CBRNe World draws on the potential future of detectors: the US JPEO CBD's Holster concept

High noon

Inevitably, CBRN detection has taken a bit of a golf bag approach; if you want radiological detection then you need a rad detector; bio ditto. But chem? Well, did you want that CWA or TICs? While the technology itself might be different, depending on its job and amount of agents detected, it often means that the device is different too. While there are multi-device detectors out there, such as Airsense's GDA2, their cost tends to be larger than their component parts – due to the data fusion – so for anyone other than the richest nations this would not seem a particularly attractive avenue to follow. The US's Joint Program Executive Office for Chemical and Biological Defence (JPEO CBD) feel they are on the cusp of breaking through this conundrum – that multi-detector devices are too expensive, and that single detector devices are too numerous – with their holster concept.

3.10 to Yersinia Pesti

The holster concept has three broad layers. The first is perhaps the one best summed up by the phrase "holster", the second by "tricorder", the third by "integration". The holster concept is based in the realisation that there are elements common to every detector, regardless of what agent they detect. All detectors need a power source, a display and a way of communicating the device to third parties – as a minimum. This means that, instead of having to have (inevitably) a wide variety of batteries for the different shapes and requirements of the detector, there is just one that has a common housing. Display technology has also matured since the first Cam and AP2C came on the market; it need no longer be detector-specific as there is nothing to stop the information the detector has found being displayed in a number of different ways. Depending on the skill or role of the operator, it could be displayed allowing them to don protective gear, at the lowest level, or potentially to display information that would allow a guess at purity and concentration – if the role demanded it. Finally, the need to be able to hand all that data off to a station in one format will cut down on technical interoperability problems and the training of the base station operators.

The assassination of Yellow Jack by the coward Walter Reed

The second part, the tricorder is something that has been hankered after for years by anyone new to CBRN and familiar with Star Trek. The tricorder was the device that was whipped out after 'beaming' to a planet that told the intrepid crew what was harmful in the atmosphere. It has long been derided as fantasy, but the JPEO have a plan to bring a similar concept in the next 5-10 years. In many respects it is purely cost and the ability of the individual to lift the device that has held back the tricorder. Smiths Detection's NBCereberus has been offering C,B and R detection for the past three years, but power requirements and weight ensure that it cannot be manportable. Yet if the devices can be miniaturised and, the often promised, arrival of fuel cells happen then many of the limitations of a device this small can be ignored. Equally many of the different approaches to detection are complementary and one device that could offer orthogonal detection with sensor fusion across a range of technology would be better than having the individual detectors and being able to manually interpret what is being seen. It is inevitable that such a device would be more expensive that the sum of its parts, yet much of this is down to scale, if the US places an order in for the entirety of its civil and military CBRN forces then much of the world would be able to piggy back on that unit cost.

Two mules for Sister Sarin

If the tricorder is considered to be 'science fiction,' then the third, integrated, option is perhaps an even greater stretch of the imagination. In the post ten year period the idea would be to move away from having individual detectors at all, and to embed them into parts of the ensemble on general soldier's accoutrements. So a range of detectors would be inside of the common infantryman's personal weapon stock, with only the inlets showing. The

The holster concept is designed to initially be deployed from specialist vehicles ©CBRNe World

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information from these, and possibly other battlefield devices, such as thermal imaging (for bio agents) would be displayed on the future soldiers electronic monocle/visor for his use, and be shunted automatically off to the CBRN cell. Equally the clothes themselves would be able to both show levels of contamination and work towards neutralising the agent while on the cloth – presumably it wouldn't be too much to ask if nanoparticles also did some form of identification.

Decon your wagon

There is, of course, a range of challenges ahead for the concept. Currently the Brigade Combat Teams are undergoing the COTS sensor roll out until 2008 that make up the preliminary work before holster starts, and these should pose few problems. The holster concept, as is the case with everything brave and revolutionary, will inevitably not come out in the 2009-2013 period, at least not as a finished product. The European Impact Consortium tried to do something similar in their WP300 programme, where they linked four chemical agent detectors (Chempro, GID3, Raid-M and AP2C) with one rad detector (SSM1). Considering that three of the chemical agent detectors utilised some form of IMS (GID-3, Raid and Chempro), this could be seen as an easy 'win' for a holster concept. Unfortunately it might turn out to be a template for holster in too many ways, as WP300 was dogged with problems over intellectual property rights and being able to share sensitive information with a third party which might result in commercial advantages being given to competitors. It is one of those concerns that the military generally has difficulties with, and it may well be this relationship/information management that provides some abiding problems (though not necessarily unsolvable ones – money talks). There will also be a certain number of training issues; one of the easiest ways to reinforce training issues is simply to look at what you are doing, and the signifiers in the shape of the detector help the thought process (ie, I am using Cam; this is what I do with Cam). When all the detectors look the same, especially during times of stress, this thought process will be unavailable and without such short cuts training must necessarily be more stringent.

As for the tricorder, the one thing that becomes rapidly apparent is the ferocious training burden that it must carry. Mr Spock never made a mistake with the reading ("Sorry everyone, I should have said keep your helmets on… Everyone…?") or had difficulty with the reading. As Colonel Daniel Berry, as PM Bio detection, once remarked, "They never gave the tricorder to the stupidest person". The Enterprise only ever had one Spock; when he didn't beam down that capability stayed with him. It's fine having a mobile lab that fits onto the palm of your hand, but only if you are a lab technician. The tricorder cannot replace the individual detectors or the holster concept; it will have to be complementary as the training burden will be too intense – what good does a $5 million tricorder do if the only information it gives you is a go/no-go? There is also the problem that not everything is airborne; there will be a need for surface sampling as well as the enclosed bottles (that raman spectroscopy deals with), and these place ergonomic and power requirements on the system that a neat little tricorder would not be able to deal with.

Equally, the integrated sensors' main problem would seem to be the old issue of proliferation of sensors on the battlefield. They are all well and good when they work, but soldiers tend to use their rifles for reasons for which they are not intended – opening doors for example – and putting detectors, even ruggedised detectors, into the typical infantryman environment is going to make for a proliferation of malfunctioning detectors. This is also assuming that some of the general false alarms that happen with sensors – diesel for example – are weeded out. Individual detectors at least have the ability to be turned off, or left behind; soldiers having to bang the stock of their rifles because the alarm won't shut up and they are trying to storm a position – will not endear them to anyone.

Tabun Cassidy and the VX kid

All three stages of the holster concept will present technical challenges; these could not even be mentioned here for shortage of space and information. Yet, as usual, money and time can solve even the most thorny of these challenges. The one thing that science (until cloning becomes possible) cannot solve is the ability of the user to operate the device in the circumstances and ways that it is supposed to be, and it is the user interface that will cause the greatest challenge. There is no doubt, however, that detection, when narcotics and explosives are included, is becoming so difficult that it will eventually overcome any but the most astute, as the disciplines and detectors will be so different. There needs to be some device that can take the wide range of technologies and tactics, techniques and procedures (TTPs) that go with it and funnel them into fewer, easier to operate equipment. As usual, the US is the only country to be attempting such a device – to the Editor's knowledge – and deprived of a wider pool of lessons to draw from will inevitably make mistakes. The trick will be to ensure all these mistakes are technical ones, and ones that time will solve; it is the soft issues – training and costs – that will take effort.

The tricorder may stop being science fiction in the next five to ten years ©CBRNe World