

CBRNe World looks at critical infrastructure protection

CHEMICAL ALARUM

THERE is always a great deal of interest in major events – the World Cups, Superbowls and G8s of the world.

These caravansera arrive, take over a city and leave with little trace that they had ever been there – apart from some lessons learned. While these are of value to governments, individuals and commercial organisations, they leave little legacy for the host city. One thing they did leave is the idea of how much better their security could be. There is no doubt that cities like Berlin, Hamburg and Leipzig will look at their current systems and wonder how they could get half the capability at a quarter of the price. Critical infrastructure protection (CIP) – the means by which buildings, transport networks or services are protected from terrorist attack – is becoming big business, as the repercussions from Madrid in 2004 and London in 2005 are driven home. Smiths Detection have their 24/7 system, Bruker Daltonics have their Raid-AFM system and companies like Lockheed Martin and Environics are heavily involved in protecting the underground transport infrastructure. The drive has been away from producing a piecemeal approach, whereby there is an odd sensor here or there; instead the network is the key, where a combination of sensors – CBRNe and conventional – are linked together to act as orthogonal detection.

“There are inter-related issues that we have been working on for a long time,” said Tim Otter, Vice President of Business Development at Smiths Detection. “Critical to this is livewave and internet-based communications systems. Essential to CIP is orthogonal detection – using two different technologies to verify each other. Those two technologies, in most instances, continue to do their day jobs; the chem detector does that role, the cameras, for example, do theirs. The cameras verify that the detector has gone off and there are people lying on the floor shaking, or there is a vapour. Or, alternatively, there might be people lying on the floor but no chemical detector alarm – this might be an earthquake. Since livewave is internet-based it is almost infinite and there are no bandwidth issues.

“We don’t want chem, bio or rad to give falsies,” he continued. “So they need to push the false alarm issue down as low as they can.

Another thing that is important is the requirement to think of a holistic system from the beginning. It may well be that you can get the chemical detector to back up bio from the beginning, or it may be that your chemical detector has two bits of tech in it – one might be cheap and cheerful, but if doesn’t false alarms at the same things that the sensitive one does, then you have a solution. It’s about lots of different capabilities meshed and entwined.”

That concept works on the grand strategic level, but the urban environment, and especially the transport network, are not the place for CBRN sensors. Firstly, there are too many interferences – emissions, dirt and fumes can play havoc with sensitive equipment, meaning the sensitivity needs to be turned down. Equally, the urban environment is complex meteorologically; there are very few prevailing winds and a sensor may not alarm if it is around the corner, too high or too low from the source. There is also the maintenance and security aspect – too low and these sensors can get vandalised or stolen, too high and routine maintenance is a problem. Highest, though, is the false alarm situation where non experts are required to believe implicitly in what the machine is saying – so a chemical alarm in Trafalgar square, despite lots of pigeons still flying around, is still a chemical alarm. The essence of CIP is that the building or area is critical, either for business, financial, transport or service rea-

sons – a false alarm may render it out of order for a short period of time, but even that might have major repercussions – for instance, the evacuation of a stock market floor. There are solutions to these problems, but they are not easy.

One of the man-made problems is that of commercial sensitivity and intellectual property rights. Users want an integrated network, not a series of interconnected ones. In fact, Environics Sales Manager Timo Jaakala pointed out it is often a prerequisite. “That is usually a requirement; they don’t want additional networks, so we have to be an extension of the existing system.” Yet this can mean a single contract let to a company to do CBRN detection, bringing competing companies together – which causes problems. This was illustrated through the Impact programme (more information on page 17), whereby members of a consortium did not want to give sensitive information about the way their detectors worked, and what their strengths and weaknesses were, to a competitor – which meant that the signal had to be downgraded and the efficiency was reduced. Tim Otter believes that wouldn’t be a problem, and pointed out the work that the UK, for example, is doing with a widespread collaboration – Team CBRN (more information page 19). “Team CBRN’s role in this would be to say fine – those people who have a commercial interest are not allowed to evaluate the IPR; they wouldn’t have to put the IPR to



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me, for example. If the government says they have a problem, industry might be the best placed people to say, 'Hey, there is a little company down the road, those are the people that you need to go to'. It may therefore be that a big company needs to put their arm around the little company to help them; it may be that they have to advise them or, if they are incapable of dealing with it – and dealing with the government can be difficult – then they may have to move in and purchase it. The owners of the company benefit – and help them in that way."

Timo Jaakala's experience had been less commercially predatory. Environics has been working on putting CIP into metro systems – providing them with a full CBRN system that can plug into their existing network. Despite using different companies' detectors, Mr Jaakala's experience had been different. "We've not really had that problem as we did all the chemical detection part," he said. "If we are taking other sensors then we apply them to our algorithm systems. Environics does not have a biological detection key competence, but if we did then we might face that sort of problem."

Yet part of the problem inherent in chemical detection is that it detects the agent once it has been released, as opposed to when it is just a threat. While attempts to interdict lethal agents are made in flights and some government buildings, it is not the case at large scale events – such as sporting matches or rallies. While all protection is an onion-skin type approach, it is better to interdict the individuals that have created or handled these weapons to be caught before they can set it off. Airports and highly sensitive areas have Tadar, biometric information and

screening to protect them, but for mass transit systems, or high population density events, this is not possible – the delays that are incumbent on these systems are not palatable for high throughput events. What could be done, however, would be to rig CBRN detectors up to the ticketing or entrance machines, whereby each ticket is scanned for an agent. While biological detectors, and sieve packs on some chemical agent detectors could get clogged with dust and detritus, it would be feasible for chemical agent detectors to "sniff" or scan each ticket to see whether someone who has handled various agents is present. The advantage of this system is that, because it is not open to the elements, the sensitivity can be increased to pick up trace elements. The disadvantage is that a lot of legitimate individuals would have to be pulled aside for screening/questioning. Those individuals who have had medical isotopes or are workers in various industrial complexes could well be the sort of individuals who would have to suffer the indignity and embarrassment of being pulled to one side – which in sporting events where alcohol had been involved could become a public order issue.

Tim Otter felt that the advantages outweighed the disadvantages: "What you are trying to do is make this something the terrorists have got to get over and around; where every hurdle is a different height, width, shape and they get more difficult and sensitive – or different in approach. He might have protected himself against explosive trace, but not change to his skin. Those are the sorts of ways you look at it. It is all about intelligence, not just a ring of defences. What happened in the Athens Olympics was that

the intelligence and screening process started in the countries where the terrorists were likely to emanate from; as well as the start point of the flight or co-joined/connecting flights. It has to go out a long way. Yes, it is expensive, but it is the world we live in."

The devil with all these systems, for the foreseeable future, is the false alarm rate.

Biodetection is so prone to false alarms, especially in underground transit, that people have to resort to pulling samples and taking them to labs for analysis – hardly a 21st Century solution. While chemical detectors false alarm less frequently, it does happen – with cleaners mopping the floor with ammonia or chlorine-based bleach, for example – so the sensitivity tends to get turned way down. While this does solve the false alarm issue, it creates problems with agents which might not be explosively disseminated – without a key dissemination event but instead using a slow release from a canister, it might not reach the critical levels needed to set off the de-sensitised detector. Stand-off detectors, usually using FTIR, would seem to be one of the better ways of dealing with this problem, yet then you are into emergency management issues rather than interdiction and interception. X-ray devices are getting far better now at detecting both powder and liquids in containers – even concealed amounts – yet they still require the trained operator, meaning that the throughput times are slow and not conducive to large public events. The 2010 World Cup and the 2012 Olympics, in South Africa and the UK respectively, will provide interesting lessons for these events. China, which will host the 2008 Olympics, is such a police state that it will be difficult to get the read across points – though the technical issues will be interesting (if released). Of the CBRNE threats, rad, nuclear, explosive and chem are probably the easiest, in that order, to detect. Bio is a vastly different fish and it may well be easier to stockpile anti-virals, vaccines and other medical countermeasures rather than spending huge sums of money, failing, and then needing to get all the Med-CM anyway. This is not to say that biodetectors will not be capable by 2010; more that the unit-cost multiplied by the amount needed will be enough to bankrupt any state. The soccer World Cup is a case in point – Germany was staggered by the amount it needed to spend on security, and if FIFA decided to include biodetectors in the security requirement it would effectively put the competition beyond the means of any but the most financially robust nations – the power of the microbe!

