URBAN AWARE

DATASHEET

Sensor Placement Tool (SPT)

An advanced decision support tool enabling the optimisation of sensor placements for better detection and protection in the event of a CBRN/HazMat incident.

OVERVIEW

The Sensor Placement Tool (SPT) is a decision support tool capable of determining the optimum placement of CBRN/HazMat sensors. The tool provides an assessment of the quality of sensor placement strategies, maximising the probability of detection whilst assessing key constraints such as line of sight communication and cabling.

With the added feature of incident warnings, SPT maximises the probability and timeliness of a real event being detected. This facilitates more proactive and informed planning as well as more impactful resource deployment.

DETAILS

SPT enables users to simulate a large number of possible threat scenarios against a target. It uses these simulations to calculate and generate the best sensor placements for maximum protection.

SPT can be utilised to maximise the probability of detection of CBRN/HazMat releases taking place outside an area (e.g. site protection) as well as those coming from within (e.g. detection of on-site incidents). As well as performing assessments on the optimal deployment strategy for a set of defined sensors, SPT can provide guidance on the sensor equipment required to meet a given detection threshold.

The sensor placement optimisation process is divided up into two distinct phases; threat generation and optimisation. Threat generation involves defining the scenario and CBRN/HazMat threat profile. This is achieved by creating simulated threat data: specifying scenario parameters and simulating likely CB events. The optimisation phase then exploits this data and other environmental factors to determine optimal sensor positioning and assign quality scores.

SPT supports three distinct approaches for sensor placement and allows users to utilise all three placement techniques for a single scenario, empowering more reliable and cohesive sensor placement. Users can use SPT to both decide on an approach or integrate several methods to suit the situation and improve results:

Manual: Sensors are placed by hand, for example to define an existing network or other fixed assets.

Rules-based: Sensors are placed according to simple, geometric strategies and environmental characteristics. This enables quick, data-driven and consistent sensor placement. Examples include Perimeter placement, Dice 5 placement, and Picket Fence placement.

Optimised: Sensor placement is adjusted using mathematical optimisation processes. First, the method evaluates the current situation and models threats. Second, it generates a quality metric score for sensor placement. Lastly, it identifies optimal solutions, accounting for the probability of detecting hazardous agents, the time in which they are detected, and other relevant considerations.

SPT is easily compatible with other tools. It leverages the Urban Dispersion Model (UDM) and the Geographical and Environmental Database Information System (GEDIS) for comprehensive data to enable more accurate results. SPT can also be integrated with third-party dispersion modelling algorithms for end-to-end capability

USE CASES

SPT was developed by Riskaware in collaboration with Dstl for the Defence Threat Reduction Agency (DTRA) and the Joint Science and Technical Office (JSTO). It has also been integrated with the US Joint Warning and Reporting (JWARN) capability. The SPT model has been extensively verified, with validation conducted by subject matter experts.

SPT is now available as part of Riskaware's HASP Suite and UrbanAware, to support and enhance the following applications in both Government and commercial use cases:

- Protection of potential mission targets (e.g. military bases and airfields)
- Protection of critical infrastructure (e.g. Government buildings)
- Detection of releases at facilities handling hazardous materials
- Analysis of optimal sensor placement strategies for major public events
- Operational research programmes
- Major acquisition programmes

FEATURES

- Optimal placement and configuration of CBRN sensor assets
- Support for desirability mapping, e.g. defining areas where sensor placement may not be practically favourable or possible
- Support for statistically sampled or historic forecasts for meteorology
- Integration with third party dispersion models and other incident modelling tools
- Ability to run on a laptop, or deploy across a network, with intensive processing happening on a server

BENEFITS

- Can model a range of different sensor types
- Scalable with the addition of more sensors
- Combinations of sensor types and numbers can be explored to assess and identify the sensing capability that can be deployed
- Enables efficient resource management by determining the optimum number and deployment configuration of sensors to meet detection requirements

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