

# Contribution and challenges of multiagent simulation for factory digital twin

## Parties prenantes



## Auteurs

Flavien Balbo  
Sophie Peillon  
Benjamin Serra

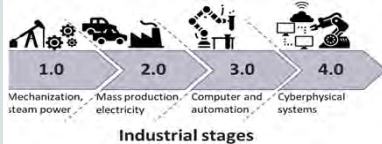
## Partenaires



## Digital twin

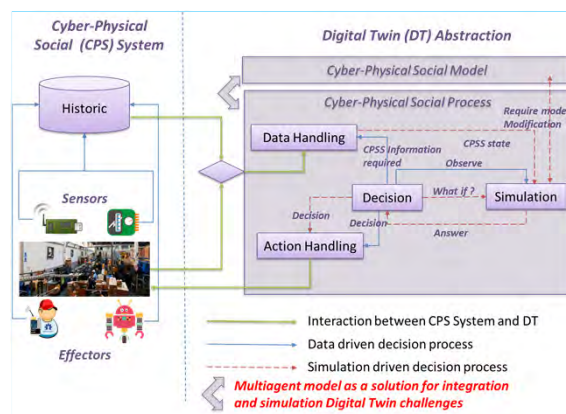
### A key technology for the Industry of the Future

- One of top 10 **strategic technology** trends for 2019 (cf. Gartner)
- A factory digital twin serves as a **virtual replica** of what is actually happening on the factory floor in near-real time



## SOLYSTIC SOSi™

- **SOLYSTIC** is a provider of solutions for mail and parcel industry
- **SOSi™** is an inhouse developed factory/supply chain digital twin; simulates **1 production year in 10 minutes**
- Enables **digital VSM** and **optimization of processes**



## Multiagent approach

### A bottom-up modeling approach for modeling a CPS System

- **Agents** for modeling goal-driven decision processes
- **Environment** for modeling information perception and actions
- **Interaction** for modeling influences between components
- **Organization** for modeling formalized and/or implicit rules

## Multiagent model of a CPS System

### A solution for making easier the transition

- **FROM Simulation as a tool for Observation**: to understand the behavior of the reference system thanks to a model that is considered as a miniature reproduction of the reference system
- **TO Simulation as a tool for Validation**: to test an hypothesis of the reference system, to validate or to certify the underlying theory.

## Why?

### A CPS System is often

- **Complex**: the global behavior of the system is hard to model and any modifications is difficult
  - **Multiagent solution**: The global system is not explicitly designed
  - **Multiagent solution**: The multiagent concepts can be understood by non-experts
- **Open**: new component may be added to the system leading to a modification of the initial model
  - **Multiagent solution**: only the new components and its interaction with other components must be designed
- **Heterogeneous**: different decision models, data models, ...
  - **Multiagent solution**: the resulting model is independent of the domain and can integrate several point of views.
- **Decentralized**: many local decisions without a centralized control
  - **Multiagent solution**: decentralization management is the core of a multiagent system.

Contact : flavien.balbo@mines-stetienne.fr