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Complex manufacturing and service enterprise systems: Modeling and computational framework (Conference Paper)

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Abstract

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This work comes as a contribution to the efforts that are undergoing within engineering systems community to account for the increased complexity of today's manufacturing or service systems. These systems are becoming more and more complicated due to the increase in the number of elements, interconnections within the system, and necessary integration with other systems. Moreover, through the emphasis on self-organization and considering the multistakeholders context and objectives, these systems are crossing the line towards complexity. There is a need for developing a framework to be used in modeling, analysis, and integration of systems that operate in uncertain environments, in which characteristics such as adaptation, self-organization and evolution, or in other words behavior prediction, need to be addressed. The proposed complex enterprise systems framework combines knowledge coming from complex systems science and systems engineering domains, and uses computational intelligence and agent-based systems simulation methodologies. The approach requires computational experience in manipulating large amounts of data and building large-scale simulation models. A significant result to be made possible by this research is that systems may no longer have a fixed, life-cycle long, design based on identified requirements; systems will be engineered to evolve and adapt as needed during the operational phase, while respecting their operational environment constraints. © Springer-Verlag Berlin Heidelberg 2013.

Author keywords

Agent-based modeling and simulation; Behavior prediction; Complex enterprise systems; Holonic enterprise systems

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