***KA 2.3:** Process monitoring, control and optimisation*
- *Call: **SPIRE-02-2016** “Plant-wide monitoring and control of data-intensive processes”*

EXPECTED IMPACT 1/2

DIRECT RELATION TO CALL TOPIC

- *Integration of local control systems into plant-wide optimisation and scheduling*
- *Collection and evaluation of large amounts of data*
- *Use of pre-existing commercially available optimisation and scheduling solutions*
- *Extension of the model based control techniques to plant or site-wide level*

thanks to a **standardised and tractable** way of **compressing** lower level **models and data**

thanks to the capacity of **reducing the complexity** of the **overall model**

INDIRECT RELATION TO CALL TOPIC

- *Frameworks taking into account **Operator Training Systems***
- *Plant level Life-Cycle management tools*
- *Delivery of at least one **demonstrator***

thanks to expertise of industrial partners in supply of complete automation solution, and of tools for Virtual Commissioning, and availability of experimental plant

EXPECTED IMPACT 2/2

RELATION TO SPIRE ROADMAP

- *KA 2.3 is directly addressed, which is a **priority** in current SPIRE phase*
- ***Data is a valuable resource:** finding a way to use all available data, in a scalable way, in real-time will lead to **increased yield** and better equipment utilisation (efficiency increases up to 20% in steel)*
- *The envisioned plant level **fault diagnosis** and monitoring applications will lead to **longer life** and **better utilisation** of existing (**ageing**) plants*

CROSS-SECTORIALITY

- *The idea addresses sensing, communication and control/optimisation issues, and as such can be **applied to any process***
 - ***large scale** and “slow” processes more suited to demonstrating the idea*
- *The addition of **industrial partners** from sectors **different** than **steel** is necessary*

EXISTING PROJECT CONSORTIUM

CURRENT PARTNERS

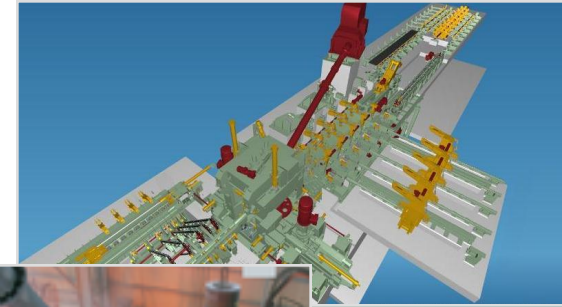
- **TU Delft / Delft Center for Systems and Control**
 - Academia, expertise in control systems
 - Coordinated HD-MPC FP7 project



- Industry, supplier of instrumentation and complete automation solutions for steelmaking
- Part of Danieli group (supplier of turn-key plants)
 - Took part into CESAR ARTEMIS-JU FP7 project

PROSPECTIVE PARTNERS

- Expression of interests from leading academic partners, including an European institution from the top ten in global THE Engineering and Technology rankings



LOOKING FOR PARTNERS

INDUSTRIAL PARTNERS

- *One, or better two partners from **other SPIRE sectors**, willing to cooperate in the **definition of requirements** and of **testbeds**, and willing to host a **demonstrator***
 - *especially in the **Chemical** sector*

OPEN TO OTHER PARTNERS

- *Academia, with interest in novel control paradigms for **large scale** systems*
- *Companies (also **SMEs**) with experience in automation hw and sw related to the present idea willing to cooperate on the **definition** of standard **protocols***

CONTACT DETAILS

CONTACT

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