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1ST Computational Intelligence For Societal Development in Developing Countries
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Sheffield
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Proposing Goal Refinement for Multi-Agent with Agent UML Tool for the Control of Explosive Terror Threats

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Introduction

- Aim of Approach
- Agents and Multi-agent
- Terrorism and its Types
- Terror Scenario & Agent based analysis
- Agent UML Tool
- Future work



Aim of Approach

- This presentation is not to create fear of terror
- Identify types of terrorism
- Identify computational capability that can identify **chemical** means of terror attacks and prevention
- To analyse a multi-agent approach to Chemical weapon detection using Agent UML tool.



Terrorism and Types

Terrorism

The purpose of terrorism:

- To instil or create fear.
- To intimidate people or organisations or government to do what ordinarily they would not do.

Definition

- Terrorism is the illegitimate or extranormal use of violence against non-combatants to achieve political ends (Gerwehr & Hubbard, 2006; Laqueur, 1987).
- In Gerwehr & Hubbard (2006) terrorism form of social influence that employs the acts of violence (instead of leaflets or loudspeakers, for example) to influence a target population's emotions, motives, objective reasoning, perceptions, and ultimately their behaviour.
- Terrorism is the deliberate use of violence, or threat of its use, against innocent people, with the aim of intimidating them, or other people, into a course of action they otherwise would not take (Primoratz, 1990). The act of terrorism instils fear.



Terrorism & its Types

Types of Terrorism

- **Individual terrorism:**

This is a lone individual sponsored terror attacks against group of people or other individuals.

- **Sect terrorism:**

A group (religious or ethnic) sponsored terror against individuals, groups or a nation.

- **State terrorism:**

This is a state or nation sponsored terrorism against another nation.



Terror Scenario & Agent based analysis

Examples of the aftermath of terror attack





Agents and Agent UML

An **agent** is a **autonomous** computer system (software or hardware) that is situated in an environment and can observe and act in that environment according to design objectives (Woodridge, 2009).

A **multi-agent** is a group of agent that socialise and work together to realise the overall common goal of a system.

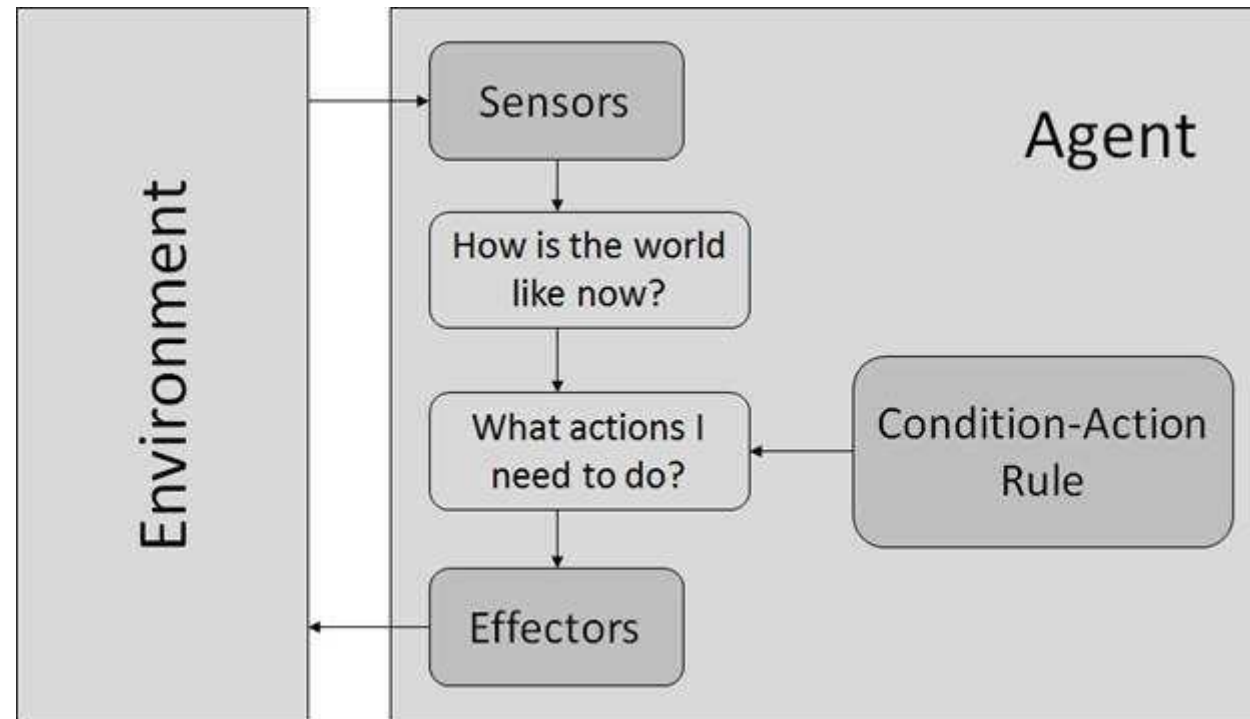
Agent UML or AOSE

- a design support notation tool for agent- oriented systems development.
- used for representing agents, their behaviour and interaction



Agent Design Model

Example of an Agent Design Model



Simple Reflex Agent Model (Russell & Norvig, 2010)



Agent UML Methodologies & Tools

Agent Methodologies

- Agent software engineering process e.g.
 - **Gaia** (Wooldridge et al. 2000),
 - **Tropos** (Bresciani et al. 2004),
 - **PASSI** (Cossentino, 2005; Cossentino, & Potts, 2002),
 - **MaSE** (DeLoach et al. 2001), Prometheus.

Tools

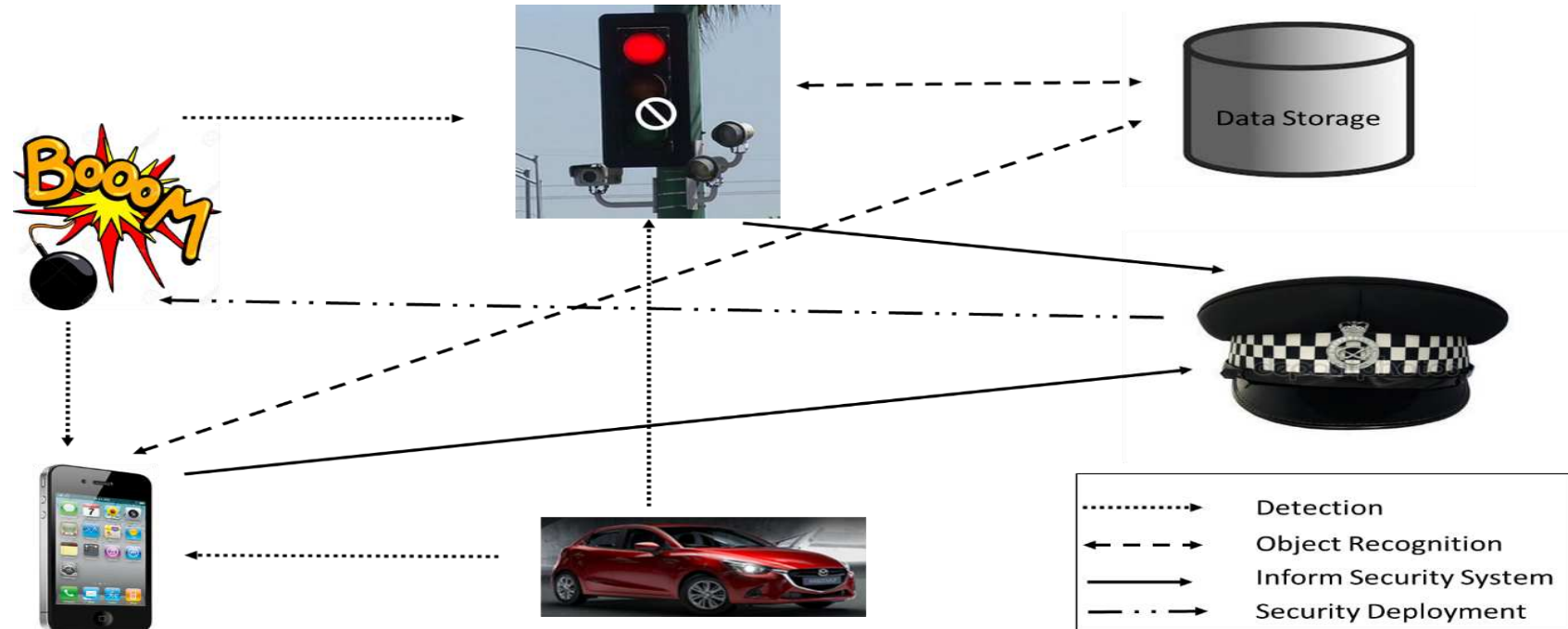
Are graphical editor for specifying the design process of intelligent agents, e.g.

- Gaia e.g. **Gaia4E** (Cernuzzi & Zambonelli, 2009)
- Tropos e.g. **Taom4E** (Morandini et al. 2011)
- Prometheus: **PDT**, called the Prometheus design tool
- This design analysis is based on the PDT



Terror Scenario & Agent based analysis

A scenario for intelligence analysis and detection





Terror Scenario & Agent based analysis

The PDT (Prometheus Design Tool) for analysing the detection of chemical explosives

Having known the problem scenario, we can

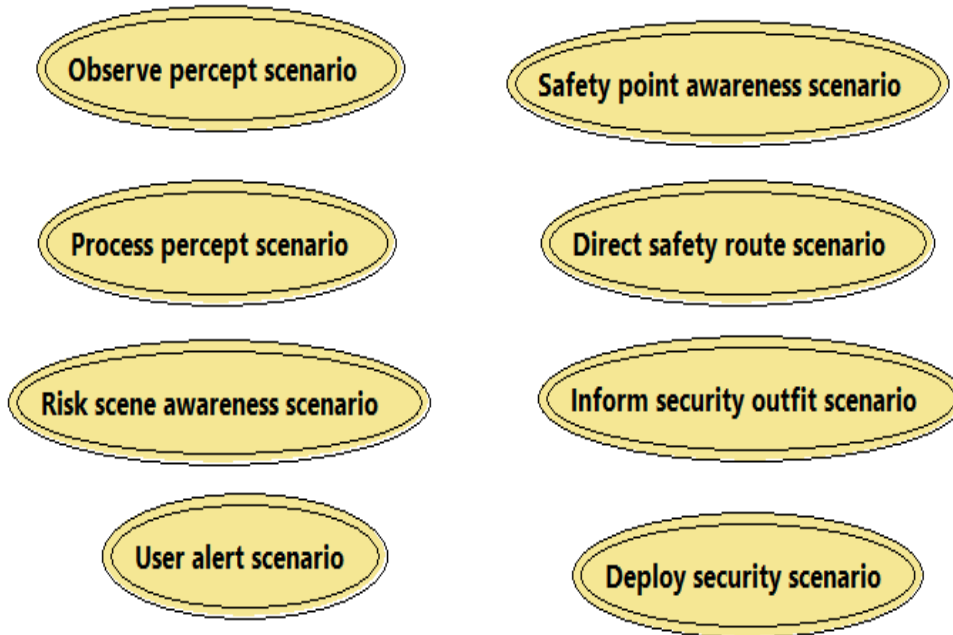
- Identify the number of agents
- Identify actors i.e. humans
- Assign functions and roles to agents and actors, respectively
- Identify data & substance repositories for intelligent learning
- Determine interaction protocol and messages between the various entities i.e. agents, humans, repositories, devices
- Build the phases of design



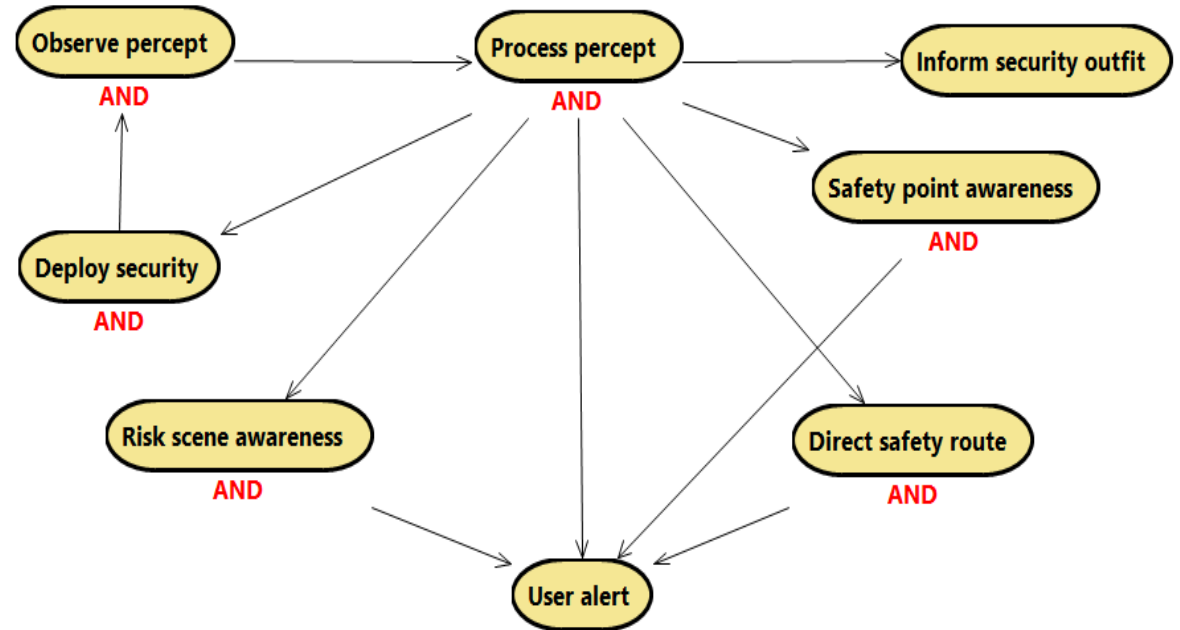
Terror Scenario & Agent based analysis

System Specification Phase

Scenario Overview



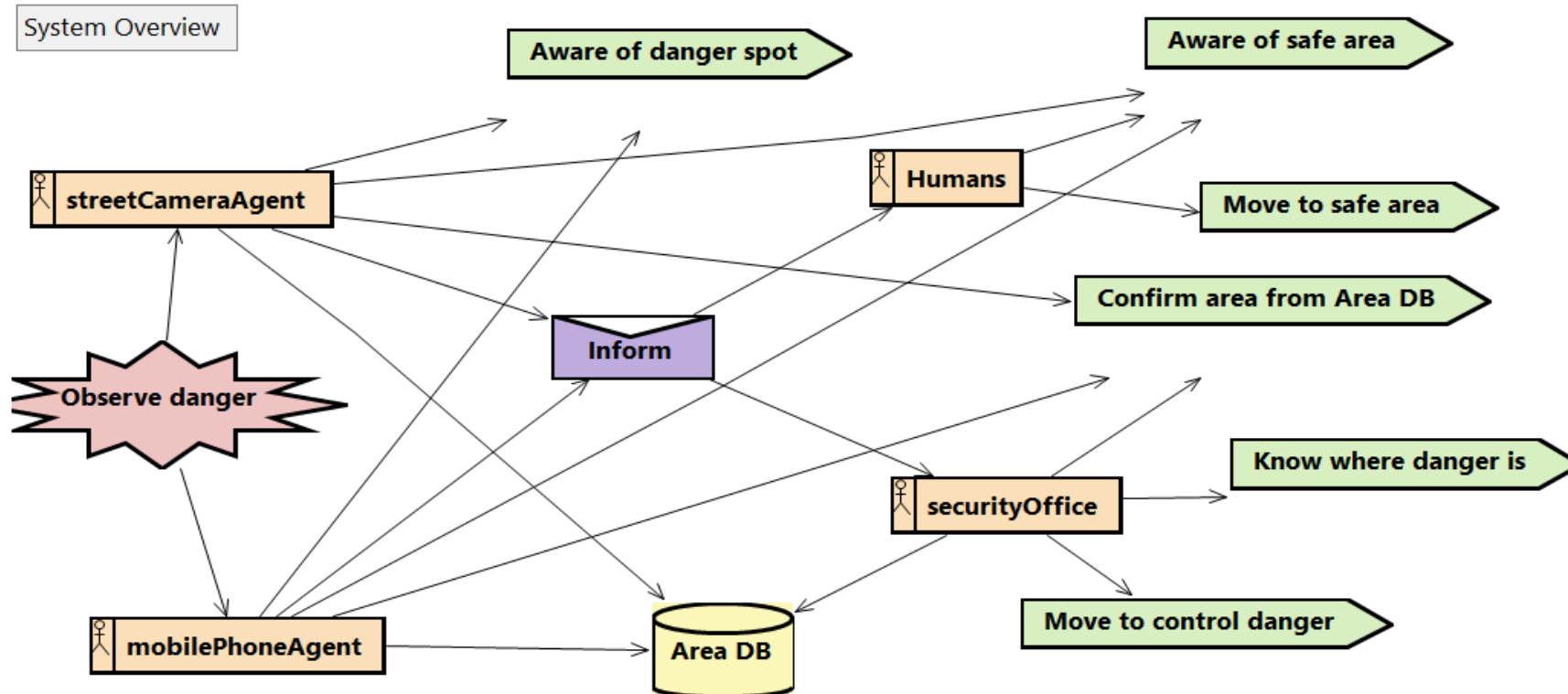
Goal Overview





Terror Scenario & Agent based analysis

Architectural Design Phase: System overview diagram

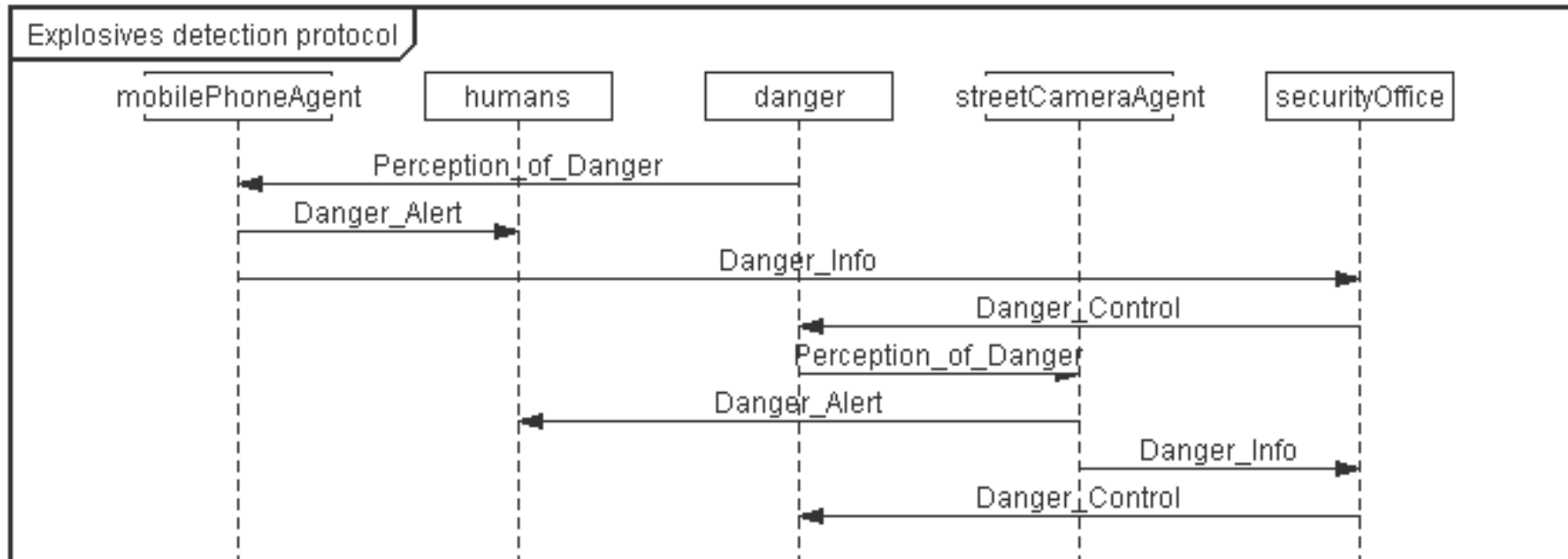




Terror Scenario & Agent based analysis

AUML interaction protocol

- This the sequential interaction between the entities in the design using the AUML command.
- The Figure below is a protocol analysis of detection, alert and rescue process





Challenges and Solution to Intelligent Approach in Developing Nations

Future Challenges

- ❑ **Energy supply:** There could be lack of adequate energy sources to power devices where intelligent agents are situated.
- ❑ **Funding:** Developing nations may not be willing to spend money on the technology.
- ❑ **Expertise:** Indigenous expertise to implement such technologies.
- ❑ **Implementation platform:**
Jack™, Cougar
- ❑ **Solution**
Knowledge and research collaborative between the developed and developing nations. This where the United Nations becomes relevant. Like the **Dr John Quinn United Nations Global Pulse** in East Africa.



Future work

Simulation:

Simulate the process for testing

Implementation:

Real world implementation

The End



Questions

Thanks for listening

Question and answer please