Institutional Robotics (IR) is a new approach to the coordination of distributed robotic systems, drawing some inspiration from social sciences, and using the concept of institutions.

**Method: Executable Petri Nets**

Specification of behaviors as Executable Petri Nets

- Individual behavior
- Institutions

EPNs: Petri Nets with actions associated to places and boolean conditions associated with transitions

- Condition 1 verified
- Transition fires

Composition of an individual behavior and a set of institutions gives us a controller for our robots

**Institutions and Institutional Controller**

Definition: An Institution $I$ is a four-tuple $(\text{Inst}, \text{initial}_I, \text{final}_I, d_I)$ where:
- $\text{Inst}$ in an EPN
- $\text{initial}_I, \text{final}_I$ are conditions for the enabling of $I$
- $d_I \in \{\text{AllowAll}, \text{StopInd}, \text{StopInst}, \text{StopAll}\}$ is a deontic operator used for composition

Definition: An Institutional Agent Controller is an EPN resulting from the composition of an individual behavior and a set of institutions controlled by their deontic operators.

**Wireless Connected Swarm**

Initial case study: 1 individual behavior – 1 institution

**TASK:** robots must maintain inside communication radius of their neighbors and avoid obstacles in a bounded arena

**Individual Behavior - Ind**

- move forward
- random turn
- end random turn

**Institution - I**

- # neighbors < 1
- turn 180°
- end 180° turn

**Composition**

- move forward
- random turn
- end random turn

**Publications:**
