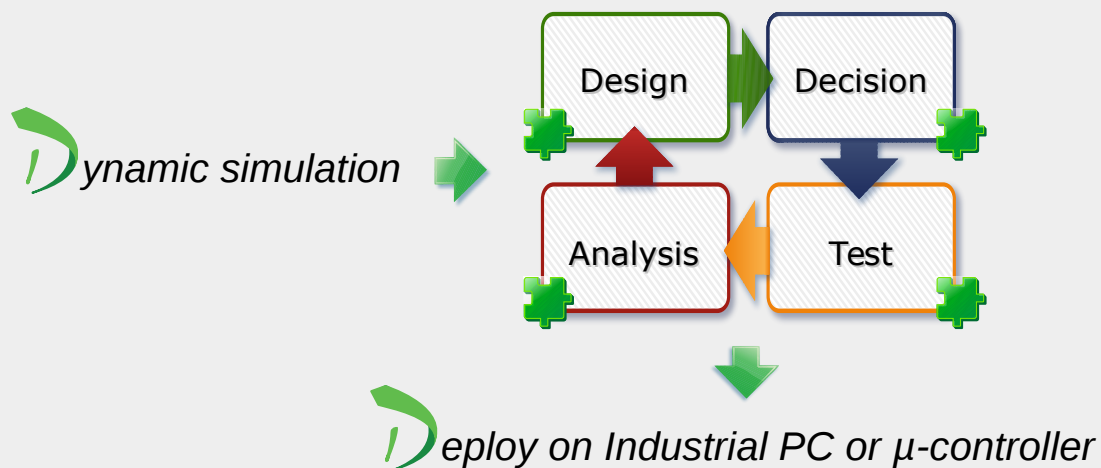


# AUTOMATION 4.0

A Workshop by: *D*ynamica

*Virtualization, Simulation “in-the-loop”, Deployment on Industrial or  $\mu$ -processor Controller*



Presented at:

**sps ipc drives**  
ITALIA  
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Automazione Industriale  
tecnologie abilitanti  
per la smart factory

FOCUS  
KNOW  
HOW  
4.0

## Modelling, Optimization & Control

Modelling  
Simulation  
Control  
Analysis  
Consulting  
Training  
Testing





# AUTOMATION 4.0

## THE QUESTIONS:

- Can modelling & simulation:
  - aid the engineering process?
  - reduce the physical prototyping?
  - improve the automation & control performance?
  - reduce the commissioning time?
  - improve the operator training?
  - aid the operation & maintenance?

Automation Engineering

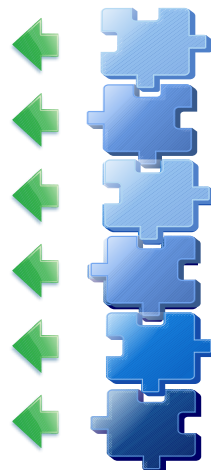
Development & Test

Deploy on  $\mu$ -controller & FAT

Commissioning & SAT

Operator Training

Operation & Maintenance



In the **Industry 4.0** scenario to give a positive answer to these questions is the challenge of the newest generation of **Model & Simulation** paradigms. The modern tools for multiphysics M&S, from one hand, allow to represent the reality with a degree of detail tailored on the project goals, and the last generation of Industrial PC and  $\mu$ controllers, from the other hand, can embed the simulation code, brings it available on-line and on-field. This **new synergy between the M&S and the Control Systems** opens promising perspectives for the entire engineering work-flow, starting from the Automation Engineering up to the Operation and Maintenance, through all the other specialized activities (development & test, deploying on control system, commissioning, operator training) which are part of the complete life-cycle of the project.

For the **engineering, development & testing phases**, the M&S can **aid to take decisions** in the key-points of the project, and virtually prototype them before to physically implement the control system, allowing an *iterative refining process at minimal cost and postponing the selection of the physical control system to the end of the engineering process*.

During the **control system implementation**, the same M&S code can be used to give realistic feedback in the testing operation, allowing also the pre-tuning of the control loop.

In the **commissioning phase**, the same M&S code again can be used to *save time - thus reducing costs* - planning and minimizing the test procedures, especially for critical tests (e.g. trip) which involve expensive machinery or plant parts, and to train the operators, either before the plant availability than during the normal operation.

Finally, deployment of the simulation code on the control system opens the way to the implementation of the **advanced controls** (like MPC) and to the **predictive maintenance**, based on devices in-line simulation & monitoring, to allow the detection of deviations from the expected behavior, thus preventing malfunctioning which can lead the process to its upset limits.

## IF YOU HAVE A PROBLEM...

- We analyze the problem and set-up the simplest model to reproduce it.
- We devise solutions and test it with you using our model (possibly extended).
- We can follow the solution implementation accordingly to your needs.

  
Modelling & Simulation

  
Virtualization

  
Deploy

## IF YOU HAVE A PROJECT...

- We build/extend/detail a library to describe the project in a structured (Object Oriented) way.
- We follow the project, using the model as a decision aid and for test & virtual prototyping.
- We can follow the project implementation accordingly to your needs.

- In any case, we provide training (also on-the-job), and knowledge & methodologies transfer.



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A UNIFYING  
VIEW



VALUE FROM  
MODELLING  
AND  
SIMULATION