EuroSIM Constructive Training System for CBR Incident Response Training

Dr James England
Riskaware Ltd

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Background

- Developed under a Defence and Security Accelerator (DASA) funded project for the UK Defence Science and Technology Laboratory (Dstl)
  - *Open Call for Innovation*

- Aim:
  - *"Develop a service-oriented CBRN training simulation technology that provides realistic CBRN hazard simulation-based training through constructive simulation, within populated urban environments."*

- Use the prototype application developed under an ESA and EDA-funded project, **EuroSIM CBRN**
  - Project to develop a next-generation information management system for CBRN events

- Add live and simulated players (scripted entities) within a training scenario

System Overview

- Designed to be easily deployable on local or cloud-based services using Docker

- Consists of multiple web service components, each with a REST (Relational State Transfer) API.

- Two User Interfaces:
  - Web App – UI to manage and observe a training scenario
  - Android Mobile Sensor Application – mock CBR sensor, also shows simulated exposure and health status
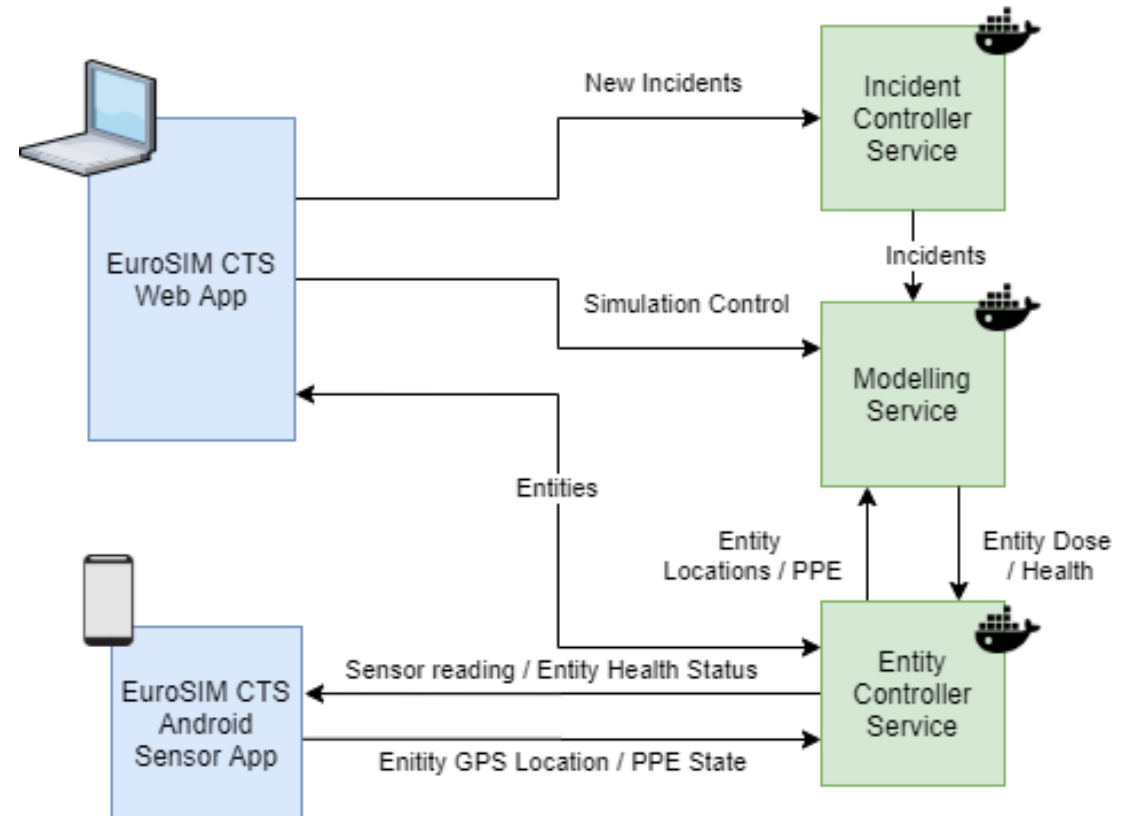
Service and UI Architecture

- Back-end services:
  - Java Spring Boot Services
  - Separate Docker containers
- Data storage
  - PostGIS database
- Web Mapping Service (WMS) Layers for dispersion contours
  - GeoServer
- Web UI
  - React JavaScript UI providing a modern user interface
  - Leaflet map
- Android App
  - React Native

Modelling Service

RISKAWARE

- Simulates dispersion of a CBR incident

- Provide casualty effects estimates for players within contaminant plume location

- Uses Riskaware HEART framework
  - Lightweight Java modelling framework

- Uses the Riskaware Flexible Dispersion Model (FDM)
  - Fast Gaussian Puff dispersion model

- Meteorology observations at a reference height

- Real-time modelling
  - Can be modified as the simulation progresses - allows the trainer to adapt training scenario

- Simple casualty model using probit calculations for eye effects, incapacitation and death

Incident & Entity Controller

Incident Controller:

- Stores generated incidents
    - available to all scenarios

- For the prototype, two simple incident implementations:
    - Simple incident – release of continuous material with specified release diameter, mass rate and release duration
    - Container incident – release of material from a container
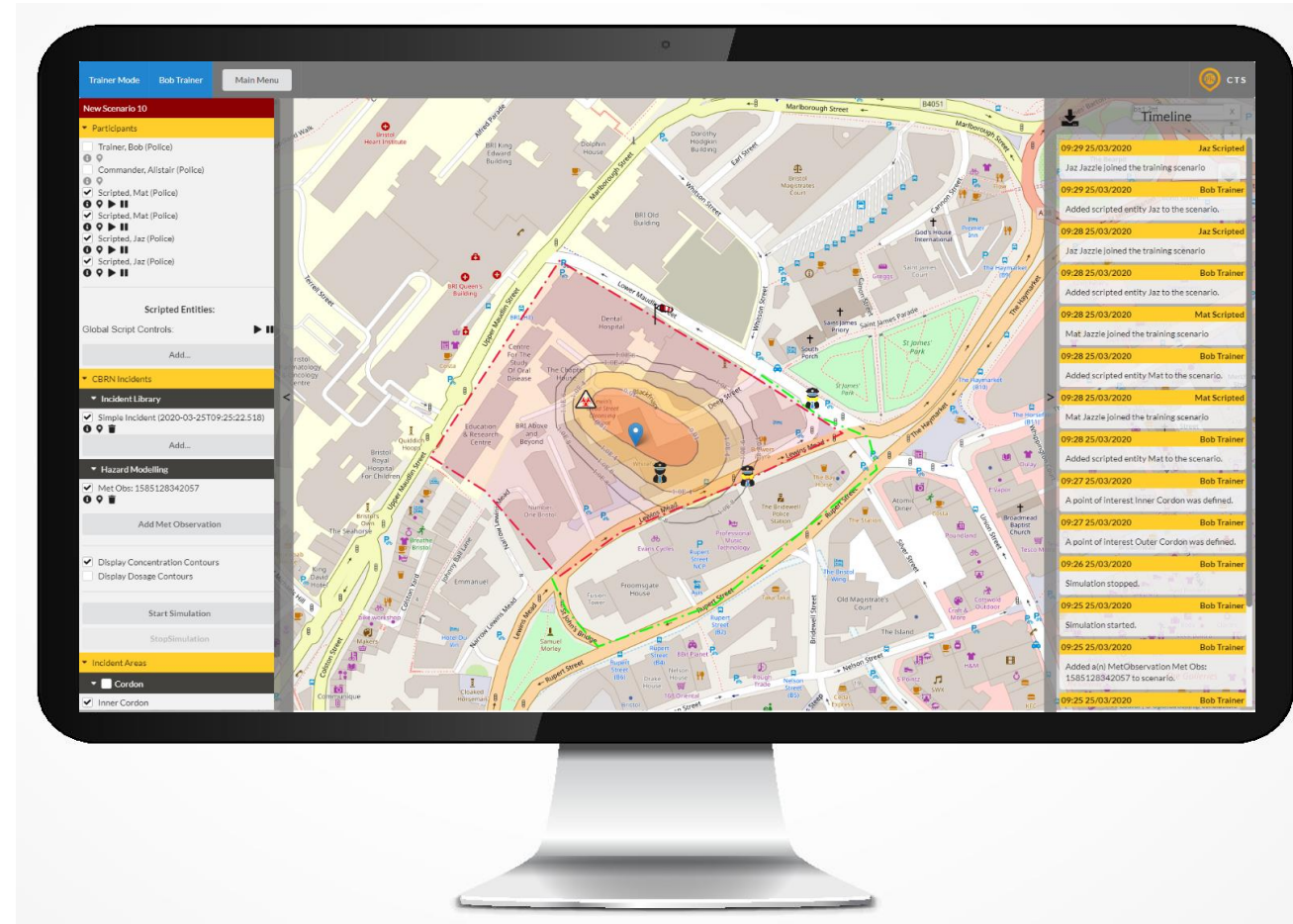
Entity Controller:

- Live (trainees in the field) and simulated players (scripted entity) management

- Live players communicate with Entity Controller via the CTS Mobile App

Web UI

- Web Application
  (based upon EuroSIM CBRN Prototype)

- Trainer/exercise controller: set up
  exercise/training scenario
  - Add CBR incidents
  - Add meteorological observations
  - Run a simulation
  - Update scenario during simulation

- Player: monitor exercise scenario
  - Incident Controller
  - Invite trainees
  - See player (entity) locations, external
    concentration values, health statuses
  - Create cordons

# Android Sensor App

- Android sensor app for trainees in the field:
  - GPS-enabled
  - Register with scenario
  - Posts data to Entity Controller
    - Location
    - PPE status
  - Retrieves data from Entity Controller
    - External concentration
    - Simulated dose
    - Simulated health status
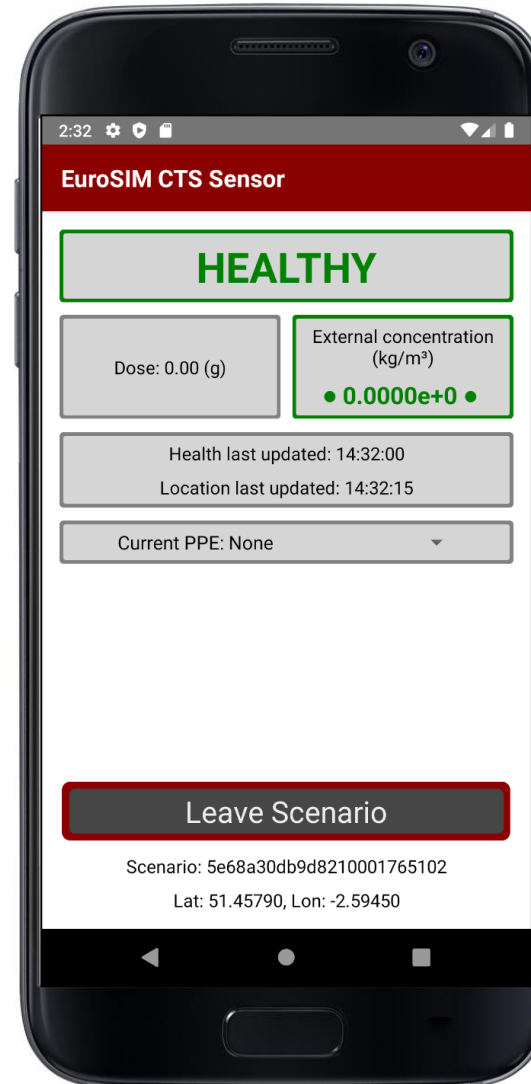
Simulated Players (Scripted Entities)

- Pre-defined routes through scenario

- Subject to same simulated toxic dose as real-world entities

- Plan to implement SISO standard for defining scripted entities - possibilities
  - Pattern of Life Definition Language (PLDL)
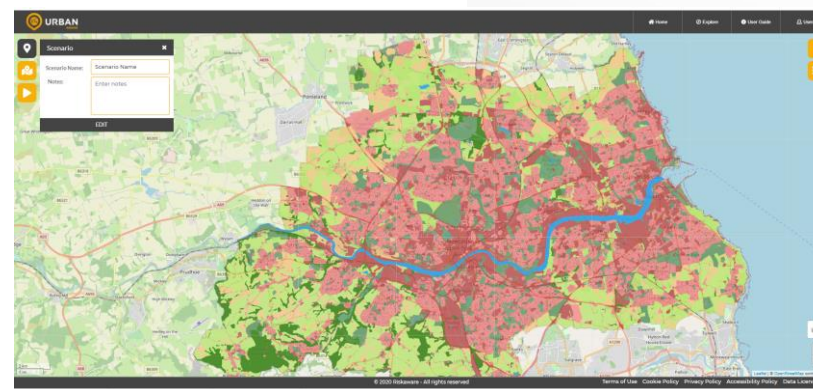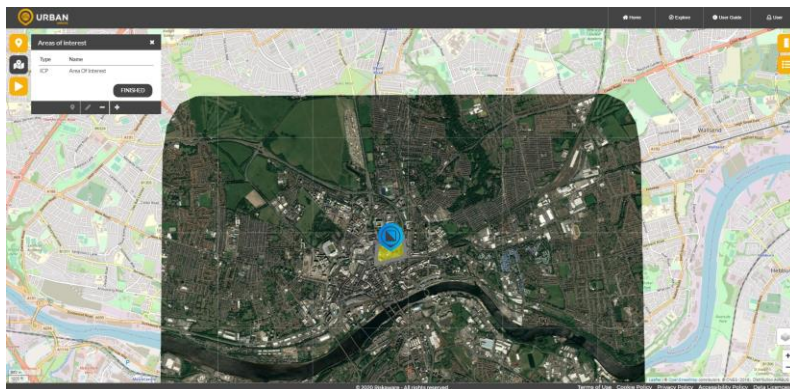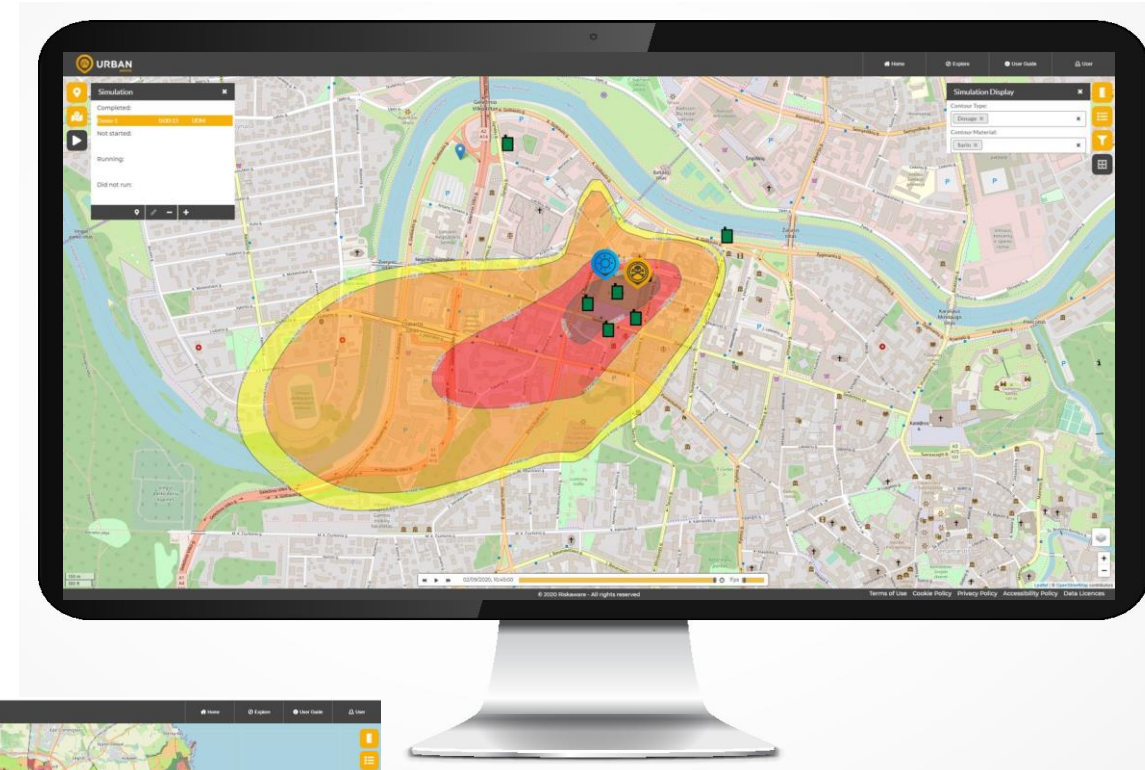 - C2SIM
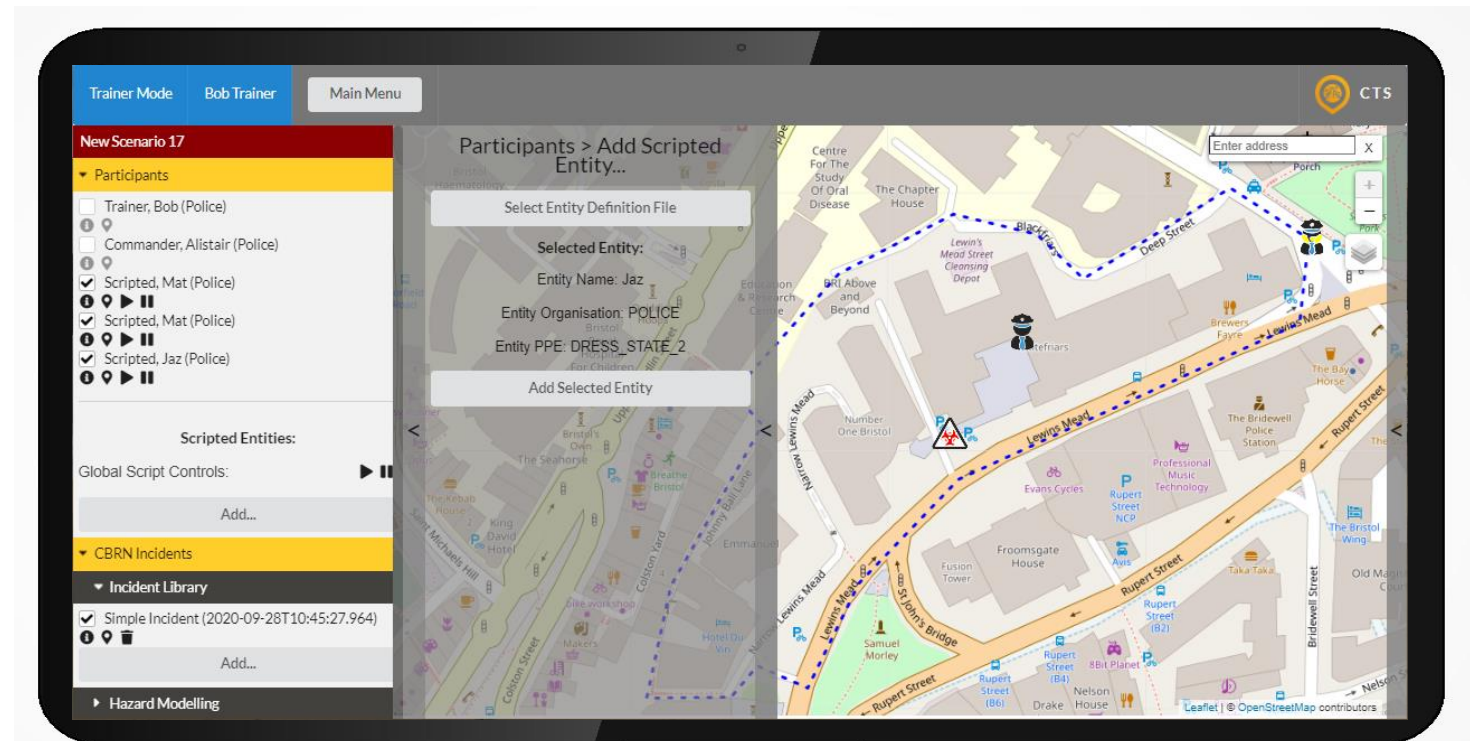
Future work

- Integrate with the UrbanAware information management platform
  - Developed by Riskaware under ESA funding for second phase of the EuroSIM CBRN project.

- Integrate Dstl's Urban Dispersion Model (UDM)

- Mobile enhancements
  - Addition of map layer
  - Addition of commands pushed by incident commander
  - Implementation of enhanced scripted entities using standards.
  - Integration with augmented reality (AR) headsets to allow uses to see simulated sensor readings.
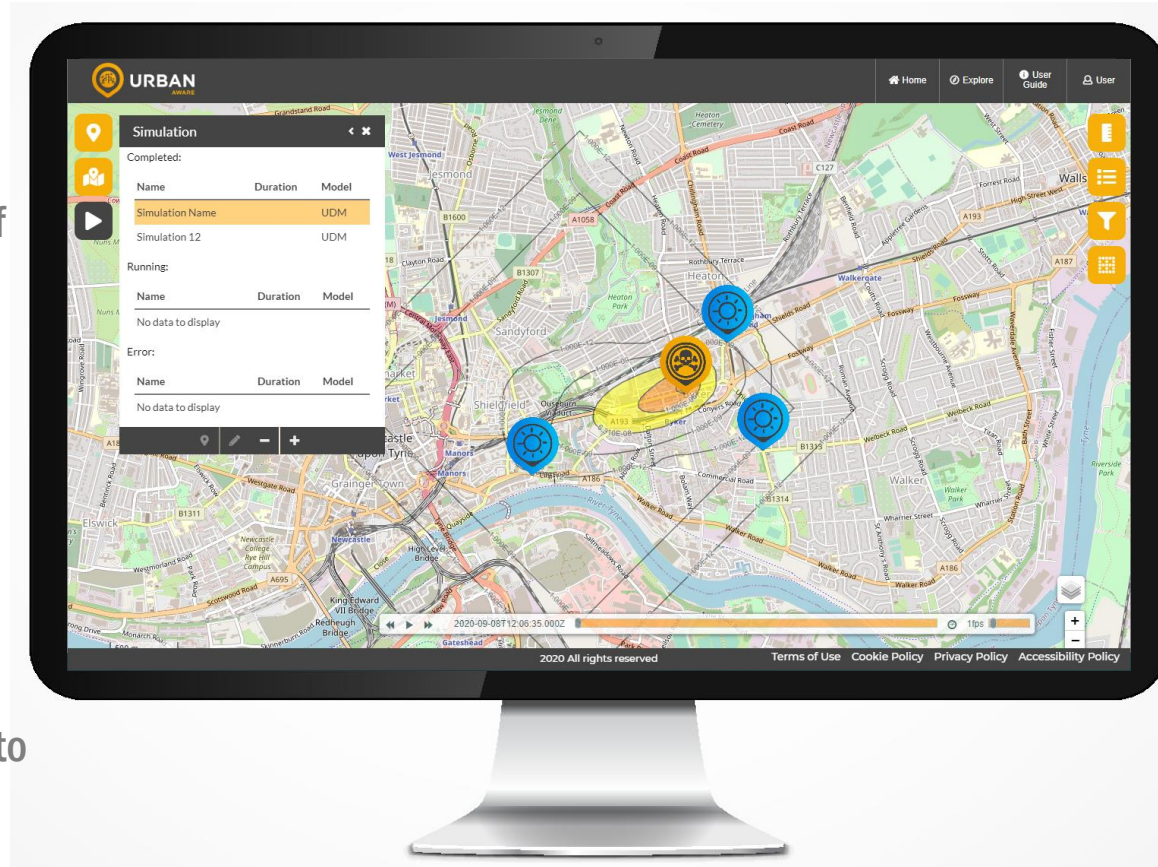
UrbanAware

- Next generation CBRN Information Management Capability

- Underpinned by Dstl HASP Suite
  - Urban Dispersion Model (UDM)
  - Geographic Environment Database Information System (GEDIS)
  - *Source Term Estimation Model (STE)*
  - *Sensor Placement Tool (SPT)*

- Leverages latest space-based data services

- Integrate EuroSIM CTS for training capability

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Questions?