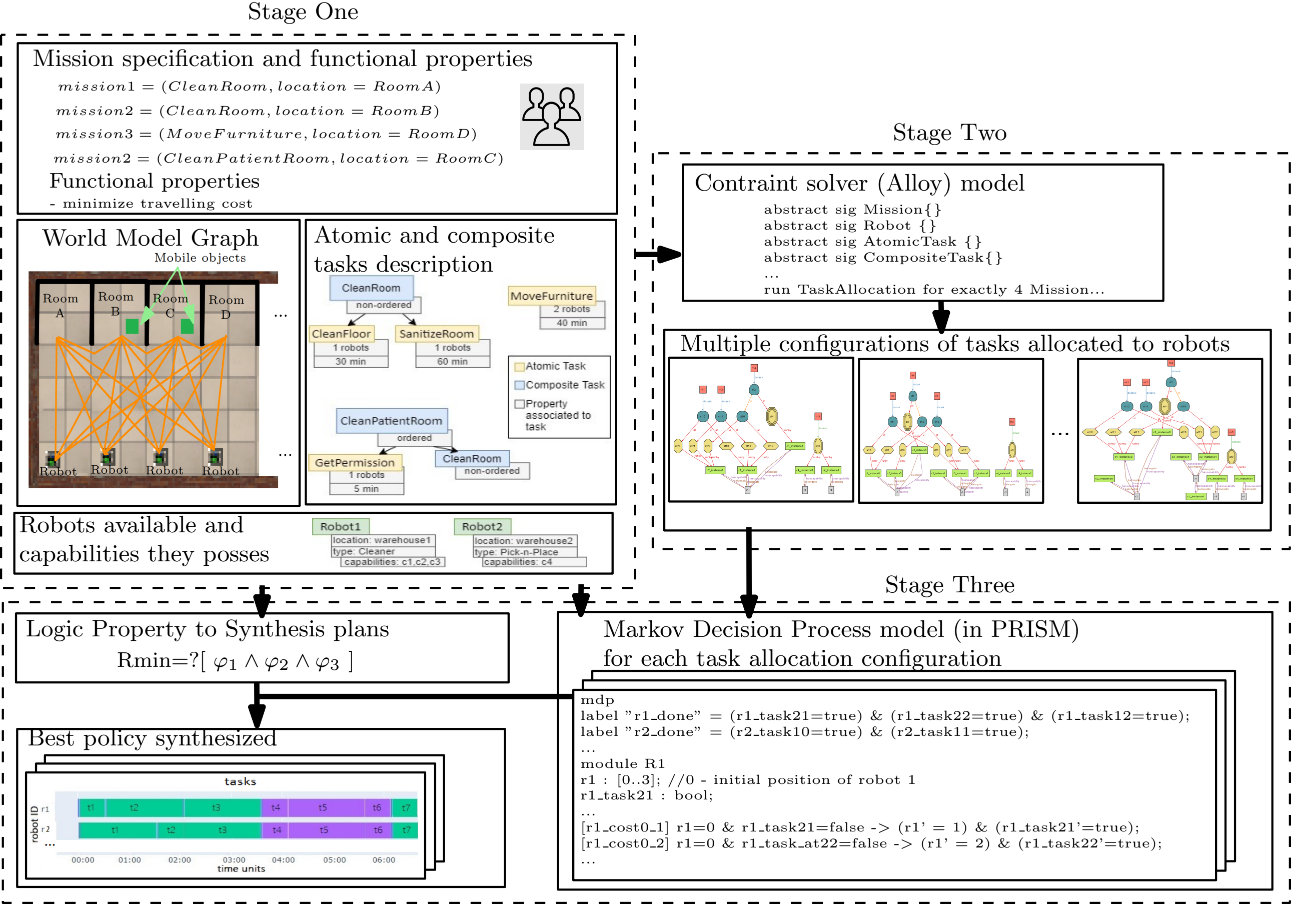

Stage One

Mission specification and functional properties

$mission1 = (CleanRoom, location = RoomA)$

$mission2 = (CleanRoom, location = RoomB)$

$mission3 = (MoveFurniture, location = RoomD)$

$mission2 = (CleanPatientRoom, location = RoomC)$

Functional properties

- minimize travelling cost

World Model Graph

Atomic and composite tasks description

Robots available and capabilities they posses

Stage Two

Contraint solver (Alloy) model

```
abstract sig Mission{}
abstract sig Robot {}
abstract sig AtomicTask {}
abstract sig CompositeTask{}
...
run TaskAllocation for exactly 4 Mission...
```

Multiple configurations of tasks allocated to robots

Stage Three

Logic Property to Synthesis plans

$$Rmin=?[\ \varphi_1 \wedge \varphi_2 \wedge \varphi_3\ ]$$

Markov Decision Process model (in PRISM) for each task allocation configuration

```
mdp
label ”r1_done” = (r1_task21=true) & (r1_task22=true) & (r1_task12=true);
label ”r2_done” = (r2_task10=true) & (r2_task11=true);
...
module R1
r1 : [0..3]; //0 - initial position of robot 1
r1_task21 : bool;
...
[r1_cost0_1] r1=0 & r1_task21=false -> (r1’ = 1) & (r1_task21’=true);
[r1_cost0_2] r1=0 & r1_task_at22=false -> (r1’ = 2) & (r1_task22’=true);
...
```

Best policy synthesized