Bruno Bellier, Director of the French Detecbio programme, DGA, and Lieutenant Colonel Marc Caudrillier, CBRN program officer from the French Joint Staff Office, tell Gwyn Winfield about the Fidgi and Samoa components of their biological detection programme – Detecbio

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GW: We mentioned in the Summer edition the contract award of the Detecbio programme to EADS, Bertin, NBC Sys and Proengin, but there has been very little detail made public about the two components – Samoa, the detection part, and Fidgi, the reagent section. Can fill in the gaps? What, for example, is the concept of operation (conops) of the system?

MC: This system was set up to deal with the threat to an air or logistic base, control post or strong points – not necessarily fixed points but those with a long notice to move. We contracted for a system with command post and "beacons" to survey an area and forces; we will use it for force protection and area surveillance, but the main concept is to survey areas. The first plan will be to use it as a central point and then deploy beacons around the command post – the beacons in this scenario will stay inside the protected area. We can use them as a force protection system, but in this case we will deploy the command post and the beacon will follow the unit we want to protect via long-range communication systems.

GW: Other similar projects, such as the UK's Integrated Sensor Management System (ISMS) and Canada's Vital Point Bio have stipulated an area to be protected. Is this the case with Detecbio? Is it for one large base or multiple smaller bases? How many beacons does it take to protect an area?

MC: It was one of the main difficulties for the system, as it depends on what granularity you want in area surveillance. We invented the system as a 20-beacon system, and with this it depends on what you want to detect and the granularity of the data. It is difficult, as I couldn't say we could survey 20 areas with one beacon each – that would be irrelevant. I cannot say

There is a desire to make the biocollection lighter in future iterations. ©Bertin

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that with five or six beacons we could do a command post, as it would depend on the concentration of the agent and the level of warning that you wanted...

GW: What is in a "beacon"? The contract is for an EADS lab, Proengin's biological detector Mab and Bertin's collector Coriolis, but what is present at each beacon? What is the correlation between Mab, Coriolis and lab?
BB: Detecbio overlaps two modes of action. The first is detect-to-warn – Mab triggering a collection with Coriolis and then taking a sample back to the lab. The other mode is systematic collection, where you have bio collectors working 24 hours a day, seven days a week, collecting samples that are analysed so you have systematic background, or so you can do reachback if something has happened but not triggered an alarm. So, if there are holes in the net, you can still get a retrospective alarm so you can have an analysis of your collectors every six hours.
Every time you have a Mab you have a collector, as the alarm will trigger a collection at the same place you have an alarm. So the beacon has comms to transmit the alarm instantaneously to the command control area, met sensors and a generator. Then you can also have other detectors plugged in: AP4CV, rad detectors and a bio collector. So there will be 20 beacons to the lab, and that is why size is a difficult question to answer, as it is dependent on the conditions and the operational context. You may wish to concentrate all your detectors on a sensitive area as it needs to be surveyed precisely, or maybe you want them 30km away, which the comms range will allow, and you will have a barrier of beacons to detect whether there is something coming from a located enemy. The system is quite versatile, as there is the central module with lab and command and control, 20 beacons and another four that are purely for constant bio collection. These will probably be closer to the sensitive survey parts, as that is where you will want to be sure you have not missed anything, or know whether a low-level bio event has happened.

GW: One of the driving forces behind placement will presumably be the individual that needs to go out and change the buffer for the sampler, or take petrol out to the generator. Who is going to do that? You can't always have a CBRN officer to hand, but equally if you don't, and you use a non-trained individual, then there is a concern the devices and their output might not be handled properly...
BB: Detecbio is a surveillance system, but a sample in Detecbio should be useful for chain of evidence, so the question is significant. It is designed to be used by dedicated people – to have 15 people serving the system for a six month period, including the lab and command post and logistics such as energy, refuelling, bio-collection, etc. Hopefully what we have done in terms of simulation has specified this number, and it seems to be feasible.

MC: These 15 people for the system will be provided by the Dragon Regiment (see *CBRNe World* Spring 2008) and the Air Force Intervention Team; it will only be specialists. The system will have 15 specialists even if some of them are only fulfilling logistics support roles.

GW: Having specialists, especially 15 for one system, puts quite a logistics constraint on deployment, as there is only going to be a certain distance they can cover in theatre in a specific time. So once lab personnel are deducted from that 15 you haven't got that many left, and that acts as a further constraint...
MC: I don't have an answer to this question today. If I give one beacon to each infantry unit, I could not give them specialists to take samples and do the logistics support, so what effect does that provide? I know I won't be able to split it into 20 teams, but is it relevant to split the system so I've given a system to an infantry company 100km away from the lab? What will they do with the samples? They cannot analyse them in the lab, as there is only one lab, so it will be a balance between elongation/coverage and the sensitivity you want to have. I cannot say I will do one beacon per company – we know that – but we can do force protection for a brigade, knowing their footprint. We have to be more accurate in the development of the system and perhaps in one year I could answer the question.

GW: Has the choice of highly trained specialists from the Dragon Regiment and Air Force meant you have been constrained in the choice of lab equipment – as opposed to deploying government scientists from the Centre d'Etude du Bouchet (CEB)?
MC: When we began on the system we wanted a fully automated system, so you could put an infantryman in there and he could do the job. We quickly realised that was not possible today. A typical platoon for this system would be an officer, four to six master sergeants and eight to ten soldiers. They need to be specialists but not doctors in biology. We began to organise such a platoon in the Dragon Regiment in 2007 : the lieutenant who will be in charge of the system is a doctor, but NCOs will all be specialists in biology, not doctors.

BB: The people who run the labs will be technicians, but skilled in biological techniques; they are not "just soldiers". The degree of automation in the system is the minimum necessary to be operated by non-experts, which does limit identification devices. They also have to be ruggedised and simple to be used by technical specialists who are non-experts. This also has an impact on the software: it has to be as simple as possible so the outputs have to be clear, as we won't have interpretation by the people running the lab. So you would have a three colour alarm: "red" is a confirmed alarm, "green" means everything is ok, and "orange" would mean you have a problem in analysis or an ambiguous result – but we need to constrain this so hardly any analysis gets orange. It is important in the conception of the lab. It is difficult for me to say anything else about the lab as it is still being designed by EADS and their partners, but we have gone back to former developments in terms of automation, as it is not realistic in terms of ruggedisation and it is not compatible with the response targets for the system.

GW: So presumably anything red would be an 80 per cent alarm, confident that an attack has happened, but still requiring unambiguous identification from a "gold standard" lab?
BB: Theoretically you reach the second level, that a confirmatory identification should be available by the equipment on their lab. We will use two different techniques: genetic analysis and immunology. There will be several targets on each agent that are in the perimeter of the system – but I can't say which or how many agents will be included as it is classified. The degree of confidence is sufficient for operational use, but we will keep duplicates for confirmatory analysis

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either in a local lab or to return to a metropolitan lab either for confirmation or evidence. Unambigous identification is not, however, a target of Detecbio.

MC: We will keep a second sample but we will not systematically analyse it. It is not acceptable to say to the commander: "Hey, stop the war, we need to send this sample off to our national laboratory!" What we want to do is to deliver confirmed information to our commander at the limit of Detecbio and not to wait.

GW: The mobile lab will be BSL3 equivalent, though not certified, but how mobile will it be? Will it be mobile like the Germfree lorry the Finnish MoD operate, or mobile in that it is in an ISO container?
MC: We tried to find a better way to specify this necessity of mobility and realised that by saying the maximum envelope of the system is that it can be delivered in an A400M (European military airlifter, between a C130J and a C17), then this becomes a strong specification to say it cannot exceed this volume. A second way to specify it is to say the system needs to deployed within six hours, which means you involve strong mobility. To be clear, the system will be constituted of two ISO containers and you can bring all the logistic support for the two containers in three trucks.

BB: The principal is that it is in ISO containers and not definitively mounted on a vehicle; it can operable while on the trucks, but not while moving. You stop, connect the systems (on the trucks or at ground) and then you can run it.

MC: We want it to be able to do the civilian mission – for it to be on the ground for weeks – but also able to do a recce mission, or force protection – to be able to detect and command on the trucks. We specified that we wanted to reach Colpro level two on the trucks and four on the ground.

GW: This announcement stated this was for Samoa version one. What is the concept for Samoa 2 – or is that too far in the future?
MC: There is a version two further down on the tracks. Currently we are strongly depending on state-of-the-art, so in 2017 there will be new technology that will be very interesting. We know we will need a version two, and currently we scheduled funds for a version two after 2014. Another fact is that we currently have a civilian and force protection system, and perhaps version two on the concept map will be for recce, or something like that. Currently we don't know what will be exactly Detecbio V2.

BB: It is also closely connected with the BioEDEP (See *CBRNe World* Spring 2007) project, as some of the output of that could be input for our developments on version two. But we also have national reflections, and currently we are on surveillance concept for V1, so V2 might increase the concept of 'recce'. We are currently upgrading the recce teams, with the Coriolis and KIM, for portable identification, and there has to be an increase in mobility – Detecbio is not a mobile system – it can't operate on the move – and that would be expected from V2. There are also possibilities on identification, which is currently done through a lab. While future development might allow first-generation identification on the beacons with a resolvable level of ruggedisation and confidence, we don't think the state-of-the-art can provide satisfactory performance at this level. So V2 could be very different from V1; it will be not only an improvement of the lab but also an important change of concept. It might include some parts of V1 and then a versatile architecture; you could have a modular concept. It also depends on the evolution of military and civilian usage; if we stay on a purely military development path then it has one architecture, but if the mission changes and takes into account a larger proportion of civilian use then there are other advantages that can be taken advantage of. KIM, though, is not part of Detecbio – it is for the SIBCRA teams. When we launched that project we wanted some MOTS technology quickly in the field, though it needed to be ruggedised and optimised.

GW: Fidgi is perhaps the more innovative part of the programme, as the creation of reagents is not usually included in such a project. How does that part work – is it based on "just in time" or a contract for X,000 a year? How are the two parts connected?
BB – That is a question that we thought about a lot when designing Fidgi. We want to acquire the capacity for production, and that is the essential part – being able to acquire a considerable amount of reagents on a short-term basis. For the moment it will only be for a priority list, but with the chain of production and supply, in time you can imagine all the reagents for additional agents. In terms of Detecbio, it is a mix of the two possibilities: we will have an annual basis of a certain amount – the minimum amount necessary to run the production line, which is important for its performance – and there will also be a supplementary amount for missions at short notice. The contract is a fixed fee for the annual basis and a supplementary price for the extra. The annual basis has been calculated on operational use of the system, number of months of operation, training etc.

GW: Are you buying a capability, or a specific? For example, are you able to change the your priority list so they constitute different pathogens as the mission requires it, or does it have to be the ones you first stipulated?
BB: At the moment we are on a fixed list of reagents that we might use – top priority agents. There is the possibility within the reagent kit that you can swap one for another, but we will need to do specific developments if operational priorities evolve during the life of the system. Currently we have a top priority list and that is what the contract is fixed on.

GW: In terms of the service level of the contract, how are they to provide them to you? Do you have some form of Contractors on Deployed Operations (CONDO) agreement so they can supply you in the field?
BB: The production line will be in France and the contractor has to provide the desired amount of kits in France. It is then the responsibility of the forces to transport them to the field – there will be no intervention of the contractor after handover unless there is some problem with the kits' performance. The kits must be designed to be compatible with the transport phase, and there must be resistant to +4 degrees, so they must be refrigerated – it is not ambient conditions – which is comparable to other medical supplies. They must be able to deliver them at short notice, so they would have to deliver them from the facility to the base in a few hours and ready for operation – and refilling stock would be on about a monthly basis.