Contribution and challenges of multiagent simulation for factory digital twin
Flavien Balbo, Sophie Peillon, Benjamin Serra

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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.

Contact: flavien.balbo@mines-stetienne.fr