



Additional Models

Jamie England

CBRN Capability Lead, Riskaware

james.england@riskaware.co.uk

Murray Purves

Chief Technology Officer, Riskaware

murray.purves@riskaware.co.uk

Cross-domain innovation

Modelling and simulation

Modelling the world to understand, prepare for and respond to threats

- Mathematical and physical modelling
- Transport and dispersion
- Health effects
- Cyber



Edge AI

Using advanced machine learning techniques to solve real problems

- Accessible
- Explainable
- Performant



Data analysis and visualisation

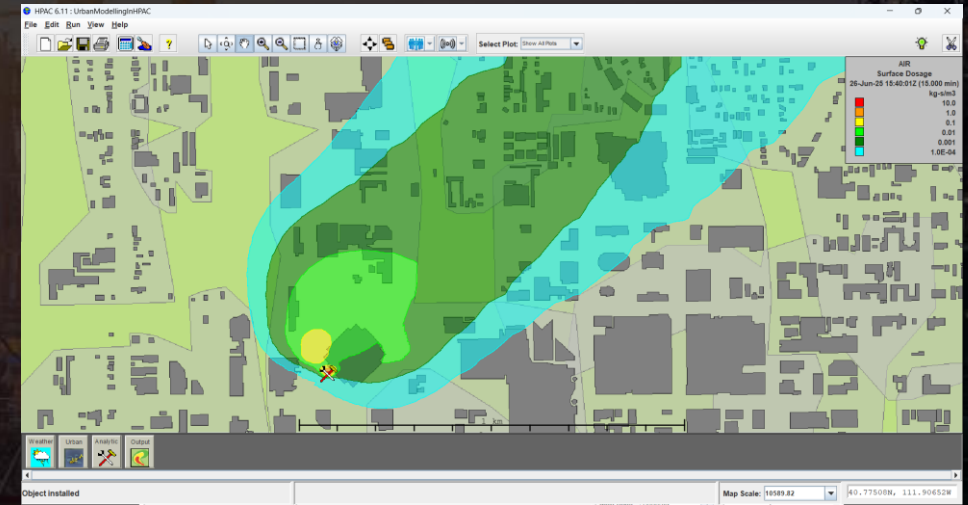
Making sense of complex datasets to extract actionable insight

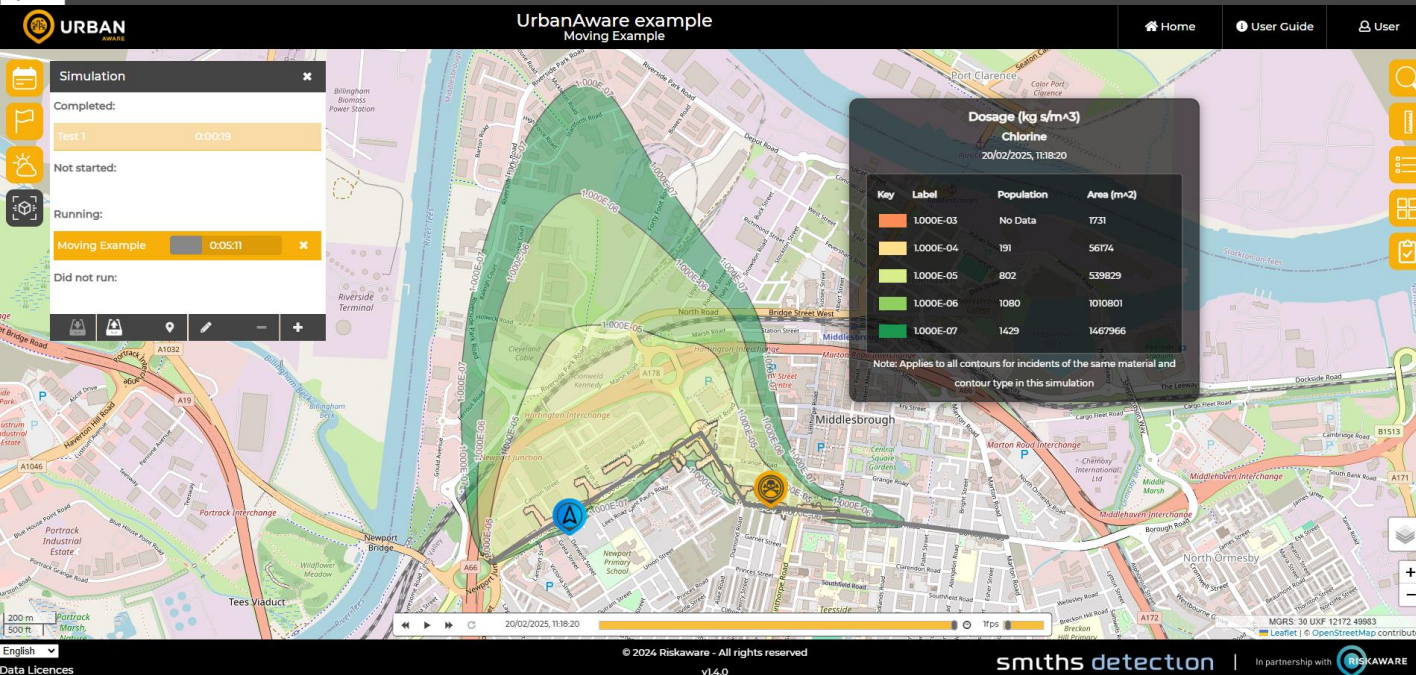
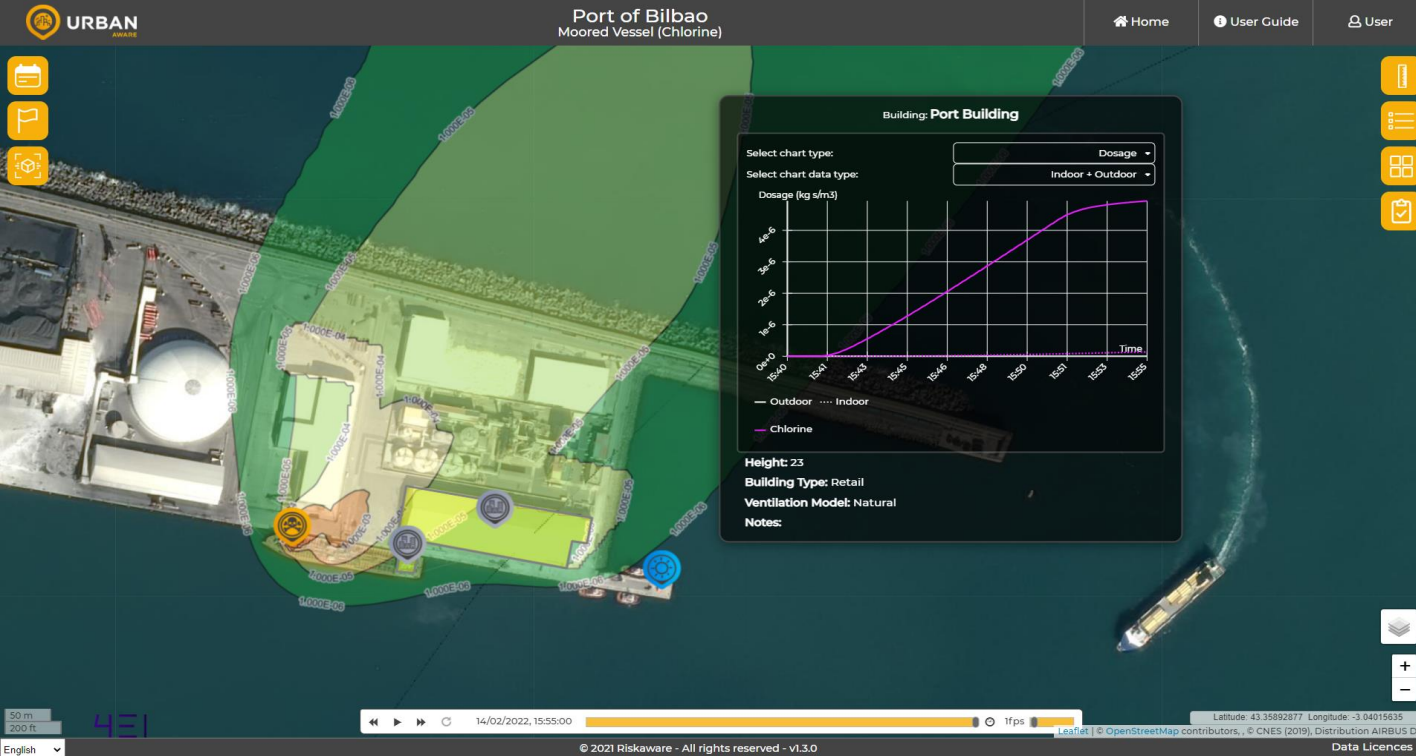
- Data collection
- Visual analytics



CBRN Defence & Security

- 25+ years working with UK MOD and Dstl
 - Development of CBRN modelling and simulation capabilities (LUCBR, CB Virtual Battlespace, Body Map, Liquid Pickup...)
 - Decision support tools
 - Information Management systems
 - Sole license for Dstl CrystalCast and HASP Suite - UDM, GEDIS, STE, SPT, SPRINT, ATP45
- 20+ years working with US DoD
 - DTRA Hazard Prediction Assessment Capability (HPAC)
 - Common CBRN Model Interface (CCMI) standard for JPM IS
 - Joint Effects Model (JEM) Program with General Dynamics and Northrop Grumman
 - JEM/HPAC reconciliation effort with ARA and General Dynamics
 - NextGen T&D, HEAT, MENTOR with Aeris

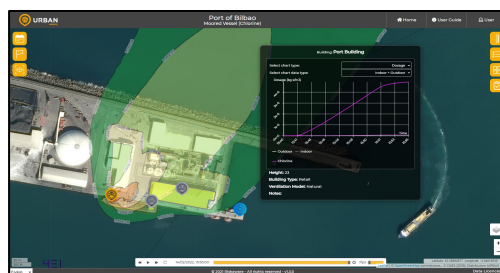




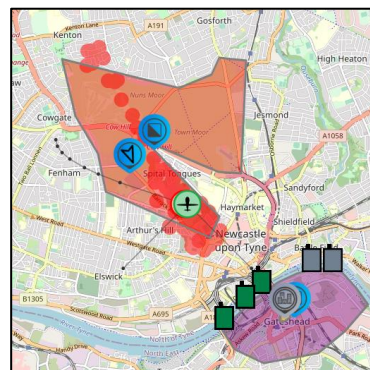
- Next generation CBRN Information Management System
- Civil and Military application built on Dstl technology (HASP Suite)
 - Urban dispersion modelling, geospatial data management, sensor placement, source term estimation
- HASP Suite technology present in US programs of record and other capabilities (e.g. HPAC, JEM)
 - Riskaware are experts in CBRN modelling software frameworks (involved in CCMF from inception)
- Applications in maritime Alternative Fuels sector and chemical industry

Model Transition

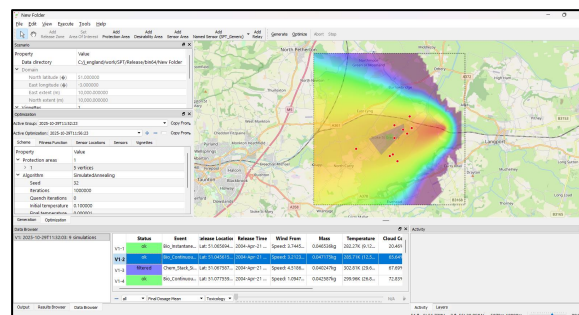
- Transitioning HASP Modelling Capabilities into CBRN Analysis



Dispersion Modelling



Source Term Estimation

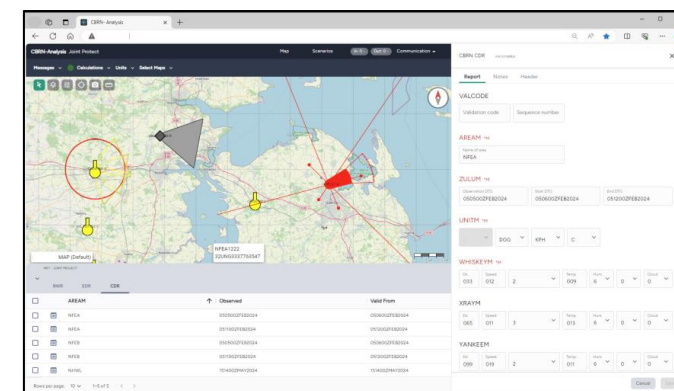


Sensor Placement

T&D
Module

STE
Module

SPT
Module

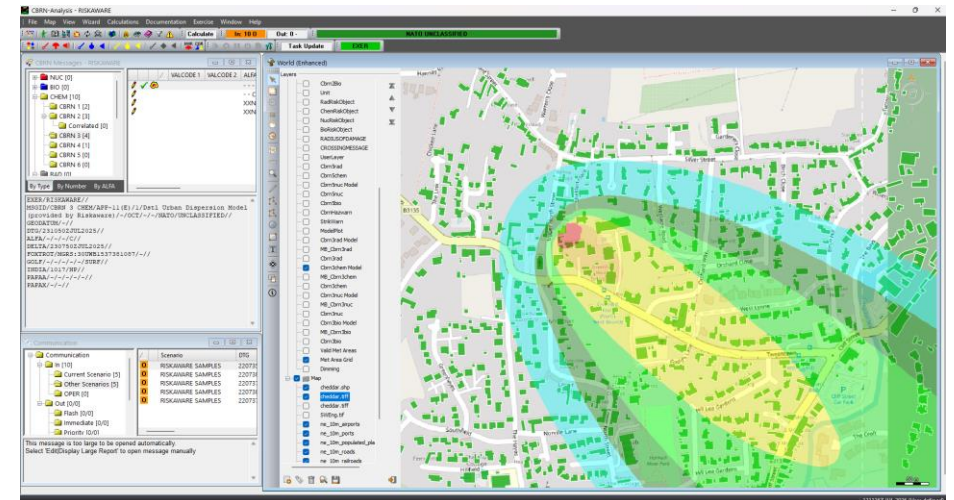
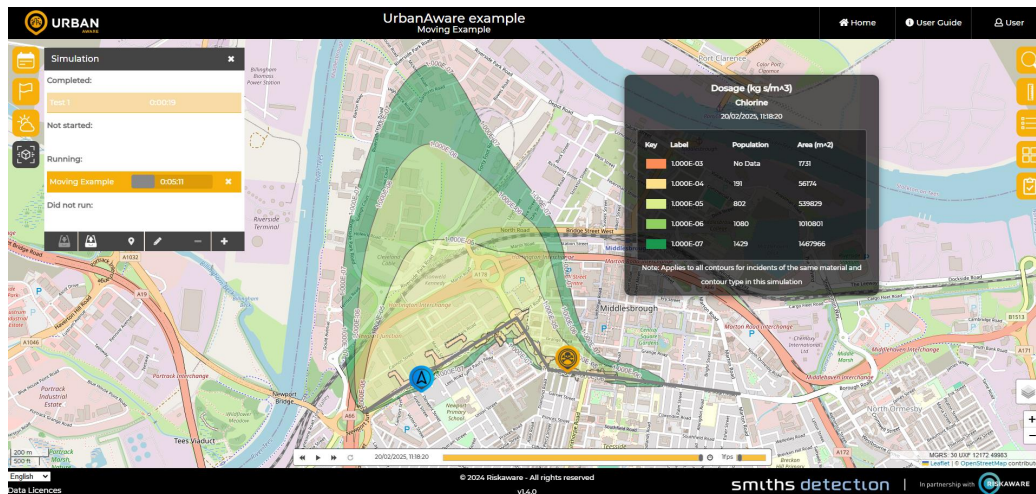


CBRN Analysis

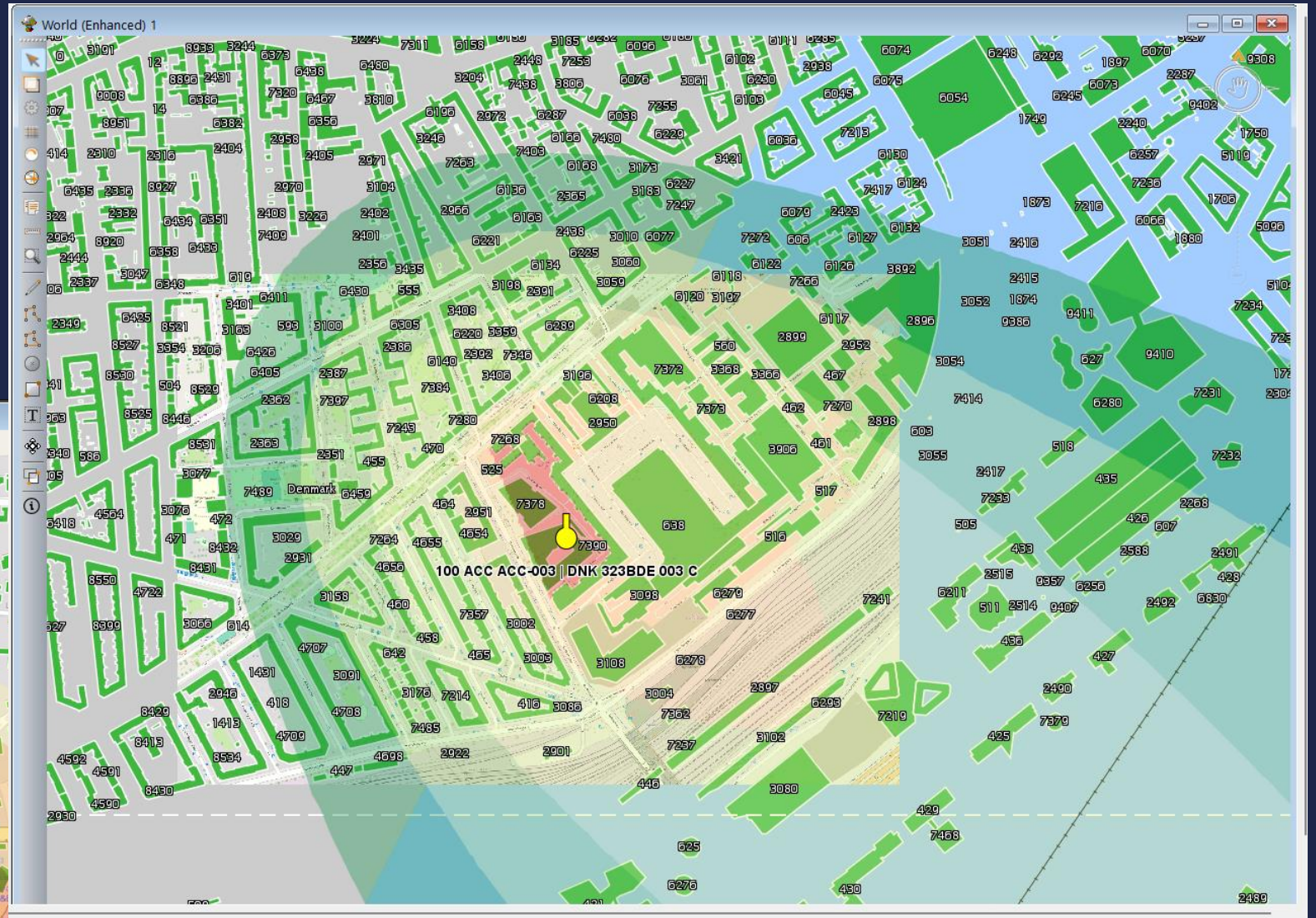
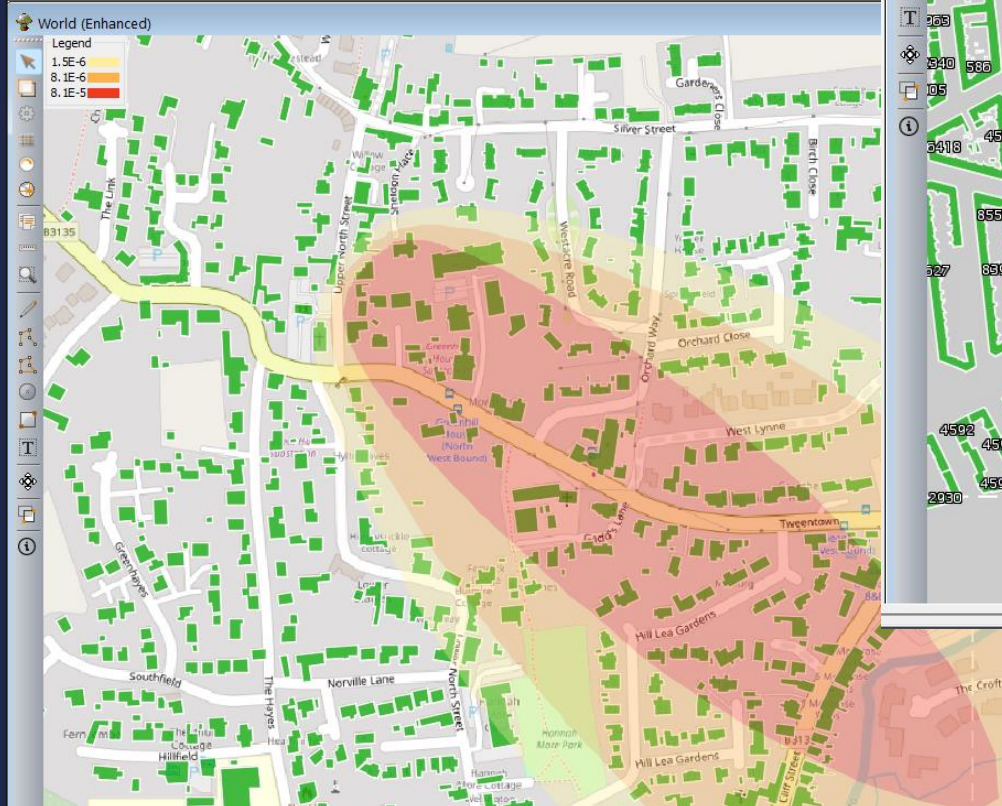
Dispersion Modelling Module



- The Urban Dispersion Model (UDM)
 - Developed by Dstl and Riskaware
 - Complex urban modelling – buildings, terrain, land cover
 - Integrated within HPAC and the Joint Effects Model (JEM) to provide urban modelling capabilities



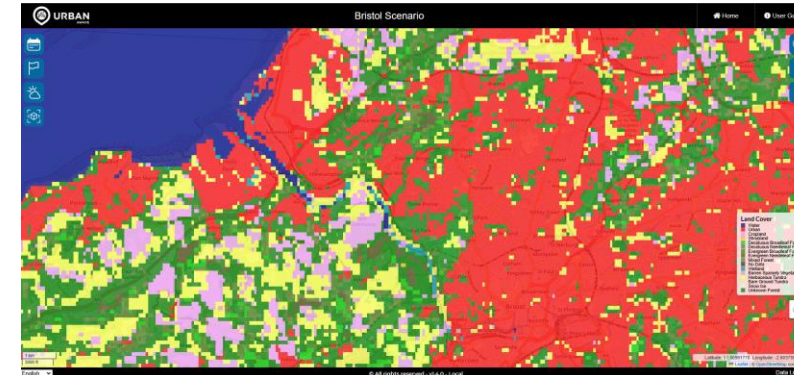
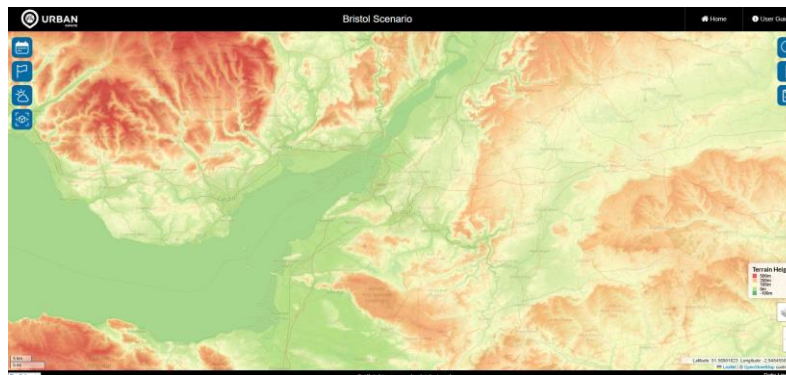
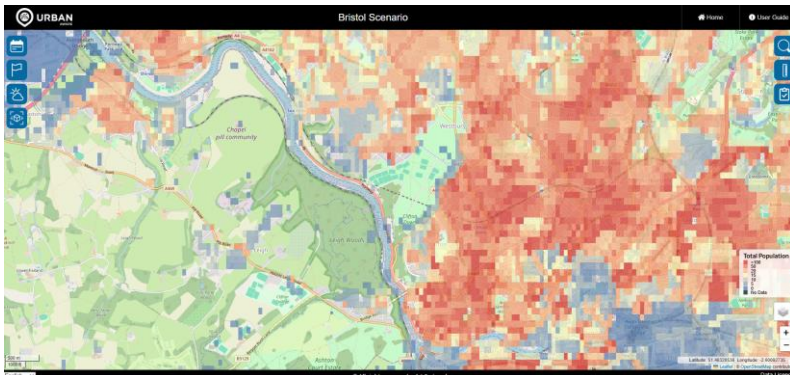
Dosage



AEGLs

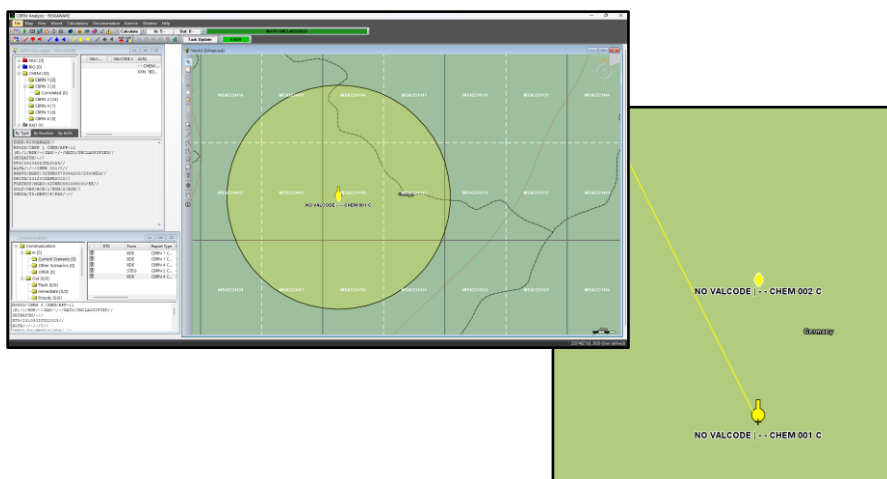
Dispersion Modelling Module

- GeoData Component Development
 - UDM uses land and building data stored within a **GEDIS** Database
 - HPAC / JEM – GEDIS DBs generated for specific **cities** by experts and imported using separate tool
 - UrbanAware dynamically generates GEDIS DB for urban modelling using the Riskaware **GeoData** component
 - Stores open-source buildings (OSM), terrain (Copernicus), land cover (Copernicus) and population (WorldPop)
 - Can store higher-resolution data if available
 - Developed to generate an **offline** GEDIS DB for UDM modelling for **any** location



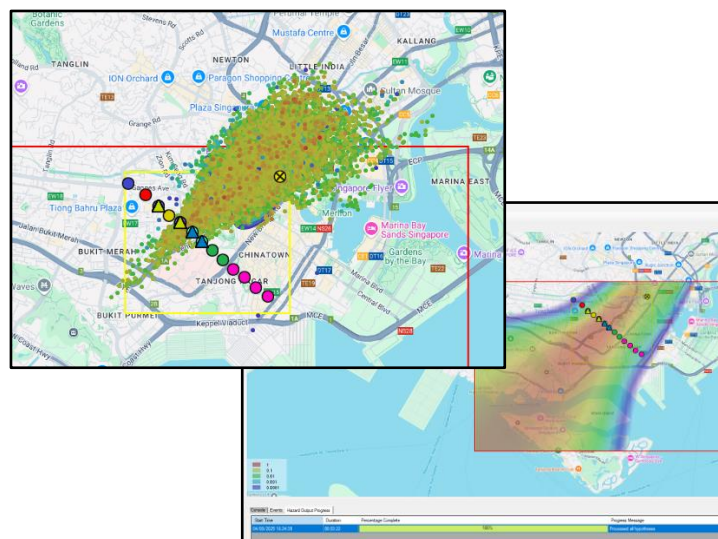
Source Term Estimation Module

- Estimates of a CBRN source can be made from observations (CBRN 1) and sensor readings (CBRN 4)
- These can be improved given meteorological data (e.g. CDR)
- Riskaware have developed multiple fidelity STE models
 - Varying complexity => Varying performance

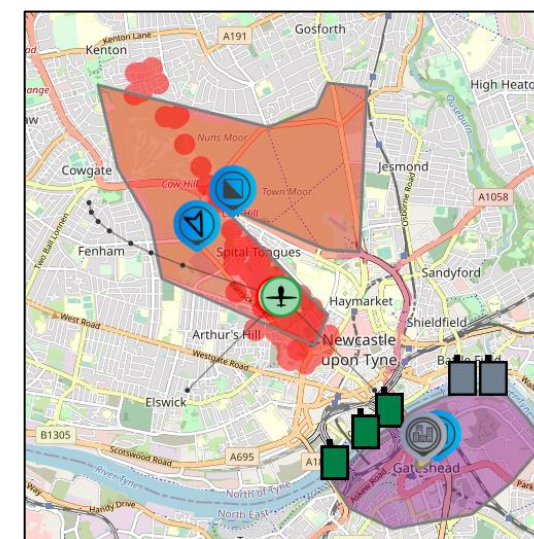


CBRN Analysis Module

STEG



Dstl STE2

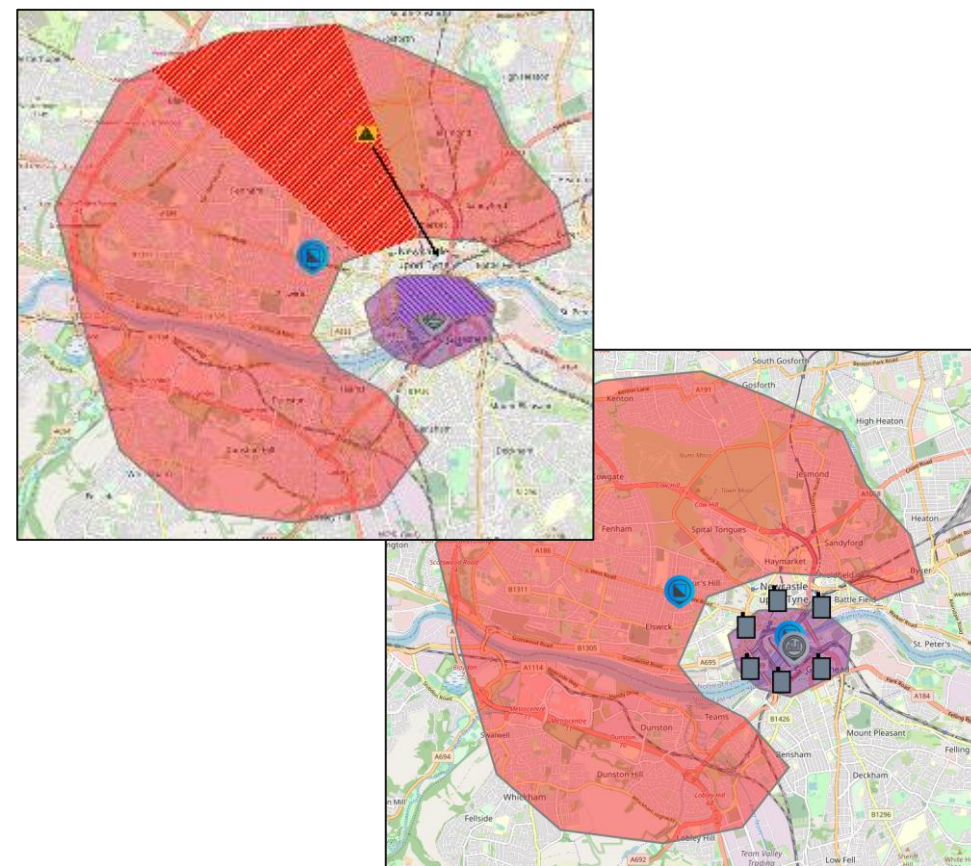
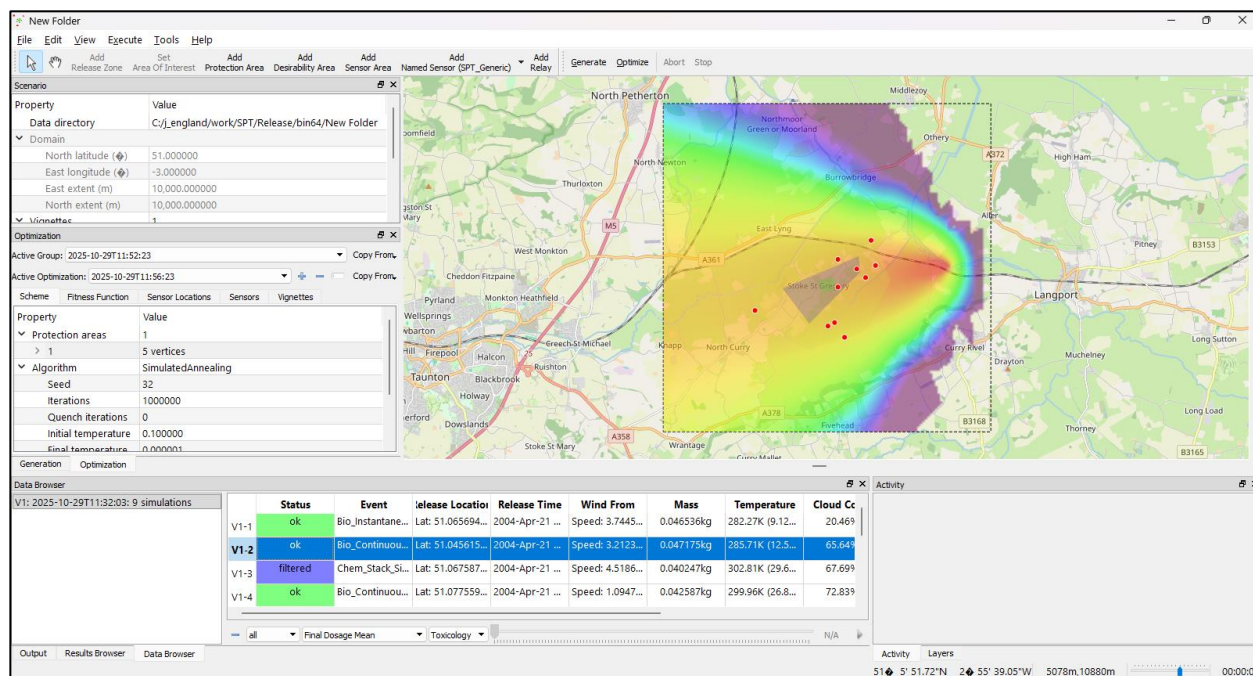


Riskaware STE

Sensor Placement



- Select the optimal placement of sensors to protect areas and assets from CBRN dispersion
 - Monte Carlo analysis
 - Multiple modes
 - Separate threat generation and optimisation







Additional capabilities: TAK Integration

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Tactical Assault Kit (TAK)



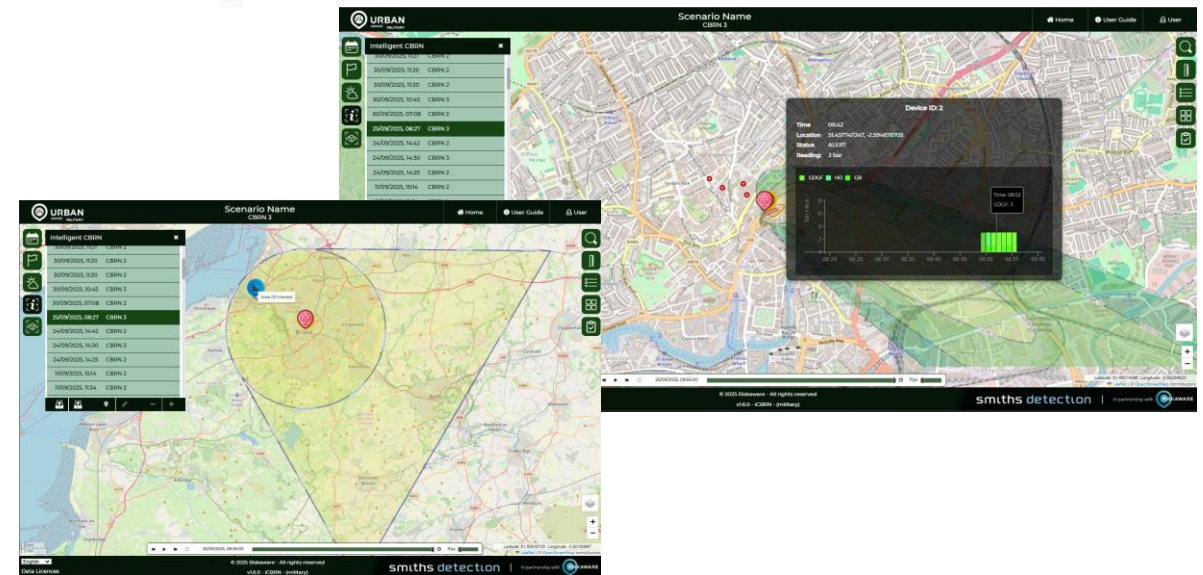
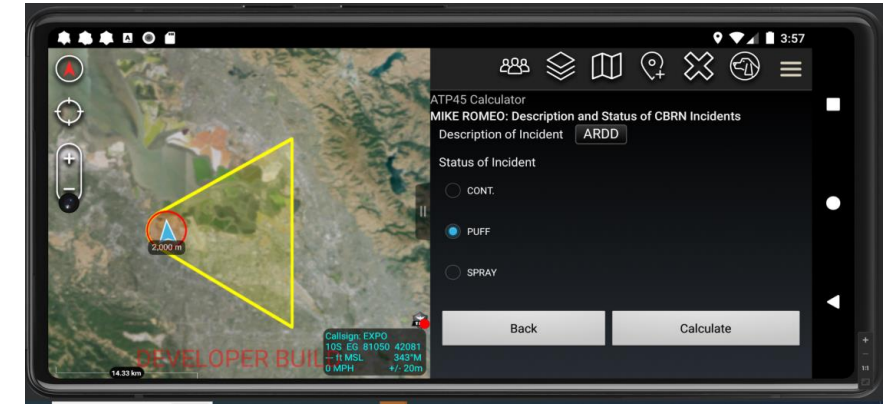
- Suite of software that provides geospatial information and allows user collaboration
 - TAK Server
 - TAK clients
 - ATAK (Android TAK)
 - WebTAK
 - Other clients (iTAK etc.)
- Widely adopted by the US government for both military and civilian use
 - ATAK-MIL
 - ATAK-CIV
- Increasingly used across NATO countries
- Uses NATO APP-6 Symbolology



UrbanAware-TAK Integration



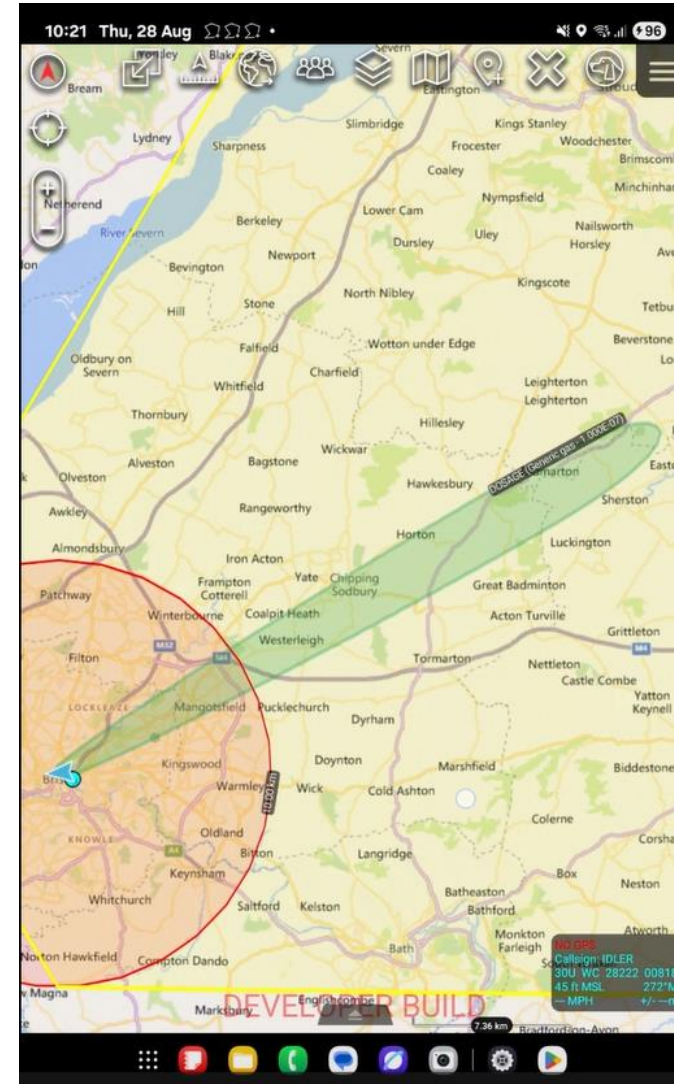
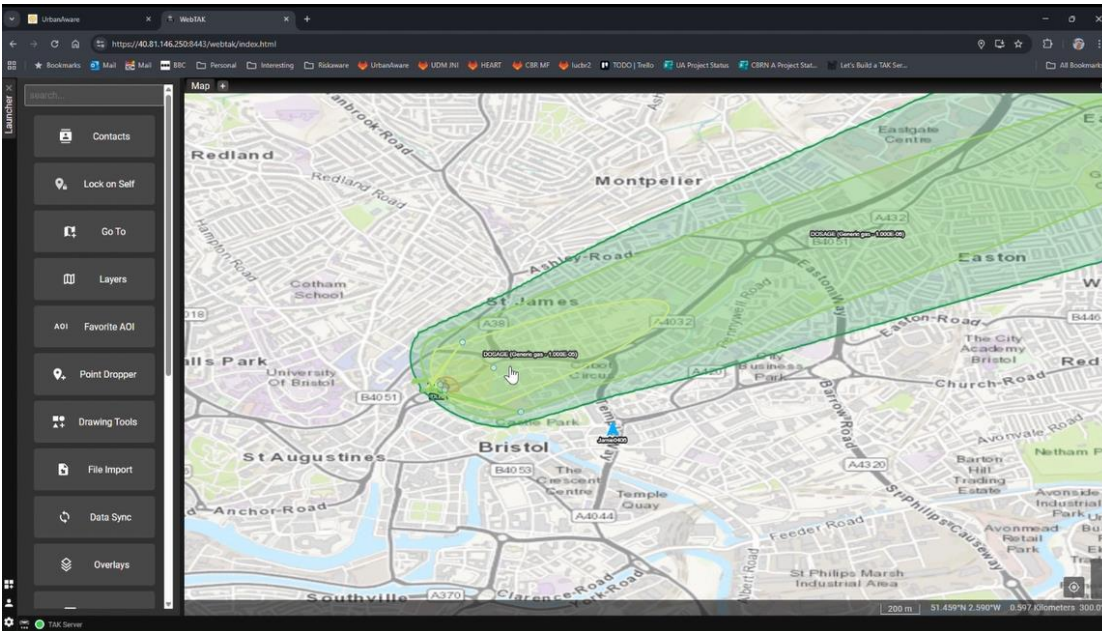
- Riskaware has developed a prototype system to interface TAK with UrbanAware
- CBRN Message data sent from ATAK device to TAK Server
 - CBRN 1 – Observation (=> CBRN 2 Release Estimate)
 - CBRN 3 - ATP-45 Hazard Area (calculated on device)
 - CBRN 4 – Sensor reading (manual or from Smiths Detection LCD 3.3 connected via Bluetooth)
- TAK Plugin intercepts messages and send data to UrbanAware for visualisation



UrbanAware-TAK Integration



- Dispersion modelling triggered in UrbanAware
- Contour data send back to TAK
 - Sent to connected TAK clients



CBRN Analysis TAK Integration



- CBRN Analysis to publish CBRN ATP-45 Templates to TAK
 - Fully-compliant NATO ATP-45/AEP-45
- SCIM® to publish CBRN 4 Sensor readings to TAK
- Templates and sensor readings viewed on TAK clients (e.g. ATAK)
- Longer term aim – calculate CBRN templates on ATAK device when offline

