Contribution and challenges of multiagent simulation for factory digital twin
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**Contribution and challenges of multiagent simulation for factory digital twin**

**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.

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