

A Robotic Middleware

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Why robotic middleware?

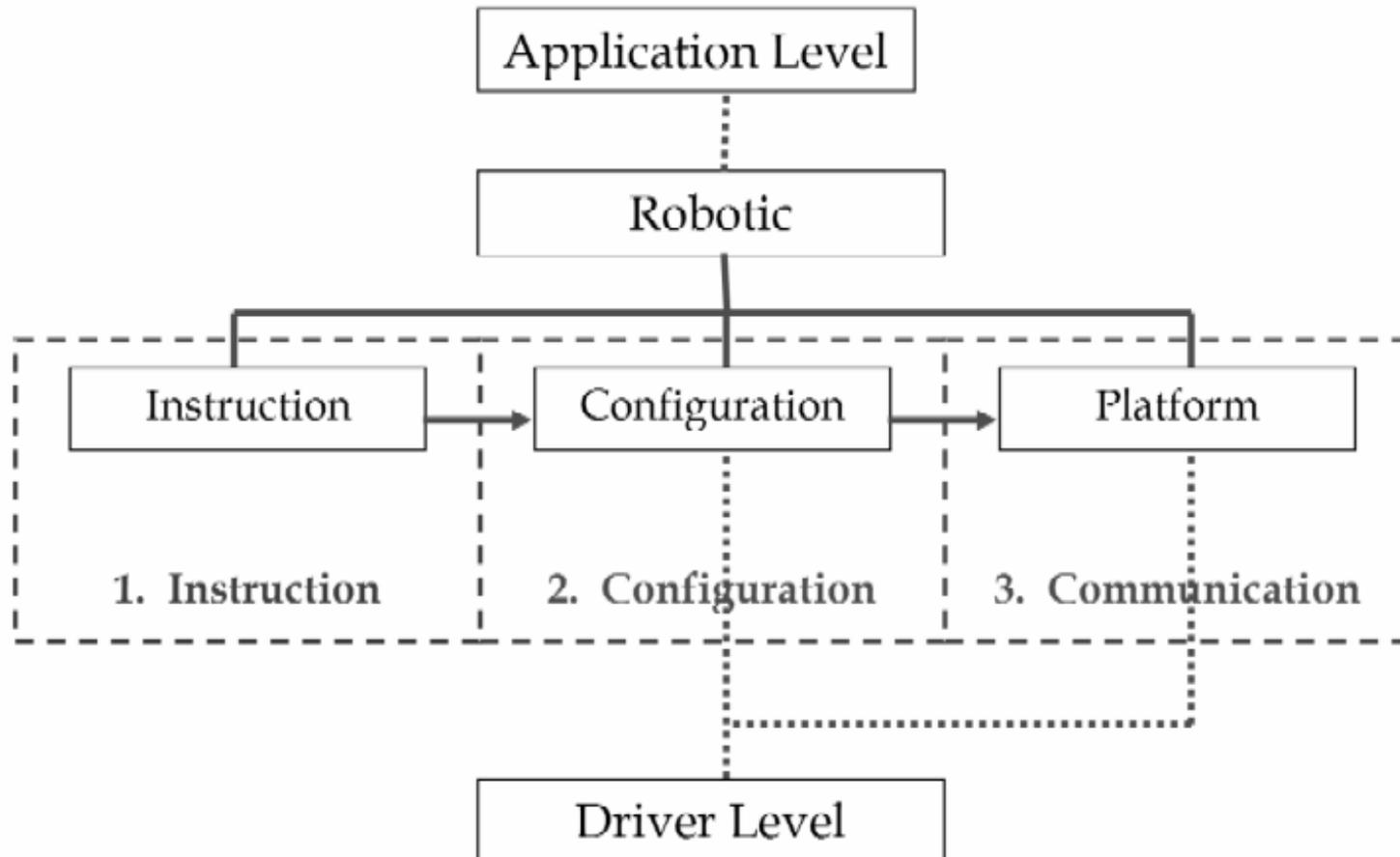


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- Build a framework that allows for multi-robot cooperation and decision making, with supervisory control in distributed environments (NCW)
- Overcome interoperability issues between different vendor specific hardware and software platforms
- Software development and maintenance cost reduction measure
- Allow for portability of software between different vendor platforms



3 Tier Architecture

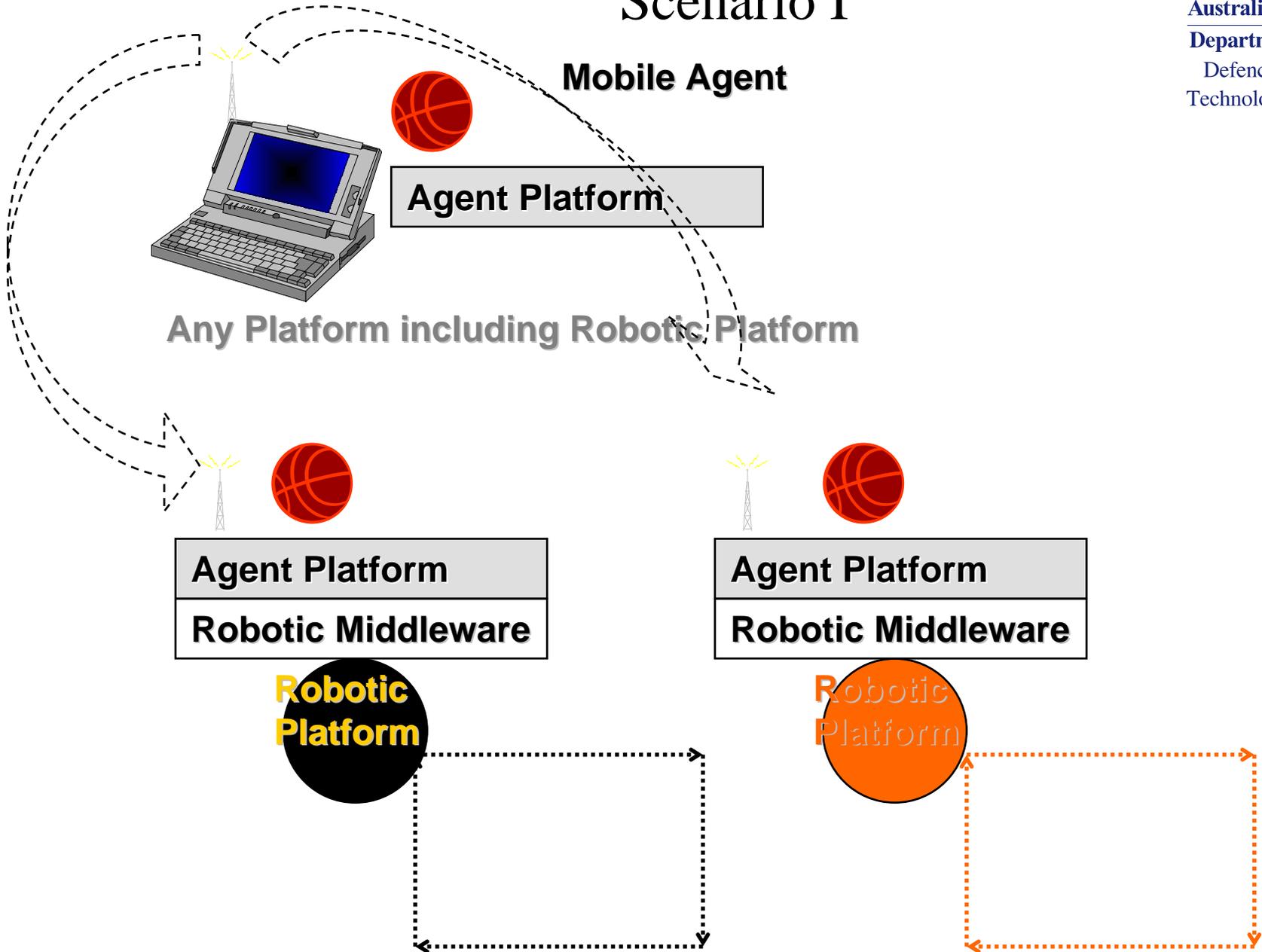


Robotic Middleware Hosting a Mobile Agent

Scenario I



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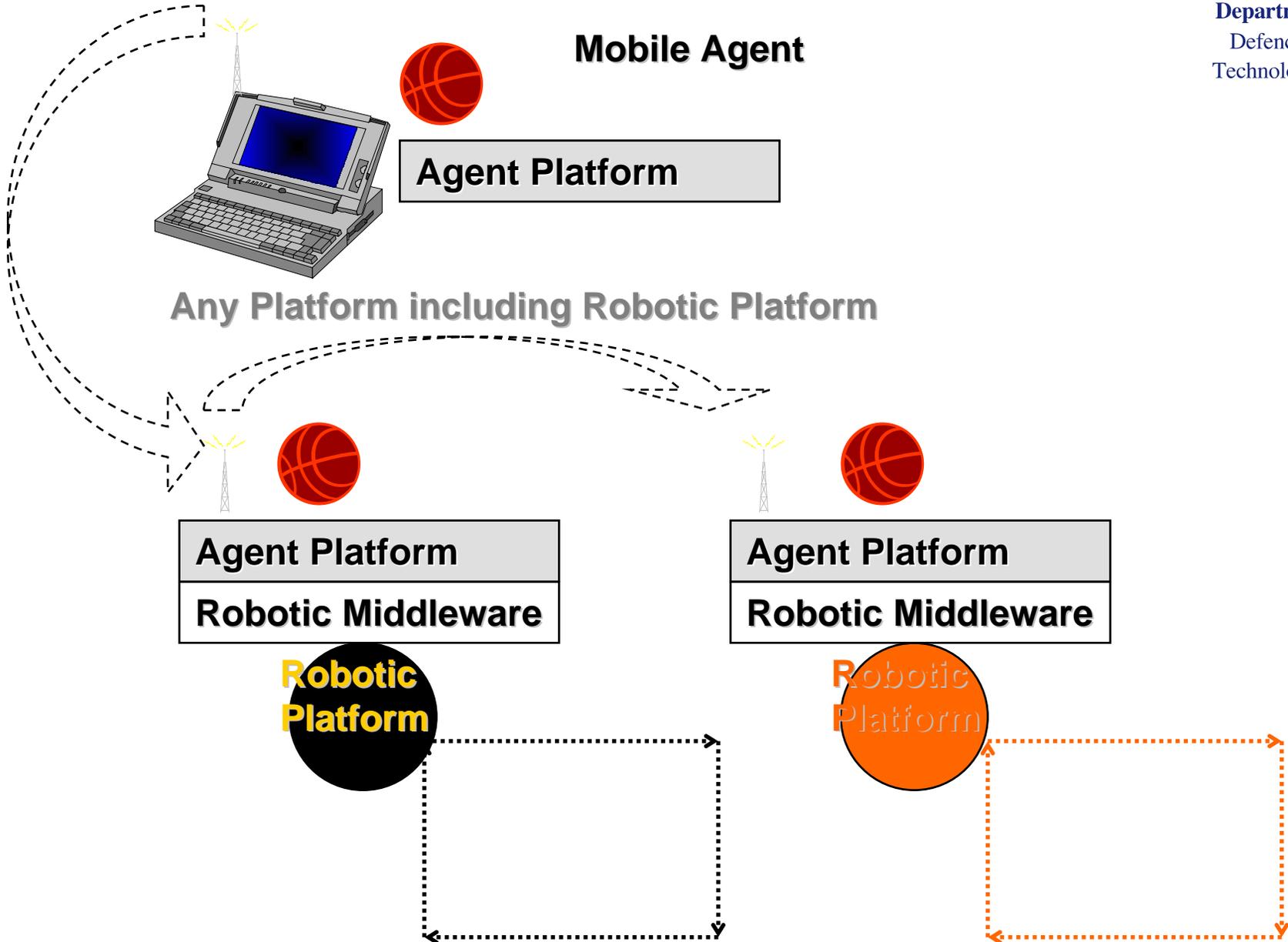


Robotic Middleware Hosting a Mobile Agent

Scenario II



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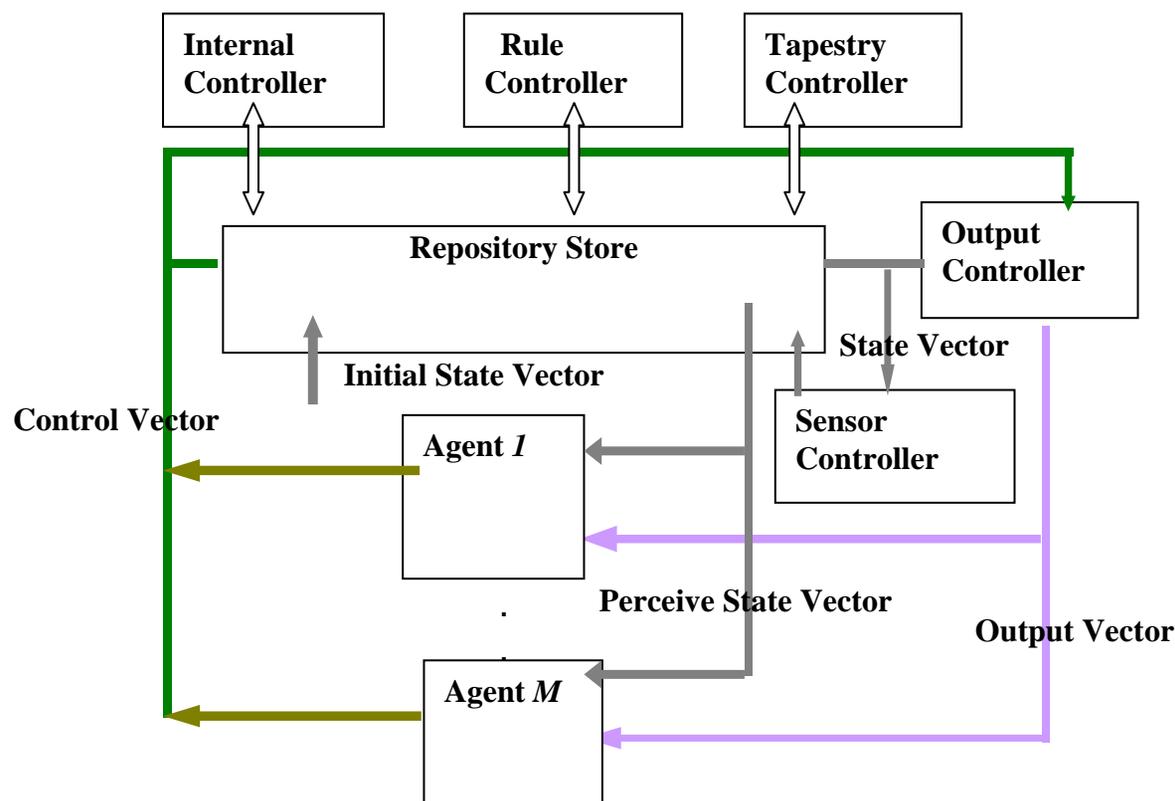


A Simulation Framework

- testing robotic middleware is a time consuming and tedious process
- in order to speed up the development process it was necessary to do preliminary testing outside robotic platforms
- need for high performance ad- hoc simulation and experimentation environment



A Simulation Framework - Architectural Model

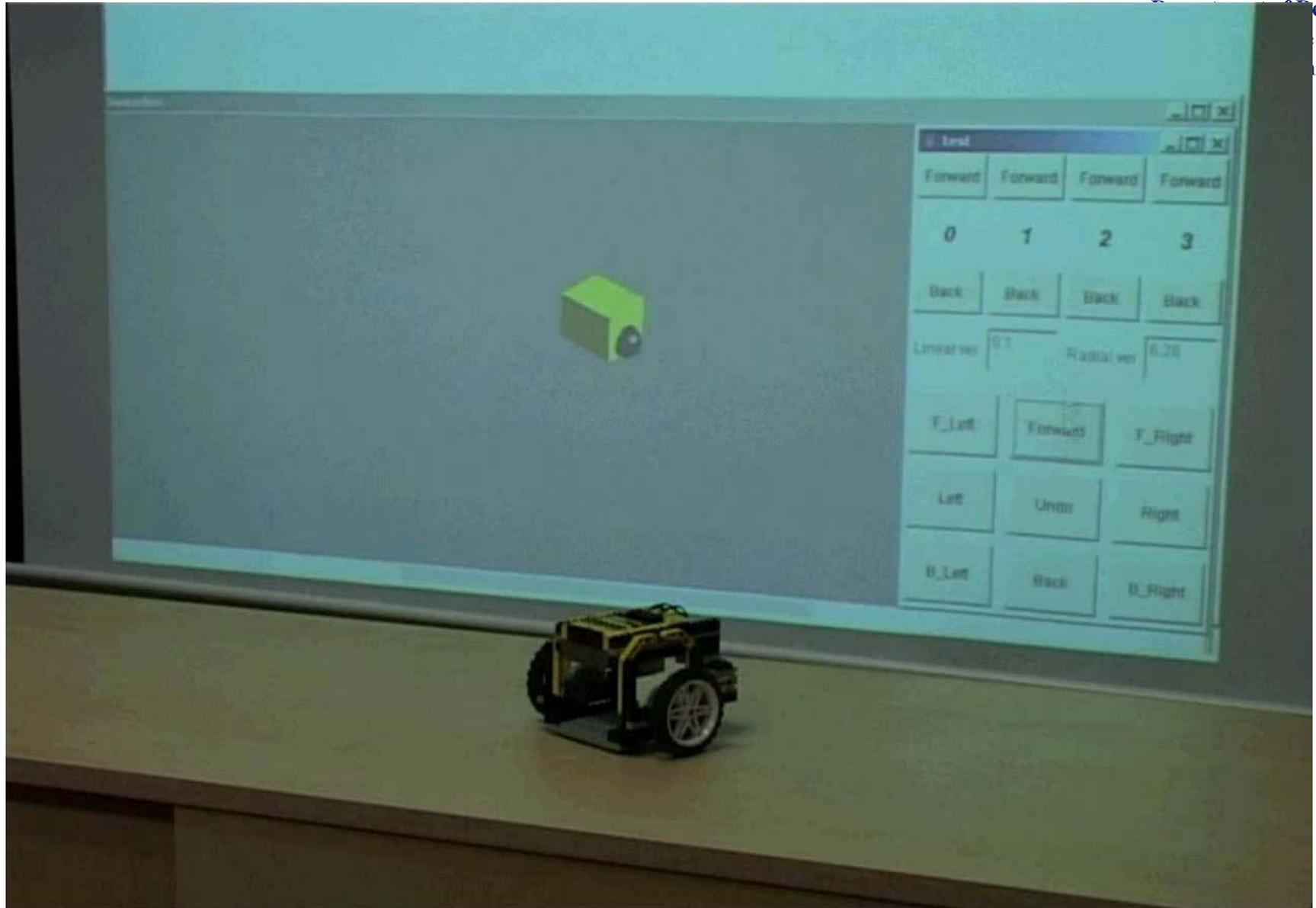


Robotic Middleware and Simulation Framework – Mind Storm Robot Example



Australian Government

Reference
and
isation



Robotic Middleware and Simulation Framework – Game of Tips Example



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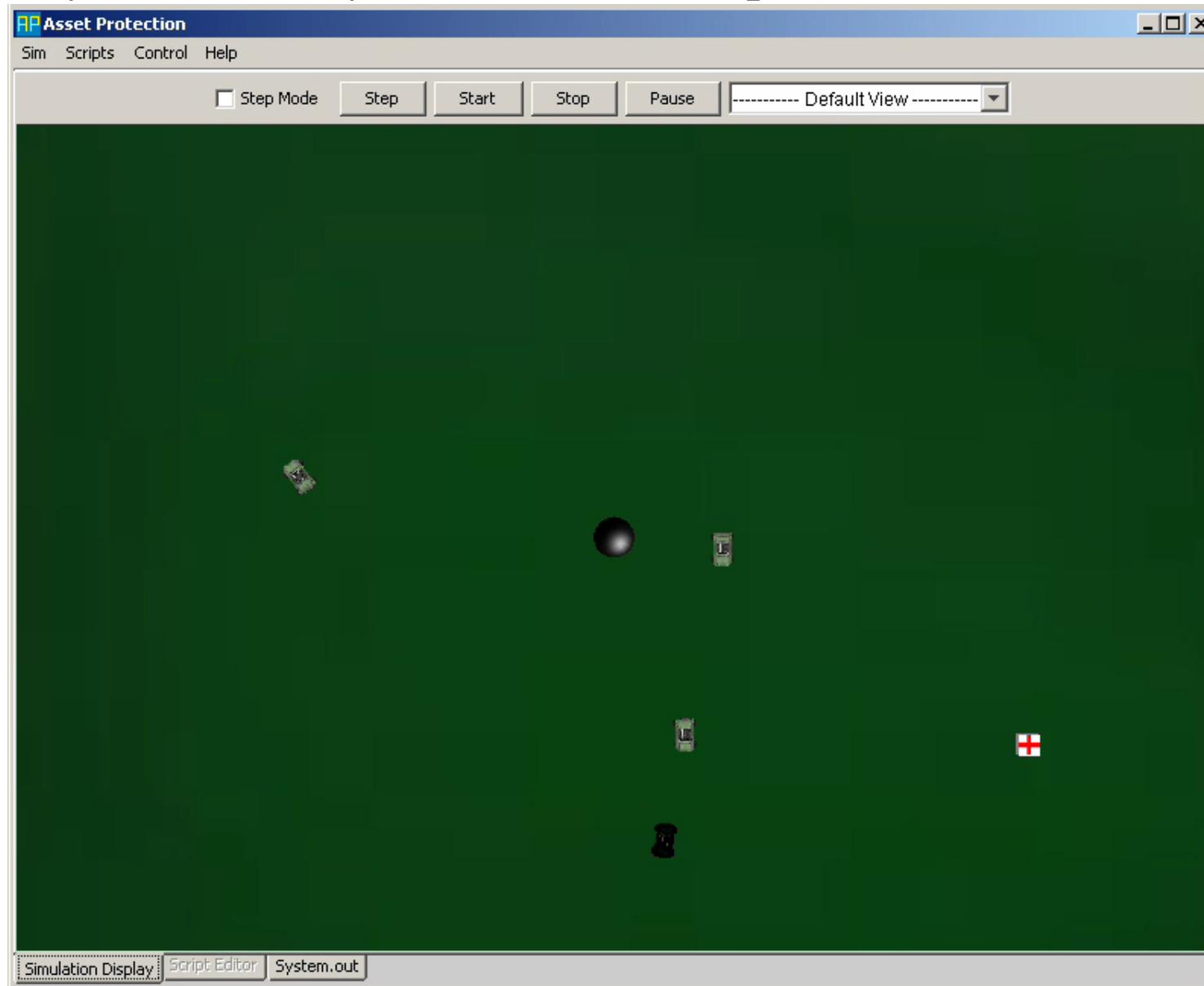
The image displays the SwarmSim software interface. The main window is titled "SwarmSim" and features a 3D simulation environment. The environment consists of a dark green floor and a light blue sky. A grey trapezoidal platform is positioned in the center of the floor. On this platform, four small yellow cubes are arranged in a line, representing the "Game of Tips" simulation. To the right of the simulation area is a control panel with the following elements:

- Start / Resume Simulation**: A button to start or resume the simulation.
- Pause / Stop Simulation**: A button to pause or stop the simulation.
- SwarmEntity**: A dropdown menu currently set to **TwoWheeledRobot**.
- Create**: A button to create new entities.
- Simulation Speed**: A section containing a slider and the text *Real Time*.
- Step**: A button to step through the simulation.
- Full Speed**: A checkbox to run the simulation at full speed.
- Real Time**: A checkbox to run the simulation in real time.

Below the main simulation window is a smaller, 2D top-down view of the same grey trapezoidal platform. This view shows several small, colored circles (green and red) on the platform, representing the positions of the robots or tips in the simulation.



Physical Security Simulation Example





Conclusions

- Robotic Middleware is a future and the cost cutting measure for Defence,
- Developed prototype is a contribution to the standard for robotics industry,
- Developed simulation framework for real time robotic applications has been successfully deployed for gaming applications.