ESM Talk
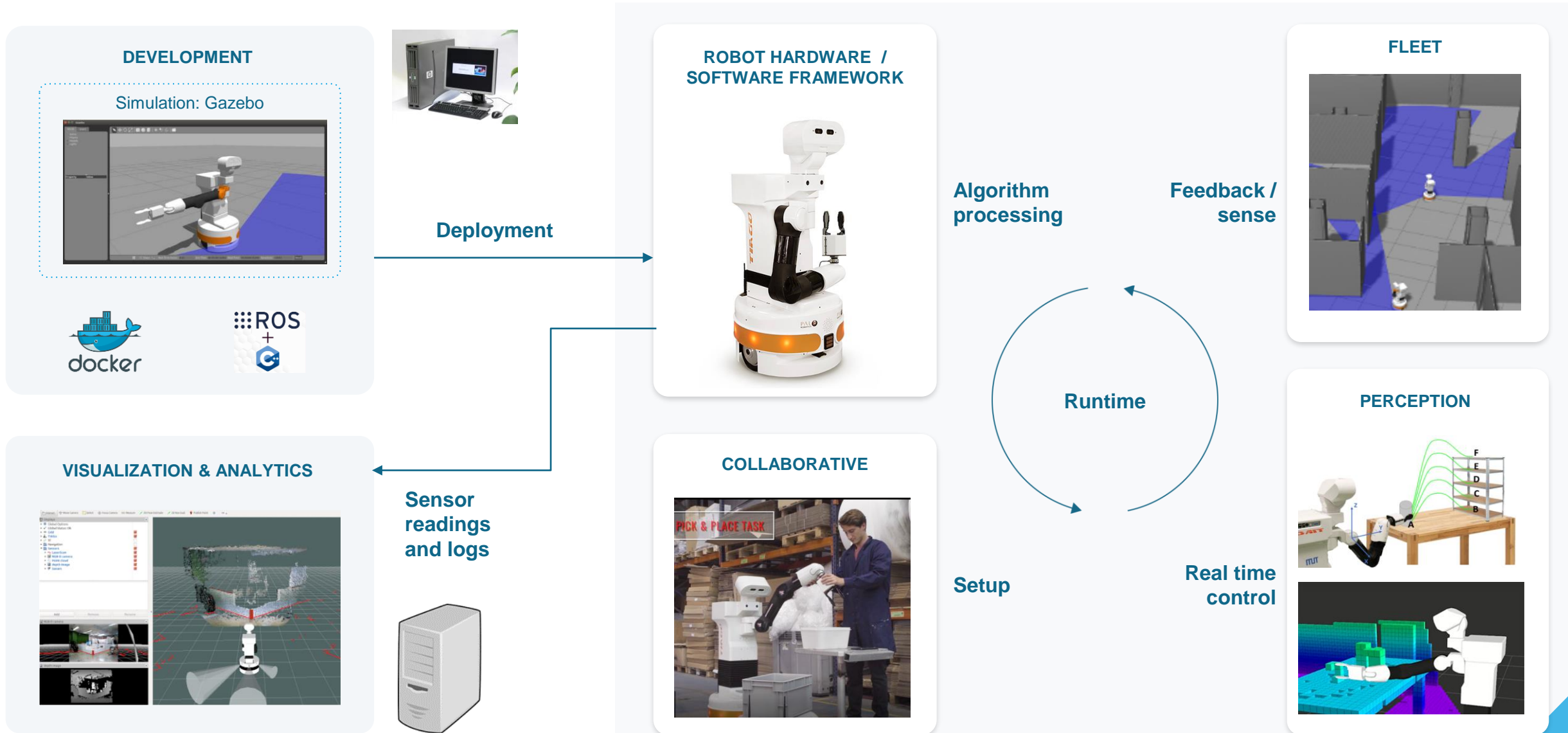
Realistic Simulation-Based Fleet of Cobots for FoF Optimization in Complex Scenarios
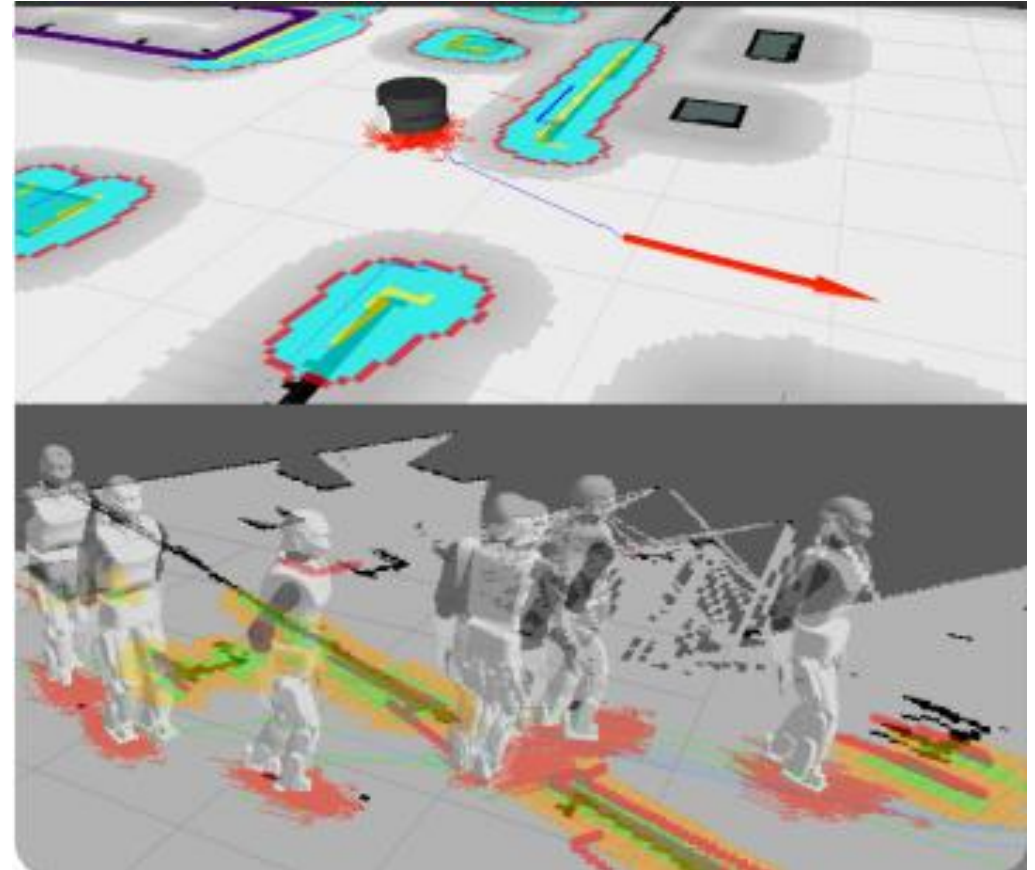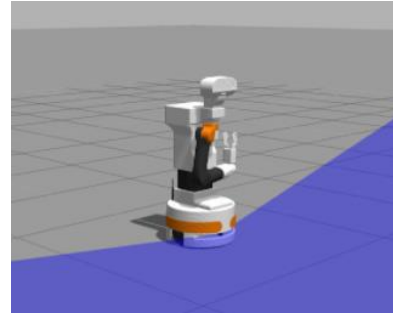
Sergi Garcia Product Manager, PAL Robotics

CYBER FACTORY NO.1
CF#1

DEVELOPMENT

Simulation: Gazebo

docker

ROS
+

Deployment

ROBOT HARDWARE /
SOFTWARE FRAMEWORK

Algorithm processing

Feedback / sense

FLEET

Runtime

PERCEPTION

VISUALIZATION & ANALYTICS

Sensor readings and logs

COLLABORATIVE

PICK & PLACE TASK

Setup

Real time control

- **Simulation is a priority** in the development of our products

- **Simulation and design are executed in parallel** with design

- The virtual replica allows faster development, bug fix, and time-to-market

- Simulated is based on open source tools to which we contribute

- Simulations until CF#1 project were uni-robot
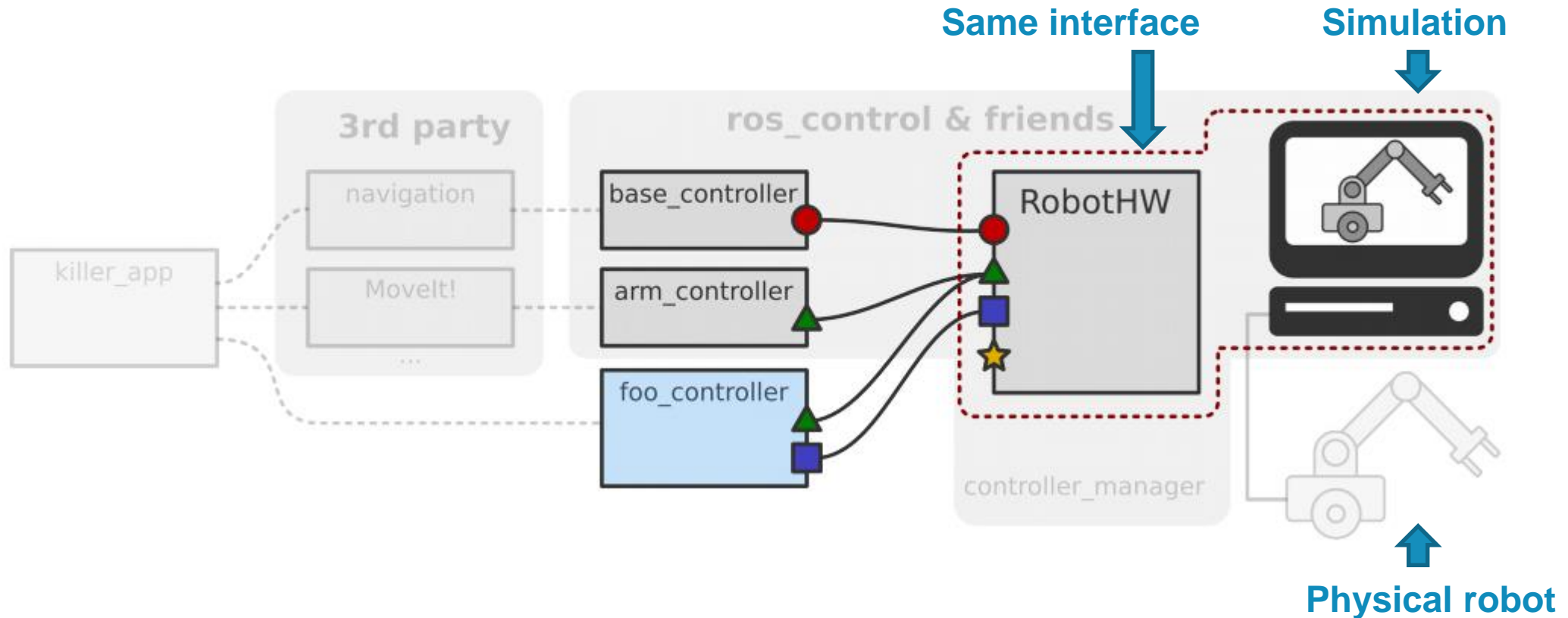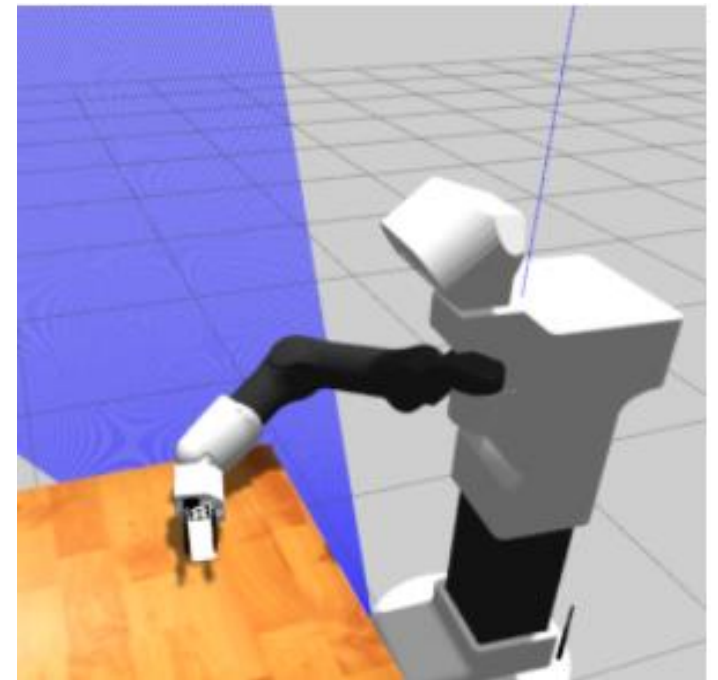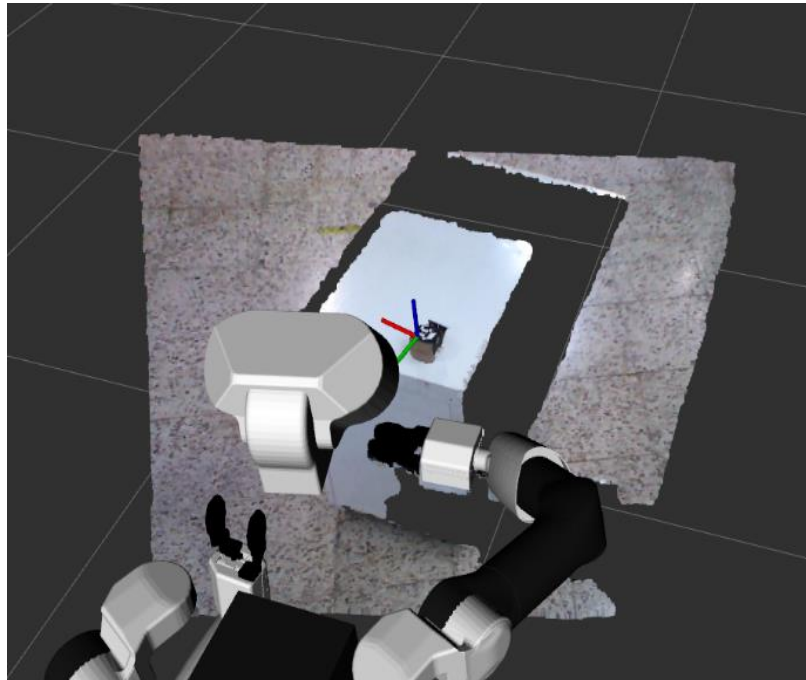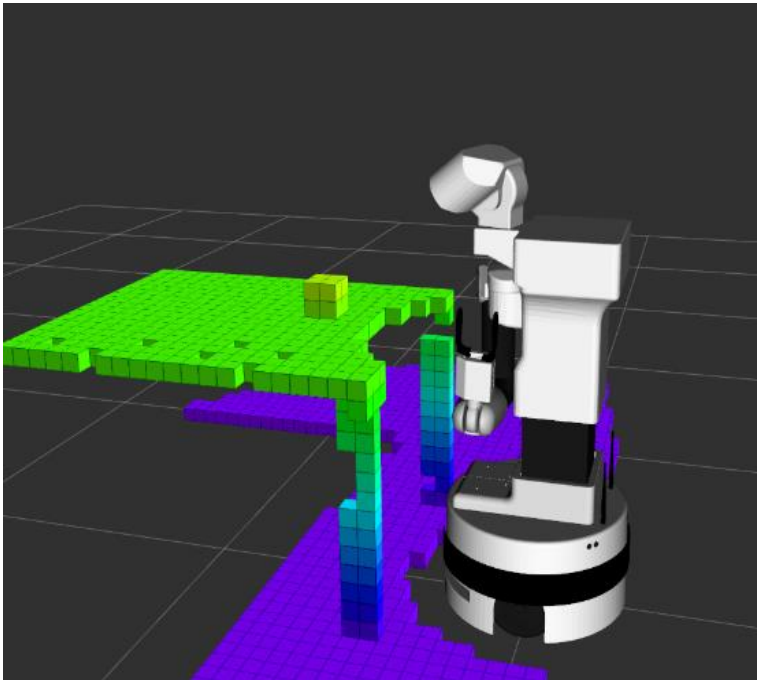
How does it work?
Exactly the same interface is used both for the simulation and the real HW
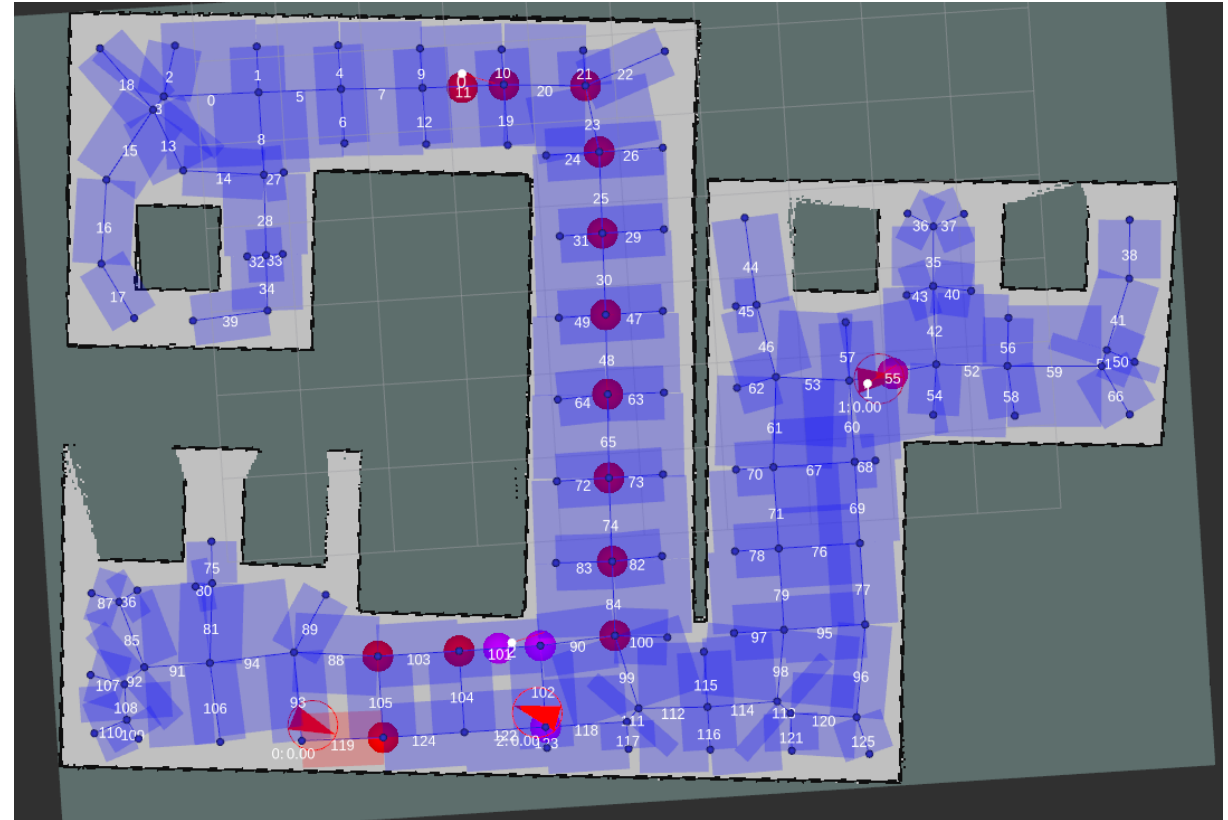
How is it implemented?

What is simulated?

- Physics (forces, masses, collisions)
- Sensors (cameras, odometry, depth)
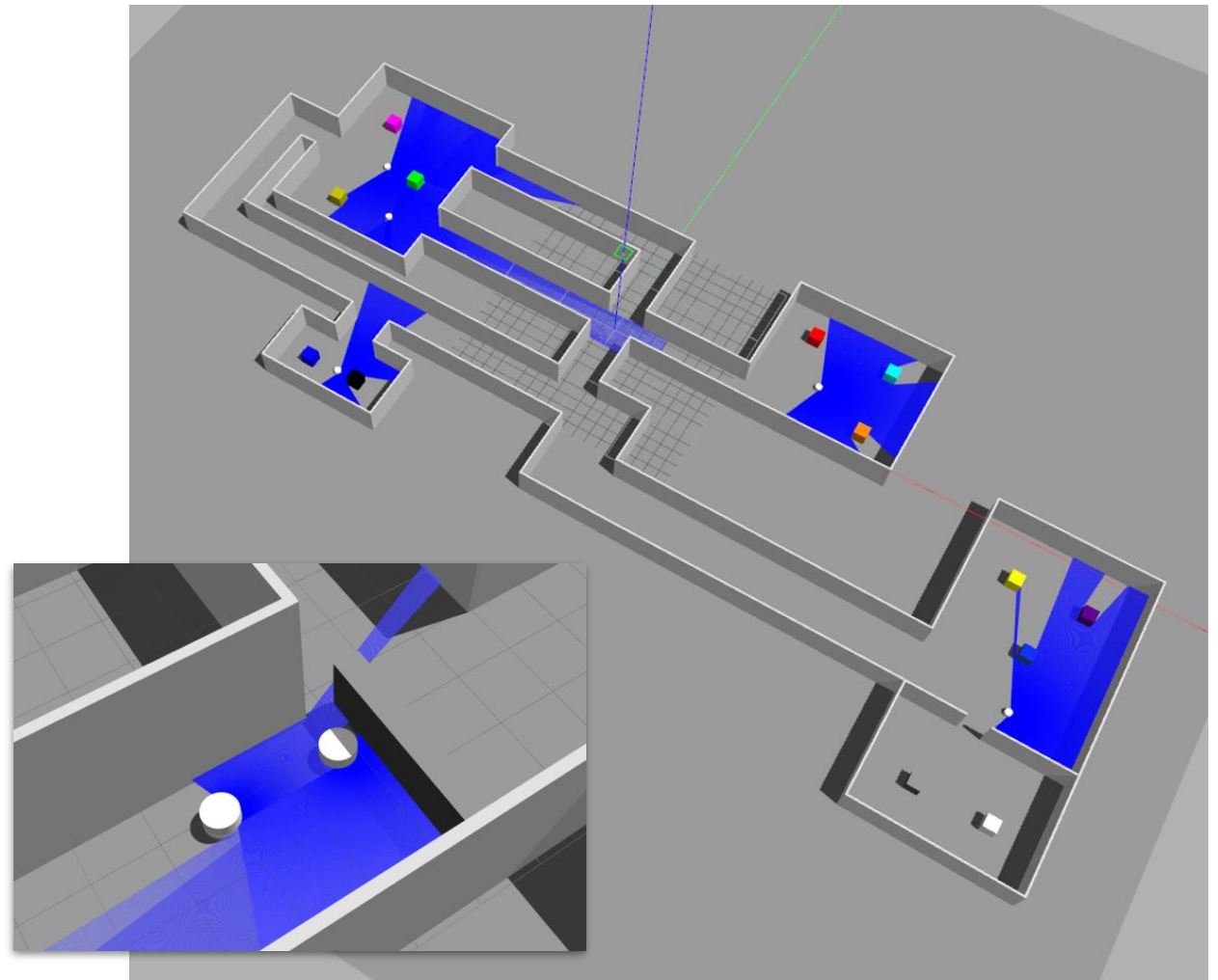- Motion planning and navigation

How is modelled the multi-robot?

- Strategy for the navigation is based on Voronoi graphs
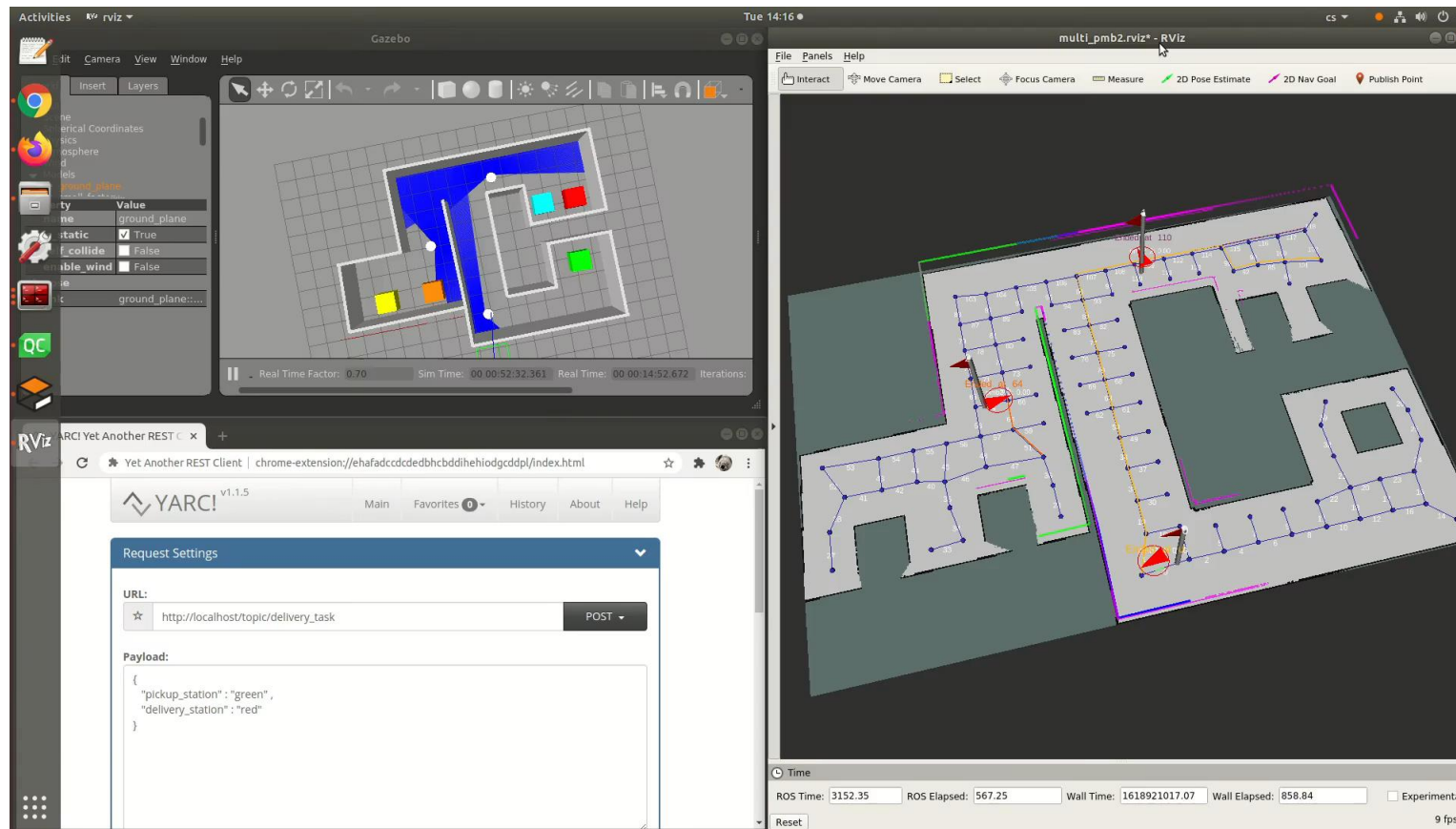
- Grid map

Synthetical scenarios containing

- Simplified cobot model
  for large number of robots

- Long and narrow corridors

- Large amount of robots coexistence
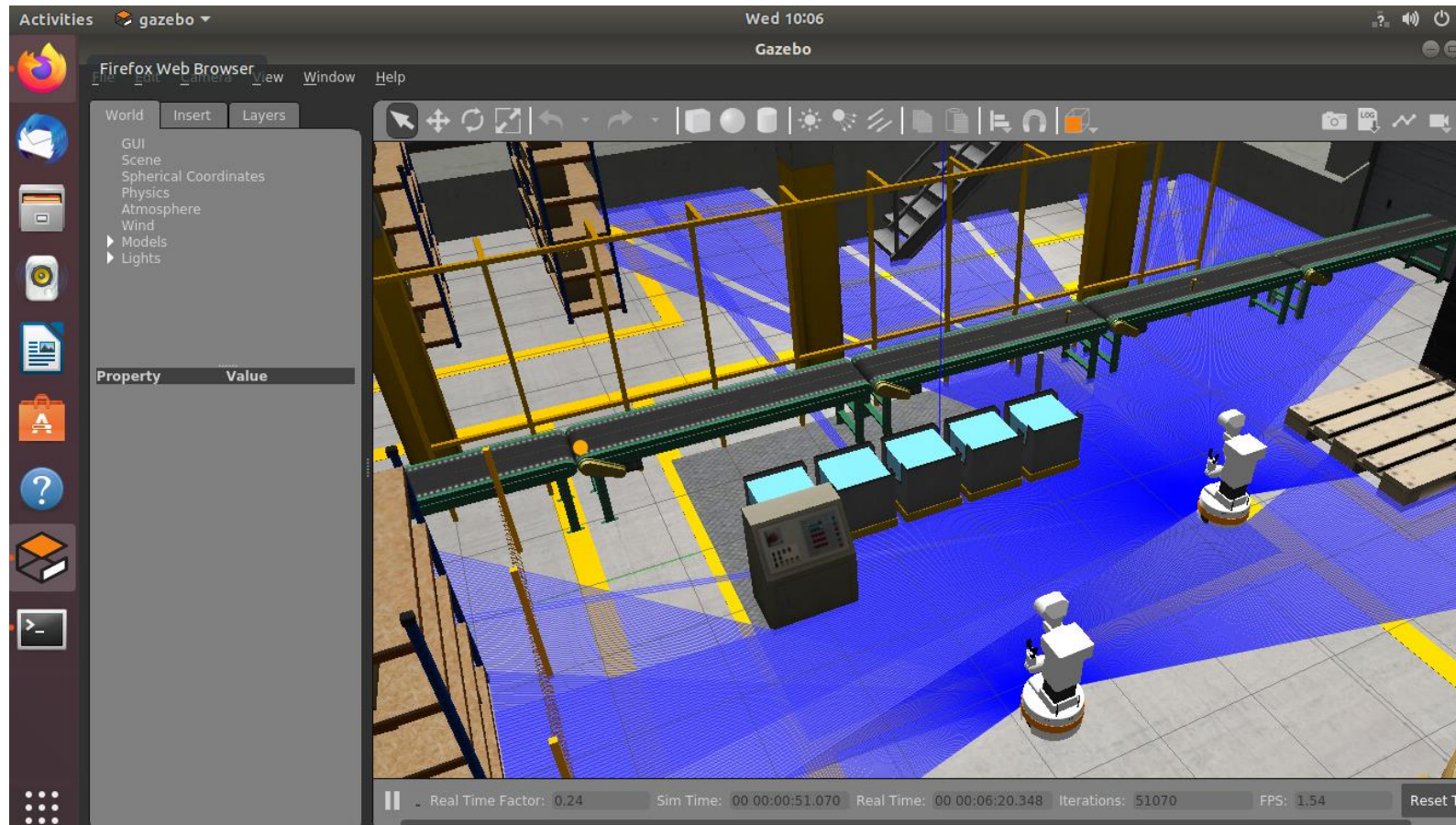
- Continuous integration development

Simulation tools combined to check different criteria:
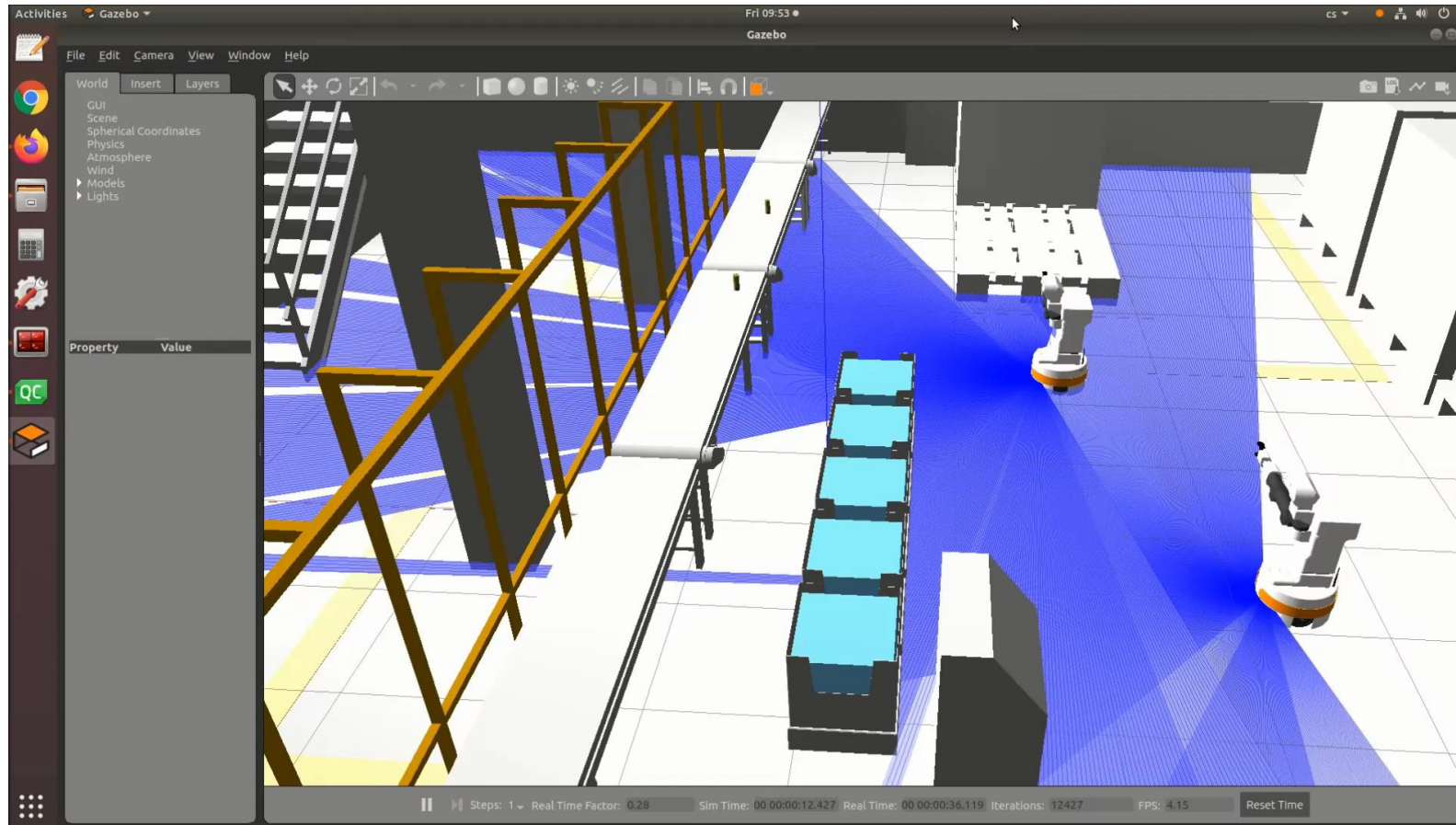### Navigation or coordination

Navigation

Fleet coordination strategies

Factory of the future integration
fleet and realistic simulation

Factory of the future integration
fleet and realistic simulation *(video low resolution)*

Link to the video: https://www.cyberfactory-1.org/wp-content/uploads/2021/11/Presentation_ESM_PAL_video.mp4

Thank you

sergi.garcia@pal-robotics.com

Questions