Effective Cooperation and Scalability in Multi-Robot Patrolling Algorithms

Patrol (pǝ-trōl') [puh-**trohl**]

• The activity of going around or through an area at regular intervals for security purposes.

Main Motivation

• Assist human operators in dangerous tasks;
• Applicability potential;
• Unfeasibility / unrealistic assumptions in previous works;
• Lack of work using distributed multi-robot teams with non-deterministic and patrol-effective algorithms.
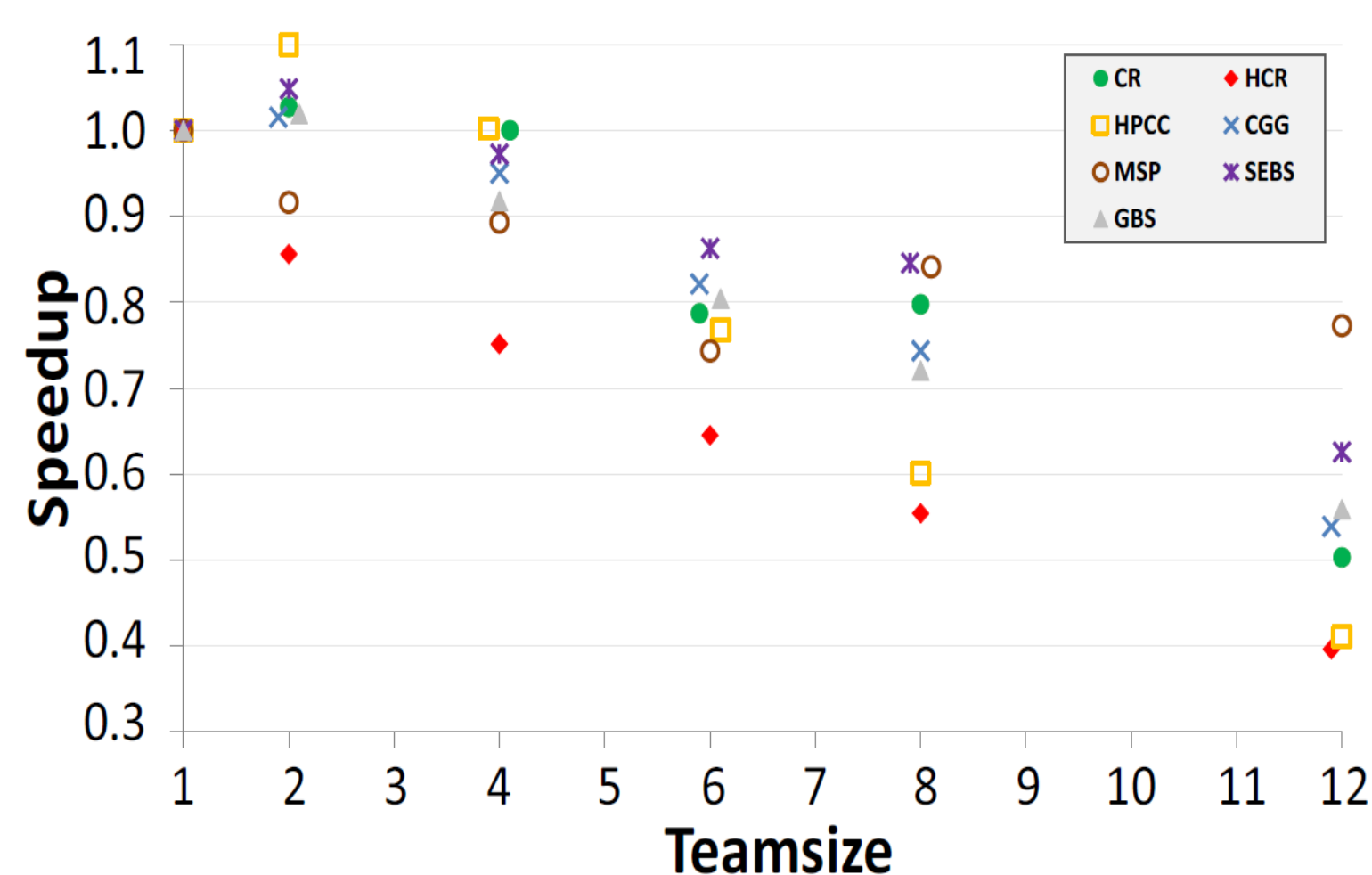
Assumption

• The environment is abstracted using a topological map.
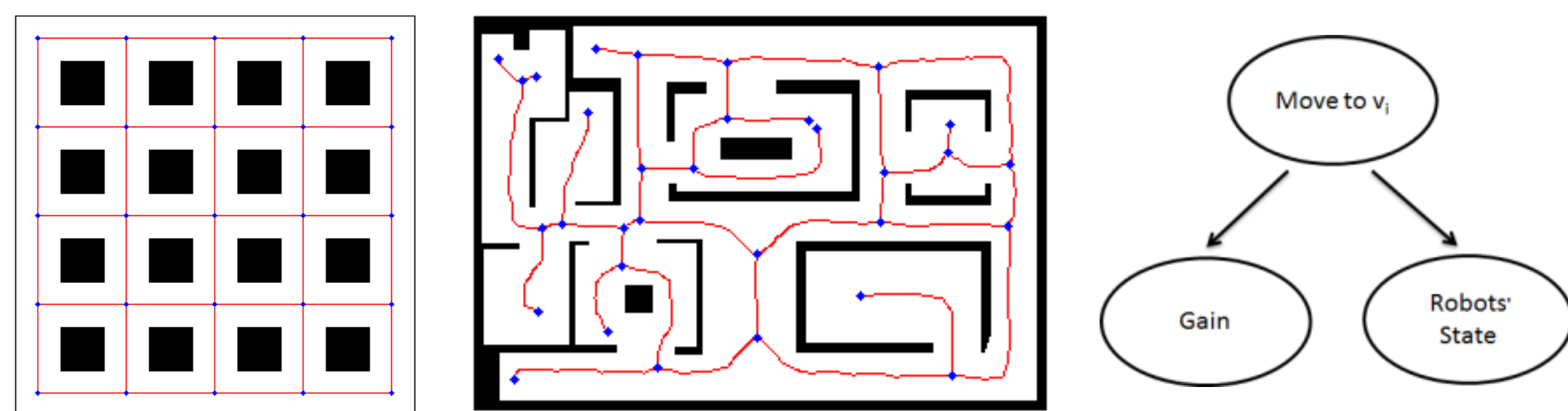
## State Exchange Bayesian Strategy (SEBS) for Multi-Robot Patrolling

• Distributed solution using Bayesian decision;
• Great adaptibility and flexibility;
• Handles uncertainty and selects actions according to the state of the system;
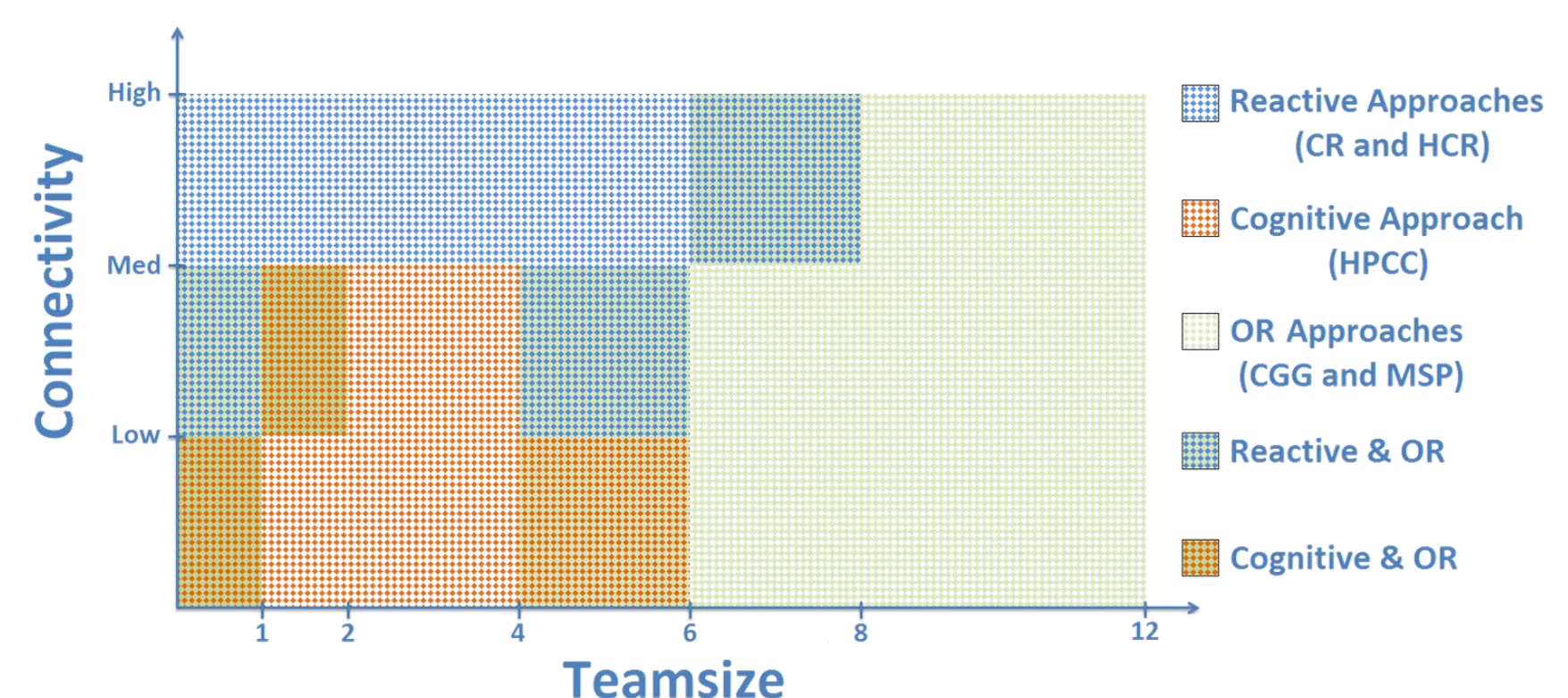• Scalable and patrol-effective with reduced interference;

• Increased performance through exchange of goals between agents;
• Validated by simulations in ROS;
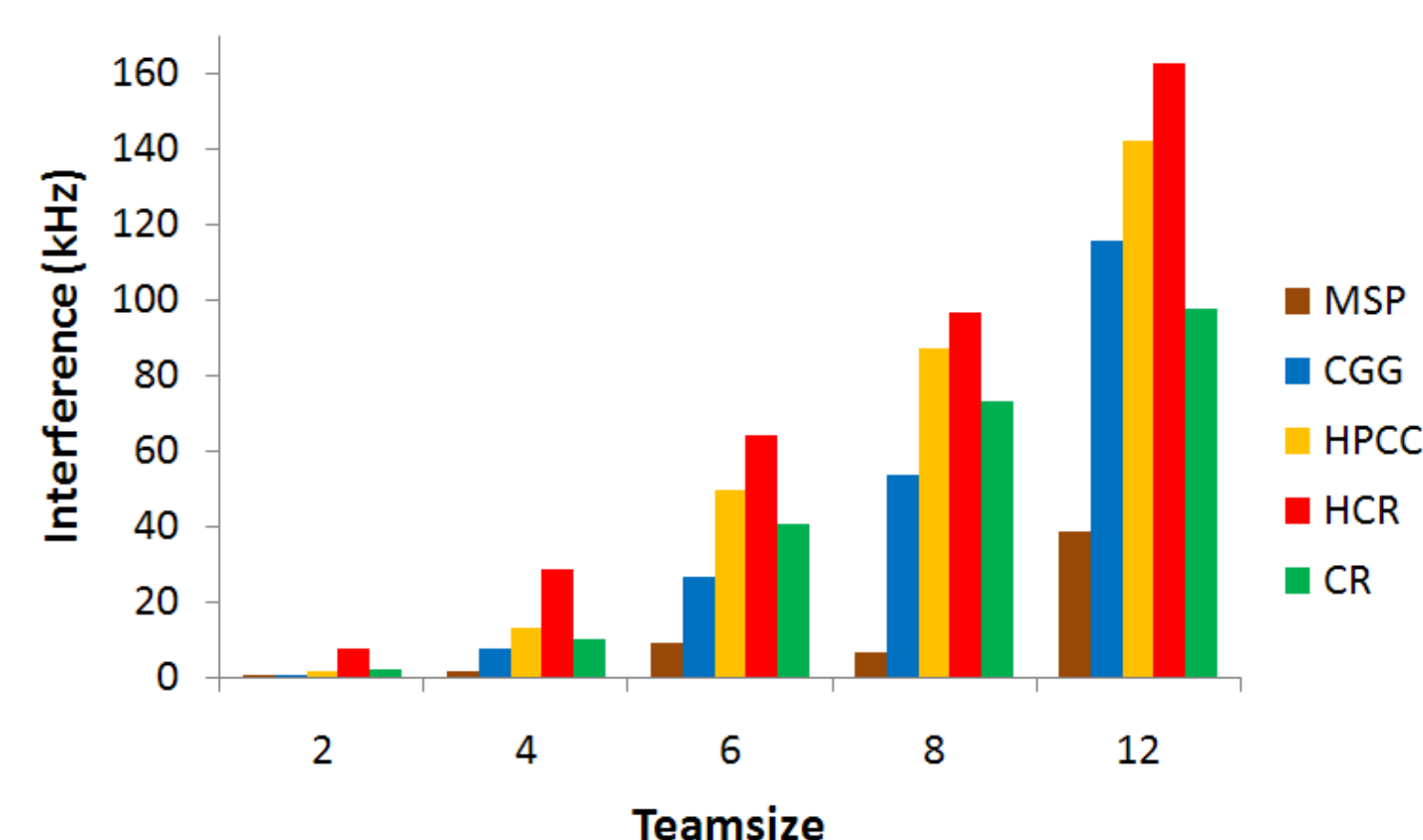• Verified through experiments with a team of TraxBots.

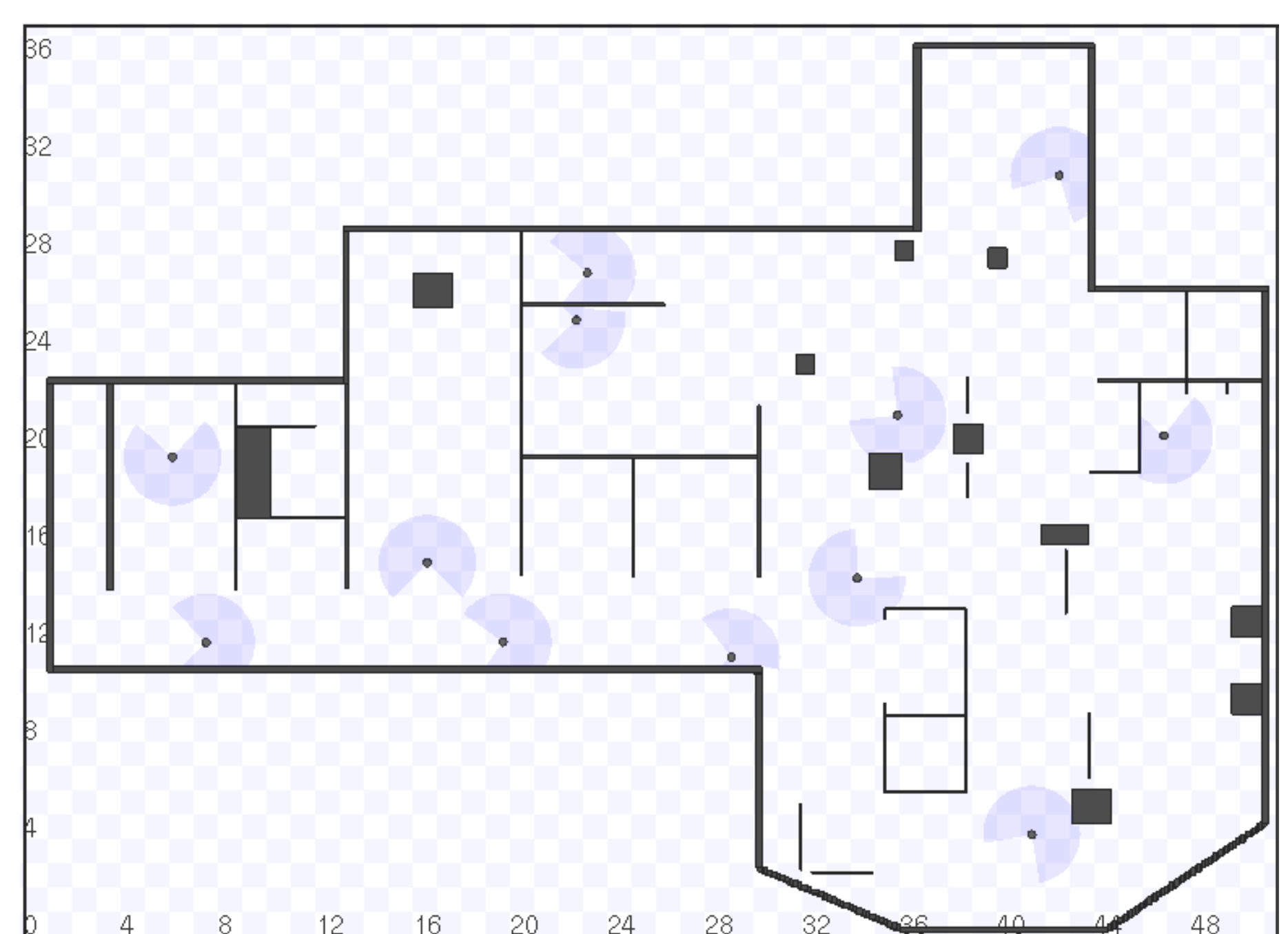## Performance and Scalability of Patrolling Strategies
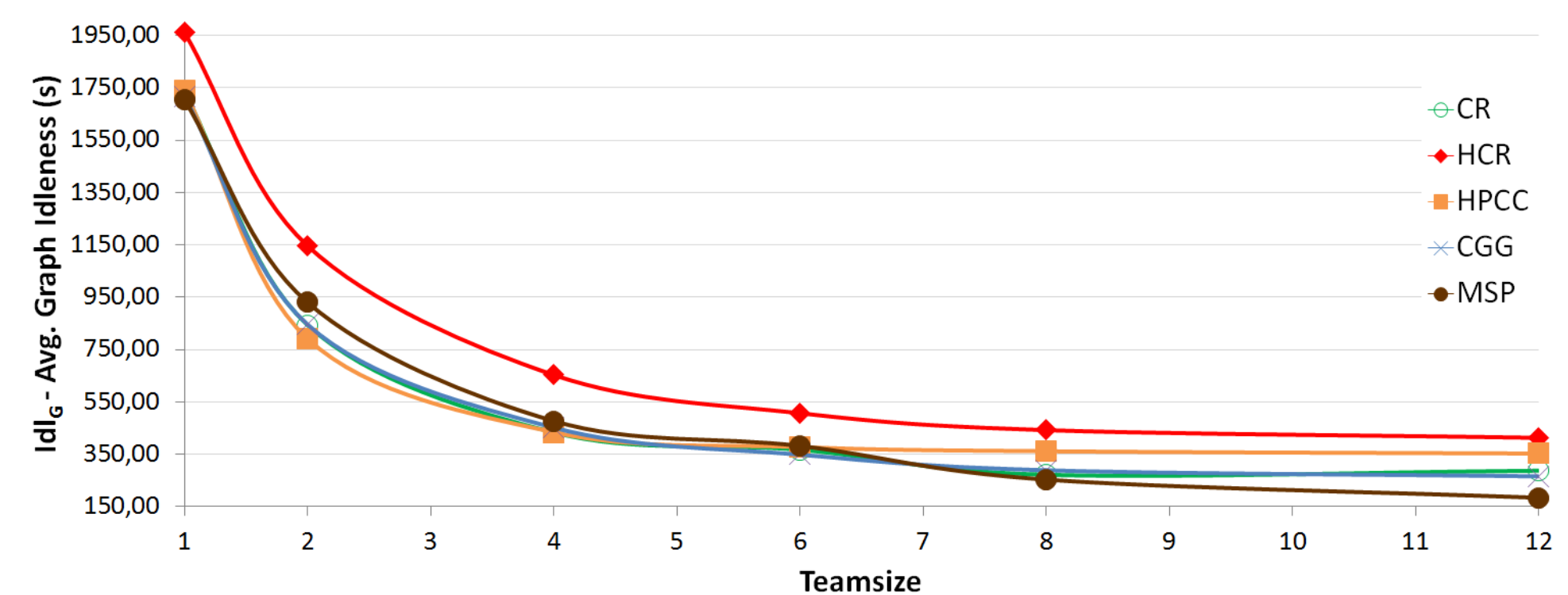
• Strategies perform differently according to environment connectivity and teamsize;

• Algorithms increase performance with teamsize up to the point where the group productivity stagnates;

• The decrease of performance is related to spatial limitations and interference between robots;
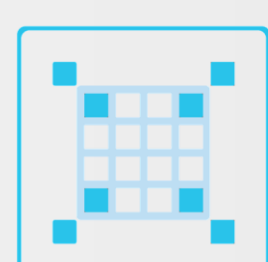

• To improve team performance, scalable methods should be developed to minimize interference.

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