# Modelling Safety & Security within Urban Logistics

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# **Project Goals**

- The authors propose the use of simulation systems as support tool for improving safety within an Urban Environment.
- The SIMULATOR is designed in order to support logistics operators within complex scenario supporting both training and policy definition.
- This innovative approach was developed by applying HLA
- concepts to create a federation that allows multiple users to interact within the scenario to reproduce complex procedures.
- This model was developed as part of the COCODRIS Initiative.









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## **Simulation and Training**

- The intermodal terminals are rapidly developing area, and this situation requires major investments in order to infrastructures and term of management systems, operative policies and training.
- Until now the simulation equipment is currently restricted to a few providers for the traditional strong investments required.
- The Contstacker SIMULATOR, we developed, is based on new technologies that supports operation on low-level platforms by light configurations and low-cost interfaces, allowing higher potential in distributing simulation in each terminal.









# **Problem** Framework

- The "last Mile" involve criticalities in term of:
  - Saturation of Urban Traffic
  - Environmental Impact over Towns
  - Difficulties to Reach final **Destination with lorries**
- - Difficulties to deliver the material to final consumers
  - Safety Issues Related to Accident and Hazardous Material
  - Security Issues related to Goods Transportation within Urban **Environments**







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## **Technology Advances**

- Most of these problem can be effectively faced by using advanced technologies in order to:
  - Monitor Situation
  - Control Traffic
  - Trace Lorries
  - Check Hazardous Materials
  - etc.









## **Open Issues**

- Modelling this framework could be quite challenging considering:
  - Workload for People Movements
  - Workload for Traffic
  - Logistics
    Operations and Interaction









# Virtual Traffic for Real Safety

• By this approach is possible to support definition of procedures and planning of operations to guarantee maximum safety in Urban Logistics









### **Cocodris Solution**

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**Cooperative Competitive Distributed Simulator** 

**Cocodris was developed as an Synthetic Environment devoted to reproduce complex operations involving vehicles and equipment within an full interoperable framework** 



### **HLA Integration**

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HLA integration allows to create interactive real time simulation across a network







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### **Vehicle Simulator**

Cocodrisprovidesawidesetofalternativescenariosfortestingdrivingcapabilities,providingproblemsintermofparking,drivingregulations,vehiclecontrol, etc.









## **Weather Conditions**

Cocodris provides very different weather conditions, including ground characteristics for testing driving ability with fog, snow, rain etc.

















### **HLA Cooperation**



HLA integration allows to test trailer exchange by Cocodris trucks over different scenarios, as well as equipment operations.





HLA High Level Architecture Standard DMSO, DoD USA



## **Supported Features**

By HLA connection, the Reach Stacker Simulator allows to provide to the user also a 135° degree point of view operating from monitors and/or rear projectors









### **User Interface**

**Simulator** Cocodris allows setup to different interfaces allowing to operate in **co-operative** environments









# **Training Modes**

There are different procedure for using the simulator during training:

**Single Users** 



Operating with a single User



**3 Views** 



Single User three Screens for Wide View



**Cooperative Training** 



MultiUser Cooperative Training



### SITRANET

SImulation for TRAiniNg & Education in Transportation

SITRANET is a project sponsored by EC, devoted to creating three simulators as training equipment for truck operators based on Virtual Reality. These Simulators includes:

- Special Crane Simulator
- Constacker Simulator
- Truck Simulator

DIP leadership operated as responsible and coordinator for the simulation developments within the project with direct support from the Simulation Team

The core engine used is Cocodris simulator by BRB (www.brbstudio.com/cocodris)

















# **Training Procedure**

Based on the multiple concurrent sessions on the Simulator ( $j_s 10\%$ ,  $j_{3v} 20\%$  and  $j_{conc}$ 70%) and using three Cocodris simulators with 50% share between real equipment and simulators, we obtained a substantial improvement in direct student experience time

With the same class hours it was possible to increase real vehicle use by each user by more than 70%







50%

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50%

## Conclusions



- Cocodris represent a very innovative development, allowing to promote simulation in an interactive distributed environment based on HLA at very low cost
- This introduces the possibility to extend use of simulation as training support in new sectors and to experience scenarios involving interaction, cooperation and competition that traditional simulators are not able to face effectively
- It is critical to extend the impact of these system over large number of users characterized by reduced resources
- The testing experience validated the System by extensive training on CIM Terminal was very satisfactory





