Control Architecture for Cooperative Mobile Robots using Multi-Agent based Coordination Approach

Mehdi Mouad, Lounis Adouane, Pierre Schmitt, Djamel Khadraoui and Philippe Martinet

CRP Henri Tudor
2A, rue Kalchesbrük
L-1852 Luxembourg

LASMEA
24, Avenue des Landais
63177 AUBIERE Cedex
FRANCE

CENTRE DE RECHERCHE PUBLIC HENRI TUDOR
CENTRE D'INNOVATION PAR LES TECHNOLOGIES DE L'INFORMATION CITI

Université Blaise Pascal

LASMEA

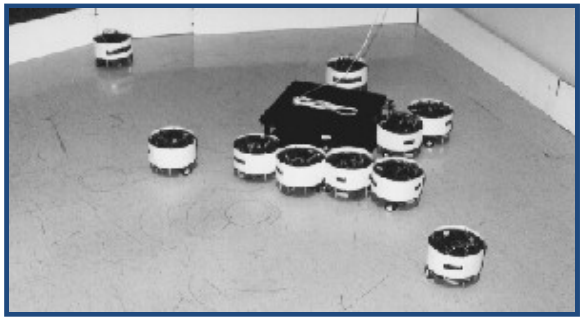
Sommaire

- Concepts et Objectifs
- Les Architectures robotiques
- L'architecture MAS2CAR
- Specification de l'Organisation de MAS2CAR
- Simulations
- Conclusion et Perspectives

Concepts et objectifs

Multi-Robots cooperation:

- Multi-Objectiv Control
- Multi-Robot Coordination

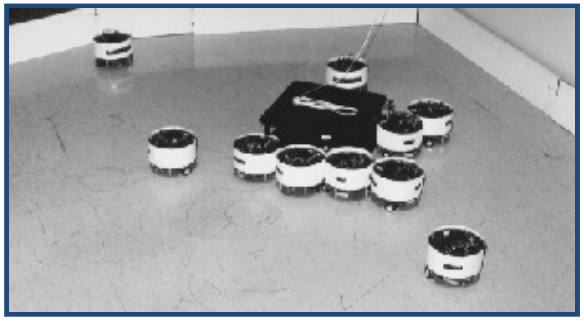


[Kube & Bonabeau 2000]

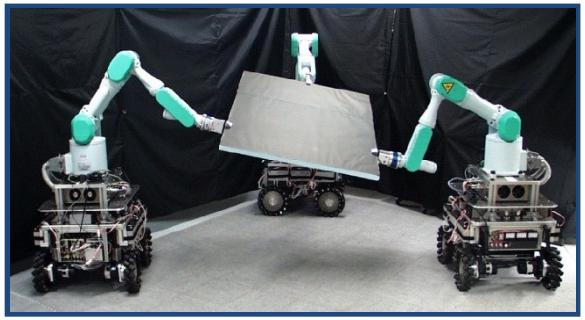
Concepts et objectifs

Multi-Robots cooperation:

- Multi-Objectiv Control
- Multi-Robot Coordination



[Kube & Bonabeau 2000]

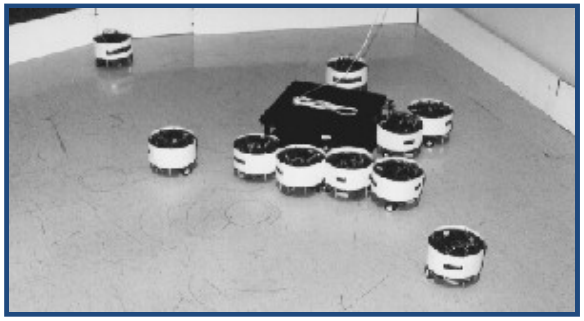


[Hirata & al. 2002]

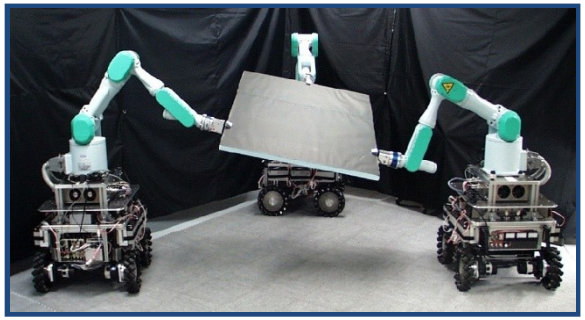
Concepts et objectifs

Multi-Robots cooperation:

- Multi-Objectiv Control
- Multi-Robot Coordination



[Kube & Bonabeau 2000]



[Hirata & al. 2002]

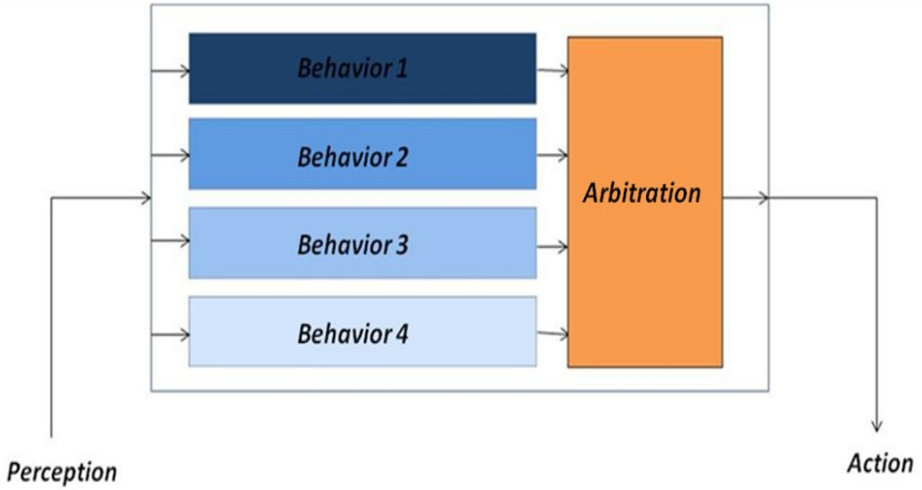
LASMEA – ROSACE team

Automatic convoying CyCabs

Les Architectures robotiques

Three kind of architectures:

- Reactive

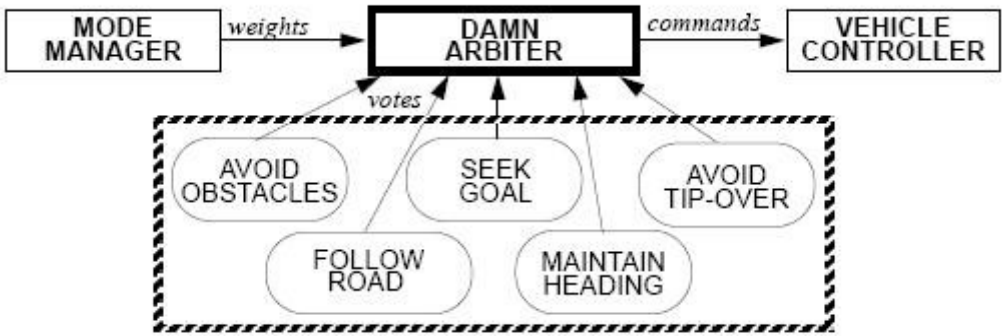


Reactive Architectures with arbitration

Les Architectures robotiques

Three kind of architectures:

- Reactive

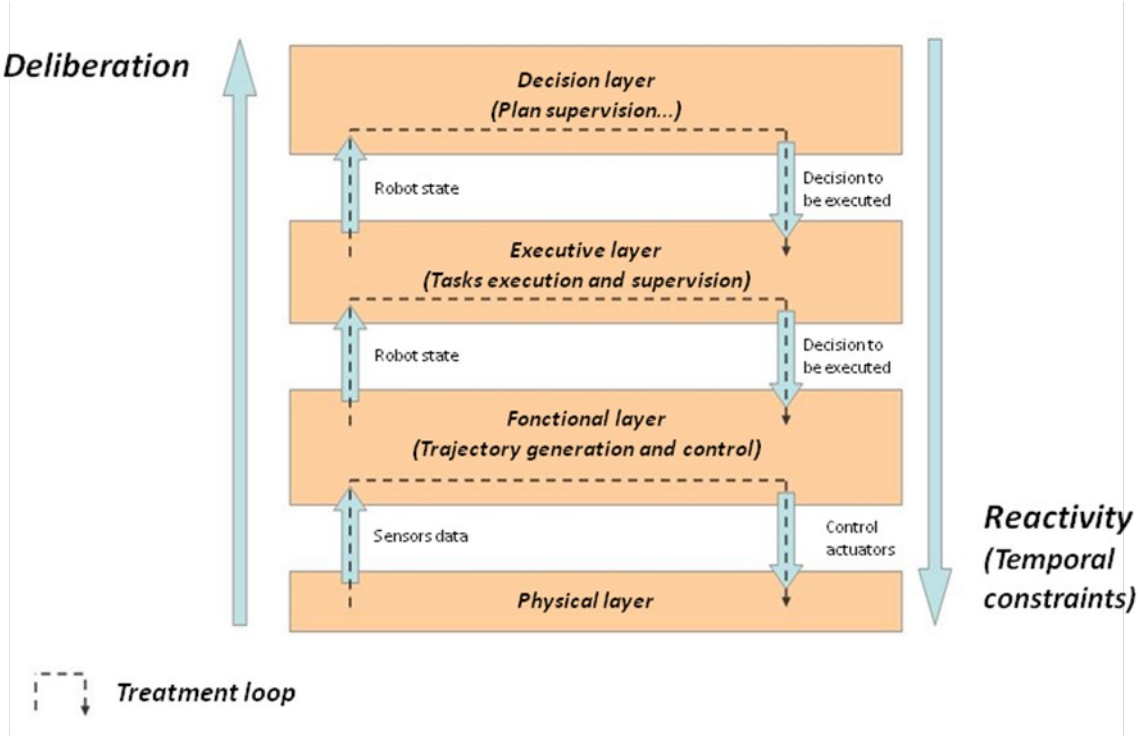


DAMN Architecture

Les Architectures robotiques

Three kind of architectures:

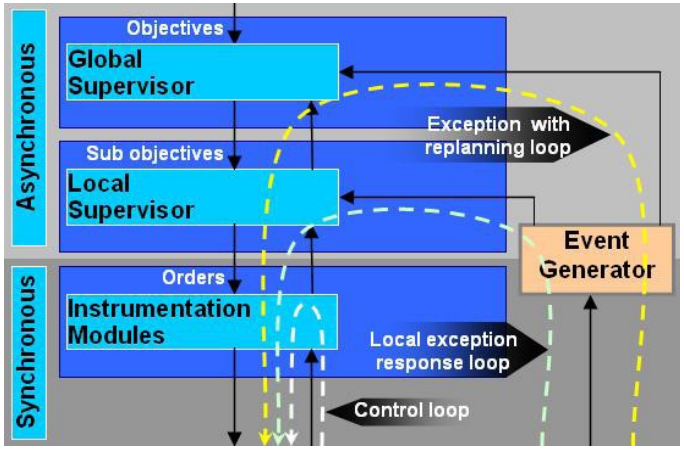
- Reactive
- Hierarchique



Les Architectures robotiques

Three kind of architectures:

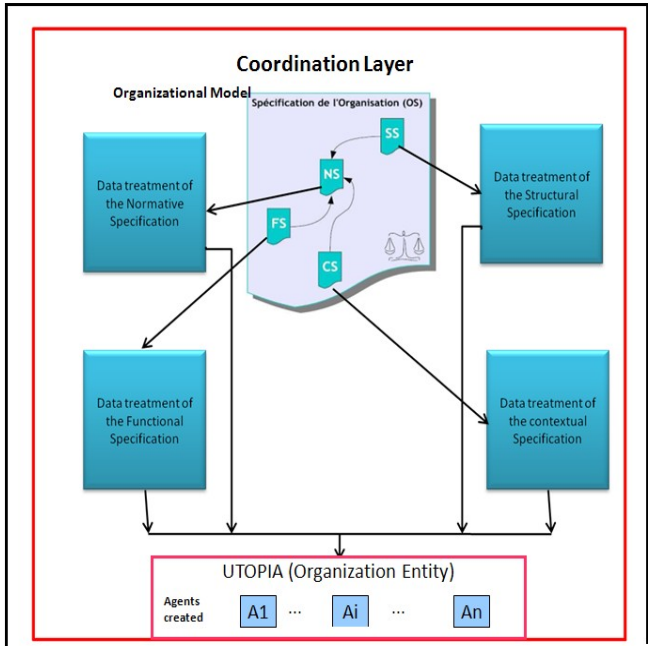
- Reactive
- Hierarchique
- Hybride



COTAMA Architecture's reaction loops

L'architecture MAS2CAR

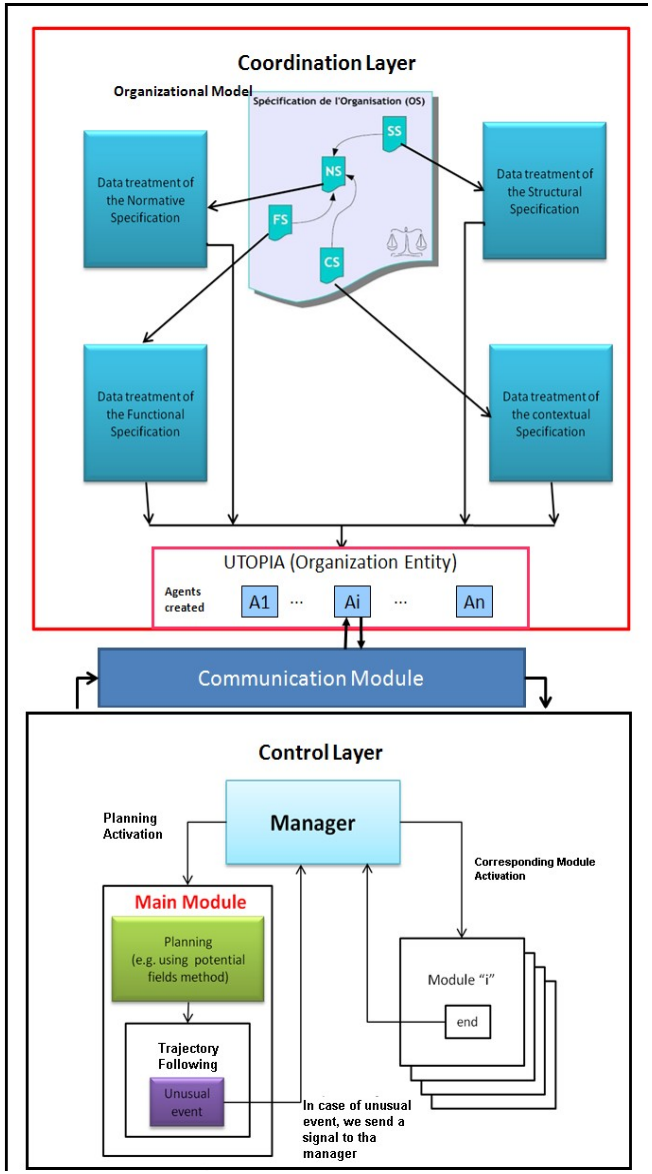
Coordination Layer



L'architecture MAS2CAR

Coordination Layer

Control Layer

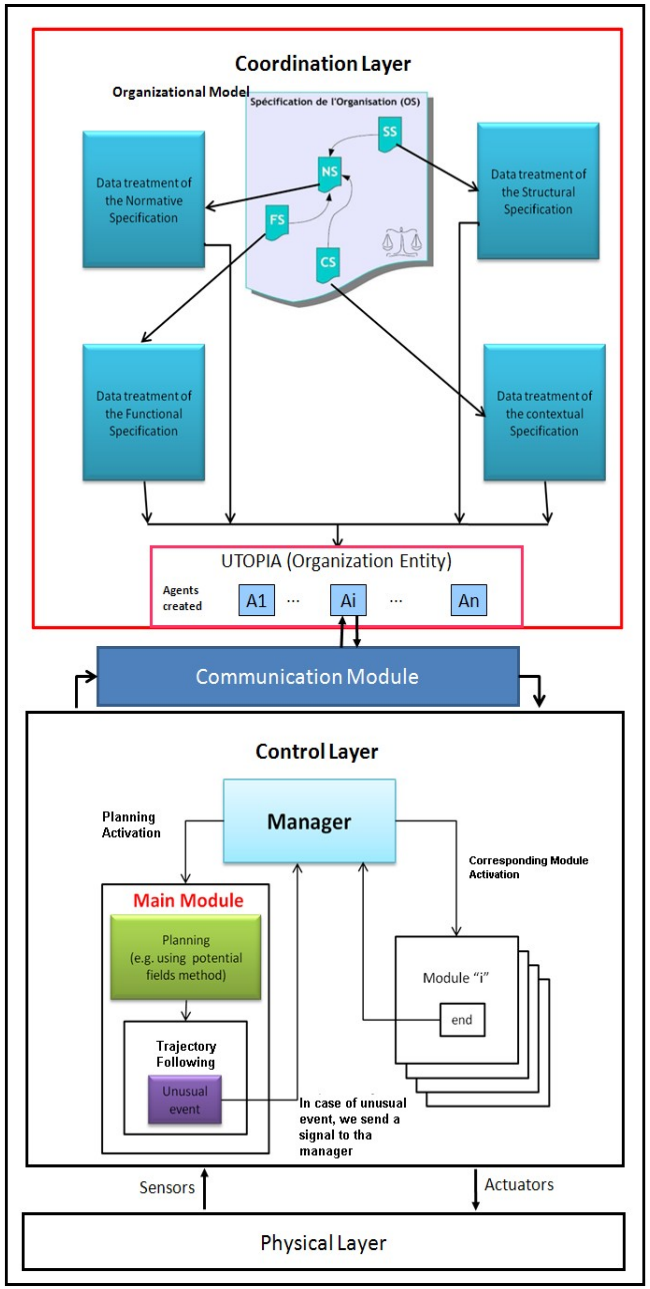


L'architecture MAS2CAR

Coordination Layer

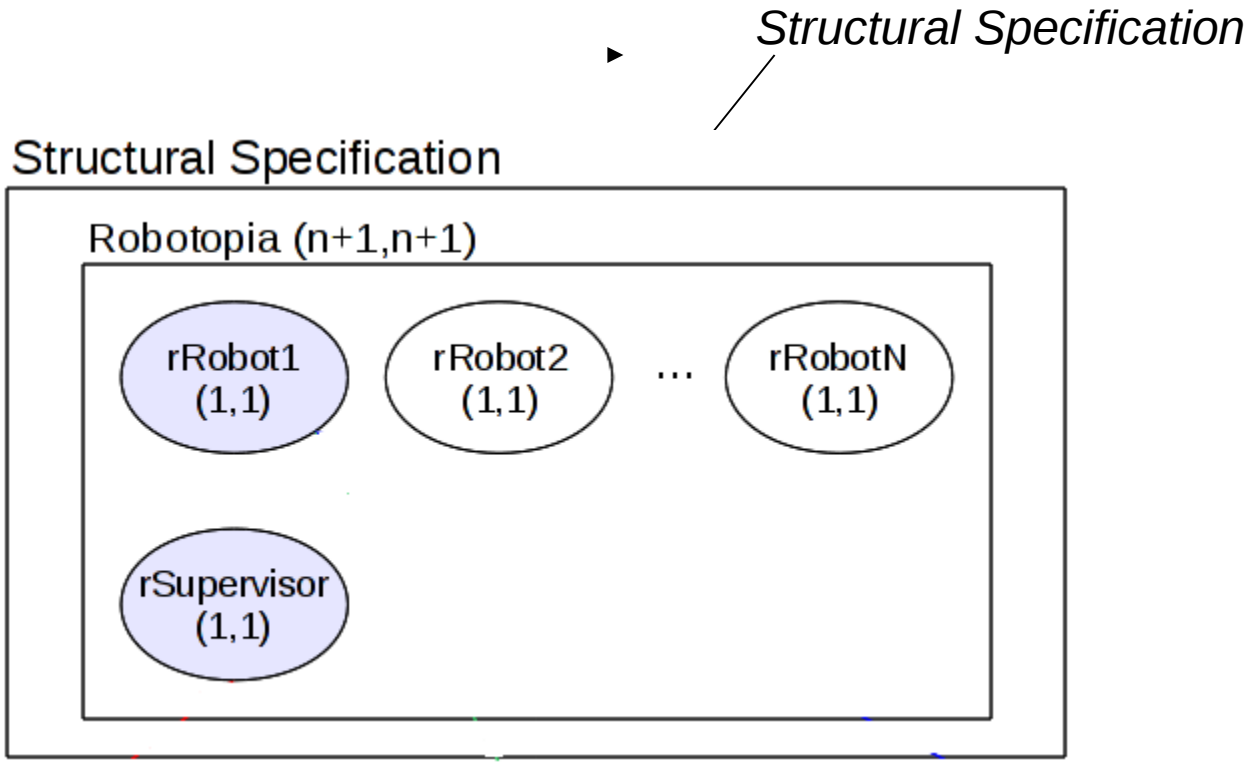
Control Layer

Physical Layer



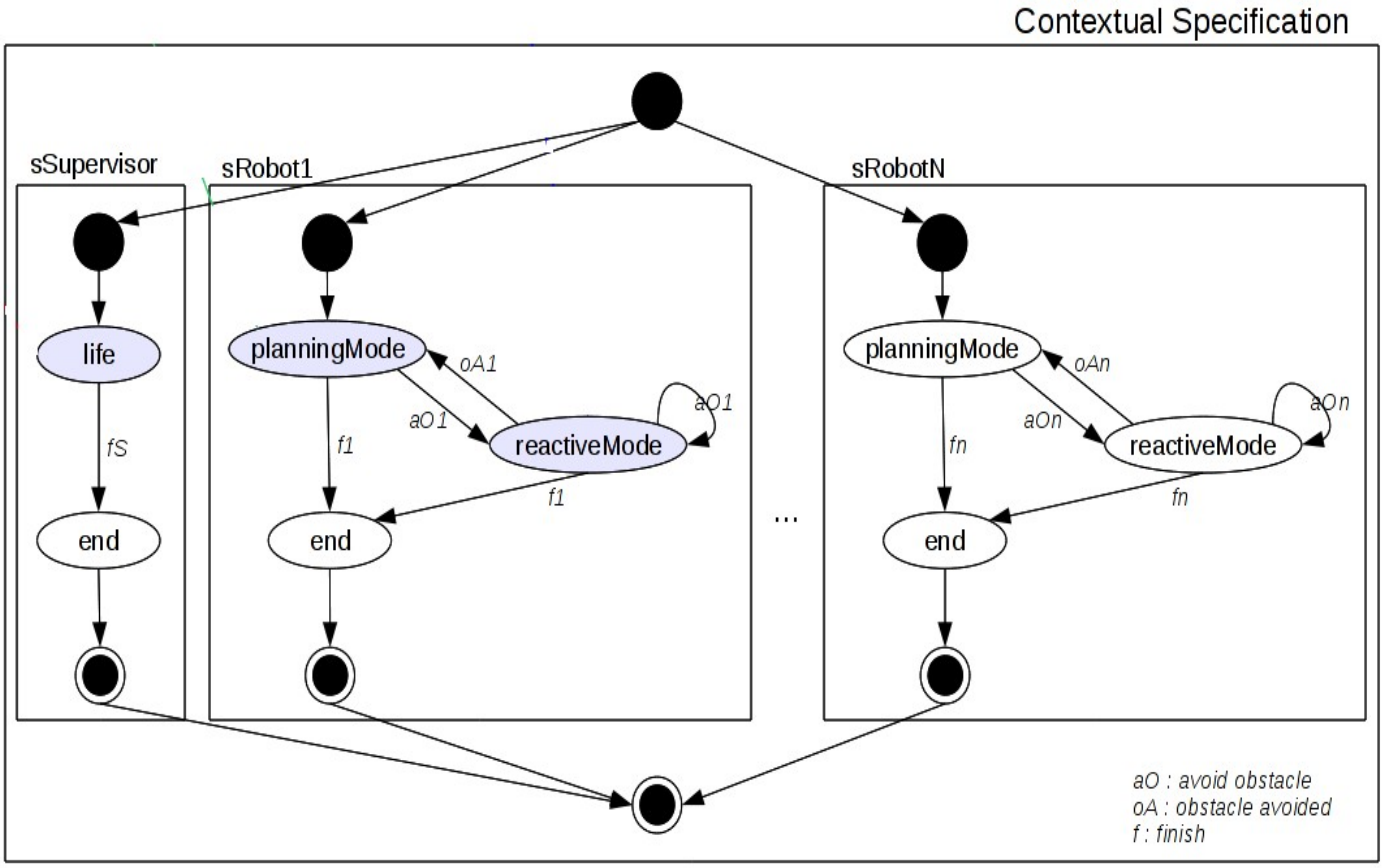
Specification de l'Organisation de MAS2CAR

Moise^{Inst}



Specification de l'Organisation de MAS2CAR

Moise^{Inst}

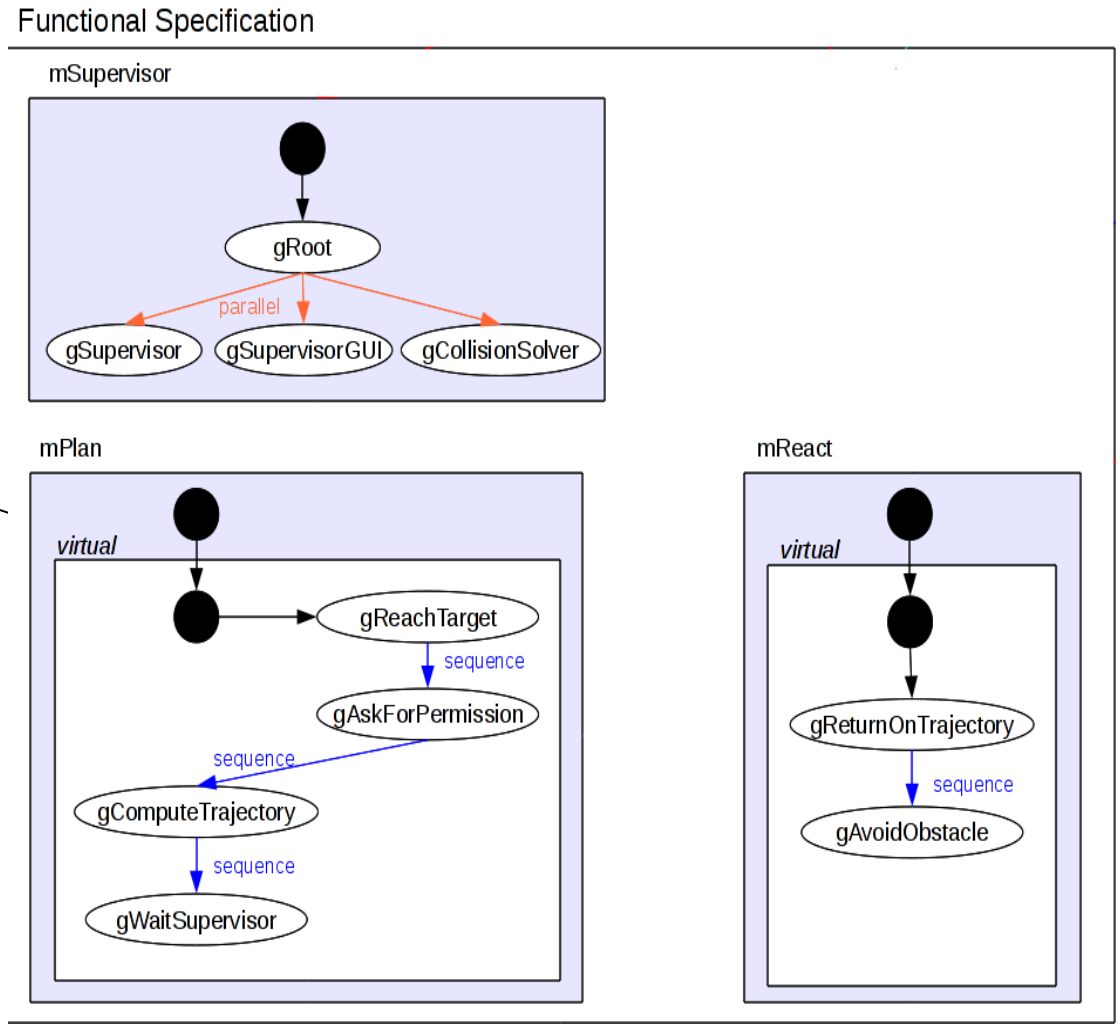


Contextual Specification

Specification de l'Organisation de MAS2CAR

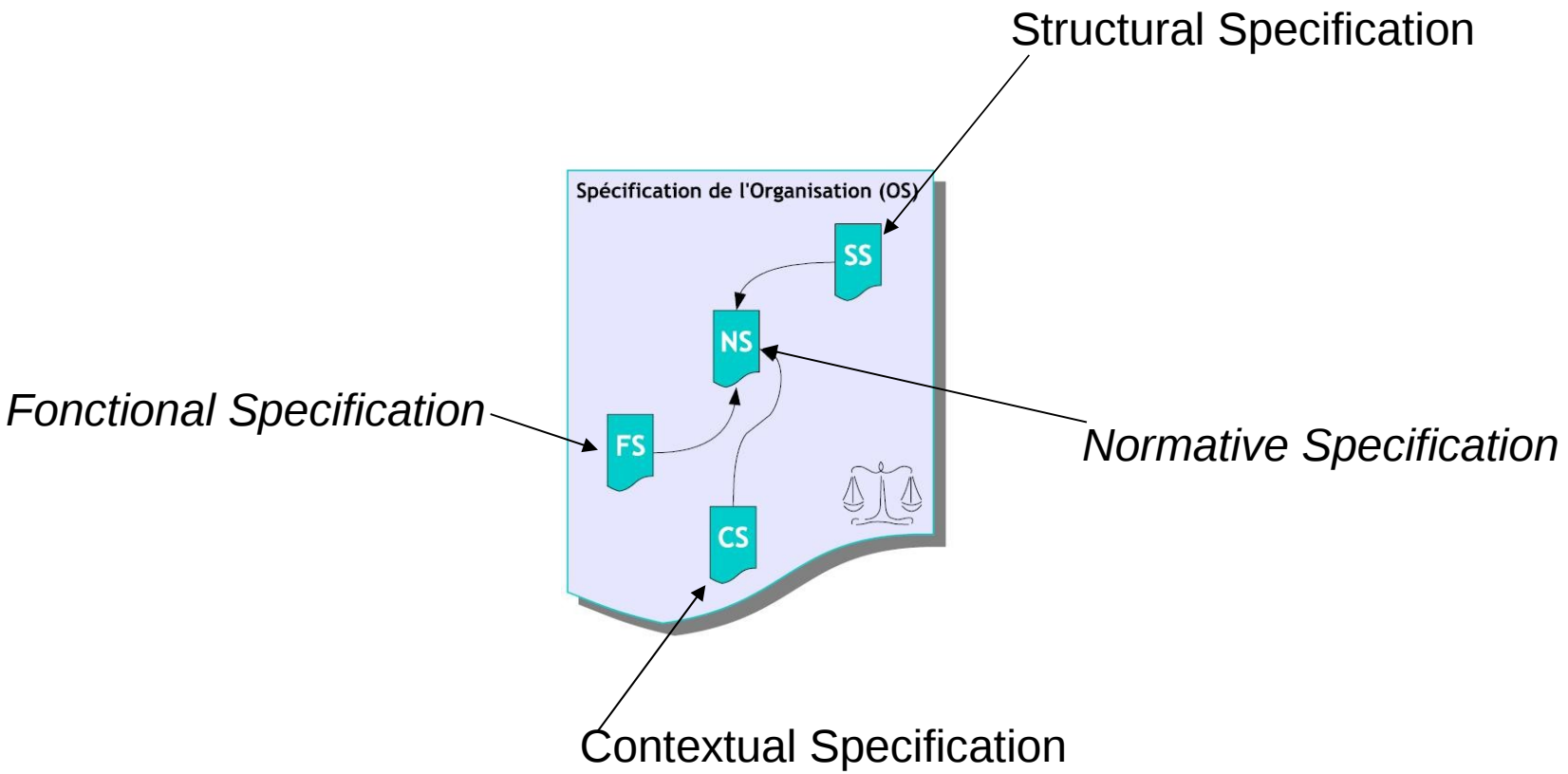
Moise*Inst*

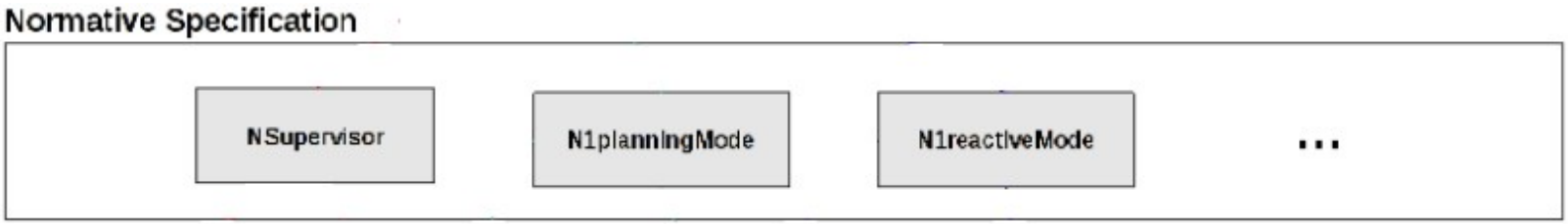
Fonctional Specification



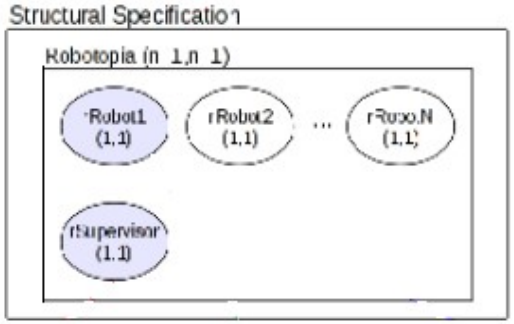
Specification de l'Organisation de MAS2CAR

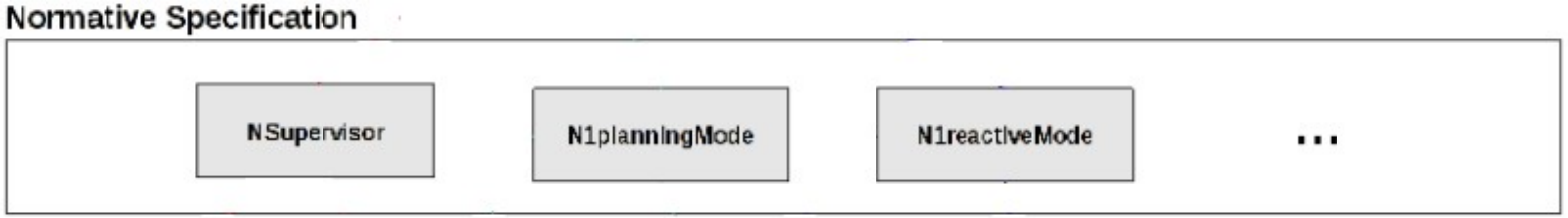
Moise^{Inst}

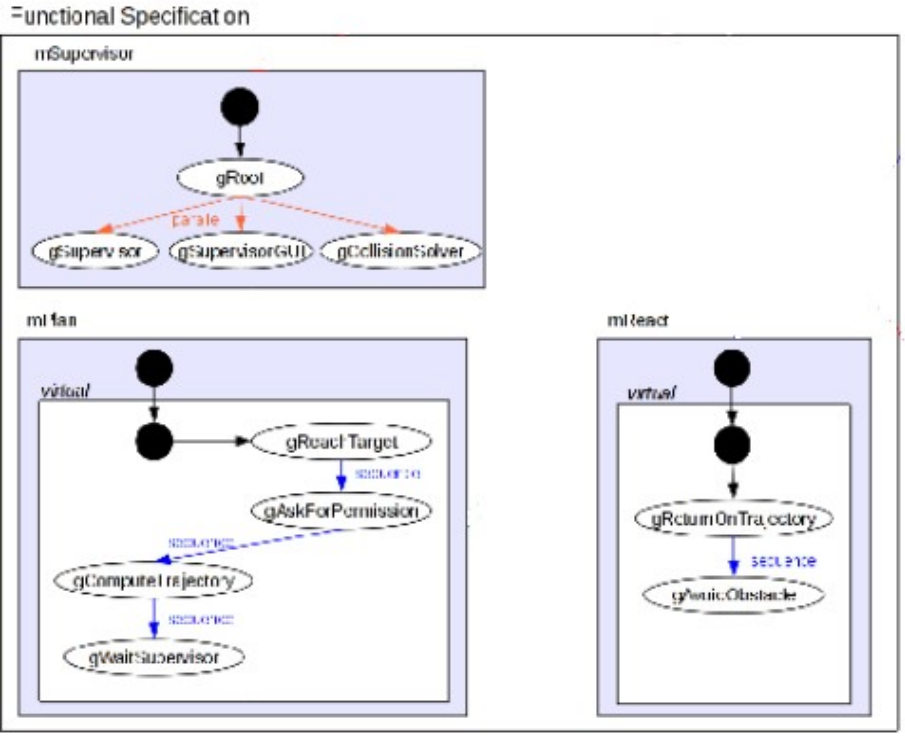


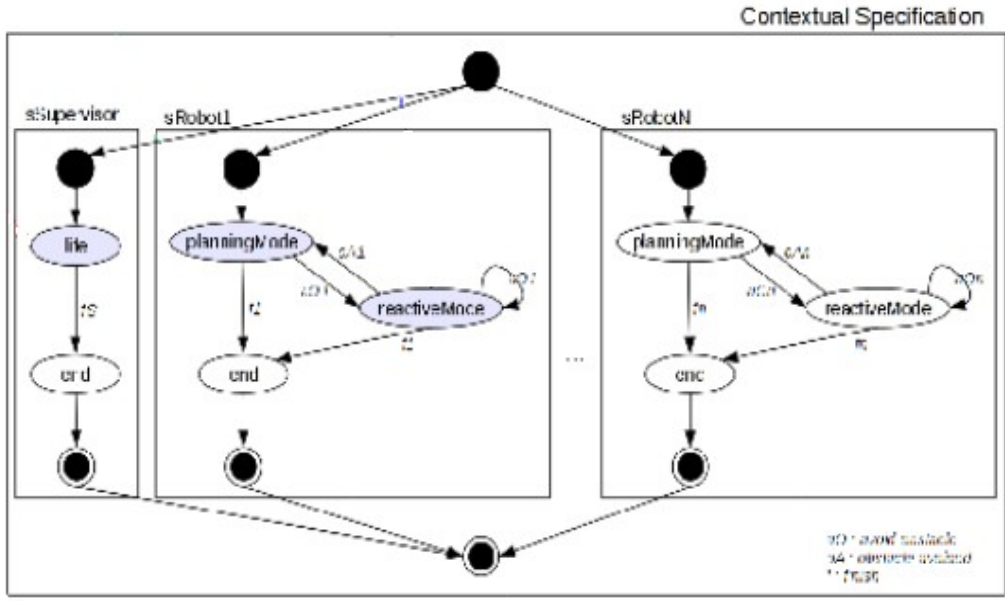


Specification de l'Organisation de MAS2CAR

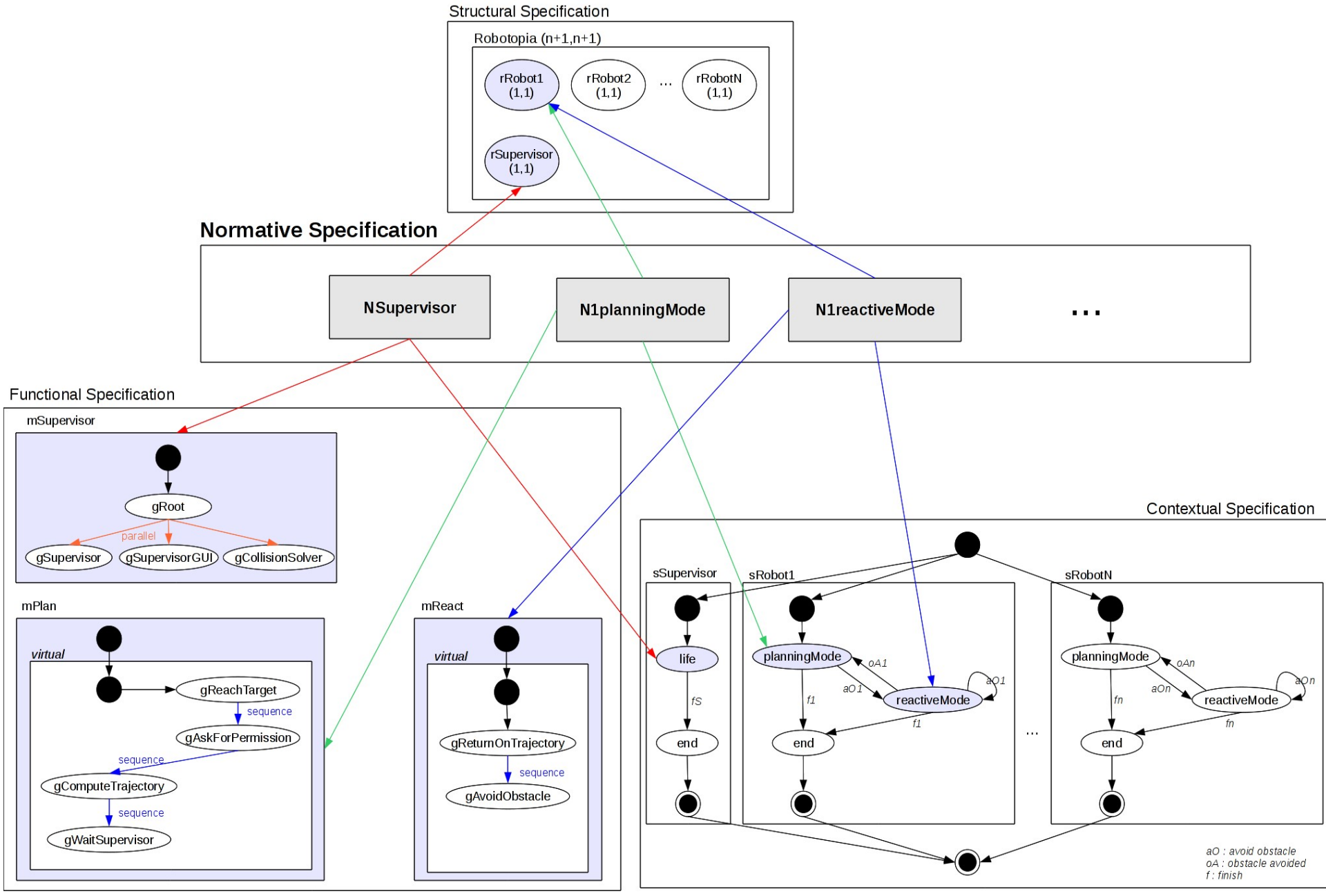






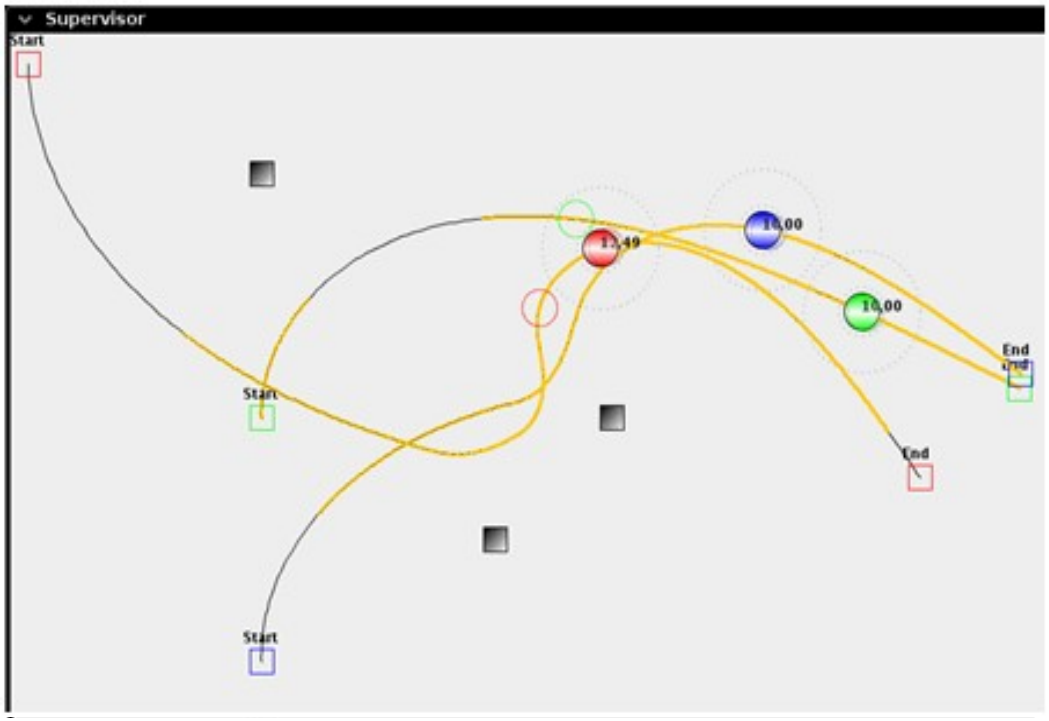


Specification de l'Organisation de MAS2CAR



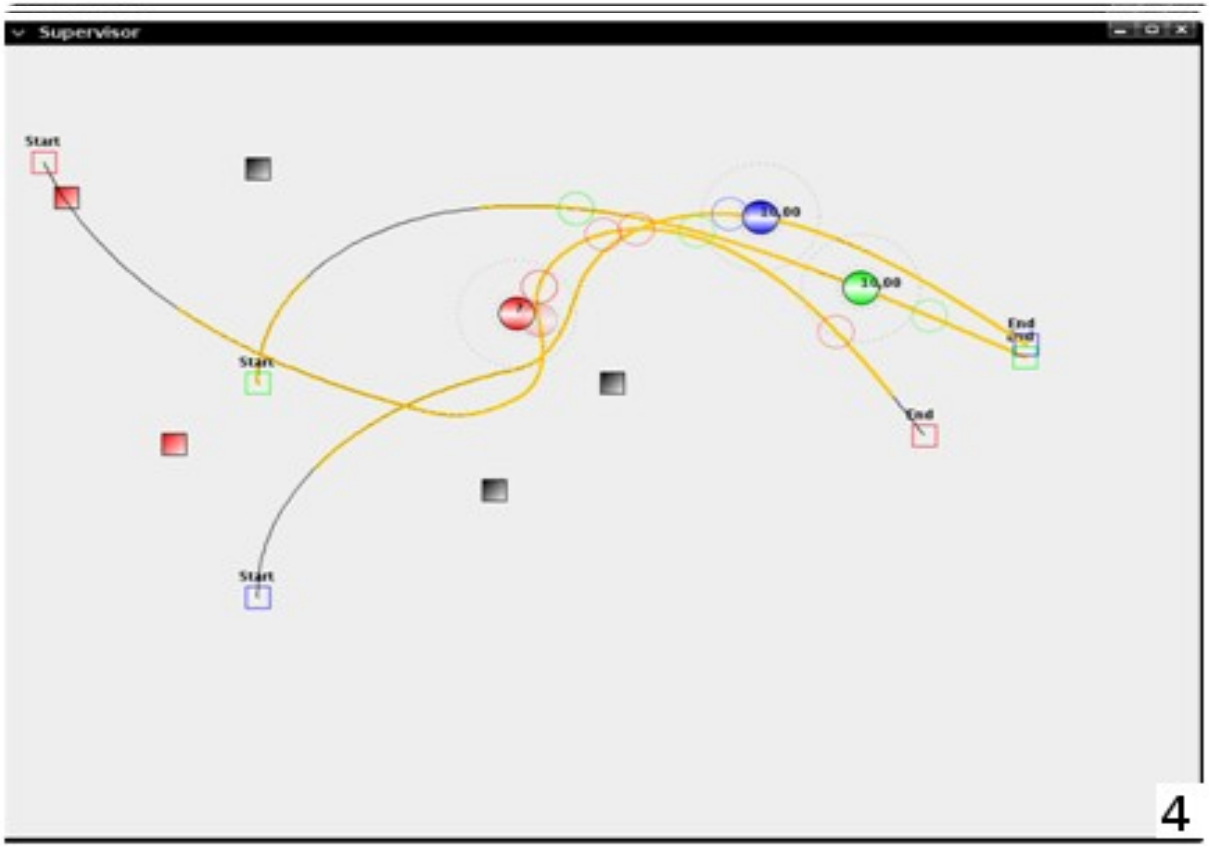
Simulations

Planning Mode :



Simulations

Reactive Mode :



Conclusion et Perspactives

This new approach have proven its effectiveness and reliability on simulations.

Our next steps:

- Future works will adress more sophesticated collaborative tasks, behaviors and team-work, such as the treatment of a big abstract mission...
- Validation of the MAS2CAR's Control Layer.
- Implementation of MAS2CAR on real robots.