Contribution and challenges of multiagent simulation for factory digital twin

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Parties prenantes

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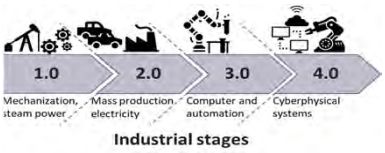


Digital twin

A key technology for the Industry of the Future

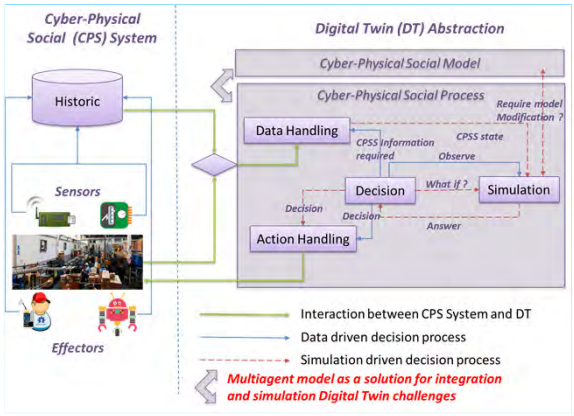
- One of top 10 **strategic technology** trends for 2019 (cf. Gartner)
- A factory digital twin serves as a **virtual replica** of what is actually happening on the factory floor in near-real time

SOSi™

SOLYSTIC

SOSi™

- **SOLYSTIC** is a provider of solutions for mail and parcel industry
- **SOSi™** is an inhouse developped 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.

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