

# A Logical Framework for Self-Optimizing Networked Cyber-Physical Systems (NCPS)



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## Challenges and Trends

- NCPS consist of increasingly large numbers of heterogeneous components
- Often deployed in challenging environments with intermittent connectivity
- High diversity, many point solutions, but lack of unifying models/frameworks
- Need to operate in the entire spectrum between **autonomy and cooperation**
- Highly concurrent and decentralized NCPS promise robustness, but need approaches to manage system as a single asset, ideally reducing the need for error-prone programming
- Declarative approaches are becoming increasingly used in networking, but logics are traditionally closed, non-interactive, and not suitable for distributed reasoning

## Approach and Contributions

- Partially ordered knowledge-sharing model for **loosely-coupled distributed computing**
- Implemented in new application framework for NCPS
- Distributed logic for declarative control
- First steps towards distributed dynamic optimization
- Simulation case study: Collaborating teams of mobile robots

