

Katja Kiukas examines CBRN threats in buildings and sets out ways to enhance preparedness

SAFE HOUSE

Have you ever thought how many years of your life you spend in buildings? From your home to the office, factories, schools, hospitals, shopping centres and transportation hubs – buildings form our modern 24/7 environment. Considering how much time people spend indoors, occupants, properties and businesses must be protected from a range of threats – including CBRN

For most types of premises the acquisition and use of video surveillance systems, control of access, crash- and attack-resistant bollards, and explosives detectors provide protection. But when it comes to CBRN threats, the story becomes more complicated.

Accidental and deliberate

Terrorist and other malign threats against buildings and their occupants include vehicle rammings, bombings and cyber-attacks. Indoor facilities involved in governmental, educational, cultural, financial, commercial and industrial operations and, especially, critical infrastructure, are perennial and attractive targets for terrorism.

As well as intentional CBRN attacks, accidental releases affecting buildings are of considerable concern. According to analysis by the Major Accident Hazards

Bureau for the OECD (Organization for Economic Cooperation and Development), there were 668 chemical incidents involving fatalities, heavy environmental costs or social disruption worldwide between October 2016 and September 2017.

Possible threat scenarios include e.g. the following: a toxic gas is released from a nearby chemical warehouse; a stolen truck of chlorine is detonated outside a workplace; a radicalized contractor worker or insider disperses radioactive or hazardous biological agent via the HVAC (heating, ventilation & air conditioning) system into an office. What happened in Salisbury and Kuala Lumpur to a few unfortunate individuals may take place anywhere – and possibly on a wider scale, and with different, and possibly improvised, CBRN agents.

While most buildings occupants do not think constantly about these threats,

employers and buildings security managers have to plan accordingly. Although CBRN events are typically of low-probability, they are of high-consequence – and countries are currently facing challenging and evolving threat environments. Terrorists look for and find new methods to cause panic, disruption, loss of life and economic damage. Threat agents may end up in the hands of well-trained terrorists or criminals who will exploit lack of protection in a building or our preparedness to detect and tackle attacks in the early stages.

Building vulnerabilities

Buildings are vulnerable to indoor and outdoor releases of CBRN threat agents for many reasons. Buildings are still constructed in accordance with building codes that lack any substantial design considerations intended to prevent or

A PARTNER IN BUILDING PROTECTION

Environics Oy, a Finnish company with over 30 years' experience in CBRN detection, provides scalable CBRN monitoring systems for buildings protection. Environics works with building designers, administrators, security experts and integrators to create and implement proportional CBRN monitoring for buildings.

High-profile buildings are attractive targets for CBRN terrorism.

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minimize the impact caused by CBRN attacks.

Guidance and strategies are defined for tackling CBRN threats in critical buildings on a national level, but no related legislative and effective regulation exists, except for safety directives such as SEVESO. The main EU legislation dealing with the control of onshore major

accident hazards involving dangerous substances, SEVESO aims to reduce major accidents in the EU involving dangerous chemicals in industrial establishments where dangerous substances are used or stored in large quantities.

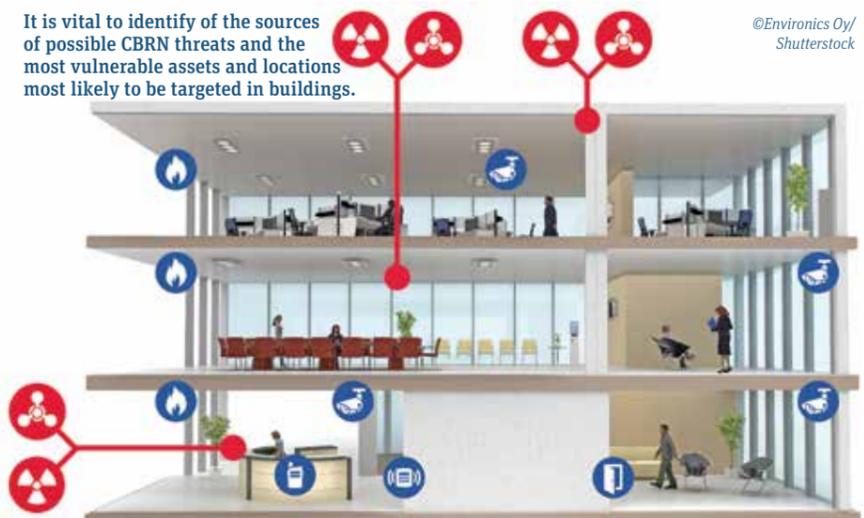
Buildings are vulnerable enclosed spaces where masses of people gather for long periods. They receive mail and

cargo and have high occupant density compared to outdoor areas. When a building has unrestricted public access, harmful quantities of CBRN agents could be hand-delivered into the building or introduced directly into its ventilation system.

Dispersal of CBRN agents

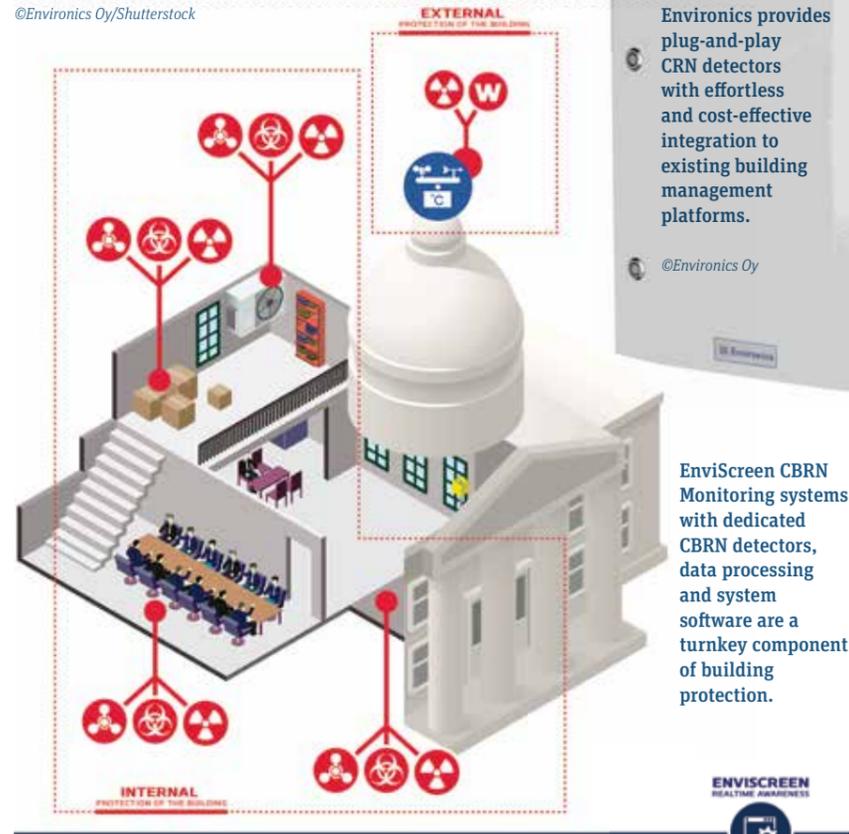
HVAC systems and movement of people can effectively transport harmful airborne material throughout the facilities. Enclosed spaces with rather stable atmospheric conditions can retain high CBRN agent concentrations and reduce the amount and durability requirements for the release agents.

In the wider context, buildings and their occupants are prone to airborne, waterborne or foodborne contamination. CBRN agents can be used to contaminate the air transported into a building, or be disseminated into the water supply or contaminate the food served in the facility. Although a successful CBRN release does not destroy the building itself, it causes casualties and fatalities, destroys the functions of the building, interrupts business and leads to



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significantly affected by an event – and will gain increased resilience and a lowered overall risk.



In the changing threat environment, it is vital to identify the sources of possible CBRN threats and the most vulnerable assets and locations most likely to be targeted in high-occupancy buildings. Similarly, it is important to establish solid co-operation with all the stakeholders – including

the authorities and first responders – and to determine which automated responses, processes, and capabilities need improvement.

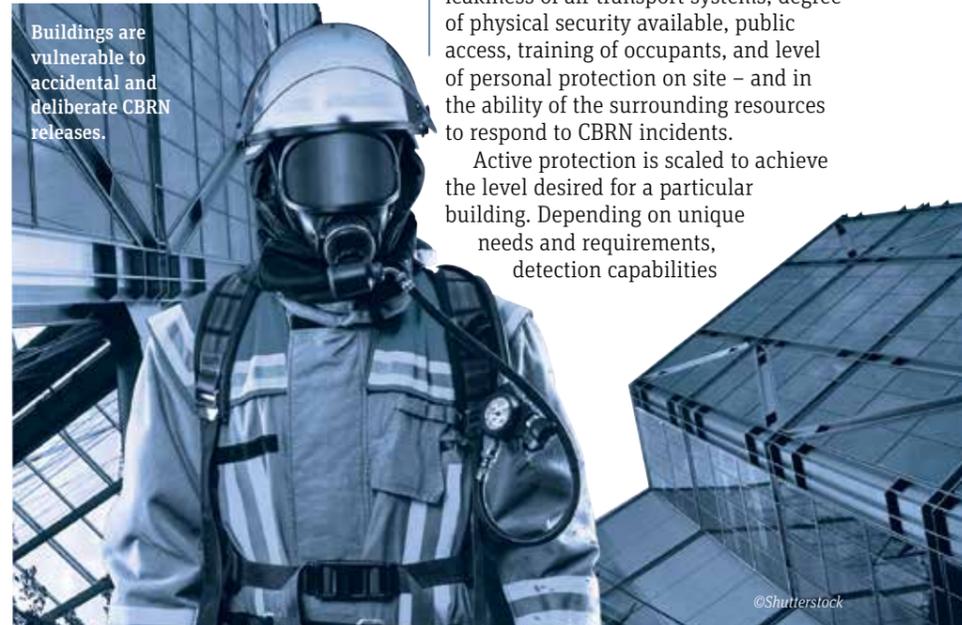
Many tools, techniques, and products are available for the design of new build and renovation of existing buildings to reduce vulnerabilities to accidental and intentional CBRN releases and their consequences, and to increase building performance and resilience. The steps towards preparedness and prevention can be taken by combining passive and active protective measures, with enhanced physical and operational safety and security, mechanical response systems, and CBRN sensor systems that are integrated cost-effectively with existing building management platforms.

Selection of components for building protection requires evaluation of many facility-specific aspects on a case by case basis. Buildings vary in their locations, surrounding areas, facility operations, resistance to infiltration of outside air, leakiness of air transport systems, degree of physical security available, public access, training of occupants, and level of personal protection on site – and in the ability of the surrounding resources to respond to CBRN incidents.

Active protection is scaled to achieve the level desired for a particular building. Depending on unique needs and requirements, detection capabilities

active or passive countermeasures, and installing security systems. Building designs have to include both physical security measures and resilience as objectives of an integrated design process to reduce the risks from CBRN releases. If building administrators can maintain continuity of operations, the organization's key functions will not be

Buildings are vulnerable to accidental and deliberate CBRN releases.



contamination of the building contents and occupants. Depending on the severity of the incident, targeted buildings may be inaccessible for significant periods of time and require expensive and time-consuming decontamination processes and sometimes even demolition or rebuilding.

Risk assessment

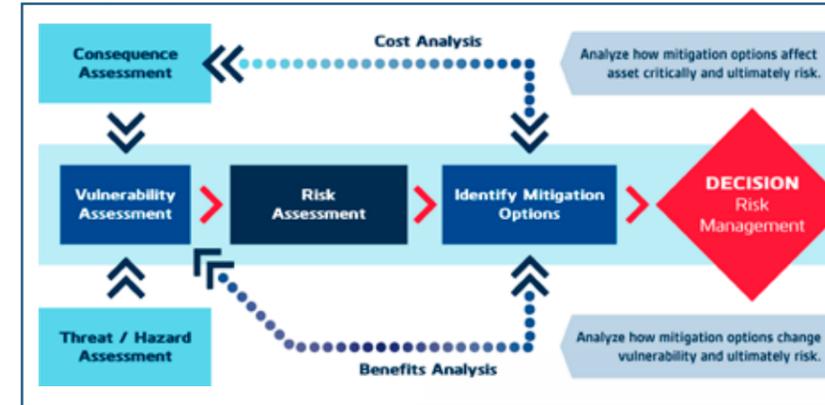
A well-defined, predictive strategy that covers phases from design to deployment helps to implement appropriate and proportional CBRN protection, safety and security measures for buildings. As indicated in the US Department of Homeland Security's Reference Manual, a successful protection strategy originates from a risk management framework that defines the processes for combining threat, consequences, and vulnerability information.

This is based on a comprehensive, systematic, and rational assessment of risks. The risk assessment provides the basis for prioritizing protective activities for reducing the risk – by improving the performance of buildings and their operations.

Effective protection strategy

Protection incorporates hazard resistance into initial facility design, initiating

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Risk assessment covering threats, vulnerabilities and consequences is a starting point for determining protective measures.

CBRN threats is a challenging task. It is difficult to estimate the risks or even predict how, why and when a CBRN incident will take place. Rather than relying on luck, security managers must protect buildings by being prepared in a continuous improvement cycle of prevention, preparation, response and lesson learning in every effort to prevent the worst. ■

can be built upon turnkey solutions provided by CBRN detectors, data processing and system software, or fixed installed, plug-and-play CRN detectors with effortless integration to existing building management systems.

Enhancing safety and security and making indoor facilities resilient against

An effective protection strategy combines passive and active protective measures with operational responses to tackle CBRN threats to buildings.



Katja Kiukas, MSc, BBA has over 10 years of application, business and technology expertise in biodetection and CBRN monitoring systems for naval vessels, land vehicles, area monitoring and critical infrastructure protection. She is currently Product Manager for Bio Detection and CBRN Systems and Application Specialist for Building CBRN Monitoring at Enviroics Oy, Finland.

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