

## *Forensic Canine White Papers*

A proof of concept foundational guide to the application of Forensic Canines within law enforcement investigations, research and training development.

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## *Forensic Canine White Paper Introduction*

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I am a Professor at Staffordshire University, Criminal Justice and Forensic Science, School of Law, Policing and Forensics. I am the lead for the integration of canine detection into courses offered by the university, associated research, and publication of relevant and appropriate material.

Martin Grime is a very experienced and recognised full time Subject Matter Expert (SME) utilising detection canines in support of homicide and abduction investigations. MG has joined our team as an Honorary Research Fellow to assist in the provision of Continuing Professional Development (CPD) and Work Based Learning (WBL) at the national, regional and local level with partners and clients. To develop and maintain the research culture within Forensic and Crime Sciences, to teach forensic application of canine olfactory detection to both undergraduate and postgraduate students, and to provide support to the various focus groups with which we are associated.

There has for some years been a recognised need for published subject material that collates and summarises relevant experience and conceptual scientific data sufficient for the understanding of foundational scientific principles and mission requirements of Forensic Detection Canines.

Staffordshire University support this series of White Papers that provide the reader with Martins views, professional experience, and understanding of the included and acknowledged 'proof of concept' scientific principles pertaining to the canine detection of target odours concerned in the investigation of homicide, suspected homicide and serious offences against the person. The White Papers provide the Learning Framework required for attaining essential skills and understanding of scientific principles that are considered pivotal to the effective Executive Management of canine programs, Search Co-Ordination and planning, Forensic Recovery of evidence, Intelligence Gathering, and Scientific Research.

The white papers are not a definitive scientific or canine training guide. It is accepted that there are many excellent canine trainers and practitioners within this specialist field.

Agency Executive Management may support the application of the information contained in these documents to develop appropriate training regimes' that provide more mission effective and credible canine detection resources than are presently available. This will be achieved through the application of scientific principles and the training of resources to specific mission proficiency requirements identified through consumer requirements.

The white papers will hopefully inspire a gravitation towards improved collaboration, investment in appropriate research, and to better utilise those with expert knowledge and experience so as to ensure there is appropriate sharing of experience and information to support effective resilience policy within the industry.

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# *The Application of Forensic Canines Within Homicide and Abduction Cases*

Foundational Learning Material derived from practitioner experience and  
supportive scientific Proof of Concept.

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## 1.0 **INTRODUCTION**

In 2005 it was realised that detection canines may be of assistance to the law enforcement investigation of homicide and allegations of abduction where the pace of investigations is of paramount importance. Innovative method and 'out of the box thinking' by the UK National Search Manager introduced Human Scent Trailing, Human Blood Detection and Victim Recovery Dogs (now collectively designated as *Forensic Canines*) within critical case investigations to ascertain whether they could provide case intelligence through retracing suspect and victims routes, detection of direct and indirect residual human decomposition odour, and trace evidence of human blood that cannot be detected through traditional means.

Our preliminary trials tended to support this was a viable program with a number of successes being recorded where canine responses supporting the death of a victim have been substantiated by the victim being confirmed as deceased, or to this date not being found alive. These resources would however require scientific development and improvement to raise confidence and credibility within the industry.

Since then we have conducted research and developed doctrine and methodology based upon published scientific proof of concept. Our success has continued, and the use of this type of detection has been included within judicial process where prosecutors have thought it appropriate within the laws of the country or State.

The use of this type of detection canine will *always* require interpretation of responses as to the weight of case intelligence and corroboration via scientific means or anecdotal witness evidence. It will always also be a catalyst for conjecture where persons not suitably qualified or in full possession of the facts of the case make uninformed judgements after the fact.

The public should be aware that detection canine responses do not confirm criminal behaviour or identify suspects. They merely identify possible sources of odour transference or trace evidence, and assist investigators develop intelligence of possible scenarios concerning suspected homicide and abduction. This is completed as early as is possible within the investigative stages. It is incumbent upon investigators to establish the facts and prosecutors to apply the law.



The author recognises the skills of canine detection trainers and handlers, search managers, and executive management. This document has been prepared to cascade practitioner experience and foundational learning from an association between practitioner and research institute. It provides doctrine that may be considered supportive to the production of mission impactful, proficient, and effective Forensic Detection canine teams within a Value for Money Framework. It forms the foundation for the initiation, development, and management, of mission impactful canine programs, whilst providing supportive 'proof of concept' for the correct interpretation of canine responses, for the benefit of those in the process of developing these resources through research, and to assist in the provision of resilience within the industry. It may be informative to graduate and post graduate students as a foundation from which they may identify appropriate project subjects, and research topics in support of development and improvement.

## **2.0 BACKGROUND**

The domesticated canine is a subspecies of wild canids. The domestic canine has been one of the most widely kept working and companion animals in human history. Thousands of years of natural selection and survival of the canine has been dependent upon its success to feed itself and other pack members. The domesticated canine retains its scavenger instinct as a natural food source behaviour.

Because of this innate ability to follow the scent trail of prey and locate the odours of decomposing flesh, bone and blood, the canine provides us with a very highly tuned olfactory detector search system that if properly trained and validated may be applied within the investigation of homicide and serious offences against the person.

Through combining the use of natural abilities paired with discriminatory behaviour shaping and imprinting methodology, a properly trained canine has proven to be a formative search resource to locate human decomposition odour and blood spillage in any context.

Whereas detection canines operated within many different strategic missions are tasked to detect odours that would not naturally be considered as attractors, Forensic Canines are tasked to locate odour sources that are genetically imprinted. We merely have to condition the canine to provide an obvious response

when it detects human source odours. This is achieved through generalisation and discrimination.

Throughout the world, many deceased missing persons have been recovered following detection by pet dogs being walked by their owners. Law enforcement human remains detection canines, differ from pet dogs in that they are trained to **search** (hunt) specifically for human decomposition odour and give a conditioned response (bark, sit, etc.) which is subsequently interpreted by the handler.

Historically, canines trained within the UK to locate human decomposition odour have been deployed within search and rescue and law enforcement scenarios, within intelligence led operational searches, to locate human remains on land and in water within both surface and sub – surface deposition contexts. These resources are traditionally trained with the inclusion of pig and pork surrogate odours. They cannot therefore be categorised as Human Remains Detection Dogs.

It is only in recent years that dogs trained specifically to detect human decomposition odour have been utilised within search strategies to locate human remains and human decomposition odour that is the result of direct or indirect contact transference in the absence of recoverable human remains or blood.

We continue the development of scientifically-based training systems and certification processes involving blind and double-blind testing to demonstrate that all canine resources are fit for purpose, proficient in search, and proficient in the recognition and discrimination of the human decomposition odour. As this system of development progresses, the content of the following document will be amended.

Detection canines should be trained and validated to specific mission requirements and tasked within a given context to the limitations of proven proficiency.

Careful consideration should be given before deploying other types of detection canines within intelligence led homicide or abduction investigations. Search and Rescue teams for example are trained to locate live missing persons. It should always be considered that upon death live human odour continues to be a viable and detectable source for some time with these resources likely to locate recently deceased missing persons as a consequence. They are unlikely however to locate

trace levels of human decomposition odour or trace amounts of human blood.

Those whose responsibility it is to plan and execute search missions should take time to research the proficiency and effectiveness of canine resources prior to inclusion in mission deployment. Due diligence at an early stage will increase the probability of success whilst avoiding risk of failure and embarrassment.

In recent years, canine olfactory detection of scents and odours has been exploited within many contexts: protecting our National Borders and our military personnel in areas of conflict, securing public safety from foreign and domestic terrorist threat, in the recovery of contraband, and to assist in the early diagnosis of medical conditions. To date, despite the obvious advantages in the provision of intelligence and securing of evidence in relation to Major Crime against the person, detection canines have not been co-opted within the forensic community.

Detection Canines are a qualitative olfactory headspace sampling search and screening resource, similar in operation to electronic devices in that they provide information to humans in relation as to 'where to look' for evidence, contraband, and other tangible material of interest. They are not considered quantitative, and responses require corroboration, either instrumentally, visually or by anecdotal witness evidence. Detection canine teams are a neutral, unbiased, detection resource. Positive responses to target odour may, or may not, be case related as the mission related substances occur naturally within the environment.

Human detection of evidence in relation to crime is achieved through a process that is predominantly visual, which may be enhanced through the application of enhancers. Canine detection of evidence is predominantly achieved through the process of olfaction, imprinting of appropriate target odours and a behavioural conditioned response. The canine response identifies locations where evidence may exist that is undetectable to humans due to placement (hidden) or size (invisible to the human eye). It is incumbent upon humans to correctly interpret canine responses and apply such systems as are appropriate to fully investigate.

The deployment of scientifically supported properly trained Forensic Canine teams, with proven proficiency within relevant odour discrimination processes and appropriate operational detection scenario contexts provide three possible outcomes. They may locate substantive evidence, provide operationally

significant intelligence to investigators of serious crime, or produce a negative result.

Negative searches are as impactful as those that are positive, they provide intelligence to investigators so as to assist in the focusing of resources elsewhere in quick time.

### **3.0 MISSION STATEMENT**

*It is the mission of Forensic Detection canines to provide an olfactory detection layer of search capability in support of law enforcement, and other appropriate agencies, for the detection of investigative mission associated target substances within all expected operational contexts, environments, and climates.*

*In addition, detection of trace evidence, and residual odour may be required for investigative intelligence purposes and provision of reasonable suspicion or probable cause.*

### **4.0 EXECUTIVE SUMMARY – FORENSIC CANINE MISSION CAPABILITY**

- **Human Remains Detection Dogs (HRDD):** Sometimes referred to as a Victim Recovery Dog (VRD), or Cadaver Dog, will ***specifically*** discriminate, and detect, human deceased victims, inclusive of dismembered parts, in all environments / contexts, on the surface, sub-surface, on land, and in water. The dogs should be trained to generalise the spectrum of decomposition process to allow for the investigation of recent death to cold case historical remains. This type of detection dog may detect human blood as a sub-set of human decomposition.
  - Canines trained with the inclusion of animal remains (pig, pork) cannot be referred to as HRDD
- **Human Blood Detection Dogs (HBDD):** Will discriminate, and detect, ***specifically*** human blood, that would not normally be located through visual examination due to size or placement. Should not respond to human decomposition. Training and proficiency validation should ensure that the canine is generalised to human blood odour specifically.
- **Human Decomposition Trace Evidence Detection Dog (HDTEDD):** Will discriminate, and detect, ***specifically*** human decomposition odour, to trace proportions, brought about by direct or indirect transference

from source. Training and proficiency testing should ensure that the canine is generalised to human decomposition odour. This role may be included within HRDD providing the canines olfactory detection threshold is so low as to be considered mission appropriate.

- **Human Scent Evidence Team (HSET):** Should *specifically* discriminate personal live human odour, confirm the presence of the target person at a specific location, and correctly identify an odour trail of an individual despite the presence of distractor trails and accurately follow it to its conclusion.
- *When deploying HSET and HRD canine resources it must be taken into consideration that there will be a crossover of odours, as the decomposition process progresses, and the live human odour diminishes. Both assets may detect recently deceased victims. Or, HSET resources will follow the live odour trail of a person to a point it encounters human decomposition odour. Search strategists should in these cases deploy HRD assets at the point the HSET trail stops, particularly if near water.*
- **Scientific Research Dog (SRD):** Scientific research dogs that operate independently from the handler, should be trained to generalise and discriminate target odours / scents, pertinent to the research being conducted. They should be proficient within the testing regimen, with statistical percentage accuracy in excess of 98 %, and should operate to such proficiency within a familiar context containing positive, negative and blank controls, inclusive of odour distractors if present. SRD's may be utilised within investigative strategy to provide confirmation of operational context canine responses

All the above should be operated within intelligence led, scientifically supported investigative strategy, or research policy, encompassing best practice guidelines as dictated by agreed doctrine, policy and Standard Operating Procedures whilst incorporating Value for Money principles. Forensic Canine capability should be customer driven to strategic mission expectancies. All the above should be independently validated to scientific 'proof of concept' and mission dictated policy through a process of continual assessment. That process should include odour generalisation and discrimination testing in a regimen of blind and double-blind

testing, inclusive of positive, negative and blank controls inclusive of odour distractors if appropriate.

Canine search teams may be required to be blind to the correct outcome or to such intelligence that may influence the outcome. Therefore, all handler / canine teams should be so proficient as to be able to operate blind or double blind in training, operationally, and when proficiency tested. There will be occasions where the handler should be aware of intelligence so as to formulate the best possible solution. This however may be avoided by ensuring Forensic Canine SME consultancy is acquired in the planning and mission execution stages.

Forensic canine teams deployed within an intelligence led search mission, should therefore, where possible, be supervised by a Forensic Canine Search Expert. This will provide consultancy opportunities for investigators and search supervisors whilst also providing support to canine teams.

The above described resources assist in the recovery of evidence through forensic examination that would not normally be located by other means. Forensic search methodology being mainly visual, canine olfactory investigation may lead crime scene investigators to indiscernible evidence. They also provide case intelligence that may be substantiated through investigative means. Corroboration is required to substantiate canine responses, but few understand that this may be achieved through anecdotal witness evidence.

It is incumbent upon the end-user, usually search managers and investigators, to ensure that only canine teams that are validated to expected mission requirements are deployed to assist in case work. Validation is inclusive of 'bracketing' proficiency testing which affords an opportunity for the end user to observe first-hand the effectiveness of the canine teams.

*'Bracketing' refers to validation tests completed immediately prior to and upon completion of mission deployment. Thereby affording the end user confidence in resource mission effectiveness'.*

It is also incumbent upon investigators and prosecuting counsel to provide corroborative evidence of canine responses where no tangible material is located at the material time. This may be achieved through forensic analytical data or anecdotal witness evidence. Forensic Canine SME's will, through consultancy,

provide expert interpretation and opinion regarding canine responses.

Management and operatives should recognise that canine responses may be admitted within the judicial system, but weight of impact is directly proportionate to odour discrimination testing, training, operational experience, mission impact, proficiency testing, deployment protocols, and scientific proof of concept support.

## **5.0 SEARCH**

Canine olfactory mission objectives of search within both military and law enforcement are two-fold. Defensively to protect and offensively to secure evidence and intelligence.

In relation to Forensic investigation, detection canines may provide an additional layer of detection through olfaction.

Forensic canine investigation follows the roadmap of:

- Interpretation of reported crime scenario and available intelligence to establish the commission of a crime.
- Deploy resources to gather intelligence relating to suspects and potential location of evidence
- Establish an intelligence supported crime scenario
- **Search** to locate and protect crime scene, inclusive of primary and secondary deposition sites
- Search for and recover weapons, potential evidence of crime, and associated items
- Process recovered potential evidence
- Review
- Re-deploy search resources as required

To provide a high assurity of finding, and therefore increasing mission impact, search mission planning **MUST** be intelligence led where the case related intelligence is applied to the tactical deployment of specific resources. Historically, speculative searching is reliant upon guess work and 'gut feelings' and is generally ineffective and inefficient. Cursory searches are historically ineffective and tend to have a detrimental effect on future deployments as this type of search rarely locates the specified target and provides a tendency for planners to assume that

the result is a true negative and is not therefore revisited. In some cases, 'blind luck' provides success, this tends to falsely support tactics and the proficiency of resources. It has been seen in past cases that prioritising intelligence gathering, and strategic planning has increased success whilst decreasing effort on the ground.

It is often seen that large numbers of searchers are deployed in the early stages of a search mission, some of which are not sufficiently qualified or skilled to complete the mission. They tend to destroy ground sign and flood the target area with vast amounts of odour, are rarely successful, and complicate the mission for more effective resources.

In relation to the deployment of Forensic Canine resources, the strategic mission is to locate and recover missing persons, locate evidence in relation to serious crimes against the person and to provide case intelligence that may assist investigators in progressing towards the arrest and successful prosecution of offenders.

Forensic Canine resources may be deployed:

- In support of ground searchers within an intelligence led strategy to locate sub-surface clandestine graves. (HRDD)
- In support of electronic detection equipment to locate human remains deposited in water courses. (HRDD)
- To question the previous presence of specific individuals at intelligence identified locations. (HSET))
- To follow the scent trail of specific individuals, suspects, witnesses and victims. (HSET)
- To conduct intelligence led searches to locate primary, secondary and tertiary human decomposition odour transference. (HDTEDD)
- In the systematic screening of clothing, property, and vehicles to identify items of intelligence interest and secure forensic evidence. (HRDD, HDTEDD, HBDD)
- Within a laboratory context to screen samples of odour recovered via Scent Transference Unit (STU) by forensic scientists at crime scenes. (HRDD)
- Within a laboratory type context to screen items of clothing or property for human blood. (HBDD)



All deployments and mission tasks should be intelligence led with all canine resources being validated to such standards required to complete expected mission expectancies. Speculative and unorganised searches must be avoided, they are a drain on resources and experience shows that they are detrimental to further investigative strategy. Intelligence may identify specific tasks to be completed or a scenario from which specific tasks may be allocated.

Intelligence based searching will ensure that resources are deployed:

- **S** – specifically, tasked within a strategic mission plan
- **M** - measurable, assurity rating
- **A** - agreed strategy, predetermined actions in relation to canine response
- **R** – realistic mission, deployed within a strategic intelligence led plan within validated parameters
- **T** - timely, must be deployed within a resource layered strategy as soon as is practicable and appropriate.

The aims of intelligence led canine searches are to search once only, systematically, and meticulously whilst applying mission proven effective resources to conclusion.

Having applied the above, there should be no requirement to revisit search locations unless dictated by newly acquired intelligence. Confidence in the outcome is always proportionate to the proficiency and experience of applied resources. This relates to the handler and detection canine as a team.

The success of a search is not judged on 'finding', it is judged on the percentage assurity that the target is or is not present. Negative searches are as impactive to casework as positive searches if the search was conducted within the guidelines of this paper.

Canine search is a science related skill for which the importance is generally underappreciated and overshadowed by quantitative instruments and equipment. In modern times DNA has become the benchmark for the presumption of involvement of suspects in crime. DNA profiles may be recovered from the smallest of forensic samples resulting in a greater responsibility for the recovery of crime related evidence by law enforcement agencies. Forensic Canine resources have a much greater potential to locate DNA samples within a large complex

operational context than any other search instrument or procedure.

In our quest for the recovery of the smallest of forensic evidence samples it has been seen that a bi-product of odour and search imprinting is the securing of case intelligence through the detection of trace levels of transferred odour, either primarily from source, secondary from contact with primary source or tertiary thereafter.

It is incumbent therefore that policy and mission statements are inclusive of the requirement for canine resources that are both proficient and effective, not only in the detection of recoverable material, but also in the detection of odour transference where no tangible material is recoverable.

## 5.1 Consequence

In the application of search there are consequences to both success and failure.

SUCCESS	FAILURE
Securing of evidence	Vital evidence lost
Prosecution of offenders	Offenders remain at large Risk of reoffending
Closure for relatives	More difficult to deal with loss
Uphold law and order	Offenders remain unpunished
Proof of Concept	Credibility of resources at risk
Provides opportunities for research	Research opportunities lost
Value for Money	Financial resources become strained
Public confidence	Public confidence decreases Opens the door for superstition and conspiracy theory
Silences one's critics	Encourages criticism

As can be seen from the above, *search competence* is deserving of our utmost attention, as it is through this skill that evidence is recovered in the pursuit of offenders. Success is dependent upon investment, not only monetary but in research and the development of people's skills through learning and the subsequent increase in effectiveness of resources.

If someone is resistant to change and does not support research and development, they may be suppressing improvement and increased capability of offender identification.

## 5.2 Search Mission Categorisation

In modern times, canine teams that are operated to locate contraband, and other types of target odour, tend to be collectively referred to as '*detection*' canines. Detection canines are operated within search missions within which there are two distinct roles.

- Olfactory screening tests
  - Systematic screening (sniff testing) of specific targets in a known context.
- Search (hunt)
  - Systematic search of an unknown context 'hunting' for the target odour.

When operated within a '*screening*' role, canines are deployed on the leash to specifically detect target odour through olfactory headspace sampling (sniff tests) within a specific context. For example: when deployed in the screening of known objects or human subjects, airport lounge or baggage claim screening, or person screening at security entry points to prisons. This requires specific 'sniff testing' and providing 'yes' or 'no' responses to the presence of mission identified target odours. Handler influence is minimal.

The canine olfactory headspace sampling of potential targets (*screening*) is of great strategic importance in the protection of our borders, but we must not lose sight of the canine's natural drive and expertise in hunting (*search*) of which there are many examples: Fox hounds pursue prey by following odour trails, bloodhounds follow live human odour trails in pursuit of escaped convicts and may follow the individual odour trails of missing persons. Narcotic detection canines will search premises and transportation. Explosive dogs will conduct route searches to locate Improvised Explosive Devices (IED's) to protect the military in areas of conflict.

Therefore, mission categorisation is very important. It may be appropriate to operate canines within a single 'detection' role, screening articles for example, or within a 'search' role to satisfy more complex missions. It may be equally appropriate to operate canines within both roles. Canines are adaptable and may be operated in many contexts providing they are trained and experienced as necessary to accomplish such mission tasking. Detection canines must however be validated to perform the task to which it is being deployed and within the expected context.

When considering which category of detection canine should be applied within an intelligence led investigation, the end user should consult with an appropriately qualified Subject Matter Expert for guidance.

Value for Money dictates that canine teams should be mission proficient and effective. Correct analysis of team training needs within specific roles will ensure that handler and canine skills are appropriate to mission requirements.

To satisfy Value for Money, proficiency, and mission effectiveness it is essential that the customer (agency executive management) completes due diligence to ensure that the services to be supplied will satisfy mission impact expectancies. It should not be taken on face value. The poor standard of some canine resources evident within the industry is directly attributable to customers not being aware of the standard that must be achieved to obtain a significant impact upon the identified mission. The effectiveness of detection canines will only improve and be maintained through the insistence of mission appropriate skills and robust validation criteria by executive management.

### **5.3 Layering of Search Assets**

There is no one 'point of the spear' search resource. Search should be planned to encompass a layering technique where multiple assets are applied within the mission tasking. Each search mission should be considered in isolation. Search strategy should be of bespoke design and appropriate to case intelligence. Layering of search assets will tend to increase confidence that the target is or is not present and reduce the risk of digging empty holes. For example: When searching for a clandestine grave in the first instance a detection canine may provide a positive response, Ground Penetrating Radar (GPR) is then deployed which identifies an appropriate anomaly, headspace samples are then acquired that are analysed and comparison made with catalogued positive sample VOC signatures. At this point the ground would then be investigated further by forensic archaeology methodology with a high degree of confidence in recovery.

The task of search is to locate all evidence relating to the mission. The mission statement for any search must include the ideal that it will continue until 100% assurance is achieved and that all potential targets are recovered or that the defined area is clear. Only appropriate assets should be deployed, they should be pertinent to mission, proficient and effective within mission context.

Search is a **team** task from the very first intelligence source through to outcome. All searches should be tasked to a mission supervisor who will take overall ownership and responsibility.

Layering of search resources allows for the secondary priority of research and development by providing data prior to recovery that may be interpreted upon the outcome.

There are many resources available to investigators and search managers that may be deployed within an intelligence led operation. No one resource should be considered as the 'tip of the spear'.

FORENSIC	GEOFORENSIC	SEARCH OPERATIVE
Fingerprints	Hydrology	Rummage search
Blood	Isotope analysis	Line searching
Trace evidence	Geophysics	Route searching
Weapons	Palaeontology	Venue search
DNA	Botany	Restricted access screening
Toxicology	Geological profiling	Hazardous materials
Substance analysis	Behavioural profiling	Detection Instruments
<b>Canine detection</b>	Offender profiling	<b>Canine detection</b>
	Odour profiling	
	Conceptual modelling	
	Thermal imaging	
	<b>Canine detection</b>	

#### 5.4 Lawful authority to Search

The lawful authority to search in many countries is based upon: consent, legal powers under warrant, from common law following arrest, on reasonable suspicion, or probable cause of commission of crime. Searches may be legally contested, and the resultant detection and recovery of contraband challenged. Therefore, it is a prerequisite in the planning and execution of searches not only to ensure that searches are lawful, but that any such operations are performed by validated proficient and effective resources.

In some cases, the non-contact canine screening of items in a public place may provide responses which lawfully provide reasonable suspicion or probable cause sufficient to allow further investigative searches. Screening may also be applied as a condition of entry to premises, for example: prison visitors or patrons entering a nightclub.

In countries in which 'stop and search' powers exist it is reasonable to consider the application of canine screening tactics to avoid the necessity for physical human contact.

When deployed internationally local laws apply, unless there is an agreement concerning sovereign territory. For example: military bases, diplomatic property etc. It may be necessary to take these facts into consideration and adjust methodology and training to account for religious beliefs and customs so as not to offend.

## **5.5 Search Method**

Forensic Canine resources are trained and validated to mission expected proficiency within the following strategic methods:

- Route search
- The search of a defined path, such as a railway, roadway or footpath.
- Area search
  - Land
    - Area of land the parameters of which are defined by intelligence and behavioural, physical, profile.
  - Water
    - Area of still water, or flowing water courses the parameters of which will be defined by intelligence, context, environment, weather, flow and depth.
    - May be conducted from the bank side or from a boat.
- Building search
  - Includes all indoor contexts.
- Venue search
  - Defined venue which may be inclusive of all methods.
- Vehicle search
  - At the scene (non -blind) specific vehicle or vehicles of interest.
  - Upon recovery, line up screening (Blind or double blind)
- Screening
  - Persons
  - Items
  - Vehicles

- Live human scent trailing (HSET)
  - Target person location checks (HSET)

## **5.6 Competence in Search**

There are differing levels of search competence within military, law enforcement and volunteer search. Competence is reliant, as most other skills, upon mission focused canine training and development of the skills of canine operatives.

There are many electronic search instruments in addition to canine olfactory resources available to assist in search. It is the skills of the operatives that dictate mission effectiveness not merely the proficiency of the methodology.

Training needs and method delivery are directly proportionate to the difficulty of detection, these requirements are dictated by the mission statement in relation to competency of assets and expected outcomes.

Canine program development should encompass the following doctrine to satisfy mission competence:

- Mission statement based upon end user requirements and agency policy
- Identified mission requirements
  - Dictates method and odour detection thresholds
- Validation criteria
  - Annual
  - Mission bracketing
  - Continual assessment of capability
- Training needs analysis
  - Handler
  - Canine
- Comprehensive professional development manual
- Operational deployment manual
- Record keeping requirements and protocols
- Value for Money criteria and review policy
- Mission competency review policy
- Resilience policy

Search success is dependent upon 'team' effort and collective competence. Teams may be made up from numerous agencies with varying skills and detection



capability. Search supervision, planning and briefing detail is therefore paramount.

'Proof of concept' must be applied to all resources which must be proficient and mission effective with a history of success. Canine teams should be led and supported by appropriately qualified SME's who may accurately interpret blind and double-blind canine search responses and integrate with overall search managers.

'Search' is a science related skill, a fact that is not always appreciated. In modern times DNA has become the benchmark for the presumption of involvement of suspects in crime. DNA profiles may be recovered from the smallest of forensic samples resulting in a greater responsibility for the recovery of crime related evidence by law enforcement agencies. Search techniques, equipment and personnel are becoming more and more relevant within modern society. Not only in the fight against terrorism but also within law enforcement, border and customs control and medical applications. Standards must be improved and maintained through investment in research, training and development of personal skills. It is now appropriate for forensic experts to realise the potential of the canine olfactory detection of trace evidence that cannot be recovered by conventional means due to its size (micro) or its placement (hidden from view).

## **5.7 Search planning**

To provide a high assurity of finding, search planning **MUST** be formulated from the available intelligence. Always bear in mind the fluidity of casework in the early stages as intelligence becomes available. Experientially it has a far greater impact upon investigations to deploy detection canines to assist in the gathering of intelligence in the early stages and to then plan larger area searches if required at a later time. This has the potential for investigators to be knowledgeable of possible offence scenarios to put to witnesses or suspects and secure admissions inclusive of locations of disposed evidence and deposition sites at a much earlier stage in the investigation.

Historically, speculative searches reliant upon guess work and 'gut feelings' are generally inefficient and ineffective. Cursory searches are historically ineffective and tend to have a detrimental effect on future deployments. In some cases, 'blind luck' provides a success. This tends to falsely support tactics and the

proficiency of resources.

Investigators should be aware of the foundational proof of concept of Forensic canines, their capabilities, and when and where they may be deployed within the complexities of investigation. They may then consult with Forensic Canine SME's directly for advice as to deployment strategy.

Modern forensic crime scene examination is visually based and incorporates techniques of enhancement. Investigators should be aware that canine olfactory examination adds a sensory level of detection of evidence that is not available visually. Visual screening of a crime scene for trace evidence is a time consuming and labour-intensive method of detection. In the event there may be more than one location of interest to investigators it may be considered appropriate to deploy a Forensic Detection canine in the first instance to identify a location as a possible crime scene. It may also be appropriate to deploy Forensic Canine teams to crime scenes upon completion of CSI investigation to increase assurity.

Forensic Canine handlers will plan searches with the intention to maximise mission impact through provision of high search assurity.

- They should be aware of available intelligence. Unless working double blind.
- The canine resources should perform bracketing validation prior to and upon conclusion of deployment.
- They must be aware of the search parameters, context and environment.
- They should consider environmental and climatic conditions:
  - Precipitation
  - Wind strength and direction
  - Ground water
  - Barometric pressure
  - Humidity
  - Ambient temperature
  - Digability of the ground
- A Health and Safety risk assessment should be completed inclusive of potential dangers from wildlife and physical features.

## 5.8 **Deployment Planning**

In the initial planning stages of search planning relevant and appropriate Subject Matter Experts should be consulted so as to prepare a logical and layered approach of resources, always considering the impact of one resource upon the effectiveness of the next. Detection canines tend to be non-destructive and will not adversely influence other search resources. However, heavy human influence within a search context may make canine problem solving more challenging, for example when deploying human scent trailing dogs.

## 5.9 **Execution of Search Plan**

- In all instances the search plan should be formulated based upon available intelligence and offender profiling.
  - Search areas should be prioritised upon available intelligence.
- Search resources should be applied in an order appropriate to usage and expectation.
  - From Macro to Micro
  - From non-destructive to destructive

***Value for Money may be a consideration but should not dictate search policy.***

- Full briefings should be provided prior to deployment of resources unless expecting searchers to operate double blind to the possible outcome.
- Thereafter team leaders will cascade information to the Search co-ordinator.
- Anomalies and detection resource responses will be investigated by forensic teams within an agreed forensic strategy.
- No ground intrusion until high confidence of target presence is achieved.
  - Speculative ground intrusion will adversely affect outcome and hamper further search.
- Plan will be executed to conclusion
- Debrief
- Reporting action
- Review

## **5.10 Value for money**

Present day financial budget restrictions increase a greater requirement for the consideration of providing search resources that offer greater value for money.

If deployed within a robust Value for Money Framework, detection canines are probably one of the more cost-effective search solutions. They are generally much less expensive to acquire, are easily transportable, operate in any context or environment, and cover more ground faster than any other search resource.

Value for money in relation to detection canines' rests entirely upon proficiency and mission impact. End users should realise that detection canines improve through experiential learning. The more they are used the better they become.

## **6.0 SEARCH STRATEGY**

For all missions, it is imperative that the strategy of search is to apply the appropriate proficient and effective resources, at a location dictated by intelligence, in the correct sequence, and in a timely fashion to maximise the percentage likelihood of achieving the mission. Always bear in mind that the mission is to conduct searches to conclusion to ascertain with a high degree of confidence that the mission target is present or not.

Canine resources should only be deployed as part of an agreed strategy where their deployment will enhance the likelihood of discovery. They should never be deployed merely because of their existence. Canine resources may not be appropriate due to circumstance, intelligence, context or environment. They will be deployed within a strategic plan but may not be the deployed as the 'tip of the spear'. Deployment in support of other resources at a later stage in the search, or as a final sweep to increase assurity is always appropriate.

### **6.1 Resources**

All search resources should be 'fit for purpose', validated and calibrated where appropriate, and operated within agency policy and established protocols.

All search resources should undergo 'bracketing validation' where the resources are proved to be working to mission dictated effectiveness prior to and upon

completion of the mission. This adds confidence that they were operating correctly at the time of the search

## **6.2 Scenario searching**

In most cases of search the strategy is based upon a scenario that is identified through intelligence, behavioural and environmental profiling, and known methodology from antecedents.

Scenario searching supports the Red- Amber -Green system of target area prioritisation, where red areas are not searched, Amber areas may be searched, and Green areas are prioritised for search. This requires diligent intelligence gathering, interpretation and the application of known factors from previous experience.

The concept of scenario searching is an extension of intelligence gathering. Positive responses from canine detection resources, geophysical instruments and forensic examination are collated prior to intrusion to enable investigators to interpret their importance and design such recovery tactics to maximise the significance.

It is as important to **accurately** declare a search as being negative as it is to locate the target. Inaccurate negative results in search are damaging in that once conducted it is unlikely to be repeated. The impact of an incorrect negative result may lead to further searches being conducted where it is impossible to locate the target because it is not there. This may drastically increase costs and decrease levels of confidence in resources. The potential impact of false negative searches upon an investigation supports the requirement of stringent validation criteria and low threshold detection capability.

Speculative searches should not be conducted. They are rarely successful and always rely on an element of luck. This is sometimes difficult to resist as political pressure to display '*action*' for public perception of an appropriate response may be difficult to resist.

Canines must be trained, and proficiency tested to mission requirements.

### **6.3 Remote Air Sampling**

Search includes the technique of remotely screening obtained odour samples. The samples are obtained using a dynamic air flow system which captures associated VOC's from targets to be investigated. A device such as a STU 100, will draw air from the target through a filter which captures the VOC's. The filter is then forensically stored for future screening by detection canines to scientifically supported method, in controlled conditions, and incorporating positive, negative and blank controls with appropriate odour distractors. The samples are also available for scientific instrument analysis to provide corroboration of canine responses.

Remote sampling is not a new concept and has been in operation to secure our borders for a number of years, being deployed to check the contents of transport containers for contraband such as explosives and narcotics.

Remote screening by Forensic Detection Canines is an excellent search method in that samples may be taken from many sources, within complex contexts and geographical locations throughout the course of an investigation. The samples may be shipped to a central location for screening by any number of trained canine teams. The scientifically supported laboratory type-controlled screening system, with the availability of scientific instrument analysis, provides statistical support to field canine responses, and therefore raises confidence levels in relation to interpretation and strategic planning of forensic recovery of evidence.

In Value for Money terms, the remote screening of samples provides a more accurate sampling strategy with reduced costs. Deployment of resources to search scenes is not required, resources are available at a centralised location thereby increasing productivity.

### **6.4 Proof of Concept**

All canine detection systems should be subjected to '*proof of concept*' testing in both odour discrimination tests and search procedures. This should be conducted:

- Annually within validation testing.
- Monthly benchmarking and training needs analysis.
- Operational deployment bracketing testing.

Training records should not be used for validation purposes. Training is specifically designed for success and reinforcement of correct behaviour so as to develop a canine teams' proficiency within an achievable, progressive, modular training program. Failure in training is usually due to a number of possibilities:

- Unsuitability of canine
- Unsuitability of handler
- Handler error
- Training exercise planning and execution error.
- Odour levels beyond present detection threshold.
- Tasking outcome is beyond the present capability of the team.
- Unexpected influencers, climate, environment, disruptions.
- Illness
- Fitness
- Injury

Proof of concept should be conducted with the involvement of relevant Subject Matter Experts and scientists.

Where practicable and appropriate, scientific publication should support proof of concept. Publication will be the resultant collation of research in which only proven proficient canine resources should be used. If the canines used within research and scientific testing are not proven as proficient the results may be challenged and the research discredited.

Persons conducting research within this field have in the past produced some excellent studies and provided valuable data from GCMSMS headspace analysis of human decomposition related samples. Unfortunately, they have included canine testing using obviously non-proficient and ineffective canine teams. This tends not only to cast doubt upon research methodology but brings to light inadequacies in the canine teams involved. This in turn provides published data that may be used to discredit or cast doubt upon credible canine teams.

This again raises the issue of below standard canine assets being used within the industry. To safeguard the integrity of research, and indeed the detection canine resource within search, customers should complete due diligence testing prior to the contracting or use of such assets. This will have an immediate effect upon the proficiency of the service supplied by raising the bar of standards, or at the very least dissuade ineffective resources from being used. End users should decide

upon mission requirements and conduct blind and double-blind testing of resources prior to deployment. This applies even with volunteer, no cost, services.

- It is the mission of Forensic Canine operatives to locate and accurately respond to the presence of generic human decomposition odour and dried human blood. (Victim Recovery Dog) This will be conducted in any, and all, expected operational contexts, environments and climates likely to be encountered when deployed by the host agency. This will include: surface and sub-surface deposition on land or in water, trace evidence, human decomposition odour transference, and crime scene investigation for generic human blood deposits. The remote screening of items of property and clothing will be included to assist in forensic recovery and provision of case intelligence.
  - A human blood specific detection dog (HBDD) will be supplied to provide a recourse that may be deployed as a stand-alone blood detection canine, or in association with a human decomposition detection canine. This allows for the further investigation of responses by the VRD to confirm the presence of human decomposition and refute the presence of blood.
    - Tactic applied in homicide cases to good effect.
  - Both resources will 'search to contact' in large open areas, buildings, and vehicles, conduct property and vehicle line up screening, and conduct screening tests within a laboratory type context.

## **7.0 CASE INTELLIGENCE**

The success of search is wholly dependent upon the application of appropriate detection resources based upon mission intelligence. Therefore, the standard of intelligence and its interpretation is paramount to success, proof of proficiency and design concept.

intelligence will identify suspects, or persons of interest, and their movements prior to and follow the commission of a crime. With today's technology there are many sources of intelligence, all of which should be considered during the search planning stage of an investigation.

Intelligence is gathered from many different sources and must always be collated and correctly interpreted to establish search parameters and justify asset



deployment.

When deployed in the very early stages of a missing person investigation there may be no viable intelligence available as to whether or not a crime has even been committed. Therefore, the Forensic Canes mission may be inclusive of intelligence gathering techniques.

The HSET canine teams provide an extraordinary intelligence gathering capability in that they can provide credible responses as to a person's location and direction of travel for a number of days after the event. This includes the victim, suspects and witnesses. This resource may be deployed not only as an investigative method but also to corroborate or negate witness accounts of movements.

The HBDD and HDTEDD may be deployed to specific locations to locate potential crime scenes and identify items and transportation that may have been used within the commission of a crime, within subsequent deposition scenario, or in attempts to dispose of evidence. In the past the HBDD has been deployed with great success in this type of mission, recovering weapons and critical evidence in quick time and also in the identification of crime scenes.

When deploying Forensic Canines in the routine search for human remains the case file, in association with communication with the case agent, provides detailed suspect antecedents and summaries of anecdotal witness evidence. This information provides an opportunity to apply behavioural, geographical and geological profiling, and allows for the identification of further intelligence gathering opportunities.

Positive responses from these resources, where no tangible material is evident, may be further investigated in the short term through the method of scent / odour recovery through non-contact absorption to gauze pads via a Scent Transference Unit (STU). The pads may then be subjected to double blind canine screening in laboratory conditions and to scientific instrument analysis if appropriate.

Although at this time the technique may not be sufficiently quantifiable and reliable for judicial process it is sufficient to support initial canine responses for investigative intelligence purposes.

It should be considered that the adoption of this investigative method will provide research data for the development of a scientific corroboration method of canine responses and may well assist in the development of a substantive hand-held instrument to assist searchers in suspected homicide, abduction and offences against the person enquiries.

## **8.0 STRATEGIC CANINE APPLICATION**

All reported cases tend to differ in context, environment and modus operandi. There will however always be a potential for physical evidence that may be recovered providing the correct search resources are applied. Offender behaviour prior to, during, and post commission of a crime will provide evidence that may be recovered if the correct and appropriate resources are applied within an intelligence led search strategy.

- Offenders leave an individual odour trail to and from the initial scene.
- They come into personal contact with evidence and the victim.
- There will be primary, secondary and tertiary transference of odour and scent.
- Evidence will be discarded, hidden or destroyed.
- DNA of offender, victim and witnesses will likely be available for recovery.

Reports of missing person generate varying degrees of response from Law Enforcement and Search and Rescue agencies. The level of response will be decided upon by Executive management and will be appropriate to the available intelligence. Cases may be solved quickly, where a child is reported as missing but is found alive and well prior to Police arrival, or they may never be solved despite the application of many resources over period of many years at great financial expenditure. Forensic Canine resources may be applied as an additional layer to search strategy in support of Forensic Examination and Ground Search mission strategy:

### **8.1 Reported Missing Persons – At Risk – Vulnerable**

The mission of resources in this case is to establish intelligence of method and direction of travel, secure any available evidence, and establish possible mission scenarios as quickly as possible for the deployment of other resources.

- Live human odour of missing persons and persons of interest, suspects, are acquired.
- HSET canine teams are deployed to the scene to conduct location checks to establish presence of target scent.
- HSET canine teams will investigate any perceived scent trails away from the scene.
- HDTEDD and HBDD may be deployed to the scene to establish if any trace evidence may be available for further investigation.
  - House
  - Premises
  - Vehicles
  - Property screening
  - Route search of identified trails by HSET, discarded evidence.
  - Possible deposition sites identified by mission intelligence gathered from cell phone information, behavioural profiling.
- Remotely obtained odour samples (STU) recovered by Crime Scene Investigators and searchers may be transferred to the laboratory for screening by SRD.

## **8.2 Reported Abduction**

The mission of resources in this case is similar as with Reported Missing Persons but with increased urgency. The urgency is related to establishing whether this is a true abduction or a false report to cover up more serious crimes.

Experientially searches conducted by Forensic Canines whilst witnesses and suspects are being interviewed by police have been a catalyst for admissions and the recovery of evidence and victims at a very early stage in the investigation.

- HSET canine teams will become more involved to establish possible suspects and the possibility of family involvement. This will be inclusive of the investigation of reported witness movements.
- HDTEDD and HBDD may be deployed to the scene to establish if any trace evidence may be available for further investigation.
  - House
  - Premises
  - Vehicles
  - Property screening

- Route search of identified trails by HSET, discarded evidence.
- Possible deposition sites identified by mission intelligence gathered from cell phone information, behavioural profiling.
- Remotely obtained odour samples (STU) recovered by Crime Scene Investigators and searchers may be transferred to the laboratory for screening by SRD.
- HDTEDD and HBDD support to CSI to locate further crime scenes and conduct preliminary searches to confirm.

### **8.3 Homicide – No Body**

Live human scent, in addition to human decomposition odour, may be a viable source of detection for a number of days following death. Investigators and search managers should consider the deployment of Search and Rescue dogs if advised as appropriate by SAR SME's.

In the early stages of a homicide investigation Forensic Canine Resources may have already been deployed within a reported missing person, or abduction mission. If not, this may be considered at this juncture.

- Dependent upon time scale, HSET canine teams will become involved to establish possible suspects, conduct location checks, and investigate possible scent trails of offenders as they moved deceased to deposition site.
- HRDD will be deployed to conduct such search mission requirements as identified through intelligence and authorised through the Strategic Search Manager. They may be supported by geophysical investigative resources.
  - Large area searches, on both land and water in any context.
  - Route Searches
  - In any other context identified through intelligence.
    - Searches may include such tactics such as probing the ground, sampling of groundwater from identified geological hydroplanes at leach points. The groundwater will collect human decomposition compounds from sub surface deposition sites.
- HDTEDD, SRD will be deployed if required to remotely screen forensically recovered groundwater samples, wood stakes driven into the ground to absorb ground odour over a period of time, absorbent material recovered

from searches. These are just two methods that have been developed to interrogate what may be deposited in the ground without the application of intrusive method. They may be used in conjunction with other geoforensic instruments and procedures.

#### **8.4 Homicide – Body Recovered**

HSET, scent samples may be recovered with the use of the STU from the body, clothing, and associated articles. These samples may be stored for future investigative usage as intelligence dictates. These are a source of scent that may identify persons that have in the past been in contact with the deceased. The HSET resources should also be considered as an asset that may identify the scent of suspects at the deposition site dependent upon the time period since deposition.

HRDD, HDTEDD, HBDD may be deployed as intelligence dictates, or to secure intelligence, in support of the investigation of the cause of death, of those involved and the subsequent deposition scenario.

HBDD, SRD may become involved in the investigation to locate and secure crime scenes, search for weapons and associated evidence, screen articles and samples recovered by CSI's.

Experientially the Forensic Canine resources have been deployed to good effect to screen articles from crime scenes that would not normally be recovered and examined due to time and financial considerations. They may also identify areas of blood spillage that cannot be located due to location or size. It should be born in mind that these canine resources may screen every moveable article from a house, through a staging area, in one to two days. A feat that is never going to be achieved by CSI's as it is too labour intensive and costly.

They may also screen drains for the presence of blood and recover weapons from the most challenging contexts and environments.

#### **8.5 Search for Crime Scene**

Investigations of homicide, abduction and serious result require the finding of a crime scene prior to deployment of CSI's. Locations of crime scenes are not

always immediately known to investigators, or they may have intelligence of a number of possibilities.

The above resources may be deployed to assist in searching for a crime scene, or in the provision of intelligence to prioritise possibilities. They may be deployed within a 'search to contact' mission context when they are stood down upon first indications there may be evidence present. CSI's will then be deployed to continue the mission.

## **8.6 Crime Scene Search**

HSET canines will provide intelligence as to whether a suspect has been present at a crime scene.

The HBDD may be deployed to crime scenes to assist CSI's in the search for evidence. They may be deployed at any stage of the investigation. At the start to identify areas of interest, useful in large areas, or on completion of CSI searches to increase assurity. This has proved to be a very efficient strategy in the past with the HBDD locating blood deposits in areas not accessible to CSI screening methodology.

The HRDD will search for and locate items that have been in contact with the deceased victim through primary direct contact, or through secondary contact with the suspect. Tools used for deposition preparation etc.

The HDTEDD and SRD will screen absorbent pads from STU operation at crime scenes by CSI's to identify areas that may have been in contact with the deceased, secondary deposition.

## **8.7 Screening of Property and Possessions**

The Forensic Canine resources may screen any items small or large that may be of interest to the investigation. This may be completed 'in situ' or following recovery, but should always be completed in blind, double – blind, tests. Screening may be tasked prior to initial screening by CSI's or upon completion.

## **8.8 Screening of Recovered Samples**

Forensic Canine resources may screen recovered samples within a blind, double-blind context with the inclusion of blank, positive and negative controls.

## **8.9 Remote sampling via Drone**

Arial or ground drones may be utilised to collect samples for canine screening both on land or water. They may be adapted to place absorbent pads in selected for later recovery and canine screening prior to instrument analysis.

## **9.0 CASE EXAMPLES**

The following case examples provide investigators and search managers with an insight as to what may be achieved through the timely deployment of Forensic Canines with the appropriate interpretation of intelligence and application within homicide and abduction mission strategies.

- A woman was reported missing and her boyfriend became a suspect. He was a craftsman at a large building site. The site was searched, and the remains of the woman were recovered from a grave identified by the canine. Subsequent searches for evidence produced numerous positive responses all of which were associated with the vehicle used for transportation and the tools used during the burial process.
- A woman was reported missing from her home by her husband, Forensic Canines were deployed: HSET established that she had not left the area of her home for some days. The VRD provided positive responses to the floor of the house at the patio doors and to a four-wheel drive farm vehicle. The husband was found guilty of her murder and subsequently gave up the wife's body which was buried in a deep grave within the family owned farm land.
- A protracted search of large building provided canine responses on the ground floor. The flooring was removed, and human bones and teeth were recovered buried in the ground 3-4 feet under the original flooring.
- An elderly woman was reported missing by her husband. Canine searches of his property did not result in any positive responses. The subsequent investigation revealed interest in a local man who had reported his vehicle stolen which was totally burnt - out prior to recovery. A search of the vehicle provided positive responses. Laboratory

testing of burnt material recovered from the vehicle revealed the victim's DNA.

Canine search of the area around the suspects home produced a positive response to the victim's grave in a river bank.

- In a cold case search for the remains of a child in a wilderness environment the canines were operated with the handler's blind to the search outcome. The canines identified the exact location of three graves from where children had been recovered 40 years previously. The wife of a farm owner was reported missing. The subsequent search of the house and garage provided canine positive responses to the carpet near to the patio doors leading to the garage where the canine responded to an off-road farm vehicle. Following a subsequent confession, the body of the woman was later found buried deep into the farm land.
- A cold case missing person investigation led to the identification of a piece of land where the body of the victim may be located. The area was searched which resulted in the canine responding to a water filled hole left when a tree fell. Subsequent excavation of the area located the body of the victim buried 70 feet away from the canine response location. The grave was filled with water. This is an example of odor migration via ground water.
- A child was reported abducted during a car – jacking. Subsequent searches produced canine responses to the child's bedroom, the father's vehicle, child's car seat and blanket. At trial the responses were corroborated by anecdotal witness evidence and the father was convicted. The conviction was upheld on appeal.
- A police officer's wife was reported missing. Subsequent searches and screening of his personal property produced several canine responses. He was convicted of homicide and the body of his wife was found some months later.
- A child was reported missing by her mother and a family friend was suspected. Subsequent searches provided positive responses to the suspects' vehicle, in his home and to discarded property nearby. The victim's blood was recovered from the home and the child's grave was located within ½ mile of the house.
- 'Serial killing of homeless women investigation led to the identification of a suspect living outdoors. A nearby large derelict warehouse was searched. Canine responses provided the location of two buried women.



- Alleged child abduction led to an operational deployment to a house where the parents knew of impending search. Despite the placement of thirteen plug-in air fresheners canine responses provided intelligence of foul play. The child has never been found.
- Following the report of a missing person, a search of a small Island provided canine responses on the beach where a body was recovered having been buried in the sand.  
Following the initial canine response, and prior to recovery, the ground was probed. The probe was placed in a field. The canine was operated leash free and blind to the outcome. The canine located the probe and provided a positive response.
- Reports of gangland killings were investigated, and subsequent canine searches led to the canine identification of multiple graves where bodies were recovered.
- 40-year-old cold case gangland killing. A blind canine search of a garage containing over 75 vehicles provided positive responses only to one vehicle. That vehicle was known by investigators to be involved in the kidnapping and homicide.
- There have been several cases where parents have reported their children as having been abducted from the home. Canine responses within the home and to family owned vehicles have provided intelligence and evidence to investigators. Unfortunately, some of the cases have never been solved. *The children have never turned up alive.*
- Following the report of a child abduction a suspect was identified. The suspects' vehicle was screened by the VRD who responded positively. The victim was found deceased in woodland after the suspect gave the location of the deposition whilst the search was being undertaken. The suspect admitted the homicide and to transporting the cadaver in the vehicle to the deposition site.
- A child was reported missing by her parents. An extensive search was undertaken by S&R volunteers including canine teams that was unsuccessful. The FBI resources were deployed which located the sub surface deposition of the child within 10 minutes.
- A number of water course searches have been conducted, within both homicide and accident scenarios, where canine responses have led to the subsequent recovery of human remains.
- The human blood detection dog has located blood, confirmed by DNA evidence, on numerous occasions at crime scenes, weapon searches and

within article line – up screening scenarios. The canine has identified blood that is relevant to both accused and innocent parties. It is non-discriminatory by locating generic human blood, not identify specific.

- A vehicle was stripped and searched by CSI at the crime lab over a period of 24 hours. Nothing of value was found. The HBDD was deployed, who located a trace amount of blood under a bolt head within 5 minutes of commencement of search.
- Following a homicide, the HBDD was deployed to search an address of interest to the investigation. The HBDD located a kitchen knife of interest which proved to be the murder weapon.
- Following the report of a homicide the HBDD was deployed to search the crime scene, a knife was recovered which proved to be the murder weapon.
- Following the homicide of an elderly woman the HBDD was deployed who searched a possible escape route taken by the offender. Several of the offender's items of clothing were recovered which were stained with the victim's blood.
- Following a homicide with a number of possible suspects, items of clothing from all the suspects were screened with the HBDD. A number of items were recovered that were blood stained. Some were classified as victim's blood others were from other persons not involved.
- During searches, the VRD has identified graves from previous war conflicts, and family members buried within homeowner property.

## **10.0 SUMMARY**

Properly trained and validated Forensic Canines may be deployed in the early stages of homicide and reported abduction case, within an intelligence led investigative strategy to support investigators in establishing leads and securing value evidence.

The application of these resources is non-biased. The correct and appropriate interpretation and corroboration of canine responses may provide evidence in support of convictions or in defence of suspects.

It is incumbent upon investigators and search managers to show due diligence in assuring that any canine resources are fit for purpose prior to and upon completion of deployment through appropriate bracketing testing.

Inappropriate disclosure and discussion of case intelligence and evidence should be avoided so as not to jeopardise the safety of missing persons and judicial process.

It is the duty of the legal profession, through judicial process, to correctly apply the law of the country in which searches take place. This applies to powers of search, recovery and appropriate presentation of evidence, corroborative measures, and the direction of jurors.

Martin Grime

# *Forensic Detection Canines*

## *Interpretation of Responses*

Foundational Learning Principles allowing for the correct interpretation of canine responses within homicide and alleged abduction investigations.

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## **1.0 INTRODUCTION**

Forensic Canine deployment within strategic missions of the investigation of homicide, abduction and other serious offences against the person should conclude with a positive or negative outcome. Forensic Canine responses must be correctly interpreted by investigators and search managers so as to provide credible case intelligence and secure evidence. Correct interpretation may only be achieved when those involved in the decision process have a foundational education as to the subject matter and access to Subject Matter Expert (SME) consultancy. Consultants may include, but are not limited to, Forensic Canine qualified experts, appropriately qualified scientists, forensic experts, and lawyers.

## **2.0 FOUNDATIONAL PRINCIPLES**

We as humans conduct searches primarily visually. We may also use other senses as touch, hearing and smell. Canine olfaction is far more sensitive and discriminatory than that of humans. Add to that a cognitive decision-making capability and canines provide us with an olfactory sensing search capability, but only if trained properly, and validated to realistic proficiency standards within scientific method.

Detection canines provide a quantitative decision as to the presence of target substances. Qualitative corroboration is provided through forensic analytical process. Detection canines may only therefore be considered a presumptive test resource. That being said, detection canines provide case intelligence, which should always be interpreted through consideration of training, proficiency testing and experience.

Detection canines are deployed as a canine / handler team. The proficiency of both being of equal importance.

Validation testing to credible standards should be applied to ensure that the highest levels of proficiency are achieved, thereby securing confidence of mission effectiveness and the credibility of the resource.

Human live 'scent' is individual. That is to say, research has not identified it as unique, nor is it as discriminative as DNA testing. Research has shown that human decomposition odour' samples show similarities but are not consistent. Human blood, dependent upon the time passed since spillage (drying), may retain

personal scent. Therefore, the training of all forensic canines must include a broad spectrum of samples so as to 'generalise' the canine to human scent and odour.

Canines are naturally attracted to decomposing animal remains, bone, blood and other associated odours.

Human odour from both live and deceased sources is open to transference and migration. Transference may be as a result direct or indirect contact primarily, secondarily or tertiary. Odour is also open to non-contact proximity absorption, for example; cigarette smoke being absorbed into clothing within a bar. Odour will also migrate from source through the effects of wind, groundwater and other environmental and geological influencers. These considerations should always be factored into interpretation of canine responses within homicide and abduction investigations. Appropriate experts should always be consulted when interpreting detection canine responses where the target substance / person is not immediately obvious.

Human decomposition odour is both pungent, persistent, easily transferable and difficult to clean away. These factors should be taken into consideration when planning searches, intelligence gathering and interpreting canine responses. Careful consideration should be taken of these facts when planning training, acquisition and storage of training samples, and when conducting research projects.

Correct interpretation of detection canine responses may only be achieved by those qualified to do so. This may require collaborative discussion of experts in a number of fields. The search manager and Senior Investigative Officer will generally then make decisions as to procedure.

Positive responses may not be case related.

Weight of evidence of detection canine responses is wholly dependent upon corroboration.

### **3.0 CANINE OPERATIONAL RESPONSES**

Canine operational responses generally do not differ from those encountered in training, proficiency testing and certification. The training and testing contexts

and duration of searches are varied routinely so as to maintain consistency with variables encountered during operational deployments.

Operational deployments typically require the canines to work long hours, search large areas, screen numerous vehicles, buildings, property and/or clothing often without giving a positive final response. In the absence of collectable human remains or blood, a positive final response can provide the observer an articulable basis for believing that the odour of human decomposition or blood was present at the place and time of the alert. In this instance, the positive final response needs to be corroborated through multiple means such as case-related intelligence, witness statements, behavioural predictions and a demonstrated VRD team proficiency.

Historically, the author's VRD's have given positive final responses in several missing person cases. In those cases, the victims have either been found deceased or have never been recovered. To my knowledge a victim has never been found alive in a case where the author's VRD team has provided a related positive final response.

These facts, whilst appearing on face value as impactful, must only be considered within an intelligence scenario. In relation to judicial process the weight of canine responses must be considered within the boundaries of the relevant case and the law of the country in which the mission was completed.

#### **4.0 OPERATIONAL DEPLOYMENT**

We are often tasked to perform operational missions that have been previously attempted by other law enforcement agency resources. Considering the challenges normally expected during operations, our canines are trained to the lowest threshold possible to increase the detection probability and provide a high degree of confidence in any VRD response or lack of response obtained during a search.

It is unfortunate that in a high number of cases those that are deployed as initial response conduct searches in such a way that they make the task more difficult. This is due to removal of ground cover, digging holes, felling trees etc. All those involved in initial searching should realise that other resources may be required to complete the mission and the least disturbance necessary should be applied to



maintain the integrity of the target area for an intelligence led, systematic, structured and layered approach to search at a later date, if required.

The deployment of correctly trained VRDs with high proficiency ratings can provide intelligence that may assist investigators to a line of enquiry that may not be previously evident. This resource is of high value in cases of alleged abduction and missing person cases where it can provide intelligence to establish investigative leads or case focus.

Human decomposition odour is easily transferable through direct contact. The VRDs do not identify person-specific remains, nor do they identify suspects. There are circumstances where human decomposition or human blood odour may be present where there are no prevailing suspicious circumstances.

Canine responses in the absence of recovered human remains or human blood should be interpreted as presumptive and applied to mission intelligence.

## **5.0 RESPONSE INTERPRETATION / ANALYTICAL CATEGORIZATION**

The correct interpretation of resources is the responsibility of the handler in the first instance to accurately assess behaviour, and secondly for the investigators to apply the information within an intelligence led investigative process.

There are four main categories of detector canine responses:

- Positive
- False positive (Type I error)
- Negative
- False negative (Type II error)

### **5.1 Positive**

The canine gives a recognised behavioural final response to a known and corroborated positive stimulus.

### **5.2 Unproductive Positive**

The canine gives a final response where there is no obvious stimulus, but where the response cannot be ruled incorrect. This includes detecting human decomposition odour where there is no recoverable human remains or human

blood, or situations where the decomposition odour has moved through fissures, chimneys, or in a leachate plume.

- Includes the direct or indirect transfer of scent and odour.

### **5.3 False Positive**

The canine gives a final response to a known negative stimulus.

- Animal bone or carcass for example

### **5.4 Negative**

The canine does not give a final response to known blank and negative stimulus.

- Negative responses, or no response, is only corroborative in a test scenario. In an operational context a true negative is very difficult to corroborate.

### **5.5 False Negative**

The canine does not give a final response to a known positive stimulus. This may be due to threshold limitations, an environment where there is insufficient odour present for detection, canine-related issues, handling errors, search strategy errors.

- Great care should be taken when criticising canine teams for providing false negative responses. There are many reasons why this may occur.

Proficient and efficient VRD's, utilized within law enforcement investigation of homicide and child abduction, are conditioned to offer recognizable behaviour responses to the presence of tangible human remains and the odour of human decomposition. Their conditioning is generalized to the entire range of odour throughout the decomposition process and is specific to human origin. In training scenarios, where the outcome is predetermined, canine responses may be accurately categorized allowing for reinforcement or correction. When deployed on casework outcomes are predominantly not obvious, therefore canine responses require a level of substantiation to allow for accurate interpretation and the planning of further investigation. To immediately categorize canine responses in the traditional manner as 'positive', 'false positive' 'negative' or 'false negative' is therefore inaccurate.

Historically, the author has experienced several cases where canine responses

were not immediately corroborated due to a poor investigative and search process. Confirmation has come later when convicted persons have identified the location of the deposition site or scenario of deposition.

Human decomposition odour is easily transferable either by direct contact, indirect contact, or by VOC's migrating from the source, diffusing into the environment and subsequently adsorbed. Now, there are substantive forensic processes that will confirm the presence of human remains / blood where there are recoverable samples. There are no forensic processes for the confirmation of the presence of human decomposition odour.

To facilitate a more robust interpretation of VRD responses the following categorization of responses may be appropriate:

#### **5.6 Responses prior to investigative process and interpretation:**

- Conditioned response
- No response

#### **5.7 Subsequent categorization**

- Substantiated conditioned response
  - Where a conditioned response is offered, and the presence of human remains is confirmed
- Unsubstantiated conditioned response
  - Where a conditioned response is offered, and the presence of human remains is unconfirmed and unsupported
- Supported conditioned response
  - Where a conditioned response is offered and is supported by anecdotal witness testimony and/or reliable intelligence, but not forensically substantiated.
- No response - substantiated
  - Where excavation or other search activity tends to substantiate that no human remains are, or have been, present.
- No response - unsubstantiated
  - Where there is no supportive investigative process or field testing conducted.

## 6.0 CAN A CANINE BE CLASSIFIED AS BEING RIGHT OR WRONG?

Extreme care should be taken when attempting to apply human principles and terms to canine behaviour.

We cannot know a canine's thought processes at the time a positive response decision is made. Nor can we recover an odour sample from the canine's olfactory system at the time of a response decision to allow comparable chemical analysis. Therefore, it is impossible to say categorically that a detection canine was correct, even if the correct outcome is achieved. There may be some element of luck, handler knowledge and influence, or a correct decision being made for the wrong reasons. The same principles apply when deciding the legitimacy of a canine negative response.

It is logical that if one is to apply the terms of **RIGHT** and **WRONG**, then the onus of proof should be the same for both. This is particularly pertinent when interpreting detection canine responses where no tangible material is recovered.

When attempting to apply the terms **RIGHT** and **WRONG** in the context of detection canine responses the following should be considered:

Humans predict outcomes based upon intelligence, known influencers, and an understanding of canine olfactory behaviour. Humans cannot however corroborate canine responses by their own sense of smell. (Except in the case of pungent odours such as cannabis). They should not naturally assume that the canine will always respond as predicted as there are many variables involved in the detection process. Nor should they assume that responses will necessarily be case specific. If you deploy a VRD to a scene it is likely to respond to any target substance, whether case related or not. Often VRD's are responsible for the recovery of historical remains and non-case related human blood spillage. This does not make them wrong, in fact it tends to support scientific proof of concept.

Executive management, investigators, lawyers, the press, lay persons, and other non-experts, tend to not understand the complex scientific principles of detection canine resources. Therefore, they are quick to make judgement as to operational proficiency and reliability and incorrectly interpret responses. On occasion, they may mischievously apply their own limited knowledge and

experiences to enhance, or undermine, detection canine credibility knowing that the canine cannot communicate justification of its decisions. This worsens when some attempt is made to suggest that handlers directly influence the canine decision-making process.

When considering canine responses, one should be aware that on occasion there will be instances when no single interpretation is possible. This is where corroboration is required for deliberation within judicial process.

## **7.0 INTELLIGENCE**

Scientific proof of concept supports the premise that a properly trained and proficient detection canine provides presumptive testing through conditioned olfactory detection of target odour. Such resources therefore provide support for such principles as: probable cause, and reasonable suspicion (validation required).

Only detection canine resources trained *specifically* in the detection of human decomposition may provide reliable intelligence. Resources trained with the inclusion of animal-based training aids provide a far wider interpretation of canine responses that must include the source may equally be animal or human. If detection canine training is inclusive of food-based pork products this widens the interpretation spectrum to include foodstuff.

In 2017, despite research and anecdotal case details being widely available on the internet, and through Subject Matter Experts based within the UK, the British Police continue to include animal-based decomposition training aids, and foodstuff, within their training modules.

It is widely accepted as being impossible to extinguish conditioned odour recognition from a detection canine olfactory repertoire. Therefore, such animals will not be classified as properly trained, or proficient, within today's acceptable parameters. The use of such resources will be easily discredited within judicial process. When considering the working life of these canines may be 8-10 years this does not represent good Value for Money. Nor does it reflect well on the British Police Service reputation regarding due diligence in relation to scientific development and improvement.

Positive responses by quality VRD's, deployed within an intelligence led search,

where there is no tangible and recoverable material, may likely be due to the direct or indirect transference of odour through the modus operandi of homicide or from subsequent disposal.

Within no – body homicide and abduction investigations, positive VRD responses may be a presumptive indicator to support intelligence of death, the proof of which may be necessary for a successful prosecution.

Positive VRD responses to motor vehicles, digging implements, or other items may provide intelligence as to possible transportation and deposition methodology of deceased missing persons by suspects.

Positive VRD responses in areas within a home may be indicative of a crime scene or place of death prior to removal and deposition.

The absence of a positive response should not preclude the continuation of further forensic investigation.

It should always be borne in mind that there may be innocent and logical explanations for VRD responses not connected to criminal activity:

- Historical remains
- Direct or indirect transference of odour by persons having contact with human remains professionally.
- Persons recently in contact with deceased relatives
- Items of furniture from deceased persons dwelling

When considering the above in line with alibi, or in explanation of canine positive responses, investigators should include questioning suspects / witnesses as to bathing, cleaning, laundry etc. since material time.

The correct interpretation of canine responses when taking into consideration other intelligence sources, may provide intelligence as to methodology of homicide, abduction and subsequent disposal of evidence and deposition of remains. This intelligence should remain confidential to investigators and judicial process. The inappropriate dissemination of such facts to the public is likely, as has been seen in the past, to cause adverse media attention and speculation, spark public debate and opinion and taint any future legal proceedings against

suspects.

Canine responses that are initially categorised as 'intelligence' may, with reliable corroboration, be put to jurors in criminal trials following judicial review of competency of the handler – canine team.

We cannot accurately predict the outcome of canine searches, nor can we train canines only to respond to recoverable evidence. Therefore, it is expected that canine responses to target odour which cannot immediately be explained will be experienced at some point in time. We may only interpret those responses and apportion intelligence worth based upon the training methodology, proficiency and mission effectiveness of the canine –handler team at the material time.

## **8.0 CORROBORATION OF VRD RESPONSES**

Evidence which confirms or supports a statement, theory, or finding. *The weight of evidence is dependent upon the type of corroboration.* Corroboration may be through verification by scientific testing, from anecdotal witness evidence, intelligence, from proficiency testing and operational success experience.

In the case of human blood recovery there are presumptive testing techniques available in support of the canine. In the case of human decomposition, the canine is the presumptive test.

## **9.0 SCIENTIFIC CORROBORATION OF RECOVERED HUMAN REMAINS OR BLOOD**

Corroboration, (verification) can be accomplished through various forensic techniques including, but not limited to:

- DNA (nuclear/mitochondrial)
- Laboratory analytical confirmation – human blood / bone
- Visual – Forensic Anthropologist
- The analytical testing of odour samples

## **10.0 CORROBORATION IN THE ABSENCE OF RECOVERED HUMAN REMAINS OR BLOOD**

The same concept applies throughout the detection phase of search. All resources can provide both positive and negative results. Both positive and negative results should be corroborated by as many other resources as is appropriate and practicable before attempting to interpret or recover.

A VRD alert followed by a forensic search of the alert site will either result in the recovery of human remains or blood, or not. A recovery can be used as proof of accuracy. However, no recovery following an alert does not necessarily mean that the dog was incorrect in that residual odour or trace evidence may have been present, or concealment may have precluded discovery.

Humans should not be so arrogant as to assume that they are right merely because they are the head of the food chain. All canine responses should be investigated to complete satisfaction, considering all relevant intelligence and scientific principles.

We have established through canine search and chemical analysis that the presence of human decomposition remains within the ground even when a body has been recovered.

Because there are presently no scientifically-validated and peer-reviewed confirmatory tests for the presence of human decomposition odour in the absence of recovered remains, a VRD's positive alert to human decomposition odour should not be used as evidence in court without some other means of corroboration. In the absence of this corroboration, the canine's response may still provide valuable investigative intelligence.

Corroboration of properly trained and certified VRD responses in the absence of collected human remains or human blood may be accomplished through circumstantial supportive intelligence where:

- Anecdotal witness testimony supports a scenario involving abduction, homicide and / or disposal of human remains.
- Human remains detection canines give positive responses which coincide



with investigative, behavioural or intelligence related information.

Factors to consider when determining the reliability of a canine team are single and double-blind proficiency tests, certification assessments and confirmed operational outcomes that correspond with the operational period. If the team has shown a high degree of proficiency with a low level of false positive responses, then the presumption may be made the team performed at the same level during the operation.

### **11.0 ANNONYMISED CASE EXAMPLES**

- A woman was reported missing and her boyfriend became a suspect. He was a craftsman at a large building site. The site was searched, and the remains of the woman were recovered from a grave identified by the canine. Subsequent searches for evidence produced numerous positive responses all of which were associated with the vehicle used for transportation and the tools used during the burial process.
- A protracted search of large building provided canine responses on the ground floor. The flooring was removed, and human bones and teeth were recovered buried in the ground 3-4 feet under the original flooring.
- An elderly woman was reported missing by her husband. Canine searches of his property did not result in any positive responses. The subsequent investigation revealed interest in a local man who had reported his vehicle stolen which was burnt - out prior to recovery. A search of the vehicle provided positive responses. Laboratory testing of burnt material recovered from the vehicle revealed the victim's DNA. Canine search of the area around the suspects home produced a positive response to the victims' grave on a river bank.
- In a cold case search for the remains of a child in a wilderness environment the canines were operated with the handler's blind to the search outcome. The canines identified the exact location of three graves from where children had been recovered 40 years previously.
- The wife of a farm owner was reported missing. The subsequent search of the house and garage provided canine positive responses to the carpet near to the patio doors leading to the garage where the canine responded to an off-road farm vehicle. The body of the woman was later found buried deep into the farm land.

- A cold case missing person investigation led to the identification of a piece of land where the body of the victim may be located. The area was searched which resulted in the canine responding to a water filled hole left when a tree fell.  
Subsequent excavation of the area located the body of the victim buried 70 feet away from the canine response location. The grave was filled with water.  
This is an example of odor migration via ground water.
- A child was reported abducted during a car – jacking. Subsequent searches produced canine responses to the child's bedroom, the father's vehicle, child's car seat and blanket. At trial the responses were corroborated by anecdotal witness evidence and the father was convicted.  
The conviction was upheld on appeal.
- A police officer's wife was reported missing. Subsequent searches and screening of his personal property produced several canine responses. He was convicted of homicide and the body of his wife was found some months later.
- A child was reported missing by her mother and a family friend was suspected. Subsequent searches provided positive responses to the suspects' vehicle, in his home and to discarded property nearby. The victim's blood was recovered from the home and the child's grave was located within ½ mile of the house.
- 'Serial killing of children' investigation led to the identification of a suspect living outdoors. A nearby large derelict warehouse was searched. Canine responses provided the location of two buried children.
- Continued investigation of serial killings from over forty years ago presented an opportunity to conduct a blind large area search of wilderness. The VRD correctly identified the graves where previous victims were buried, located and recovered over forty years previously.
- Alleged child abduction led to an operational deployment to a house where the parents knew of impending search.  
Despite the placement of **13 plug in air fresheners** canine responses provided intelligence of foul play. The child has never been found.
- Following the report of a missing person, a search of a small Island provided canine responses on the beach where a body was recovered having been buried in the sand.  
Following the initial canine response, the ground was probed.

The probe was placed in a field.

The canine was operated leash free and blind to the outcome.

The canine located the probe and provided a positive response.

- Reports of gangland killings were investigated, with subsequent canine searches leading to the canine identification of multiple graves where bodies were recovered.
- 40-year-old cold case gangland killing. A blind canine search of a garage containing over 75 vehicles provided positive responses only to one vehicle. That vehicle was known by investigators to be involved in the kidnapping and homicide.
- There have been several cases where parents have reported their children as having been abducted from the home. Canine responses within the home and to family owned vehicles have provided intelligence and evidence to investigators. Unfortunately, some of the cases have never been solved. *The children have never turned up alive.*
- Following the report of a child abduction a suspect was identified. The suspects' vehicle was screened by the VRD who responded positively. The victim was found deceased in woodland after the suspect gave the location of the deposition whilst the search was being undertaken. The suspect admitted the homicide and to transporting the cadaver in the vehicle to the deposition site.
- A child was reported missing by her parents. An extensive search was undertaken by S&R volunteers including canine teams that was unsuccessful. VRD resource was deployed, which located the sub surface deposition of the child within 10 minutes. The detection threshold of the VRD being much lower than those previously deployed.
- A number of water course searches have been conducted where canine responses have led to the subsequent recovery of human remains.
- The human blood detection dog has located blood, confirmed by DNA evidence, on numerous occasions at crime scenes, weapon searches and within article line – up screening scenarios. She has identified blood that is relevant to both accused and innocent parties. She is nondiscriminatory by locating generic human blood, not identify specific.
- A vehicle was stripped and searched by CSI at the crime lab over a period of 24 hours. Nothing of value was found. The human blood specific canine was deployed who located a trace amount of blood under a bolt head within 5 minutes of commencement of search. The blood was

not case related and was considered to have been as a result of a minor cut to the person assembling the vehicle at the factory.

## **12.0 SCIENTIFIC SUPPORT**

The use of canines in the forensic investigation of homicide, and false reports of abduction to conceal evidence of wrongdoing, is supported by 'proof of concept' scientific research and search mission outcomes. Although there are individual published pieces of research there is no published definitive reference summary that may be utilised within judicial process, training, and professional development.

There remains scepticism of the use of such resources, which tends to dissuade agencies and individuals from investing in research and development of canine systems within this discipline. This scepticism is born from a lack of fundamental understanding, or misunderstanding, of the concept.

Some research publications tend to show that although the science is well supported in principle, and provides proof of concept, canine resources used within research testing procedures vary substantially in quality. This subsequently dilutes the impact of the research and adversely affects reputation and confidence. All canine resources involved in research must be of the highest quality, proven by statistical analysis of training, odour discrimination performance, and proficiency tested to robust standards in the field.

The aim of our research is to collate known facts, relevant research, and operational canine outcomes to provide comprehensive evidence of detection and proficiency concepts.

As scientists reach out in support of a better understanding of detection canine olfactory discriminatory capability, there has been a perceived requirement to include canine testing and subsequent publication of resultant data.

There comes with the inclusion of canines within research a moral and strategic responsibility to ensure that the mission credibility and integrity of detection canines is not compromised or undermined without good reason.

Research to date, involving the comparative analysis of odour samples from both

live and deceased persons, has been crucial to the development of canine detection capability. We should therefore ensure that the incorrect, or inappropriate, inclusion of canines within research does not diminish the impact of the science, nor the credibility or integrity of detection canines.

When considering the above, the general concept is that detection canine odour generalisation and olfactory discrimination must be of the highest calibre, irrespective of search qualities. the published documentation. It is advised that detection canines undergo odour scientifically supported discrimination training and testing as a priority.

### **13.0 PROSECUTION STRATEGY**

Prosecution counsel may include Forensic Canine responses within their case presentation. It is unlikely if because of canine responses, a body, blood or other tangible and credible evidence has been located. E.g. DNA evidence If, however the evidence was recovered because of canine provision of 'probable cause' the proficiency of the canine team may be questioned by the defence with a view to exclude such evidence from being admissible.

Prosecution counsel are more likely to include Forensic Canine responses within a circumstantial evidence context, where responses may add credibility to their case. In this instance, the admissibility of such testimony will be questioned by defence council. The presiding advocate will rule as to admissibility and weight of evidence of canine responses.

Prosecuting counsel should realise that the forensic canine resources remain unbiased and neutral and the defence team may interpret responses differently. Corroboration in some form will be required to support detection canine responses.

The prosecution should ensure that there is evidence of proof of concept, canine team proficiency, mission effectiveness and scientific basis for the use of such resources. This may be achieved by the involvement of appropriate Expert Witnesses, scientific research and proficiency records.

## **14.0 POTENTIAL DEFENCE STRATEGY**

There are individuals with varying experience of canine training and operational experience that set themselves up as highly paid defence experts. They may or may not have animal behaviour degrees. Their main areas of defence to detection canine responses are that; The canine is not properly trained and /or that the canine was 'cued' into providing a response.

One fine example is that a defence expert claimed that during a blind search, the handler cued the canine to accurately respond *when out of sight and separated by many yards, on different floors, within a building*. This expert also claimed that in their opinion a canine could not be trained to exclusively detect generic human blood.

### **14.1 Defence Expert Witnesses**

Historically, challenges to SME canine testimony have included self-described animal behavioural scientists, canine trainers, and research scientists whose expertise within this field is questionable. Potential expert witnesses for the defence should be challenged to provide the following to show expert status within this field of expertise:

- Generic canine training experience and qualifications to include accredited courses attended.
- Forensic Canine handling experience.
- Forensic Canine training experience.
- Forensic Canine certification assessment experience to include information about the canine teams accredited and assessment guidelines used.
- Law enforcement canine operational experience and success.
- Law enforcement search strategy planning and supervision experience.
- Law enforcement detection canine training and certification experience.
- Description of current and past human decomposition research.
- Human decomposition detection canine research project notes and results.
- Human decomposition detection canine research and testing notes and results.
- Curriculum Vitae and certification records of all canine teams used operationally and in research and testing.
- Records of methods used to test each canine team's proficiency prior to

- any research or testing and subsequent test results.
- Examination of published documents by SME's.

## **15.0 IS THE CANINE A WITNESS?**

One court, in response to an attempt to assign error to the admission of tracking testimony in part because the dog could not be cross-examined, noted that photographs and exhibits also cannot be cross-examined but are nevertheless admissible if relevant, material, and probative, if a proper foundation is laid. (Starkes v. U.S. 427 A.2d 437 (D.C. Ct. App. 1981).)

Proficient and effective canines provide a qualitative olfactory detection solution within a layered, mission focused, search strategy. They are not considered quantitative as responses require corroboration, instrumentally, visually or by anecdotal witness evidence. The weight of evidence in relation to detection canine responses will be considered within judicial process. Detection canine teams are a neutral, unbiased, search resource. Positive responses to odour may or may not be case related.

## **16.0 CUEING**

Cueing, in canine terms, is to illicit behaviour using signs, verbal commands, posturing, and consistent behavioural traits that the canine associates with actions.

All animals are trained with the use of cues. Only when the cueing results in behaviour that is incorrect does it become an issue.

Cueing is a term also used to describe the eliciting of a 'trained response' to target odour from a dog and includes:

- Verbal command
- Visual signal
  - Intentional
  - Unintentional

Whilst cueing may be appropriate in training, it has no place in testing or operational deployment.

Any cues used within the training regimen for the response to target odour must be extinguished. This is imperative as in operational use the canine will be required to conduct sniff tests under the direction of the handler, this must not be misconstrued as an instruction to provide positive response behaviour.

Lay persons and those not associated with the training and deployment of Forensic Canines may misinterpret cueing for handler interaction with the canine to sniff test specific items or locations. This type of detection canine should be specifically trained to 'detail', a system of search where the canine sniff tests specific locations as directed by the handler. Correct training and validation will ensure that responses are not coerced inappropriately.

### **16.1 Appropriate use of cues**

***Initial Training*** is appropriately biased towards success and it is essential that the correct outcome is achieved to properly train the canine. Cues may be appropriately used in the initial training of a dog for control purposes. When training a final response to human decomposition odour or human blood it is preferable to adopt operant conditioning methodology to reduce the requirement for cueing. This method also provides solid foundation for the principles of odour discrimination training and proficiency testing.

However, it is appropriate that canines deployed to conduct screening searches of items and crime scenes are trained to conduct 'sniff tests' that are directed by the handler. This involves the handler pointing directly at a point at which the sniff test must be performed. This to some may be considered an inappropriate cue and one that may elicit a final response. If the canine has undergone correct odour discrimination training it will not offer a final response unless target odour is present, no matter how insistent or persistent the handler's cue.

### **16.2 Inappropriate use of cues**

Cues are inappropriate when intentionally or unintentionally applied to a trained canine during a search operation. The cue may in some circumstances be described as a cheat but may also be as the result of a subconscious reflex on the part of a handler who influences the canine to give a positive response using a cue. It is for these reasons that when deployed operationally, handlers, as far as



is practicable, remain blind to known outcomes or intelligence that may influence their handling techniques.

Training, proficiency and benchmarking tests should include such exercises to test the skills of the handlers. This will include scenarios where there are visual clues present that may be misinterpreted by the handler who in turn may try to influence the decision-making process of the canine in relation to target odour.

### **16.3 Clever Hans**

*A form of involuntary and unconscious cuing. The term refers to a horse (Kluge Hans, referred to in the literature as "Clever Hans") who responded to questions requiring mathematical calculations by tapping his hoof. If asked by his master, William Von Osten, what is the sum of 3 plus 2, the horse would tap his hoof five times. It appeared the animal was responding to human language and can grasp mathematical concepts. It was 1891 when Von Osten began showing Hans to the public. It was eventually discovered (in 1904) by Oskar Pfungst that the horse was responding to subtle physical cues (ideomotor reaction) or as Ray Hyman puts it "Hans was responding to a simple, involuntary postural adjustment by the questioner, which was his cue to start tapping, and an unconscious, almost imperceptible head movement, which was his cue to stop" (Hyman 1989: 425).*

There are defence Expert Witnesses that will rely upon Clever Hans and attempt to discredit handlers. Particularly where canines are operated on the leash.

This increases the importance of odour discrimination testing and the independent operation of canines away from the handler.

### **16.4 Safeguards**

To extinguish cueing and ensure that it is not occurring in the operational scenario, the following safeguards should be in place:

- Handlers and trainers are employed within a career structure and are well paid. They rely heavily upon reputation, credibility, integrity and are aware that to intentionally cue a positive response when deployed operationally risks their liberty in addition to their careers. They are also aware that any such action is likely to severely disrupt an investigation and may be the

direct cause of a miscarriage of justice.

- Handlers are trained within an open and honest continual assessment environment involving blind and double-blind exercises with controls. Cueing would cause false positive responses and a decrease in statistical proficiency resulting in the removal of the dog and / or handler from service.
- Handlers are aware of odour threshold levels of their canines and that a known positive outcome may not produce a positive response due to a low amount of human decomposition odour or human blood being available. Thresholds of these resources vary, and it is possible that when a low amount of odour is present, two canines may give different responses.
- Research and development may only progress in a blind or double-blind environment where there is no handler influence other than directional control.
- Negative outcome searches, where there are no known training aids, are conducted during exercise periods which occur on most days. Once initially certified, the find to search ratio during training sessions is very low.
- In training a variable reward system is utilised where the final response is reinforced by rewarding at variable rates. Operationally, in assessment, and in research scenarios, the dog is not rewarded as the outcome is unknown to the handler.
- The canines are operated off lead; the search is directionally controlled by the handler with the use of verbal and visual commands. The search is a free-flowing exercise where the dog is kept on the move at a considerable distance. Any change in behaviour is observed by the handler who continues to make progress through the area. The decision to respond positively or negatively is made by the canine without influence from the handler. It is a common occurrence for the canine to exhibit a change in behaviour, investigate, dismiss the odour and move on.
- A false negative response, where the canine fails to locate known presence of human decomposition or human blood odour, has less of an impact upon the proficiency of a team than a false positive, in that false negatives do not incorrectly infer suspect complicity as would a false positive response. False negatives may be the result of a canine with an odour threshold that is not sufficiently sensitive to detect a low odour level, handler error in the search system, canine health or a combination of factors.

## **17.0 CANINE PROGRAM MANAGEMENT**

The Executive Management of canine detection programs should be conducted by SME's in conjunction with search managers and appropriate scientists.

Executive Management should ensure that all related employees and advisors possess the requisite credentials and experience to consolidate proficiency and mission effectiveness whilst promoting research and development and instigate a continual review policy.

It is not good practice to appoint non-experts with an expectancy for them to develop. This is too long a process and allows for the possibility of influence from other non-experts and persons looking for self-promotion.

Forensic canines provide support to investigators of the most serious of crimes. Crimes that are immediately of national and international interest to the media and public. Inefficiency reflects badly upon Value for Money and the reputation of our law enforcement resources.

A modular program of development must be in place for new personnel, and canine partners, with a safeguard policy to only retain the most mission effective resources.

National policies regarding the management, training and development of these resources must be considered at the earliest opportunity. Only when these policies are actioned will we satisfy the need for proficient and effective canine resources that support investigators of critical cases and provide realistic mission impact in closure for relatives and the prosecution of offenders.

## **18.0 SUMMARY**

Properly trained, proficient, and mission effective detection canines provide a qualitative olfactory detection solution within a layered, mission focused, search strategy. They are not considered quantitative but may be presumptive. Detection canine responses therefore require corroboration either instrumentally, visually or by anecdotal witness evidence. The weight of evidence in relation to detection canine responses will be considered within judicial process. Not by members of the public, the press, or anonymous critique within internet forums.

Detection canines provide a conduit for intelligence gathering in critical case investigation. However, care must be taken in the interpretation of canine responses. Investigators MUST look to SME advice and not make assumptions based upon detection canine responses without corroboration.

Detection canine teams are a neutral and unbiased search resource. Positive responses to odour may or may not be case related. Canines should respond to all target odour sources, recent or historical, source based or from migration through natural environmental causes and deliberate / accidental contact.

The reliability of detection canine teams is wholly dependent upon a science-based doctrine, Subject Matter Expert led training, development, and mission strategy supported by executive management within a robust Value for Money framework.

Forensic Canine resources do not merely recover deceased missing persons. Within the appropriate deployment strategy and subsequent correct interpretation of responses, they provide a detection resource that excels in the recovery of vital evidence and case related intelligence.

Law enforcement should embrace the potential of canine detection in this field. Through investment in scientific research and development of canine resources there is a potential to improve our response to the investigation of homicide, abduction, false reporting of abduction, and other serious and critical criminal investigations.

It is not sufficient to continue to train detection canines of this type based upon practices and systems from 30 years ago.

Martin Grime

## *Forensic Canine Handler – Required Skills*

Foundational Learning Material derived from practitioner experience and supportive scientific Proof of Concept.

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## **1.0 INTRODUCTION**

The investigation of homicide, and abduction where homicide is suspected, requires that searches be conducted for related evidence and associated intelligence sources. Forensic Canine teams may be deployed to assist investigators and crime scene investigation specialists within strategic missions to locate human remains, human blood and related odour that may provide mission related intelligence.

Experientially Forensic canines are not deployed to incidents where the deposition of human remains have already been located and potential evidence recovered. They are deployed when other resources have failed, or when the expected scenario is complicated with a low expectancy of success using more traditional forensic methods. This therefore requires that both the canines and their human partners are both effective and efficient if any success is to be forthcoming. This may only be achieved through the training of required skill sets for both the canine and the handler to robust standards of team proficiency.

Canine detection proficiency and mission effectiveness of these resources are wholly reliant upon the appropriate knowledge and practical skills of the handler to effectively conduct high confidence searches. Therefore, consideration should always be given to the professional development of handlers who should be allowed the opportunity to develop skills and qualification through both practical and academic teaching.

There are minimum standard requirements essential to the success of any search mission. These requirements should be set by the end user and proficiency tested within practical operationally based training scenarios prior to deployment. These scenarios should include testing within expected environments and contexts.

To facilitate professional development, validation criteria should be set, the required knowledge furnished through modular training courses and supported by appropriate documentation.

When executive management and end users require validated standards of proficiency and mission effectiveness from detection canines, it is only right and proper that the same is expected from the handlers and those responsible for the interpretation of canine responses. It is incumbent upon canine team supervisors

therefore that the handlers are provided the necessary training and professional development to acquire and retain the required skill set.

It is advisable that prior to investment in training and development prospective handlers are tested as to their suitability for the role, and that all modular supportive training packages are prepared and made available.

## **2.0 REQUIRED SKILLS**

The following skill set is relevant to practitioner proficiency and operational effectiveness:

- Canine training
  - Control
    - Obedience
    - Socialisation – team dynamics
    - Search – directional, ground coverage,
  - Odour generalisation and discrimination
  - Final response
  - Training aid acquisition, storage, use and disposal
    - Compliance with Human Tissue legislation
- Canine operation in the field
  - Ensuring maximum mission effectiveness
  - Interpretation of canine behaviour
  - Ability to plan and execute high confidence searches
  - Ability to advise Investigators and search managers
- Man tracking and ground sign recognition
  - Handlers should possess such skills where they may locate graves from ground sign
- Search
  - Interpretation of intelligence and behavioural principles of deposition
  - Search mission planning
  - Application of search principles
  - Interpretation of canine responses
  - Crime scene investigation principles



### **3.0 REQUIRED FOUNDATIONAL KNOWLEDGE**

Forensic Canine handlers should have a foundational theoretical knowledge and practical experience of the listed subjects. Such knowledge will increase their mission effectiveness and allow them to consider the appropriate juncture in which to deploy their resources and the available geoforensic and scientific support.

- Canine olfaction and detection
- Foundational principles of scent / odour - chemistry
- Practical application of the principles of odour migration in all contexts
  - Hydrogeology
  - Direct and indirect contact with source
  - Proximity absorption
  - Chimney effect within certain geological contexts
  - Effects of environmental influences, weather conditions and human interference
    - Animal scavenging
    - Barometric pressure
    - Humidity
    - Temperature
    - Precipitation
    - Groundwork
    - Landslip
  - Chemistry of decomposition process
    - Foundational knowledge and understanding required for the acquisition, handling, storage and disposal of appropriate training aids.
    - In depth knowledge for associated research and development.
  - Behavioural science in relation to homicide and disposal of remains and related evidence.
    - Required for search planning and identification of areas requiring detailed examination.
    - Behavioural science will assist handlers understand the deposition process and the disposal of related evidence.
  - Intelligence gathering

- Essential for the practitioner to accurately interpret unexpected canine responses.
- Geophysics
  - Essential to understand complimentary search resources that are available and at what stage of the mission plan to deploy – before or after canine.
- Geology
  - Essential to understand the ground in which deposition occurs and likely effect upon migration of odour.
- Crime Scene Investigation
  - Forensic awareness is imperative if evidence is to be secured and protected.
  - Canine practitioners should at all times be aware of the consequences of working within a potential crime scene and the impact it may have on vital evidence.
  - Knowledge and experience of Crime Scene Investigative measures will allow the canine practitioner to decide if the deployment of detection canines is appropriate, and at what stage to do so.

#### **4.0 SCENARIO DESIGN**

Practical scenarios should be designed to replicate as far as is possible all expected mission expectancies. This having been said it is essential that canine teams 'stay within their lanes' and only react to appropriate requests for assistance.

Scenarios may be stand-alone canine problems or be inclusive of problems that other resources such as Crime Scene Investigators, Geophysics, Underwater Search, Ground Search, and Search and Rescue teams, may become involved.

Scenarios should follow a planned model from a fictional event but should replicate real life incidents as near as is possible. Time lines should always be considered as should the transference of odour, blood spatter, crime scene cleaning, and human remains deposition processes.

Persons planning and supervising practical scenarios should be search trained and be cognitive of canine detection capability.

Training odour samples should be specific to the scenario and to the substances to which the canine has been trained and validated. In the case of Forensic Canines these should be human specific.

All scenario planning should be recorded and be inclusive of expected outcomes.

Appropriate records should be kept and should include critique upon search method, execution, outcomes, training requirements and professional development opportunities. Records should be made available for research purposes.

## **5.0 CONCLUSION**

I fully support a requirement for detection canines to be scientifically trained and validated within odour generalisation and discrimination criteria. It is essential for the purpose of mission effectiveness that they also undergo training and testing within practical scenarios.

This provides search experience for canine teams and evidence of practical mission suitability and potential effectiveness.

Whilst it is essential that detection canines are validated to agreed proficiency and mission effectiveness standards, it is equally important that the handler (practitioner) has the required skills and proven ability to function effectively within complex homicide investigations. Handlers should be validated within both theoretical and practical skill sets.

It is incumbent upon agencies employing detection canine handlers to policy credible and achievable validation criteria for both the canine and handler. They should provide the required training and professional development opportunities to reach and exceed the required standards.

Policy should reflect validation criteria to end user requirements and be inclusive of expected mission outcomes.

Martin Grime

# *Forensic Canine Validation*

Foundational Learning Material and guidelines

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## **1.0 INTRODUCTION**

Validation of detection canine teams to scientific 'proof of concept' design is recommended to ensure that both the handler and canine consistently operate effectively to strategic mission requirements within a Value for Money framework. The process of validation also provides training methodology benchmarking opportunities and the continual assessment of developmental process of the canine team.

Validation provides credibility in support of the reliability requirement to apply probable cause and reasonable suspicion, whilst in addition providing confidence in relation to the intelligence value of canine responses. The more stringent a validation process the more evidence in support of reliability is acquired.

In recent times, since the advent of DNA, social media, and a greater public interest in the performance of law enforcement, the standard of evidence required for judicial process has increased. We, as an industry that provides intelligence as to the whereabouts of substances with a potential as evidence against a suspect, should look to ensuring that our canine teams are validated to the highest standards whilst maintaining agency resilience. These standards should be scientifically supported and conducted within robust and stringent scientific method. We should however realise that detection canine responses are unlikely ever to be accepted within judicial process in a similar way to DNA evidence and will always require corroboration. To apply similar standards of accuracy does not therefore comply with Value for Money principles.

A review of cases from around the world has shown that canine detection responses are being challenged on a scientific basis that the minimum standard for validation, and the subsequent inclusion of evidence, should be through independent double-blind proficiency testing. A method of testing where the canine, the handler, and independent examiner are unaware of the correct outcome as a way of minimising or eliminating bias that may consciously or subconsciously affect the results of the assessment.

If we are to accept double-blind validation as the standard benchmark for detection canines we should also accept that detection canine training is founded upon that principle.

It is logical therefore, that if we are to embrace scientific principle, we should also adopt scientific method and the support of appropriate scientists in the design and application of scent and odour generalisation and discrimination processes. This does not mean however that scientists should dictate policy. There are many operational requirements that demand consideration, resilience for example. There is no point in setting unachievable standards, or those that may be attained only by a small percentage of canine teams.

The collaboration of professional, qualified and experienced canine handlers and trainers, with appropriate scientists will undoubtedly improve the standard of canine detection and increase strategic mission impact. The scientific input must always be appropriate. Suggested backgrounds being in chemistry and geology, these being the two most appropriate for training, validation and research. Handlers and trainers within U.K. law enforcement are generally very skilled, whether they include animal behaviourists in their training regimen and research would be through agency policy and requirement.

Within the skills set required of detection and search, humans apply their natural senses. These senses are enhanced by way of scientific instruments, visual enhancers, tools, and appropriate animal olfactory assistance. Proficiency is based upon the ability of the human to operate the assets effectively. This includes the operation of canines.

A proficient and effective canine team is one where the handler and canine are both independently skilled and competent. The canine must operate to certain end user requirements to be mission effective, whilst the handler must have the skills to read behaviour changes of the canine and apply those changes to the context in which they are operating based upon mission intelligence. It is not merely sufficient for a handler to expect a canine to operate independently. The importance of handler skills must not be underestimated by management who should structure professional development accordingly. Dependent upon mission status, canine handlers may benefit from generic search and intelligence interpretation training.

The overall performance of a canine detection team is measured through multiple areas: training, annual certification assessments, proficiency assessment, and confirmed operational outcomes.

Performance within research may, or may not, be an indicator of canine performance and is not normally included in performance records. It is suggested that the inclusion of operational detection canines within research is restricted to operational context type exercises. Research involving complex odour discrimination testing is best undertaken by canine teams specifically conditioned to task.

## **2.0 VALIDATION**

Validation is the assessment of a detection canine team's performance and provides a proficiency benchmark that meets the minimum standards of agency policy pertaining to strategic mission requirements. Validation is first administered upon successful conclusion of initial training following a successful blind assessment conducted by the course instructor or supervisor.

The validation assessment is conducted within a double-blind scenario and is inclusive of scent or odour generalisation and discrimination tests, and operational contextual and mission related problem solving.

Agency policy may include the requirement for independent testing. This may not comply with value for Money principles due to the impact of financial charges for testing, and retesting.

Validation should ideally be conducted on a number of occasions throughout the year and may be considered within a framework of continual assessment. Training should not be considered as validation. Training is rightly and appropriately designed for the canine detection team to be successful. Training is not therefore conducted double-blind.

Validation opportunities:

- Initial validation upon conclusion of basic training.
- Annual validation.
  - Most agencies have a policy of annual validation and certification. Usually upon conclusion of a refresher training course.
- Upon handler reteam, following appropriate training.
- Bracketing, prior to and upon return from operational deployment.
  - Provides evidence that the team were competent prior to and upon completion of the deployment and therefore are likely to have been



- competent during the deployment.
- Operational outcomes.
  - Confirmed positive or negative outcomes in double-blind operational tasking provides validation support.
- Upon return to duty following an extended period of absence due to injury or illness.
  - Agency policy should be inclusive of detail.
- At the supervisor's discretion based upon performance in training or operational mission deployment.
- Prior to and upon completion of research testing (bracketing).
- Calendared monthly testing.
  - Agency policy may support monthly, or quarterly, validation in support of a 'rolling annual validation' policy.
  - Provides Value for Money in that canine teams are less likely to be taken away from duty to complete annual validation during periods of high volume mission requests.

Agencies may be required to justify validation policy within judicial process. It is likely that annual validation alone will not be accepted as sufficient. Quarterly validation within a rolling validation policy as a minimum is advised.

### **3.0 PROFICIENCY STANDARDS**

Proficiency Standards should be set to establish the Canine Detection Team professional standards required to achieve full End User Requirements. The Standard Benchmark should be 'Pass' or 'Fail'. Percentage accuracy, whilst informative, encourages elitism and may adversely affect the experience of canine teams. The most proficient being preferred for operational deployment.

The required standard should reflect the minimum end user requirements to successfully complete the strategic mission.

### **4.0 ASSESSING A DETECTION CANINE'S PERFORMANCE**

The assessment of detection canine teams is conducted within the following contexts:

- Scent or odour generalisation and discrimination testing within a scientific context where the canine, independently from the handler, conducts a series of 'sniff tests' of samples inclusive of controls. The type of controls

and placement within a system of 10 tests is decided randomly. The test is repeated 10 times providing for a percentage performance rating.

- Scent or odour generalisation and discrimination within an operational type context where natural controls may reasonably be expected to be present. Additional controls may be included but consideration should be given to the fact that these odour sources will be alien to that context and will likely draw the canines attention far quicker than if it were a naturally occurring problem to solve.
  - For example, if a hole is dug within a natural context and a target substance is buried, the canine may be drawn to the hole as being a 'new' event. Therefore, a number of holes should be dug to allow for discrimination. Care must be taken with regard to odour transfer through direct or indirect contact.

#### **4.1 Assessors**

The credibility and reliability of detection canine's rests upon the training and validation of both the canine and the handler. Therefore, there is a requirement for the validation process to be beyond reproach. It must be fair, open, honest, and consistent. It should accurately reflect strategic mission requirements whilst applying Value for Money principles

Assessor qualification should be a matter of agency policy. Policy should reflect a 'peer review' process and dictate qualification and experience required. Ideally, assessors should undergo foundational training and be certified through a system of validation. Certification should be mandatory and reviewed periodically.

It is not merely sufficient for assessors to be scientifically qualified when assessing performance and interpreting animal behaviour. Assessors should be experienced in both the training and operational handling of detection canines. Scientific qualification should be appropriate to the knowledge required, chemistry preferably.

#### **4.2 Canine responses**

Detection canines are conditioned to provide a known behavioural positive response to target odour.

- **Positive response**
- The canine provides a conditioned positive response which is subsequently corroborated.
- **Negative response**
- The canine conducts sniff tests and does not provide a conditioned positive response.
- **False positive**
- The canine provides a positive response to a **known incorrect outcome**.
- **False negative**
- The canine does not provide a positive response to a **known positive outcome**.
- **Inconclusive response**
- The canine response cannot be corroborated or discounted. This includes changes in behaviour which the handler cannot accurately interpret. However, handlers may air on the side of calling a positive response and advise further investigation.

Canine olfactory detection is not an exact quantifiable science. Animal behaviour is interpreted in the provision of intelligence to investigators and search managers. This must be considered by agencies when designing policy and by assessors when applying that policy.

### **4.3 Blind testing**

In blind testing, the canine handler is not told if a target odour is present or where a target odour is located during the experiment, thus excluding the handler from consciously or subconsciously signalling or cueing the canine to respond when they know they are near the target odour location.

During blind testing, precautions are taken by the assessors to avoid being positioned to give cues to the handler or canine that could indicate that they are approaching, or near to, a target odour.

Blind testing would be appropriate within a training regimen where an instructor wishes to benchmark a student's progress. This would comply with Value for Money (VfM) principles to avoid the expense of an independent examiner.

#### **4.4 Double-blind testing**

In double-blind testing, neither the individual monitoring the test, nor the handler knows where the target odour is located, thus eliminating bias and subconscious or conscious cueing from the handlers and the organisers. A suitably qualified detection canine Subject Matter Expert and appropriate scientist should design and supervise an appropriate test scenario based upon agency policy, end user strategic mission requirements, and Value for Money principles.

#### **4.5 Arguments against double-blind testing**

Some may argue against double-blind testing on grounds such as health and safety. Any argument may be countered by the fact that in most operational contexts the outcome is unknown, otherwise searching would be unnecessary, and are therefore considered double-blind.

It may also be argued that whilst double-blind testing is a scientific gold standard when validating canine teams within an operational context the policy should reflect assessing the handler capability and skills. This is best achieved by an assessor that is aware of the correct outcome. This of course would not be required within a laboratory-based odour discrimination test.

The obvious solution is therefore to assign two assessors, one who is aware of the correct outcome and one who is not.

#### **4.6 Controls**

Controls and distractors are applied within training exercises, proficiency assessments, research, and validation testing to achieve the following:

- Tests the canine cognitive process of scent and odour generalisation and discrimination.
- Tests the detection threshold of olfaction in the individual.
- Ensures that the canine is not merely responding to the 'significant' presence of a substance alien to the environment.
- Ensures that the canine is not merely responding to a pungent and persistent source.
- Shows that the canine is behaving as one expects based on previous knowledge, experience, and observations.

- Enables the trainer or experimenter to pinpoint error if something goes wrong.
- Allows for an opportunity to extinguish unwanted behaviour
- Eliminates alternate explanations for experimental results.
- Allows researchers to draw the conclusion that the cause of the experimental result was only a consequence of the variable being tested.

Controls are always naturally present in scenario-based search environments:

- Animal remains
- Urine
- Faeces
- Discarded foodstuffs
- Grills
- Trash cans
- Live human scent
- Diapers
- Tennis balls and other common canine reinforcers
  - Anecdotally, tennis balls that are found during searches are recovered and retrieved to the handler. This is not a sign of inefficiency, it is a good performance indicator in that it shows the canine is motivated to the task of searching to contact. It is an indicator of correct odour discrimination and conditioned responses. The canine retrieves the tennis ball and returns to the handler, but barks and holds on human remains, thus performing two distinctly different responses.

#### **4.7 Control Types**

Great care should be taken in relation to the use of controls when planning the method of validation, particularly when conducted indoors within a scientific type testing regimen. Consideration should always be given to:

- Cleanliness of venue and equipment
- Air flow
  - Consider purging area
- Type of samples
  - Randomly decided

- Placement of samples
  - Randomly decided
- Pungency
- Odour mixing
- Size of samples
  - Smallest detectable with least sniffs
- Vapour pressure
- Temperature
- Humidity
- Integrity of samples
  - Ideally scientific analysis of samples should be considered for comparison and research data
- Appropriateness
- Proximity absorption
- Only non-absorbent, easily cleaned, equipment to be used
  - Glass
  - Stainless steel
  
- **Negative controls** - No canine final response is expected. For example, when testing a dog, the negative control would be any odour NOT within the conditioned canine odour recognition and detection repertoire.
- **Blank controls** - A blank is a training aid conduit (container, scent pad) that does not contain target odour, yet retains its own smell. A blank is a form of a negative control. It is essential to include blanks in training to ensure the canine is responding to human decomposition odour and not something associated with the training aid (container, scent pad).
- **Positive controls** - A canine positive final response is expected. Positive controls allow the researcher to know that the canine is responding as it should base on previous experience. The dog should alert or react when encountering a scent pad that contains the smell of human decomposition odour. A lack of a reaction to a positive control lets the trainer or researcher know immediately that something is wrong.
- **Distractors** – Negative control odour sources that are common place to the canine and which are intended to test distraction from mission objectives, handler odour, food etc.
  - Great care should be taken during the design phase of validation assessment of canine teams. Consideration must be given that some distractors will result in unwanted canine behaviour. The

introduction of canine urine or faeces into a laboratory type scenario will likely lead to a natural canine response of urinating in the laboratory. Food may be eaten, reinforcers may be retrieved.

- Those responsible for method design should consider that canines trained in operational type contexts will be experienced of distractors, there may therefore be no justification to include such distractors in scientific type odour discrimination tests.

## **5.0 TRAINING CONCEPT**

Training method gravitates towards successful outcomes so as to provide opportunities for behavioural conditioning and reinforcement. Training sessions should be designed to create situations where the dog can learn and be rewarded for successful (desired) behaviour. Conversely, failure to design a training session which allows the dog to be successful will result in an inability to obtain a desired behaviour. Thus, training records are not to demonstrate proficiency, but to record training frequency and action plans, if applicable, between benchmarking assessments and validation tests. They are primarily for the information and action of management to accurately assess the training development of human and canine resources and to provide evidence of suitability or to justify removal from the program.

Only blind and double-blind testing provides evidence of proficiency, effectiveness and mission impact.

Training method should be modular and designed to encompass end user required strategic mission related competencies of the team. Modules will provide the necessary training to establish those competencies which will be subject to proficiency assessment, validation, or professional development planning to attain the required standard.

The end user should only be offered canine detection teams that are strategically prepared and validated to mission requirements. It is incumbent upon the end user to apply due diligence to ensure that any canine resources are fit for purpose prior to deployment. To this end they may wish to examine training, assessment, and validation records and conduct independent bracketing assessments.

Handlers and trainers should embrace double - blind validation and assessment as an opportunity to display their canine partners skills. They will gain confidence

in mission effectiveness and be in an excellent position to become involved in research and development to the greater good of the industry.

## **6.0 ANNUAL CERTIFICATION VALIDATION ASSESSMENT**

It is common place for agencies to include an annual certification validation assessment. A lengthy process that not only tests the team's ability to generalise and discriminate target substances, but also tests other required professional skills.

Canine teams are trained, proficiency tested and certified to standards that meet or exceed agency guidelines. The certification process is conducted annually over a period of days and encompasses:

- Odour Recognition
- Odour generalisation
- Odour discrimination
- Comprehensive Testing to include:
  - Operational scenarios
  - Negative area searches
  - Controls
- Blind and double-blind testing – sniff tests
- Laboratory testing sniff tests
- Control exercises
- Focus and motivation assessment
- Report writing
- Search strategy review
- Deployment planning and preparation.
- Training aid handling, storage and security
- Health and safety
- Animal care
- Kennel management
- Driving assessment
- Firearms assessment – requalify
- Human and animal first aid

The canine program manager is responsible for managing training, proficiency testing and the annual certification process.



The program staff and appropriate scientists are involved in the preparation of blind and double-blind scenario search preparation, briefing and supervision.

Research scientists are involved in the preparation and supervision of blind and double-blind laboratory testing including controls. They should conduct appropriate comparative instrumental analysis of test samples both prior to and upon conclusion of the tests. They should not independently interpret responses or formulate conclusions without collaboration of the handler and canine supervisor.

The validation process should be recorded, and reports submitted inclusive of method. There should always be in existence an appeal process in the event of failure and recommendations as to development through training action plans and benchmarking.

On completion of Validation testing the program manager will make a judgment from reported test results as to the proficiency of the canine team. The following circumstances may apply:

- The canine team is validated and certified.
- The canine team is validated and certified with a performance action plan allowing for minor control and behavioural issues only to be addressed.
  - Any deficiency in odour discrimination will result in failure of the assessment.
- The canine team is not validated and is subject to remedial training prior to retesting or is withdrawn from service.
- The canine is reteamed with a new handler.
- The handler is reteamed with a new canine.

A printed certificate of validation should be issued on successful completion and be available upon request.

## **7.0 PROFICIENCY ASSESSMENTS**

Agency policy may introduce proficiency assessments in addition to Validation.

Proficiency assessments are constituent part of continual assessment. They allow canine teams to become accustomed to a culture of performance review and attaining high standards. Blind or double-blind tests that gauge a canine team's

performance at a specific point between validation assessments. The proficiency assessments range from simple odour recognition to operational type search scenarios. They differ from validation testing as they are performed in operational type unfamiliar contexts. They will be inclusive of negative searches to ensure the canine teams are not expectant of 'finding' on each and every deployment. They hone the search skills of the handlers and provide opportunities to include other search resources.

Proficiency assessments provide a benchmark for the purpose of developmental planning and advancement. They also provide suitability evidence in the support of decision making processes in the hiring of new handlers and acquiring new canine recruits.

The scientific community determines the accuracy of a quantitative instrument by knowing the expected outcome and gauging the instrument's response to the control presented to it; the accuracy of the instrument is never gauged upon its performance in an uncontrolled setting. Instruments are usually calibrated, sensitivity is adjustable, and they provide either specific 'yes' or 'no' answers or a quantitative analysis for interpretation.

Assessing the performance of a detection canine team within an operational type context differs from gauging an instrument's accuracy in that detection canine assessments are reliant upon such variables as area coverage, sniff rate, detection threshold, weather, atmospheric pressure, odour availability. The canine first has to be guided to the correct location. Whereas instrument performance is assessed by offering a sample to the device. Therefore, assessment of canine teams needs to be a comprehensive test of all the identified required skills of the team, not merely odour discrimination testing.

## **8.0**     **RESEARCH**

Research may be carried out within a science related or operational type context. Research is typically conducted within two distinct areas: testing with compounds known to elicit canine responses and testing with compounds or single chemicals with unknown outcomes. The experiments are conducted double-blind to eliminate bias. The results of research testing on unknown compounds are not applicable to the overall proficiency of a detection team.

The inclusion of detection canines within research should always be appropriate and enhance the subject matter. Not merely be included to add an interest value to readers.

Canine teams included within research should always be validated to the intended method. They should undergo benchmarking tests both before and upon completion of the research testing. Failure in either tests should render any data recorded as unusable.

For research to be considered as a measure of proficiency there must be due diligence to examine and peer review the researcher's method, application, interpretation and conclusions prior to publication.

Researchers should consult with a reputable canine detection Subject Matter Expert in the specific field being researched prior to method planning and at each stage until completion. Ideally canine detection SME's should be co-authors if canine testing is included.

## **9.0 RECORDS**

Agency policy should reflect that training records are maintained and made available for scrutiny from the most recent annual validation assessment through the following annual validation assessment. Proficiency assessment records should be maintained from the first passed annual certification assessment through the working life of the canine. These will include all blind or double-blind test results, with research tests being the only exception. In research the outcome of the tests cannot be predicted unless operational type target material is included.

Training records that include failures, incorrect responses, or behavioural inconsistencies should also include opinion as to why it occurred and appropriate remedial action to be taken. They should then include progress reports of remedial action and any subsequent related assessment.

## **10.0 BENCHMARKING PROFICIENCY**

Experts within the canine community generally agree that the reliability of a canine/handler team is determined upon the results of certification and proficiency assessments (controlled tests) and confirmed operational outcomes.

As scientific instruments are subjected to calibration to ensure accuracy, detector canines must be shown to be operating within specific acceptable parameters of accuracy. Proficiency tests, certification processes, bracketing, and confirmed operational outcomes are the only benchmark methods available to determine the capability of a canine team as they include blind and double-blind testing with the inclusion of controls.

Canine training gravitates towards success, therefore training sessions should not be construed as benchmarking proficiency. Benchmarking is included upon conclusion of training modules to provide evidence that the learning requirements have been achieved, or further training is required.

Any and all opportunities to benchmark a detection canine teams performance should be taken advantage of. This will not only support mission proficiency but will provide data for continual assessment of policy, training method, validation criteria, and operational outcome expectancy.

## **11.0 SUMMARY**

Scientifically supported proof of concept design validation method, to mission focused end-user requirements, is essential for Forensic Canines to be deemed competent for deployment within critical case homicide and reports of abduction.

We have shown that such resources are capable of recovering human remains from complex search contexts, recovering evidence that would not have been possible using tradition methods, and providing pivotal case intelligence that provides investigators and prosecutors a foundation to identify and process offenders.

Development of this type of detection canine, within a robust end user requirement validation policy that encompasses the collaboration of appropriate scientists, will enhance present forensic capabilities through the provision of an additional, effective and credible olfactory layer of search capability.

Martin Grime

## *Practical Training and Validation Scenarios*

Foundational Learning Material derived from practitioner experience and supportive scientific Proof of Concept.

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## **1.0 INTRODUCTION**

Practical scenario creation for the training and validation process of Forensic Canine teams is an exciting proposition that requires imagination and knowledge of human behaviour within homicide, abduction and serious assault scenarios.

Both canines and humans learn from experience, it is essential therefore that we do not limit our efforts to the capability and effectiveness of target odour discrimination. If we are to provide quality canine detection teams, we must be inclusive of simulated mission focussed practical scenario exercises within our training and testing regimen. Whilst this may in the first instance appear to be a reasonably simple task there are many impact factors that must be considered.

The overall mission effectiveness of Forensic Canine teams is directly proportionate to knowledge and experience. Therefore, appropriate simulated practical training exercises should be included within modular training and validation criteria.

## **2.0 TRAINING SAMPLES**

Here in the U.K. we are limited by the Human Tissue Act 2004 to the type of training aids we may use to simulate sub - surface deposition of human remains. It is unlikely that we will ever be in a position where we may legally acquire human remains for the purpose of simulating sub - surface deposition scenarios. This is not an issue as it is the headspace odour the canines are detecting. We must therefore research methods of applying human decomposition related odour sources to replicate headspace odour emitting from the ground or water courses.

To achieve this objective, we will look at delivering aqueous solution on land and airborne samples within water. Neither system requires the disturbance of the search context or leaves 'clues' as to the location of the simulated source.

We will look at remote delivery options including Unmanned Aerial Vehicles (UAV) and Diffused Air Delivery (DAD) within water, from land or from a boat.

### **3.0 IMPACT FACTORS**

Great care should be taken in the design phase of practical training and validation exercises. It is important that we accurately represent expected mission scenarios without training the canines to 'problem solve' through associated clues left by the exercise management.

When designing training and validation mission type scenarios the following impact factors should be considered:

- Detection canines sample the air to detect headspace target odour.
  - The VOC's associated to the target
- Mission related scenarios must accurately represent the target odour reasonably expected to be experienced within end user requirements:
  - Age of sample
  - Size of sample
  - Context
  - Detectable amount of odour (threshold)
- In the design phase of the exercise consideration should be given to the disturbance created within the search context by the placement of targets.
  - If the exercise is to represent sub-surface deposition consideration should be given to the digging of holes, movement of soil and rocks etc. Any ground disturbance, even footfalls, should accurately represent the time line of the training design. One cannot accurately represent a historical deposition within a training exercise applied the previous day.
  - Great care must be taken when digging holes or probing the ground within training scenarios. It is entirely possible that detection canines may only associate target odour to recent ground disturbance. We do not wish to train 'ground disturbance detection dogs!
- When placing training aids within an outdoor context, consideration should be given to the laying of trails and tracks by the person placing/hiding the target. Canines are sentient beings that have the capability of problem solving. They will soon learn that to achieve their mission it is possible to follow a recognised odour trail of trainers or track footfalls to the target. Their mission is to search to contact, covering the ground within a systematic plan:
  - In the design phase of the exercise persons unknown to the canine



- should be allocated to assist.
- Training samples should be specific to that one exercise.
  - Control samples will exist naturally within the environment.
    - Animal remains, faeces and urine, trash, food remains, decomposing vegetation, live human scent
    - Placed control samples will naturally attract detection canines as 'alien' to the context / environment.
  - Items associated with deposition or evidence of the crime may also be included.
  - Behavioural science should be applied when simulating deposition:
    - Parking of vehicles
    - Distance to carry a body
    - Tools
    - Digability
    - Evidence disposal
    - Likely depth of grave
    - Dismemberment
      - Multiple targets
      - Multiple locations

#### **4.0 PRACTICAL SCENARIO CHALLENGES**

For the purpose of benchmarking proficiency of canine detection teams, and to provide as near to realistic experience as possible, it is advisable that they are put through their paces within behavioural designed practical scenarios that accurately replicates reasonably expected investigative problems.

Scenarios should replicate as far as is reasonably achievable:

- Planning of homicide or abduction
- The event
- Weapons used
- Blood spatter
- Crime scene clean-up attempts
- Deposition tools
- Transportation
- Preparation of ground
- Disposal of evidence
- Time - line

- Transference of odour

Scenario exercises may include the combined resources of Crime Scene Investigators, Investigators, searchers and geophysics.

## **5.0 CONCLUSION**

For the purpose of validation, benchmarking and to gain as near to real life practical experience, canine handler teams should be exposed to double – blind practical scenario challenges.

Such scenarios provide opportunities for research, training and operational development, and educational data.

## **6.0 DISCUSSION**

Considering the content of this paper it may be considered that training of these resources may be nationalised or regionalised at academic centres of excellence.

This will allow agencies and individuals concerned in the investigation of serious crime to concentrate on operational issues, leaving the complex problems of training sample acquisition etc to others.

Martin Grime

*The Inclusion of Forensic Canines within Scientific Research  
and Subsequent Publications*

Foundational information and guidelines to students, scientists, practitioners  
and supervisors.

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## 1.0 **INTRODUCTION**

The purpose of this narrative is to address my concern as to the occasional perceived inappropriate inclusion of detection canines within scientific research, the interpretation of resultant flawed data, and subsequent publication of incorrect and misleading conclusions that may undermine the credibility and integrity of researchers and canine teams. Rather than expend valuable time and considerable effort in discussing previous studies, I feel it more appropriate to cascade my thoughts based upon my operational search experiences, success, and involvement in research.

Credibility is the primary criterion that must be established within canine qualitative and quantitative research. It is required to establish trustworthiness and confidence in the canine resources deployed within strategic missions to recover missing persons and locate evidence for the subsequent prosecution of offenders.

***The cognitive process of olfaction discrimination in detection canines is of paramount importance, we therefore must ensure that training, validation and their involvement in research is as unambiguous as possible so as to accurately interpret canine responses and formulate rational conclusions.***

This policy is generally agreed and accepted by scientists and practitioners within the industry. However, current policy and practices do not often reflect the concept.

Historically, the scientific community has provided some excellent support to canine detection practitioners, providing 'proof of concept' data that assists in training design and mission strategy development. However, whilst reviewing recent publications, submitted draft narratives and other documents, it is apparent that some research is being conducted by persons who have not been sufficiently supported by appropriate scientists and Subject Matter Experts, and have insufficient knowledge and experience to do so with any credibility. Experimental design flaws and inappropriate canine testing methodology incorporating canines that are not validated within the experimental context has led to inaccurate results and detrimental conclusions. This not only casts doubt over the associated canine capability but upon detection dogs in general. This is

of some considerable concern when defence lawyers worldwide have access to such information and will make every effort to discredit canine detection at every opportunity.

This may be addressed through collaboration of scientists and canine detection Subject Matter Experts 's within research, and a structured approach to professional and academic development through foundational education. This will promote the ideal that scientists and canine detection practitioners are understanding of both the chemistry and the canine olfactory sensory detector whilst providing a more robust consultancy and peer review process.

***'The inclusion of detection canines within scientific research must be appropriate to the subject matter, and only include canines that are trained and validated to conduct such research in the context to which it is being applied. Forensic Chemists and Detection Canine Subject Matter Experts (within the field of research subject) should be consulted at the planning stage to approve of proposed research method and be involved in any interpretation of responses and forthcoming conclusions. Subsequent documents submitted for publication and inclusive of canine training or testing should undergo peer review by suitably qualified and experienced Subject Matter Experts.'***

Staffordshire University are presently considering a proposal to integrate Forensic Canine science into the School of Law, Policing and Forensics to provide a seat of learning for graduate, post graduate students and the industry as a whole. This will include facilities for research and acquisition of appropriate target odour samples that will be available to researchers and practitioners.

## **2.0 FORENSIC CANINE BACKGROUND**

Prior to consideration being given to conducting detection canine olfactory research it is important that one first fully understands the complexities of the subject matter. Much research has been conducted using scientific instrumentation that includes but is not limited to Gas Chromatography coupled to Tandem Mass Spectrometry. GC/MS/MS) is used to separate and record data pertaining to organic compounds in a mixture. This technique is increasingly becoming the analytical tool of choice when analysing target compounds in complex matrices. Resultant data is recorded and published for the information

and consideration of the scientific community. Occasionally, scientists conducting this type of research include canines. The inclusion of canines is not always appropriate, testing method is often fundamentally flawed with canine responses being misinterpreted leading to incorrect conclusions that adversely affect canine detection credibility.

Forensic canine olfactory detection requires the generalisation and discrimination of live human scent, deceased human decomposition odour and trace evidence of bodily fluids. The canine olfactory system may be likened to the GC/MS/MS, but one must consider that the canine is more perspicacious in its analytical sampling and its cognitive ability to problem solve.

Properly trained detection canines provide intelligence to investigators and forensic practitioners of the location of odour that is associated with mission target substances. This is achieved through canine olfactory generalisation, discrimination and cognitive process. It is the function of investigators, searchers and forensic practitioners to interpret intelligence correctly and locate physical evidence. It is the function of prosecutors to review intelligence and evidence obtained through the application of detection canines, apply the rules of evidence prior to inclusion in legal proceedings, and ensure that the court is understanding of foundational principles.

Cognitive function of the canine is rarely considered and often overlooked. Scientists tend to assume canines will function within perceived scientific, logical and predictive parameters. This is not the case, canines are a natural scavenger that operate within the same environment with different more basic life sustaining objectives. Sustenance, safety of the individual and the pack, and procreation. Olfaction generalisation, discrimination and cognitive analysis of odour is paramount to their existence in the wild. Therefore, they will always be drawn towards odour sources that are significant to their existence. (Food, predators, family members, perspective mates, prey, tracks of injured animals.) It is very unlikely that a canine will be trained to show no interest in this type of odour source. This observation should always be considered within research method planning, interpretation of results, and when formulating conclusions. Canines will always gravitate towards, and show interest to, odour sources described above. Inclusion of food, urine, faeces and other natural attracters should be carefully considered prior to inclusion in research testing of canines. Research data that is inclusive of evidence of a canine being attracted to such odour sources would not

be considered to be 'ground breaking' or 'innovative'.

The canine olfactory detection system is far more sensitive and discriminatory than most people may imagine. It is more impactful to provide examples of this statement than a definitive statement: **(For the purpose of describing and when referencing forensic canines, 'scent' refers to live human smell, 'odour' refers to the smell of human decomposition and bodily fluids.)**

*One may take a sterile gauze pad and have four people add to it their personal scent by direct contact. The pad is then stored in a sealed glass jar. The four people meet at a single predetermined point. At the same instant they walk away in different directions. A randomly selected member of the group stops at the end of their scent trail. The others having completed their scent trails return to a staging area. Sometime later the remaining three return to the original meeting point. A properly trained and validated 'Trailing Dog' is brought to the meeting location from which the four persons walked away. The dog is offered the odour pad containing the group of four's mingled odours. It is allowed to briefly sniff the pad and is then introduced to the group of three in turn and allowed to sniff test each person. It is then mission tasked. The dog then discriminates the missing person's scent from the group of four, identifies the missing person's presence at the meeting point and then follows that individual's scent trail to its conclusion where it 'tags' the correct person stood in a group of other people.*

*A child was reported as having been abducted during the 'jacking' of a vehicle driven by her father. The following intelligence gathering searches were conducted by a properly trained and validated Victim Recovery Dog (VRD). Search of the family home resulted in a positive response within the child's bedroom. A search of a building resulted in positive responses to the child's blanket and car seat. The search of a vehicle storage building containing many cars resulted in the positive response to the child's father's vehicle. All searches were conducted blind to the outcome. Although the child's body has never been found however, the canine responses were corroborated by anecdotal witness evidence and the father was convicted of homicide.*

*Within a historical homicide investigation, forty plus years previously, intelligence identified a large area of interest that required searching for sub-surface deposition of human remains. Forensic Canine searches resulted in positive responses to leachate points in one specific and identified geological hydroplane.*



*Ground water samples were acquired from locations within the hydroplane, that when screened by the Forensic Canine within a scientific process inclusive of controls and odour distractors, positive responses were forthcoming. Analysis of the samples provided data that supports the presence of human decomposition in the area of interest.*

*During a missing person / suspected homicide investigation a totally burnt out vehicle was screened by a Forensic canine. A positive response was forthcoming to ash within the rear passenger foot well. Subsequent laboratory analysis of a sample from the foot well identified the victim's DNA. Further searches by the same canine produced the sub surface deposition site of the victim.*

*A canine has the natural ability to accurately decide upon the direction of travel of a track laid by prey, or humans, through the olfactory comparison of 2 -5 footfalls.*

The examples above show that a properly trained Forensic canine, if deployed appropriately within an intelligence led mission strategy, may provide pivotal intelligence to investigators that may not be otherwise forthcoming. This may only be achieved by canines that are trained and validated to stringent standards of detection with regards to odour detection threshold and human source specificity.

It is unlikely that science will produce a portable quantitative analytical instrument that may accurately mimic the canine olfactory analytical and sentient capability. If we are truly motivated towards the investigation of serious crime, and the prosecution of offenders, we should look to embracing canine olfactory capability and strive towards improvement and development of investigative qualities. The inclusion of the scientific community within any detection canine program is paramount to success, but only if conducted in an appropriate manner by those qualified and experienced to do so. Scientists should support resilience of canine detection programs through foundational education, consultation, and mentoring of graduates, postgraduates, practitioners, investigators and executive management.

These type of detection canines are best trained using the scientifically supported method of specific target odour collection by direct contact absorption and indirect contact with the use of a Scent Transference Unit. Surrogate and pseudo scents

and odours should not be incorporated. They should be trained to scientific 'proof of concept' (published) principles through the guidance of full time Forensic Chemists and Forensic Detection Canine Subject Matter Experts.

Interestingly, these methods of odour coaction have been available for a number of years and yet United Kingdom law enforcement agencies, search and rescue, and private sector companies that operate this type of detection canine, continue to include surrogates (pig and pork) within their training policies. They obviously do so in a misguided belief that because they occasionally recover buried human remains as a subset of the animal decomposition that the canines are properly trained and validated. The inclusion of animal decomposition may only be considered appropriate if case investigators are satisfied with the present-day canine detection capability. Awareness of the content of this paper may convince investigators of the potential increase in mission effectiveness through the application of scientific principles, proof of concept, and development of resource mission effectiveness. It is incumbent upon the scientific community to support research and proof of concept principles and offer foundational education courses, education and consultancy support.

The 'Forensic Detection Canine' concept differs from other canine detection disciplines in that the target odours involved are instinctively recognised and investigated. We merely condition the canines to search to a predetermined system and provide a recognisable visual or vocal response to the presence of specific target odour. The challenge is in conditioning the animal to detect trace levels of odour in any and all contexts within sometimes very complex scenarios. This is achieved through focusing the animal's attention to task, increasing its sampling rate (sniff) per square meter and lowering olfactory detection threshold.

The task of locating a deceased and decomposing human cadaver on the surface of the ground is not challenging. This is often achieved by pet dogs with no detection training whatsoever. The intentional detection of a deceased and decomposing human cadaver buried to a depth of six feet, in compacted earth, forty years previously, is an extremely challenging mission that requires the greatest levels of proficiency and mission effectiveness. As does locating human blood deposits smaller than the naked eye can detect, or trace decomposition odour associated to primary, secondary, and tertiary contact with the deceased. Such levels of proficiency are only achieved through the application of scientific proof of concept principles and meticulous training methodology on a full-time

basis to provide extensive operational experience within a myriad of environments and contexts.

Forensic Canines designated to detect live human scent, human decomposition odour, human blood, and other related body fluids, are a proven search resource that may assist law enforcement investigators through the provision of case related intelligence as to the location of live missing persons, deceased victims of crime, deposition associated items, and may direct scenes of crime investigators to the location of vital evidence. However, to complete complex strategic missions effectively, these canine resources must be properly trained and validated within accepted scientific 'proof of concept' principles for resultant positive and negative responses to be of credible intelligence value. It is also of great value to operate both live human scent and human decomposition detection canines within complex missing person investigations.

Validation of Forensic Canines is conducted under two headings:

- *Quantifiable* odour discrimination ability
  - *Sniff tests providing yes or no responses*
  - *Collated data may become qualitative if performed to exacting standards*
- *Quantifiable* strategic search proficiency.

*Quantifiable* odour discrimination assessment is achieved through a series of double blind' laboratory type odour discrimination tests, inclusive of positive, negative and blank controls. This type of assessment requires the detection canine to systematically 'sniff test' samples and provide 'yes' or 'no' responses to the presence of target odour. Outcomes are known and therefore percentage accuracy may be calculated.

Quantifiable search proficiency assessment is completed 'double blind' within a mission focused practical scenario context. Within this context positive, negative and blank controls are either already in existence, or placed, and the canine is tasked to 'search' a predetermined area under the control of the handler. Odour distractors will naturally be present. Researchers should take care to note the predicted and experience distractors.

**Odour distractors** are usually pungent odours that are likely to distract the detection canine from mission focus. Experience indicates that the distraction is

increased when present within a laboratory context. These may include for example, but not limited to: food, animal urine and faeces, blood (including canine sources), deceased animals, birds and fish, freshly dug holes, decomposing vegetation, stagnant water. These naturally occurring distractors produce odours that will likely illicit some form of displayed interest from detection canines. Although it is expected that the detection canines should not provide a recognised positive response to such odours, there may well be displayed such behaviour as urinating. It is incumbent upon the canine handler to recognise such visual behaviour of interest, and whilst allowing sufficient time for a cognitive response to be provided, must move the canine away from distractors and continue the search.

Odour distractors will not, as a matter of routine, be included in laboratory type odour discrimination testing and research. This type of odour source detracts from the task of providing systematic screening with 'yes' or 'no' responses. The presence of distractors will be specifically justified through method and the aims of the research.

Scientists must consider odour influencers and the expected resultant behaviour of canines. Food whilst very unlikely to illicit a positive response, will likely illicit behaviour based upon the urge to consume, the presence of animal urine and faeces is likely to encourage the canine to urinate within the laboratory,

It should also be considered that when conducting laboratory type testing odour distractors are likely to interfere with systematic screening and the provision of 'yes' or 'no' responses with the minimum of sampling (sniff tests). Experience indicates that odour distractors also illicit more interest within a laboratory than they would within an environmental context. Exposure to this type of testing within the laboratory is likely to increase the distraction effect when conducting complex mission searches.

Validation is achieved through:

- Annual independent accreditation
- Continual assessment through benchmarking within continuation and refresher training.
- Bracketing assessment prior to, and upon conclusion of mission deployment.
- Mission effectiveness

Validation should include odour generalisation and discrimination tests that are conducted within both *quantitative* and *qualitative* assessment criteria.

Agencies may wish to include within policy that research does not apportion data towards opinion as to validation. Research will tend to include chemicals and concentrations such that an accurate interpretation of behavioural data may not be possible until corroborated through further testing.

So as to secure credibility and integrity, validation should be conducted independently to agreed policy, standards and methodology. The inclusion of appropriate scientists (ideally chemists) within the validation process is highly recommended. They should have the required knowledge and experience to plan and execute odour generalisation and discrimination tests to accepted scientific principles. They will also have the skills and experience to fully investigate anomalies and corroborate canine responses. It may well also assist in their research and promote publication of findings.

Within the UK, there are a number of law enforcement and other agencies that operate this type of detection canine. Whilst historically these resources have shown to be mission successful, the training and validation methodology cannot be fully scientifically supported as it is inclusive of animal remains. The national doctrine is weak, and validation requirements are not sufficient so as to produce mission appropriate for purpose search resources. Over confidence may be caused by 'finding' easily located targets, in training and during strategic missions, by luck, or by intelligence providing the exact location prior to search. Confidence in Forensic Detection Canines should come from blind and double-blind testing, in all expected contexts, to challenging threshold levels of target odour.

Historically, service canines were limited to detecting explosives and narcotics. Now within the canine community there are: guide dogs for the blind, hearing dogs, assistance dogs, therapy dogs, bed bug detection dogs, mobile phone detection dogs, endangered species detection dogs, explosives vapour trailing dogs, human trafficking detection dogs, cash detection dogs, tobacco detection dogs, medical condition detection dogs, to mention a few.

The development of the above types of canine detection tends to reflect the investment, research, and support, of both the public and the private sectors. Whilst it is accepted that there is a priority to protect our borders and the public, enforce the law, and provide the best possible healthcare we would argue that there is an equal moral priority to locate deceased missing persons to provide closure for relatives, and to recover evidence in relation to serious crimes against the person and the prosecution of offenders. There is little or no such support for the use of canines within forensics. This is of some frustration to the author, particularly when one considers the importance of forensics in the investigation of terrorist atrocities. We must therefore promote this field of detection. This is best achieved through a policy driven by scientists and the end user whilst supported by detection canine practitioners. Historically, Executive management have shown to be relatively unsupportive of these resources. Probably at no fault of their own as they have in the past tended to be influenced by persons who have little or no knowledge or experience in this field, misinterpretation and lack of follow up investigation of canine responses. Experientially, Forensic Canine missions tend to be successful when properly trained and validated detection canines are deployed within an intelligence led mission strategy, where the canine detection SME has been consulted and operates the canine within an investigative strategy, as opposed to just speculatively searching areas to which they are directed. It should always be realised that detection canines no matter how well trained are dependent upon the skills of the handler. We should therefore also research the efficiency of handler strategy and operation of the canine so as to identify and develop a specific skill set.

There is sufficient 'proof of concept' and supportive evidence of Forensic Canines through strategic mission success. The scientific community, and end users, should therefore urgently prioritise the advancement of Forensic Canine resources by securing the support of Executive Management through review of the proof of concept design and promoting canine detection within this field. This may be achieved by concentrating upon training design, validation principles, acquisition of appropriate training aids and lowering of detection thresholds. This policy should be driven by the end user, search co-ordinators and investigators, driving canine detection capability to identified mission requirements.

In support of the above we should look to providing learning opportunities of foundational knowledge and basic skill sets for those that may become involved in this field. This will also provide resilience for the future and encourage the next

generation to continue research and development from a position of understanding basic principles and concept design.

We should look to promoting Forensic Canine resources to support the investigation of crime, inclusive of terrorism, both within a search to contact context and the screening of potential trace evidence items that would not in the past be forwarded to a forensic laboratory due to budget restrictions.

In particular, the Human Blood Detection Dog is trained *specifically* to locate human blood to near invisible proportions in any context. When one considers that it may be deployed prior to Crime Scene Investigators to establish the whereabouts of a crime scene, post crime scene Investigation to increase assurance, and screen 100's of items or property/clothing per day that would not normally be examined due to cost restrictions, the potential for cost saving and increased detection of critical case evidence is immense. Researchers may wish to concentrate efforts to provide proof of concept and canine program design in support of this concept. Executive management may as a result be persuaded to invest in this type of research, particularly as it may be applied to ALL violent crime, including terrorism, homicide and serious sexual offences.

Presently U. K. detection canines operated within the mission to locate deceased persons are designated '**Human Remains Detection**' canines. This is a misleading descriptor as they continue to be trained predominantly with pig and pork products as a surrogate to human remains and are in fact '**Animal Remains Detection**' canines. Human remains cannot be used within canine detection training. Whilst this is true, there are other methods of acquiring appropriate human decomposition odour training aids. ("**Acquisition, Storage, Handling, and Disposal of Human Decomposition Samples for Forensic Canine Research and Training**")

Mission appropriate substances, for example, narcotics and explosives, the possession of which is unlawful to the public, are included in the training of law enforcement and other agency detection canines. The government and executive management are rightly of the belief that public safety dictates the canines are trained to detect mission defined target substances. It would be publicly disagreeable for canine trainers to use approximated surrogates, such as cleaning fluids, to train explosive detection canines deployed to protect public areas and our borders. They do however accept that it is appropriate to train canines

deployed to search for missing persons to be trained using pork products and pig. Research scientists, graduate and post graduate students, may wish to consider applying their academic and practical skills in assisting the detection community acquire suitable and appropriate training aids that may be instrumental in training fit for purpose and mission effective canine resources.

This will be better achieved if a decision as to what may be considered appropriate and acceptable is forthcoming from the community as a whole. Whilst some chase the most probably unachievable holy grail of producing a single product that will satisfy the complex requirements of human decomposition odour generalisation, our efforts are more likely better placed in capturing more widely encompassing samples. For example: Absorbent pads placed on mortuary cadaver to capture decomposition odour. If stored in glass jars in a cool, dark environment they will remain viable as training aids for 7-10 years. Given that there are many mortuaries within the U.K, opportunities exist to centrally acquire, store, and supply sufficient samples to satisfy a need for both canine training and research. This system may also be applied to acquire odour samples from grave sites, crime scenes, disaster scenes, and any location known to be a deposition site.

Executive management tend to consider all detection canines as being the same and are reliant upon canine program managers to supervise canine development and strategic deployment. Canine program managers should be qualified and experienced canine practitioners but are often placed in post due only to rank. They operate to ever decreasing financial budgets and strict Value for Money principles, their priorities rightly prioritising public safety through the supply of patrol dogs, and detection canines trained to locate explosives and narcotics. Research is not generally a priority to them, unless a reaction is required as a product of a catastrophic event, such as an explosion, or threat of using, a new and previously untrained explosive substance. They operate to agency doctrine and training manuals, which are rarely reviewed, and seriously outdated. They are restricted to train canine teams to agency validation standards developed to mission strategy that are not customer driven, the standards of which are aimed more at production of large numbers than high standards due to resilience targets.

It is therefore incumbent upon government departments to ensure that sufficient support is available to drive research that leads to improvement and development that may be disseminated to practitioners.



Contrary to common belief, forensic canine strategic missions are more complex, with search targets often more difficult to locate due to size (trace odour), placement or deposition, buried, dismembered and dispersed, submerged, burned etc. The amount of available and detectable target odour generally being far less than that available from Improvised Explosive Devices or narcotics. In some cases, detection of clandestine deposition can only be achieved through tertiary contact or from samples of ground water.

Explosives and narcotics odours are generally chemically consistent due to manufacturing process. Human decomposition odour is generally more complex, individually variable, due to context, microbial decomposition, deposition environment, moisture and air content, prevailing environment and climatic conditions for example. It is therefore essential that human decomposition detection canines are 'Generalised' to the full spectrum of the decomposition process from many sources. Generalisation is required for the process of simplification of detection. It is achieved through the training and testing of canines within a regimen of positive, negative, and blank controls, inclusive of odour distractors where the positive controls are from many varied sources. This process allows the canines to become experientially conditioned to the odour of human decomposition and not merely to a small sample set. Experientially, canines trained to detect only a small number of samples tend only to detect those samples, and do not respond to other positive controls when tested. This may account for animals trained in this manner not locating deposition sites that are subsequently located by animals properly 'generalised' to the target substance.

Practitioners within explosives and narcotics detection canine roles have opportunities for advancement and promotion due to the numbers employed in those fields of expertise. This is not the case with forensic canines. Therefore, there are very few recognised and qualified SME's within the forensic canine field of expertise. Doctrine and training tend to follow the guidelines for explosives and narcotics. Whilst basic general training principles may apply, they are not fully appropriate to the training of forensic canines due to the complexity of the mission. We may address the shortfall in expertise through collaboration, foundational teaching, mentoring, inclusion of SME's in research planning and appropriate peer review of publications.

Forensic canine resources are much fewer in number than other canine detection resources. Their mission proficiency expectancy is higher and the tasking more difficult. They are however only deployed when required, they have no routine screening duties to perform and therefore there should be more time available for training, research and development. They are however handled by persons with other duties and rarely full-time professionals in this field. Therefore, handler and canine mission experience is limited. These canine detection resources should be of the highest calibre. Unfortunately, doctrine, training, strategic mission manuals, proficiency validation, research and development would suggest that this is not the case. Proficiency and mission effectiveness are directly proportionate to training, validation and experience. Experientially, Forensic Canines are more mission impactful when allocated to a full-time detection team, trained and operated on a daily basis and involved in research.

Validated as proficient and mission impactful human decomposition canine detection teams are required to support land, and water, search teams within an intelligence led and scientifically supported strategic mission plan. Therefore, such teams must be developed within a structured, scientifically supported, and agreed doctrine of requirements that encompasses both canine and handler training to strategic mission requirements identified by the end user.

Mission proficient canine teams provide forensic evidence, and case intelligence, which must then be correctly interpreted and acted upon by investigators. Interpretation should be scientifically supported through 'proof of concept' to agreed validation principles, protocols, and operating procedures.

As scientists reach out in support of a better understanding of detection canine olfactory discriminatory capability, and related production of training aids, there has been a perceived requirement to include canine testing and subsequent publication of resultant data.

With the inclusion of canines within research there comes a moral and strategic responsibility to ensure that the mission credibility, and integrity, of detection canines is not compromised or undermined without good reason. The credibility and integrity of scientists is essential, for it is through them that 'proof of concept' and improvement is achieved.

Whilst researching odours and scents within the context of detection canines, we must consider that scientific instrument analysis of target substances, surrogates

and pseudo substances is quantitative and performed using calibrated devices. This provides the opportunities for corroborative research and publication thereby diminishing interpretation and argument. Our canine partners by comparison have the capability of similar analytical capability however their role is deemed qualitative. Canine detection is achieved through the process of olfactory sampling, perceived detection thresholds, interpretation, and decision making based upon experiential learning (training). It is generally accepted that the canine olfactory system is more sensitive to odour and scent than present scientific instrumentation. It is unrealistic therefore to make assumptions of a validated proficient canine failure where corroboration of an assumed incorrect response is not immediately available.

Research to date, involving the comparative analysis of odour samples from both live and deceased persons, has been crucial to the development of canine detection capability. We should therefore ensure that the incorrect, or inappropriate, inclusion of canines within research does not diminish the impact of the science, nor the credibility or integrity of detection canines.

Unfortunately, the author has experienced instances of research scientists failing to adopt a credible and robust methodology, this has resulted in flawed data being recorded and incorrect conclusions being presented.

### **3.0 EXECUTIVE SUMMARY – DETECTION CANINE CAPABILITY**

The reader should familiarise themselves with the required detection canine capability:

- **Human Remains Detection Dogs (HRDD):** Sometimes referred to as a Victim Recovery Dog (VRD), or Cadaver Dog, will *specifically* discriminate, and detect, human deceased victims, inclusive of dismembered parts, in all environments / contexts, on the surface, sub-surface, on land, and in water. The dogs should be trained to generalise the spectrum of decomposition process to allow for the investigation of recent death to cold case historical remains. This type of detection dog may detect human blood as a sub-set of human decomposition.
- **Human Blood Detection Dogs (HBDD):** Will discriminate, and detect, *specifically* human blood, that would not normally be located through visual examination due to size or placement. Should not respond to

human decomposition. Training and proficiency validation should ensure that the canine is generalised to human blood odour specifically.

- **Human Decomposition Trace Evidence Detection Dog (HDTEDD):** Will discriminate, and detect, *specifically* human decomposition odour, to trace proportions, brought about by direct or indirect transference from source. Training and proficiency testing should ensure that the canine is generalised to human decomposition odour. This role may be included within HRDD providing the canines olfactory detection threshold is so low as to be considered mission appropriate.
- **Human Scent Evidence Team (HSET):** Should *specifically* discriminate individual live human odour, confirm the presence of the target person, correctly identify an odour trail of an individual despite the presence of distractor trails, and accurately follow it to its conclusion.
- *When deploying HSET and HRD canine resources it must be taken into consideration that there will be a crossover of odours, as the decomposition process progresses, and the live human odour diminishes. Both assets may detect recently deceased victims. Or, HSET resources will follow the live odour trail of a person to a point it encounters human decomposition odour. Search strategists should in these cases deploy HRD assets at the point the HSET trail stops, particularly if near water.*
- **Scientific Research Dog (SRD):** Scientific research dogs that operate independently from the handler, should be trained to generalise and discriminate target odours / scents, pertinent to the research being conducted. They should be proficient within the testing regimen, with statistical percentage accuracy in excess of 98 %, and should operate to such proficiency within a familiar context containing positive, negative and blank controls, inclusive of odour distractors if present.

All the above should be operated within intelligence led, scientifically supported investigative strategy, or research policy, encompassing best practice guidelines as dictated by agreed doctrine, policy and Standard Operating Procedures whilst incorporating Value for Money principles. All the above should be independently validated to scientific 'proof of concept' and mission dictated policy through a process of continual assessment. That process should include odour

generalisation and discrimination testing in a regimen of blind and double-blind testing, inclusive of positive, negative and blank controls inclusive of odour distractors.

Canine search teams should be blind to the correct outcome or to such intelligence that may influence the outcome. Therefore, all handler / canine teams should operate blind or double blind in training, operationally, and when proficiency tested.

Forensic canine teams deployed within an intelligence led search mission, should be supervised by a Forensic Canine Search Expert.

The above described resources assist in the recovery of evidence through forensic examination that would not normally be located by other means. Forensic search methodology being mainly visual, canine olfactory investigation leading crime scene investigators to 'hidden' clues. They also provide case intelligence that may be substantiated by investigative means. Corroboration is required to substantiate canine responses, but few understand that this may be achieved through anecdotal witness support.

#### **4.0 SCIENTIFIC RESEARCH**

Canine detection scientific research has provided several sources for valuable knowledge in this field. For example, the research surrounding the use of canines to follow the scent trail of humans. This research established that human scent is individual and that canines possess the ability to catalogue an individual's scent from a given sample and follow a scent trail a number of days after being laid. Their abilities are so refined that they may discriminate one human scent from a number present and follow the scent trail of an individual irrespective of the number of other scent trails present.

This research also established that individual human scent may be captured and stored for future canine usage. This is achieved through direct contact and indirect headspace sampling. Both methods incorporate the usage of absorbent gauze pads.

Direct contact is achieved through the placement of absorbent gauze pads on mortuary cadaver. Headspace sampling is achieved by a vacuum type device used

to draw air from the subject, or article of clothing for example, onto gauze pads. The device is designated as a Scent Transference Unit (STU).

In research testing the STU is used to acquire headspace samples of all test materials. Positive, negative, blank controls and odour distractors. This system allows for the usage of such low quantities of odour that the canine is motivated to 'sniff test' individual samples in turn, and to make conditioned and experiential decisions from one source, as opposed to having to 'problem solve' and make a 'best guess' judgement due to the mixing of differing source odours and scents.

We have also conducted research to establish that this system can be utilised for the successful training of a Human Decomposition Detection canine. This was completed in the U.K. in 2007 with the resource operating for ten years with many successful missions and convictions to his credit. This system was adopted for the generalisation and discrimination of human decomposition odour, and the lowering of detection thresholds to include trace odour. It also allows for the lawful possession of human decomposition odour training aids that may be stored for very long periods of time. SOP's for the collection, storage, use and disposal are available upon request.

The STU may be incorporated into canine research. The device provides for low volumes of odour being available for use within the below described methodology. This ensures that research testing methodology is appropriate and that the training of strategic mission resources have a validated odour threshold that is consistent with operational requirements.

The STU is non-evasive and may be adopted for the sampling of grave sites and other deposition sites, scenes of crime, and associated property and clothing.

Human Decomposition odour is both pungent and persistent, Standard Operating Procedures (SOP's) for the use and cleaning of the STU may be provided upon request.

## 5.0 **FORENSIC CANINE RESEARCH GUIDELINES**

There are two types of research that may include detection canine involvement;

- **Scientific method in controlled environment**
  - Qualitative laboratory type testing where canines are tasked to sample positive, negative and blank controls inclusive of odour distractors, within identical set up test runs.
  - Quantitative data may be collated in the form of correct and incorrect outcomes.
- **Scenario method**
  - Mission type scenario tests in in operational contexts. Controls and distractors are included.

The following guidelines are offered for canine involvement within scientific research:

- Careful consideration should be given prior to the inclusion of operational detection canines in laboratory type scientific research:
  - Operational detection canines are trained, and experienced, in 'hunting' (search) target odour. This involves experiential learning and problem solving. Within a research context 'problem solving' is discouraged as canines may falsely respond to 'similar' odours that they 'perceive' as correct but are in fact false.
  - Operational detection canines may be included within research if trained and validated within the research context and bracketing test exercises are completed prior to and upon conclusion.
  - Canines included within research are required only to 'sniff test' samples and provide clear 'yes 'or 'no' responses within a laboratory type screening context. Testing is required to be completed within in a specific systematic method, it may therefore be more appropriate to train research detection canines specifically for the purpose.
- It may therefore be appropriate to train dedicated scientific research dogs, trained to generalise and discriminate target odours / scents, within a research context, pertinent to the research being conducted.

They should be proficient within the testing regimen with statistical percentage success rates of more than 98 % and should operate to double blind proficiency within an environment containing positive, negative and blank controls, inclusive of odour distractors.

- These canine detection resources will be highly proficient within blind and double- blind odour generalisation and discrimination testing. They may then be adopted by search agencies for development within operational mission contexts.
- The inclusion of canine resources within research should be officially sanctioned by Chief Officers, (Executive Management) with authority allowing for the publication of resultant data and conclusions.
  - Data and conclusions should be reviewed by the management of all canine teams involved in research prior to submission of documents for publication.
  - Consideration should be given to the fact that published data may adversely affect credibility and integrity of resources.
- All research testing should be conducted 'double blind', with minimal handler influence.
  - If trained correctly the canine should operate independently of the handler, off the leash but under directional control.
- Research methodology should be designed by scientists in collaboration with a Detection Canine Research Subject Matter Expert.
  - Research scientist teams involved in canine olfactory detection research should be inclusive of a chemist.
- Canine detection SME's will be supported by high-level educational institutions with biographies that must be inclusive of:
  - Appropriate canine and handler training qualification and experience.
  - Practitioner experience (Within the field of expertise).
  - Strategic mission experience and success. (Within the field of expertise).
  - Canine research experience.
  - Published author.
  - Science papers, articles, posters, etc.
  - Training manuals
  - Internal briefings
  - Public presentations
  - Credible references from the scientific community



- Consideration should be given to the appropriateness of inclusion of canine testing within research:
  - Does it add to the impact of the research?
  - Or would the scientific data 'stand-alone'.
  - Does it provide answers to questions and support analytical data, or merely pad out the scientific conclusion and add 'reader appeal'.
  - Are canines included only to further a researcher's interest in animals?
  - Does the inclusion of canines support the scientific data or create confusion?
  - Does the canine testing impact upon the credibility of the research data?
  - Does the canine testing positively or negatively impact upon the credibility and integrity of detection canines?
- Researchers should be aware of the wide-ranging impact of the above in relation to the world-wide usage of detection canines in the fight against terrorism, and major crime.
- Is the proposed research based upon a requirement suggested from previous research, or merely a repetition of similar research?
- Does the research conform with Value for Money principles?
- Have the researchers consulted with canine Subject Matter Experts as to requirement, methodology and possible mission, or pending court case, impact.
- Canine testing methodology should be scientifically supported through 'proof of concept' design within a scientific framework for validating proficiency.
- Canines utilised for research should be trained and validated to the methodology and physical context of research testing.
- They should operate independently from the handler to negate voluntary or involuntary cueing.
- They should be generalised to target substances through an odour discrimination training program.
- Generalisation comes from training on a wide range of acquired target substances (positive controls), negative controls, blanks, and odour distractors, forensically acquired, stored, and handled.
- Canine detection thresholds should be appropriate to the research method and operational settings.

- Canines should not have been trained using pseudo scent or surrogate substances.
- They should be trained a final response (indication) that is immediately recognisable, and not a natural behavioural action, such as sitting or lying down.
  - An accurate, solid, static '**point**' response of a minimum of 15 seconds is preferred.
- Testing should be conducted in a familiar indoor context, within a consistent environment, that is easily cleaned.

## **6.0 FORENSIC CANINE RESEARCH METHODOLOGY:**

Credible detection canine research may only be achieved through the application of robust scientific principles and properly trained and validated canine resources. Prior to conducting research involving canine's researchers should consult with appropriate Subject Matter Experts as to method design, interpretation and subsequent conclusions. It is advised that intended method should undergo a period of testing and development prior to the research.

Canine research testing is designed within a similar context to odour generalisation and discrimination training recommendations for operational mission detection canines. Agencies may therefore have suitably trained and validated canines available to assist with research. It may also be appropriate to include research within the agencies validation procedure.

Careful consideration should be given prior to including research testing results for validation of strategic mission resources. Within research it is entirely possible that odour sources may be included for which the canine outcome cannot be predicted or interpreted to be correct or incorrect.

- Canine testing should be conducted within an appropriate context taking into consideration:
  - Cleanliness
  - Access by canines
  - Health and Safety
  - Size of area
  - Air flow
  - Prior usage
  - Lingering odours

- Distractors
  - Distractions
- Canine testing should be conducted over an appropriate period.
  - Dependent upon how many test runs are required to complete the research this may take several days.
  - The very nature of this type of research testing tends to be demotivating if repeated 'ad nauseam'. This leads to incorrect responses being offered and flawed data.
- Screen multiples of 10 samples in test runs of 10 repetitions.
  - Provides a percentage performance result.
  - Choice of samples and placement is decided by random numbering.
  - An appropriate break period should be allowed between tests. This allows for the preparation of test samples and placement.
  - Canines should be moved to a staging area between tests and allowed appropriate exercise breaks.
  - The welfare of the canine will always remain the responsibility of the handler. Researchers must comply with handler advice as to motivation, focus and fatigue of the canine. It is not essential for all tests to be carried out on the same day, providing bracketing proficiency testing is conducted prior to a testing session.
- Each canine included should complete at least one round of tests prior to and upon completion of each session to provide confidence in resultant data. (Bracketing)
- Positive, negative and blank controls should be included within test scenarios together with appropriate odour distractors if required.
- Samples should be contained in identical, clean test receptacles.
  - Glass being the preferred medium, easily sterilised and sealed with Teflon lids.
- A minimum of 10 samples of each test substance should be available and numbered to allow for randomised usage and placement.
- Positive controls are not required in each test run.
  - Repeated positive responses in tests may convince the canine that it must pick one of the test samples.
- Blank only test runs should be incorporated.

- Test runs containing odour distractors only should be included if appropriate.
- Test runs containing one positive control with blanks should be included.
- Test runs of one positive control with odour distractors should be included.
- Type of test, and order should be decided by random number generator.
- Content of test sample receptacles, and order of placement, should be decided by random number generation.
- The canine's proficiency should be validated prior to and upon conclusion of research testing (bracketing).
  - Positive, negative, blank controls and odour distractors should be included in validation bracketing.

Canine research testing methodology should be inclusive of, but not limited to, the consideration of:

- Location
- Environment
- Weather
- Temperature
- Atmospheric pressure
- Humidity
- Airflow
- Sample size and placement proximity
- Concentration estimates of samples.
- Concentration needs to be above detection threshold but not so high as to risk impacting other samples in proximity.
- Vapour pressure
- Containers, small diameter
- Pooling and mixing of sample headspace
- Equipment
- Cleaning and subsequent canine olfactory proofing of:
  - Test venue including equipment
  - Equipment
  - Acquisition, storage and handling of samples
- Unrelated odour transference to test area by humans and canines.

- Conducting environment canine olfactory tests to establish baseline prior to, between, and following research testing.
- Analytical proofing of test controls prior to including in tests. 'Dip testing' samples will provide data for research and proof towards credibility.
- Canine research testing should be trained to negate as far as is possible any handler direction or interference other than to start and finish the exercise.
- This will be achieved through operating the canine off the leash whilst remaining under control of the handler.
- Canine handlers should not enter the room but remain at the entry door with the canine and test samples in view.
- The canine should be trained to wait at one place until instructed to start. (Starting point)
- Upon command the canine should approach the test samples and sniff test each test sample systematically from start to finish, only stopping to give positive responses.
  - The canine should not retrace its steps or sniff test samples out of sequence.
- Upon conclusion, with no responses being offered, the canine should move to, and remain at a 'finish point'.
  - The test run will be concluded:
- When a positive response is forthcoming. (Positive)
- When the canine completes the task with no responses forthcoming (Negative).
- If the canine SME present believes that the canine is not operating effectively.
- If an incident occurs that may adversely affect the research, spillage, distraction etc.
- Testing should be actioned and supervised by independent scientists, with independent canine SME consultancy support.
- Appropriate records should be retained and made available to appropriate canine agency / owners.
- Canine responses or behavioural changes should not be reinforced during testing.
- Executive management should be aware that testing of this nature upon operational canine detection teams may reflect proficiency and

provide statistical evaluation of detection ability in case related judicial process.

- Canines that cannot attain a high proficiency rating should not be deployed operationally.
- Research testing is one method that will assist the verification of canine generalisation to target substances and therefore assesses the suitability of individuals to future development and mission deployment.
- Interpretation of canine research testing data should always be completed with the involvement of Canine research SME's.
- Only true and accurate positive responses should be included in data interpretation.
- Perceived 'interest' of canines to specific test subjects should be interpreted as a negative, unless immediately followed by a true positive response.
- Changes in behaviour and 'interest' may be noted and considered when reviewing method.
  - 'Interest' may be an indicator of failure in training, test method, fatigue, or distraction.
  - For the purpose of research, only positive or negative responses should be considered. Unless of course recording of perceived interest is one of the researches aims.

## **7.0 PUBLICATION**

Scientific research conducted by qualified scientists is recorded and submitted for peer review prior to publication. Scientists are rarely qualified, experienced and recognised Subject Matter Experts within the field of Canine Olfactory Detection.

Research involving detection canines should be inclusive of recognised canine detection research SME's within the research design, recording and interpretation of data, conclusions, and publication. They may be considered for inclusion as authors, or their efforts at least acknowledged.

Publications of this nature should be 'peer reviewed' by appropriately qualified and recognised Subject Matter Experts from the specific canine detection field.

There are few such qualified and recognised SME's available. Consideration should be given to the provision of teaching courses at universities to appropriately

experienced canine practitioners to increase the number available for research, consultancy with law enforcement agencies, military, and private sector practitioners.

Publication should always include detailed description of:

- Canine resources
- Validation policy
- Age and experience of canine
- Bracketing validation
- Acquisition, handling and storage of all samples, including blanks, negative, positive controls and odour distractors.
  - Chemical signatures of above may be included if appropriate for comparative analysis.
- Method, inclusive of:
  - Description of containers, placement and size
  - Distance between containers
  - Context airflow, temperature, humidity etc.

## **8.0 RESEARCH TOPICS**

The following research topics may be considered:

- The prediction of deposition site location through the investigation of groundwater influences.
- Acquisition, storage, and handling of research and training samples.
- Odour transference
  - Migration
  - Contact
    - Direct
    - Indirect
  - Leaching
  - Proximity absorption
  - Groundwater
  - Animal influences
- 'How low can we go' – identify the minimum amount of detectable odour required to illicit a positive detection canine response.
- Recovery and subsequent analytical corroboration of transferred odour samples.

## **9.0**     **SUMMARY**

The application of Forensic Detection Canine resources that are properly trained and validated, within an intelligence led investigative mission, may provide critical case intelligence as to the movements and whereabouts of a missing person, recover surface and sub-surface human remains, and locate trace evidence that may identify suspects of crime.

Whilst detection canines may be included within scientific research their involvement must be both justified and appropriate. Canine teams must be validated to the applied scientific method and scientists involved must be suitably qualified and experienced within required inclusive fields of knowledge, chemistry for example.

Canine olfactory detection is a practitioner skill based upon scientific principles. It is critical to the credibility, integrity and proficiency of these resources that scientific support is forthcoming to provide foundational proof of concept and to support mission-based development. Scientists should not however consider themselves as canine detection experts based purely upon their scientific knowledge.

Experientially the most impactful research to date is founded upon collaboration between scientists and practitioners. A collective of appropriate experts allows for a more balanced and accurate method, correct interpretation of responses and responsible conclusions.

Martin Grime



*The Acquisition, Storage, Handling, and Disposal of Human  
Decomposition Samples for Forensic Canine Research and Training*

Foundational Learning Material derived from practitioner experience and  
supportive scientific Proof of Concept.

**Martin Grime**

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## 1.0 **INTRODUCTION**

The purpose of this white paper is to disseminate information to Executive Management, detection canine program supervisors, and practitioners, concerning the acquisition, storage, handling and disposal of human decomposition samples for forensic canine research and training.

Detection canine mission effectiveness is reliant upon odour association, discrimination, and generalisation training process, detection threshold, and accurate cognitive process, where mission specific target substance recognition is of paramount importance. Training aids must accurately represent the chemical composition of the olfaction search mission target substances. Surrogates and pseudo samples should not be used unless they accurately represent the chemical signature of the target.

The cognitive process of olfaction discrimination in detection canines is of paramount importance, we therefore must ensure that training, validation and their involvement in research is as unambiguous as possible so as to accurately interpret canine responses and formulate rational conclusions.

This policy is generally agreed and accepted by scientists and practitioners within the industry. However, current policy and practices do not reflect the concept.

Canines designated to detect human decomposition odour, and human blood, are a proven search resource that may assist law enforcement investigators through the provision of intelligence as to the whereabouts of deceased victims of crime, deposition associated items, and direct scenes of crime investigators to the location of vital evidence. However, to complete strategic missions effectively, these canine resources must be properly trained and validated for resultant positive and negative responses to be interpreted correctly and be of intelligence value. Training and validation come in two parts, *quantifiable* odour discrimination ability and *qualitative* strategic search proficiency.

Within the UK, there are a number of law enforcement agencies that operate this type of detection canine. Whilst historically these resources have been successful in the recovery of human remains, the training and validation methodology cannot be fully scientifically supported as it is inclusive of animal remains and foodstuff. The national doctrine is weak, and validation requirements are not sufficient so

as to produce credible mission intelligence gathering or highly effective search resources. Interpretation of canine positive responses must presently include the possibility of animal source material which therefore significantly dilutes intelligence value. This is not compliant with 'Value for Money' or scientific 'Proof of Concept' principles.

The application of surrogate material (pig and pork products) in forensic detection canine training is somewhat worrying. When one considers the target odours relating to Forensic Canines, decomposing remains and body fluids, these odours are naturally and genetically imprinted into a canine's olfactory library as being food source, being a natural scavenger. When one also considers the fact that approximately 180,000 pigs are slaughtered per week for the UK food industry there is a massive potential for pig and pork remains to be available for canine detection within the environment. Therefore, canines trained to locate and provide positive responses to pig and pork products cannot provide a similar level of credible investigative intelligence as one that is exclusively trained using human decomposition odour. When one considers the fact that we have trained detection canines to discriminate human decomposition from that of pig, pork, and other animal remains, the logical scientific approach to training would demand that Forensic Detection Canines are trained exclusively using human based training aids.

Interestingly, canines trained within the UK in the detection of: explosives, narcotics, cash, tobacco and other substances are all trained within a policy of the use of mission target substances. The public, Executive management and practitioners would not accept explosive detection dogs being trained using household cleaning materials for example.

Animal remains are reported as being included within UK canine training as a surrogate because human remains are not available in the UK for this purpose at this time. Human teeth and archaeological bone are included in training, but these bring to the fore a number of related scientific reservations regarding target odour integrity through inappropriate history of acquisition, handling and storage.

Human blood is also applied in the training of UK detection canines. Both scientists and practitioners should consider the following when interpreting canine responses in relation to the search for human blood:

- There is a chemical difference between wet and dried blood. A canine that has been trained to detect blood that has dried over a period of 24 hours will not necessarily detect recently spilled wet blood.
  - Research shows that the chemical signature differs considerably.
- Blood retains the scent of live humans.
  - It is used as an odour source for the application of trailing dogs to locate and discriminate live humans.
- As with human decomposition detection canines, canines trained to locate specifically human blood must undergo a considerable period of generalisation training.
- No assumptions should be made as to canines that are trained to locate human blood will respond to human decomposition odour.
  - A canine has previously been trained to locate and respond specifically to human blood and will not as a result respond to human decomposition odour.
  - This is of great assistance to investigators and crime scene specialists.
- Detection canines trained to locate human decomposition odour may respond to human blood as a subset.

## **2.0 FORENSIC DETECTION CANINE TRAINING AID REQUIREMENTS**

Prior to discussing the acquisition of Forensic Canine training aids, it is important for the reader to understand the basic requirements of training aids:

'Training aid' is an industry recognised term that refers to substances acquired for the purpose of olfactory imprinting of mission related target odour, and for validation purposes.

The term 'aid' is used because surrogates and approximations are sometimes included in training, and it does not imply any form of scientific authentication. A more appropriate reference would be 'specimen'. This term would better encourage the use of accurate and credible substances for the purpose of training and validation that may be scientifically authenticated.

- The integrity of training specimens is critical to mission proficiency and effectiveness.
  - Training aids must unambiguously chemically represent the odour signature of strategic mission target substances.

- Training aids must effuse only such quantities of odour that accurately represent the expected mission scenario.
- Training aids must be supplied within an eclectic policy to satisfy the principle of odour generalisation.
- Credibility of canine training aids must be achieved through record keeping of data inclusive of: method of acquisition, handling and storage, usage and disposal.
- Training aids should be made available to the scientific community for the purpose of analytical research and scientific substantiation of canine training method.
- Training aids should be acquired ethically and morally, handled within a forensic strategy, stored appropriately taking into consideration health and safety and environmental issues, and disposed of in a manner that satisfies moral, ethical and lawful policy.

Integrity of training aids is mission critical in that Forensic Canines are tasked within strategic mission strategy to lead investigators and forensic Crime Scene Investigators to the location of clandestine deposition and trace evidence. False positive and false negative canine responses may adversely affect the credibility of resources and reliability of case intelligence through misinterpretation. False negative responses where detection canines fail to locate mission targets are as equally, if not more, detrimental to investigations. Therefore, the canine detection threshold of target odour should be as low as possible so as to detect the smallest amount of odour attainable through behavioural conditioning.

So as to secure the highest probability of detection, canines should be trained to generalise the broad spectrum of human decomposition odour from immediate death to putrefaction and skeletisation and discriminate from animal remains.

Considering the previous information, training aids should conform to the following policy:

- Training aids should be acquired that are chemically consistent with the target substance.
- They should exude an amount of odour compatible with the canine detection threshold required to fulfil mission strategy.
  - Or be of a composition that may be manipulated to reduce headspace odour quantities.

- They should be procured through a robust forensic strategy to published policy guidelines that accounts for both credibility and integrity.
- Training aids should be stored to appropriate standards that protect the integrity of the associated chemistry.
- Accurate records should be kept of procurement, handling, storage, usage, recovery and disposal.

### **3.0 HUMAN TISSUE ACT 2004 – HUMAN TISSUE ACT (SCOTLAND) 2006**

The Human Tissue acts impact upon the training and validation system of Forensic Canines within the U.K. in that they provide policy as to the acquisition, transference, storage and disposal of material that is inclusive of human cells.

Although the acts are not inclusive of canine training they are related to research. The acquisition of appropriate training aids for canine training will most likely only be achieved through research channels. We should therefore comply with the acts requirements as best practice.

It may be appropriate to ensure compliance with legal requirements and to ease the challenge of acquisition of training aids that agencies and individuals acting as practitioners affiliate themselves with establishments that hold licences to store and use human tissue samples.

With the field of Forensic canines being relatively complex in nature, and with research ongoing, the affiliation with research establishments will increase the data available to scientists and ensure that appropriate training aids are available to practitioners.

Only collaboration between research establishments and canine practitioners will secure the availability of appropriate training aids for the future.

The Human Tissue Acts regulate relevant human material that consists of, or includes, human cells. Therefore, human remains, blood, semen, and teeth that may include human cells will be inclusive.

Agencies and practitioners that are at present using any of the above without a Human Tissues Authority Licence may therefore be in contravention of the Human Tissues Act.

## **4.0 TRAINING AID ACQUISITION**

The Author (MG) in association with the US Department of Justice (DOJ), Federal Bureau of Investigation (FBI), Evidence Response Team Unit (ERTU), and Counter Intelligence and Forensic Science Research Unit (CFSRU), assisted in the development of published concepts to capture human decomposition odour samples for the purpose of canine training that negates the requirement for tangible material. The concepts are based upon the fundamental principles of odour and scent transference via direct contact absorption, proximity absorption, and ground water influencers. These concepts allow for: the lawful and ethical procurement and possession of training aids, chemical integrity, ability to reduce odour headspace quantities to expected strategic mission proportions, ability to integrate samples into the environment and recover with the minimum perceived impact, ethical and moral disposal. They also provide authentic samples for continued analytical research and development of mission effective resources.

### **4.1 Odour Absorption - Direct contact**

Forensic Detection Canine human decomposition training aids may be created by the direct contact application of sterile gauze pads with mortuary cadaver within the UK. Or from international sources where the deceased have given permission for their remains to be used within research.

Direct contact absorption human decomposition samples may also be acquired from confirmed target odour sources such as *confirmed* recent recovery sites.

We have yet to conduct research to establish the impact of the Human Tissues Acts in that we need to establish if human cells are captured using this method.

#### **Method**

- Johnson and Johnson pads are used to collect samples over a period of 1 hour to Three days.
- The pads are prepared by direct contact with mortuary cadaver or other confirmed odour sources.
- No fluids or broken flesh.
- Pads are supplied in boxes in original wrappers.
- Mortuary staff, or CSI, wearing protective gloves, open the pad wrappers using disposable forceps and place the pads on unbroken skin, torso,



thighs, arm.

- The pads remain in situ for a determined period of time.
- The pads are then removed using disposable forceps and placed in sterile glass jars, sealed with Teflon seal lids.
- The jars are labelled with date and time placed and removed.
- The jars may contain a number of pads providing they are from one source and are from same batch.
- Labels will be serialised, with records kept of:
  - Date time and place samples are made.
  - Person responsible.
  - Serial number.
  - Date of removal.
  - By whom.
  - Date of disposal, as clinical waste.
- Samples are stored in cool darkened room, which ensures a shelf life of a number of years.
- Samples are used once only, and as soon as practicable destroyed.
- All persons coming into contact with the pads will be suitably forensically clothed, gloved, with masks.
- Samples should not be tainted with live human odour:
  - Breath
  - Contact
  - Sweat
- Samples should be obtained from as many different and varied sources as are available, variables will include:
  - Gender
  - Race
  - Age
  - Background
  - Employment
  - Time deceased.
- Samples should not be taken from cadaver that has been embalmed or treated with chemicals.
- Samples should be of single use and disposed of through burning.

#### **4.2 Odour Absorption – Non-contact – Proximity – Scent Transference Unit**

The SOP's for indirect- non-contact production of training aids is the same as for direct contact, except that a device known as a Scent Transference Unit (STU) is

used as opposed to direct contact. (Remote Air Sampling)

The STU is an electronic device that pulls air through a hood that contains a Johnson and Johnson absorbent pad, thus trapping the available Volatile Organic Compounds (VOC's) associated with human decomposition.

The amount, and source, of VOC's trapped is directly proportionate to the length of time the device is operated and the distance from the target.

Operating time will be decided upon and cascaded in briefing form.

Distance from target will always be between 1-6 inches, so as not to risk the trapping of unwanted environmental odour.

We have yet to conduct research to establish the impact of the Human Tissues Acts in that we need to establish if human cells are captured using this method.

#### 4.2.1 **STU Cleaning**

Human Decomposition odour is both pungent and persistent. SOP's for cleaning of equipment are available. Cleaning involves the washing of items with isopropyl alcohol. Research has shown that the mere wiping of equipment with alcohol wipes is insufficient to remove human decomposition sufficiently.

#### 4.3 **Odour Absorption – Non-contact – Proximity Absorption**

The SOP's for indirect- non-contact proximity absorption production of training aids is the same as for direct contact, except that the absorbent pads are placed in close proximity to the deceased. They may either be suspended or placed upon stainless steel racks immediately above the body.

Although this system is unlikely to capture human cells, appropriate research is being conducted.

#### 4.4 **Water**

Groundwater that migrates through a grave collects human decomposition related VOC's that are detectable through canine olfaction at leach points. This provides a method of acquiring training aids through submerging human decomposing material in water for a period of time before collection and storage.

A 5 cm cube of decomposing human flesh may be placed in a clean glass vile with a litre of water. This is left for a period of 1 day – 1week before removing the flesh, filtering the liquid and storing in a refrigerator. Chemical analysis may be conducted for comparison with the source for research purposes. The liquid may then be dispensed within a training scenario.

This type of training aid is excellent as it provides an opportunity to apply a non-visual source, and relatively low amount of odour that dissipates quickly leaving no detectable residue.

Filtering may remove any human cells likely to be captured using this method.

#### **4.5 Softwood Absorbers**

Softwood stakes may be used to absorb human decomposition related VOCs, cut to size and applied as training aids. The process is simple in that the stakes are driven into known deposition sites or within close proximity left for a period of time and then recovered. The stakes, or parts thereof may be subjected to scientific instrument analysis to confirm the presence of human decomposition related VOC's prior to use.

#### **4.6 Grave Dirt**

With the necessary permissions grave dirt may be acquired from suitable locations, homicide victim recovery, disaster recovery, archaeological digs. It is advised that scientific instrument analysis of samples is performed to verify chemical structure and ascertain whether human cells are included.

#### **4.7 Archaeological Bone**

Archaeological bone that has been stored at universities and other locations are unsuitable for canine training. Bone is porous and as such will have potentially absorbed odour from many sources either directly or through proximity absorption.

#### **4.8 Human Teeth**

Human teeth are chemically different to flesh and bone. It is agreed that they may be tainted with human decomposition through the remaining tissue immediately following extraction, but this will soon degrade to undetectable levels

of odour.

There will be very few homicide investigations where it is expected that the victim has decomposed completely and leaving no residual decomposition odour. Experientially the author has identified graves hundreds of years old without the need to train his dogs using human teeth. It is also very unlikely that a mission brief will be to locate single teeth removed from a corpse and buried individually.

I have witnessed a canine handler place single teeth in the ground as a training aid, allowing his dog to dig up the tooth and consume it. The ensuing choking apart, the forensic recovery process would be to recover the tooth from the canine faeces.

#### **4.9 Human Remains**

The author (MG) has been employed within agencies overseas that store human remains for the purpose of canine training. Despite financial investment in infrastructure and storage facilities the pungent and persistent odour of human decomposition is very difficult to contain and tainting of proximity items and general surrounds is commonplace.

The absorption method of capturing odour for the purpose of canine training is however much more user friendly and the odour easier to contain.

#### **4.10 Handling of Samples**

Samples should be handled in accordance with agency policy. Policy should reflect the forensic recovery of samples, handling and storage.

- Appropriate health and safety equipment should be worn.
- Samples should be handled with sterile disposable forceps.
- All equipment used to manufacture training samples should be cleaned or disposed of in accordance with agency policy.
- Samples should be placed in sterile glass vials or jars, secured with Teflon lined screw on lids.
- A label should be attached to the container that has a barcode corresponding to the acquisition and storage register data.

#### **4.11 Storage of Samples**

Samples should be stored in accordance with legal requirements and agency policy. Policy should reflect appropriate security and access. They should be refrigerated or stored in a cool dark room. A register should be kept containing data of: acquisition, source, storage, use and disposal. The register should accurately describe the source and any scientific instrument analysis of samples.

#### **4.12 Use of Training Samples**

- Only authorised persons should handle training samples.
- Agency policy will reflect Health and Safety, security, authority of use and involvement.
- Canine handlers as far as is practicable should not handle training samples.
- Training samples should not be carried within canine transportation.
- Training samples should be transported in airtight containers.
- Samples used within odour generalisation and testing within a scientific method will be presented in clean containers or suspended off of the ground using sterile disposable forceps.
- Samples used within operational type training contexts may be placed so as to accurately represent mission outcomes. This will result in absorption and tainting of samples by environmental odours and must be considered when recovering samples with the intention of reuse.
  - If placed within the ground to represent sub surface deposition negative control distractor ground disturbance should be included.
- When placing samples, consideration should be given to the fact that they are being introduced to an environment as a new and disparate item that will naturally attract the attention of the canine. Controls should also be included in training so as to ensure the canine is discriminating odour correctly.
- When planning training exercises it should be realised that the person setting the targets will leave an odour trail / track that may be considered a clue to the canine as to the location.
  - Distractor tracks should be laid
  - The use of aerial drones to deliver target odour within training search areas may be developed.

- Drones may also be utilised to collect samples of ground water, soil and other items for comparative screening in the laboratory.
- Training samples left in situ for long periods will promote the migration of odour. Variations in wind direction, humidity, precipitation, and atmospheric pressure will cause odour pooling. Samples may be disturbed by animals and human movement within the search area. Consideration should always be given to security of samples, and the appropriateness within the training environment.
- Consideration should be given to utilising water-based training aids within surface and sub surface deposition training scenarios. They only provide an odour source for a limited period of time but have the advantage of leaving no visual clues or disturbance and security is not an issue.

#### **4.13 Disposal of Samples**

Samples should be disposed of following single use. They should be disposed of in accordance with legal requirements and agency policy. Incineration is strongly advised with appropriate records being kept.

#### **4.14 Cleaning of Equipment**

Human decomposition is both pungent and persistent. Experience has shown that the cleaning of equipment should be through heat, steam, and copious amounts of alcohol. Wiping with alcohol wipes does not sufficiently remove decomposition odour.

#### **4.15 Use of Protective Gloves**

Traditionally protective gloves are used to reduce the impact of odour and human scent transference, and as a health and safety measure.

Practitioners should consider the impact of protective gloves to the environment and their actual usefulness. Particularly as detection thresholds are falling through research and development.

Careful consideration realises the following points:

- Disposal
  - Gloves tainted with the odour of contraband and human

decomposition are likely to enter the waste disposal system and have a potential to illicit positive detection canine responses within that system.

- Over confidence in a protective system will tend to decrease effective management of odour transference.
- Glove boxes are absorbent and will be tainted with many odours.
- One cannot remove gloves from the box without touching the outside of the glove, transferring human scent and any residual odour from the hands onto the glove, and then onwards to other items.
- In the past handlers and trainers have recovered samples by placing them inside a protective glove, thus transferring glove and human odour to the samples. Used protective gloves have been placed in plastic sacks and then disposed of through the waste system to landfill sites. If you follow this system, there is a potential for adversely affecting future searches through the transference of odour and scent.
- Protective gloves should be incinerated as soon as is practicable.
- Practitioners should research this subject and consider the use of forceps and other instruments for the handling of training samples that may be cleaned regularly during training. For example, the use of isopropyl alcohol.

These examples clearly show a necessity to regularly check that detection canines do not provide positive responses to protective gloves, handler and trainer scent through the inclusion of these scents and odours as controls within mission appropriate target discrimination testing.

#### **4.16 Delivery of Human Decomposition Odour to Water Training Contexts**

The training of canines to detect target odour emitting from water courses is one of the easier contexts in which to operate. Odour sources such as flesh and bone should not be introduced into the water. A remote air delivery device is required to pump human decomposition odour into the water, which will rise to the surface and be detectable through canine olfaction.

The device consists of an air supply, progressive air flow control valve, odour source reservoir, delivery tube, diffuser and sink weight. This device is easily constructed from parts available to divers. Police dive teams will assist in their construction and operation. It is entirely possible that with the current trend in

remote delivery a wirelessly operated device may be a feasible project.

The device is operated from the bank, or from a boat, to deliver target odour and switched off immediately prior to deploying the canine team. There should be no visual cues or markers that may assist the detection team.

#### **4.17 Sample Supervision and Supply**

So as to safeguard the integrity, security, and restricted supply of human decomposition training aids it is recommended that:

- There should be only one agency responsible for collection, storage, supply, recovery and disposal of training aids, to registered and approved entities.
- The University would be the ideal single point of contact agency. Funded by administrative charges.
- The university would be in a position for providing:
  - Compliance with the Human Tissues Act
  - Quality assurance
    - Random scientific instrument testing prior to supply
    - Testing upon return in support of correct canine responses
  - Security of storage
  - Record keeping
  - Canine validation kits:
    - Supply of kits to agencies comprising of sets of ten sample pads, positive, negative, blank controls. Inclusive of odour distractors.
    - Laboratory test run instructions.
    - Provision of results.
    - Provides for remote independent odour discrimination testing to a worldwide customer base.
    - Provides worldwide scientific support of proficiency and mission effectiveness.
    - Provides sample data for research analysis.
    - Eliminates the need for agencies to acquire, store and place human remains within the environment.
    - Provides an ethical solution to the problem of human remains odour supply for the purpose of canine training.



## **5.0**    **SUMMARY**

The possession of human remains is not necessary for the training of detection canines to strategic mission effectiveness. Published scientific principles and methodology exist for the acquisition of human remains related training aids through the collection and storage of associated Volatile Organic Compounds through the use of absorbers and water-based products.

The above described training aids have been successfully employed in the training and validation of a Human Decomposition Detection Dog that has been proven to specifically respond to human decomposition disregarding all animal and vegetative decomposition. This dog is proficient, mission effective and has had a significant impact in many homicide and child abduction cases where he has recovered human remains previously missed by traditionally trained search dogs.

Martin Grime

## *Forensic Cemetery Research Facility*

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## **1.0 INTRODUCTION**

A Forensic Cemetery is a research facility that provides a context in which human decomposition processes may be studied.

Human cadaver are deposited within the confines of the facility within a structured scientific research method so as to facilitate specific requirements. These may be chemistry, biology, toxicology, palaeontology, geological or other science related projects inclusive of Volatile Organic Compound (VOC) research in respect of canine olfactory detection.

I am very supportive of the commissioning of a Forensic Cemetery in respect of scientific research. Such a facility will provide excellent opportunities for researchers, students and practitioners in a number of fields that are supportive of criminal investigations.

In respect of headspace VOC research relating to canine olfactory detection there are a number of discussion points which should be considered.

## **2.0 EXISTING OPORTUNITIES**

We have a number of existing opportunities that prevail within the U.K. at present. We should consider the opportunities that are available from existing cemeteries around the country that may provide opportunities to obtain analytical samples from a far wider spectrum of differing geological and environmental contexts.

Air and groundwater sampling from in and around established cemeteries should possibly be considered. This data may be shared with environmental study agencies that are presently active in research research the environmental effects of human decomposition.

There are many other opportunities for research that pass us by which I feel should be addressed if we are to be convincing of a need for a specific research facility. For example, when homicide victims are located and recovered, at the scenes of mass fatalities either by natural disaster or terrorist related incidents. It may be more appropriate to justify the research and recovery of samples by Forensic Scientists than to justify the necessity for a facility where the research may be called into question due to the number of internments, chemical and odour mixing, baseline contextual and environmental chemicals, and the fact that only one site is being adopted for this research. Surely in the consideration of repeatability of research we should look to having numerous sites in different parts of the country at the very least.

If we were to conduct research inclusive of field sample testing a Forensic Cemetery would be available for the

### **3.0 DETECTION CANINE MISSION**

Forensic canines that are designated as human decomposition detection resources are required to be generalised to that specific target odour with a very low detection threshold.

Analytical sampling of human decomposition headspace has shown that there are variances in the type and quantity of VOC's from different sources. We should therefore provide training samples from many different sources.

Experience has shown that locating deposition sites of human remains in certain contexts requires canines to detect very low amounts of target odour. This is particularly relevant when investigating the migration and transference of odour.

Therefore, canines should be trained adopting a myriad of samples to the smallest amount of target odour possible (so as to locate residual odour) whilst retaining a non-aversion to large target source material (whole cadaver in advanced stages of decomposition on the surface of the ground – or multiple targets in one location).

### **4.0 APPROPRIATENESS OF FORENSIC CEMETRY IN RELATION TO CANINE TRAINING AND TESTING**

In the early stages of development, a forensic cemetery may be of some useful purpose to Forensic Canine practitioners in that the first one or two cadavers may present opportunities to perform mission related contextual detection exercises. It would also be of some practical usage to recover odour samples for the purpose of training and validation.

There will however become a point very quickly where the general area of the research facility will be saturated with human decomposition odour as more and more cadaver are introduced. This would not be accurately representative of mission examples for homicide investigations. Some may consider this to be more representative for Search and Rescue (missions where mass fatalities are expected) but my thoughts would be that this is not the case as the time of death and deposition of multiple bodies over time would not be accurately representative.

## **5.0 ANALYTICAL DATA COLLECTION**

I am whole heartedly in support of a Forensic Cemetery as it provides opportunities for the study of human decomposition related chemistry, odour migration and transference, and the detectable levels of related VOC's within a controlled environment. It will be extremely valuable in research to establish the effects of groundwater and inferring the location of grave sites through the prediction of groundwater flow. We should however consider the potential for 'mixing' of chemicals and VOC's from multiple different samples within the environment of such a facility, and its effects upon conclusions from analytical data.

I would be supportive of more than one site for the reasons previously mentioned.

## **6.0 CANINE TRAINING SAMPLES**

I would not be supportive of the removal of tissue samples, bone, teeth and other directly related samples for the purpose of canine training. I do not feel that this is necessary as we have other methods of acquiring training samples that are more appropriate and risk averse.

A Forensic Cemetery would however be in a position to provide training samples that are acquired through direct and proximity absorption onto pads, and through a process of aqueous purge.

## **7.0 CANINE VALIDATION SAMPLES**

I would be supportive of the use of human samples for the purpose of practical canine detection validation. However, there would have to be in place strict security so as to minimise risk, and the planning of exercises would have to be at the highest management level in association with both qualified scientists and Subject Matter Experts.

## **8.0 FORENSIC CEMETERY RESEARCH TOPICS**

A Forensic Cemetery research facility would be in a position to assist in many canine research topics that may include but are not limited to:

- The point at which the recovery of human remains by Search and Rescue dogs trained to detect live human scent becomes unviable and the remains may only be located by canines trained to locate human decomposition

odour.

- The effects of groundwater upon leachate produced from decomposing human remains.
- The extent at which human decomposition associated chemicals migrate in different environments and geological contexts.
- The effects of depth of deposition on land and in water in the canine detection process.
- Inferring the location of human remains deposition through the sampling of groundwater.
- The migration and detectability of human decomposition in the air over distance and time.
- The development of a reproduceable training odour mimic that accurately represents the odour of human decomposition.

## **9.0 CONCLUSION**

Whilst I feel that the introduction of a Forensic Cemetery as a research facility has a number of excellent research opportunities within a number of specialist fields I feel that it is not essential for the purpose of detection canines' training and development. That is to say, we may continue to train Forensic Canines without a Forensic Cemetery being available. It is more likely however that with the introduction of such a facility Forensic Canine detection of human decomposition odour will increase mission effectiveness through increased knowledge gained from research.

The facility may provide opportunities to obtain validated remotely acquired training samples to be included within a structured and modular training regimen. Other opportunities to acquire training samples may not afford us the opportunity of validating the authenticity which is required if we are to validate canine detection robustly.

A facility of this type may also provide opportunities to have installed at or nearby bespoke canine training, testing and research facilities.

Martin Grime

## *Forensic Canine - Value for Money Principles*

Foundational information and guidelines to students, scientists, practitioners and supervisors.

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## **1.0 PREFACE**

Value for Money (V.f.M.) is defined as being the optimal use of proficient resources to achieve intended outcomes and maximise the impact of spending to achieve and maintain strategic mission effectiveness. The optimal V.F.M. is to provide top quality resources at the most reasonable cost. Quality is dependent upon the process of creation of the final product at all stages of development. Foundation must be solid, with a modular process of progression to a finished article that is fit for purpose, proficient, and mission effective. The entire process is subjected to quality control through the policy of performance review based upon appropriate units of assessment and expected outcomes. The product must be periodically quality tested (validated) to ensure maximum efficiency.

There are a number of factors that will impact upon quality assurance, the most important being premium quality management, raw materials, professional development and resilience. Quality detection canine program management ensures that an organisation, product, or service is consistently operating to peak performance within mission guidelines to maximise the impact upon the tasking requirement. Without expert management of policy, strategy, procedures, continual development and review processes, the production of a quality service will likely fail. The mission will therefore always be unachievable.

## **2.0 INTRODUCTION**

The following information is included to provide the reader with a foundation of subject knowledge and a benchmark applied for the purpose of a financial review. Search is defined as the application and management of systematic procedures and appropriate detection equipment to locate specified targets within appropriate contexts. Search requires the application of mission focused systems combined with Subject Matter Expertise, an understanding of mission intelligence and the scientific support of detection resources that may be deployed to locate. It is these processes and the skills of the searcher that enables its discovery. The term *search* includes screening of persons and objects for concealed contraband.

Search may be completed by operational, trained and proficient persons, scientific instruments, forensic analysis and by canine olfaction. Search policy and mission appropriate strategy may dictate the use of one or more systems to secure high levels of proficiency and effectiveness.

Mission focused search systems prioritise the recovery of targets whilst also providing mission related intelligence. It is accepted that application of more than one system may be required to secure recovery.

A by-product of mission focused searching is the provision of case intelligence where canines respond to migrating scent and odour from source, residual scent and odour, or scent and odour that has been transferred by direct or indirect contact.

Statistical analysis of search data relating to recoveries of target material does not accurately assess performance unless policy, training, and operational strategy is mission focused and resources are proven to be proficient in the detection of contextually correct targets. Statistical analysis alone cannot calculate a Value for Money worth unless executive management place a monetary value upon negative searches where negative responses are forthcoming.

Canine olfactory detection systems are deployed to locate and recover evidence that may not otherwise be located in a timely fashion by human sight, instrumental screening, and physical searches.

Canines do not specifically locate the physical presence of targets. They detect the odour of specific agreed substances for the subsequent *finding* by humans through physical search. Therefore, the detection of trace amounts of substances and residual odour will provide intelligence for collation and interpretation.

Canines should be conditioned to contextual mission proficiency. They must be proficiency tested as *mission ready* prior to deployment. Not merely be assessed within a training regimen that bares no comparison to mission-based problems and expected outcomes.

All detection canine missions should be dictated by agency policy and specific strategic requirements, not by canine trainers and handlers. All canine detection services should be customer led. Canines may be trained to conduct diverse roles, providing it remains contextual to target substances. Operational mission usage of canines is contextual. Canine behaviour may be conditioned so as to perform different functions within different contexts where the context is a cue to tactical methodology. This provides the opportunity to increase the numbers of resources

that are available for deployment without increasing the number of canines and handlers.

Canines should not be dual - role in mixed and inappropriate substance detection. Narcotics and Improvised Explosive Devices (I.E.D) for example. They should also be trained using the substances considered as targets. The use of surrogates and pseudo scents are not considered to fall within sound V.F.M. principles. It is essential that positive responses provide intelligence that is not confusing to those interpreting canine responses where decisions are made as to appropriate action at a financial cost.

Mission based intelligence gathering, and executive management strategy, should dictate the search target substances to be located and to what specification (size). Scientifically supported Subject Matter Experts (S.M.E's.) and researchers will replicate mission type training scenarios and scientifically supported odour threshold testing to ascertain the detectable level of odour available and canine olfactory detection capability.

When designing detection canine policy, consideration should always be given to the mission expected detection capability within all reasonable and predicted contexts. The expected capability will dictate the required canine odour detection threshold of target substances. For example: Detection canines deployed within a crime scene should be capable of locating such small samples that would be invisible to investigators due to size or placement.

Odour threshold refers to the amount of target substance required to produce sufficient odour for detection and a canine response within a specific context. When considering the mission expected of forensic evidence detection dogs their detection threshold must be the lowest achievable.

Threshold is wholly dependent upon odour discrimination training within a laboratory type context, mission-based training, and proficient handling.

Proficient and mission effective canine teams are only produced through the application of mission focused policy and strategy, Subject Matter. Expert (SME) designed modular training, professional development, and appropriately qualified management.

The strategic effectiveness of any canine program is wholly dependent upon foundational subject knowledge, appropriate management and the proficiency of the canine trainers and handlers. Agencies must invest in a robust and effective professional development program so as to secure mission effectiveness and resilience.

Policy, strategy, target substance identification, proficiency testing, training systems, and deployment protocols should be *mission focused*, and appropriate to the host agency.

The most proficient and effective canine program will be one tailored to the prevailing needs of the service, mission context, and available intelligence. To merely follow the direction of other agencies in outdated policy and training methodology will not best serve the identified mission. To continually and consistently improve it is important to install a process of continual review and research towards improving standards.

Detection and recovery effectiveness are directly apportioned to the standard of excellence of those tasked with the mission. Appropriate expert management and training staff, together with robust recruitment requirements, are essential for any canine unit to reach an acceptable level of competence.

The health and safety of the canines owned by any agency is the responsibility of the service as a whole with immediate management and handlers having a direct *duty of care*.

It is imperative that all agencies *MUST* provide the appropriate level of care to the animals in their charge irrespective of cost. Failure to do so will result in poor performance and greatly increase risk of disciplinary action or legal challenge.

### **3.0 VALUE FOR MONEY**

Value for Money is defined as being:

‘The optimal use of investment and resources to achieve the intended outcome’.

V.f.M. is not a new concept, but it is a hurdle we have to negotiate in order to justify continued usage of a particular resource or to secure investment in development.

Any decision to invest in resources requires a judgement of whether the **outcome** justifies the investment, for example there is a massive financial investment in the deployment of explosives dogs at our borders. This is as much a pro-active deterrent as a detection role. In the case of Forensic Canines, it is the **mission impact** that provides justification in that they provide evidence in the investigation of the most heinous crimes including terrorism, they do not however at this time receive sufficient funding or support for development.

### **4.0 FORENSIC CANINE PROVISION OF VALUE FOR MONEY**

Forensic canines, if properly trained and validated within a framework that encompasses strategic mission competencies, provide V.f.M. in the following ways:

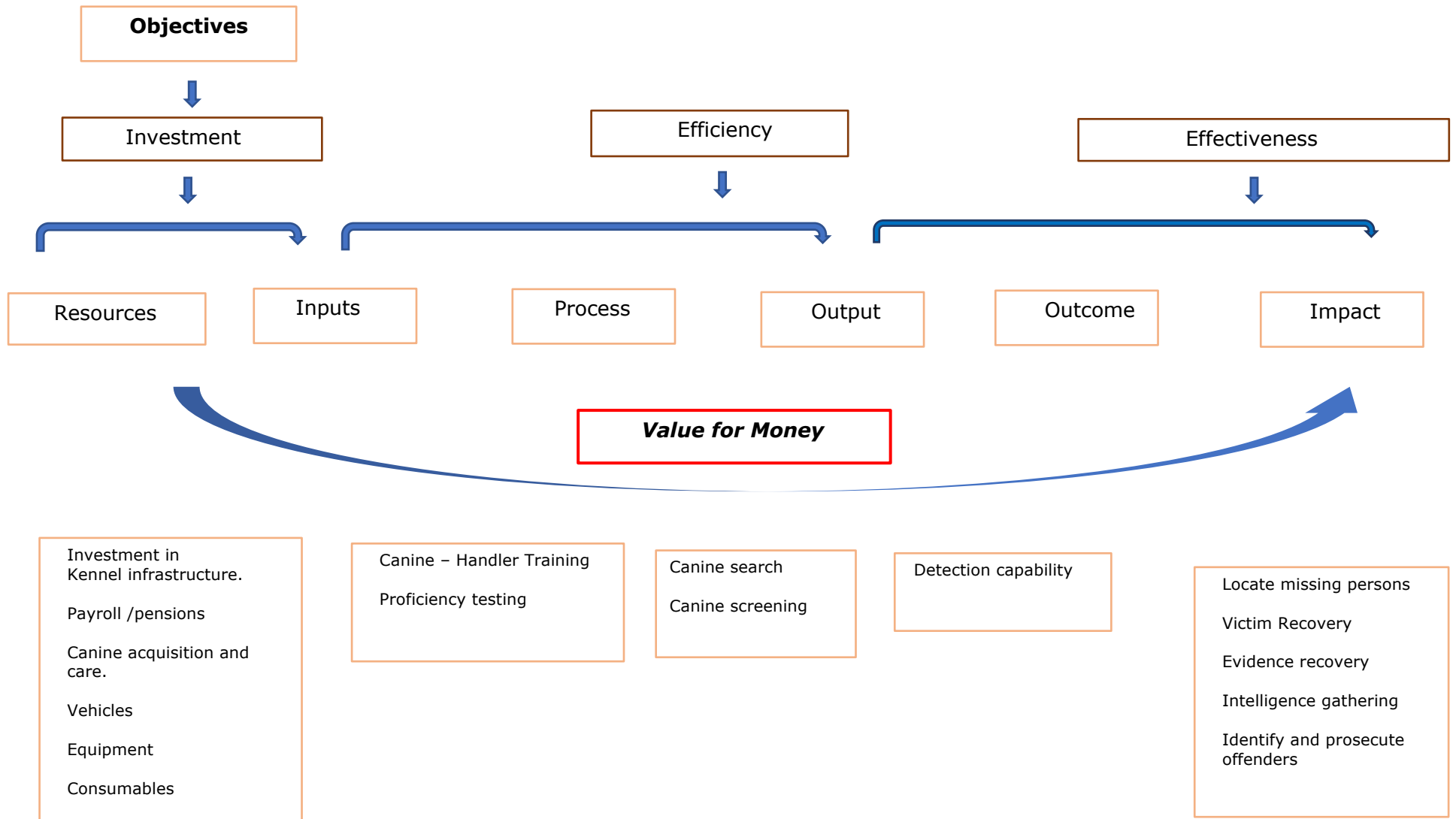
- One canine team can search areas much faster and cover more ground than a team of humans.
- They can locate evidence that is hidden from view, or so small that it is invisible to the naked eye and would not be found using traditional methods.
- They can screen many items for evidence in quick time for long periods. Items that would normally be discounted due to the cost of laboratory screening.
- Canine teams are very mobile and highly adaptable. They will search in any context or environment and can negotiate the most testing terrain and ground cover. They can operate on land or in water from the bankside or from a boat.
- They are not reliant upon a supply of electricity and may be called upon to commit to protracted searches over many days duration.
- They are extremely adaptable, they learn through experience and are easily upgraded through training.

- They are reliable in terms of availability and easily transportable.
- They are easily maintained at little cost in comparison to electrical instruments.
- The initial acquisition cost is minimal in comparison to expensive instruments.
- Replacement cost is minimal in comparison.

## **5.0 VALUE FOR MONEY FRAMEWORK**

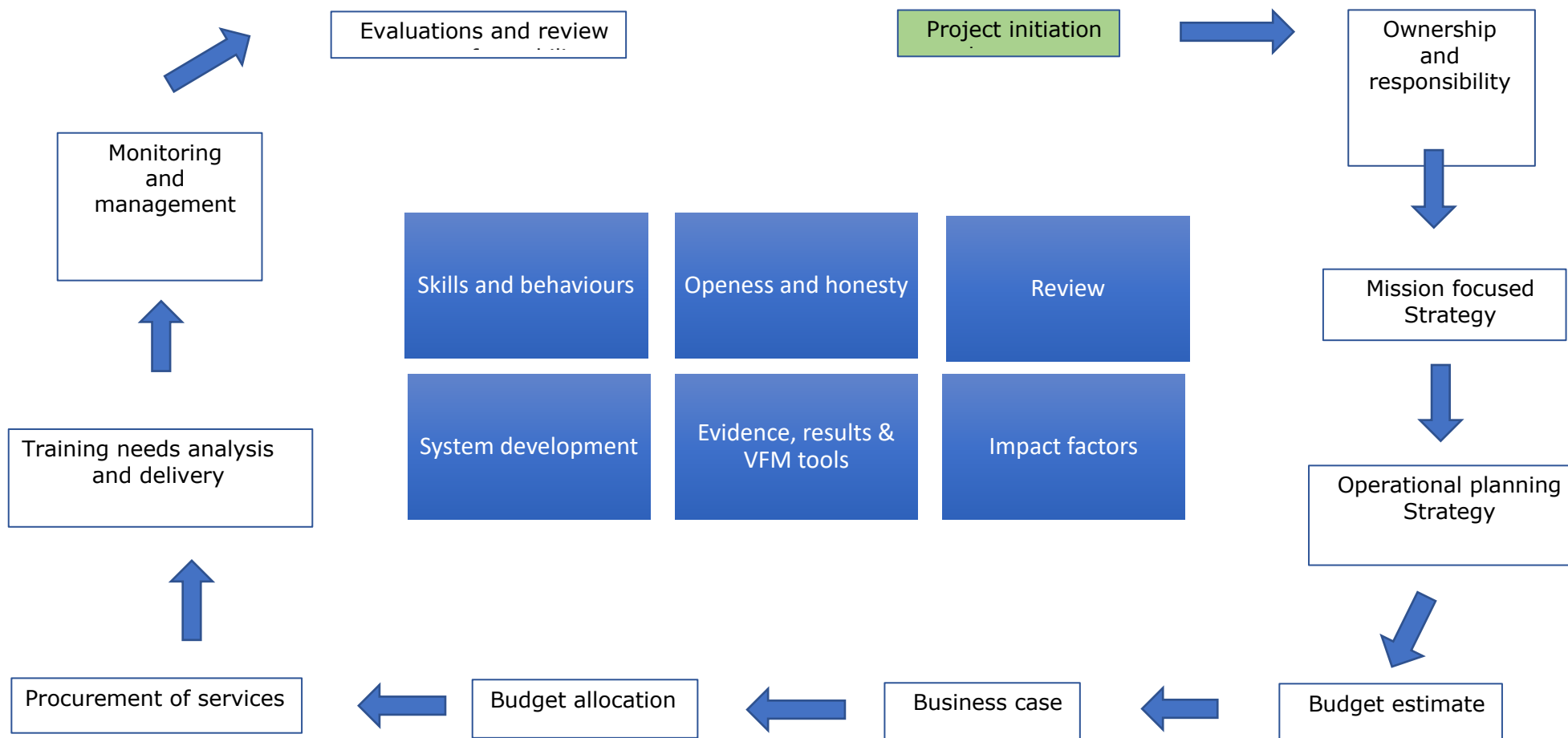
The Value for Money agenda is not merely an exercise in cutting costs. It is an opportunity to test the management, service systems and policies, training and development, and review processes to establish whether or not the unit is *fit for purpose*. What outputs and outcomes an agency can realistically expect and whether or not expectations can be achieved using the resources presently employed. The results are not just short term but have an ongoing impact upon future development and mission success.

# Value for Money Framework





# Enablers that Drive Development



## **6.0 BACKGROUND**

The following background requirements assist in the provision of V.F.M.

- An agreed mission statement
- Project Initiation Document outlining responsibilities and ownership
- Appropriately qualified and experienced Subject Matter Expert management
- Visionary and flexible mission focused goals
- Correct deployment strategy within the agency framework
- Robust strategic policy
- Correct and mission focused operating procedures
- Scientifically supported modular training, based upon mission focused training needs analysis and delivered by expert training staff
- Odour discrimination testing
- Operational scenario-based proficiency testing
- Robust validation criteria
- Communication
- Planning
- Oversight
- Continual review and assessment
- Professional development

## **7.0 FINANCIAL REVIEW**

Value for Money in relation to the agency canine resources is the optimal use of investment and resources to achieve intended mission outcomes. It should be considered on a daily basis and tested through a review process at regular intervals dictated by agency policy.

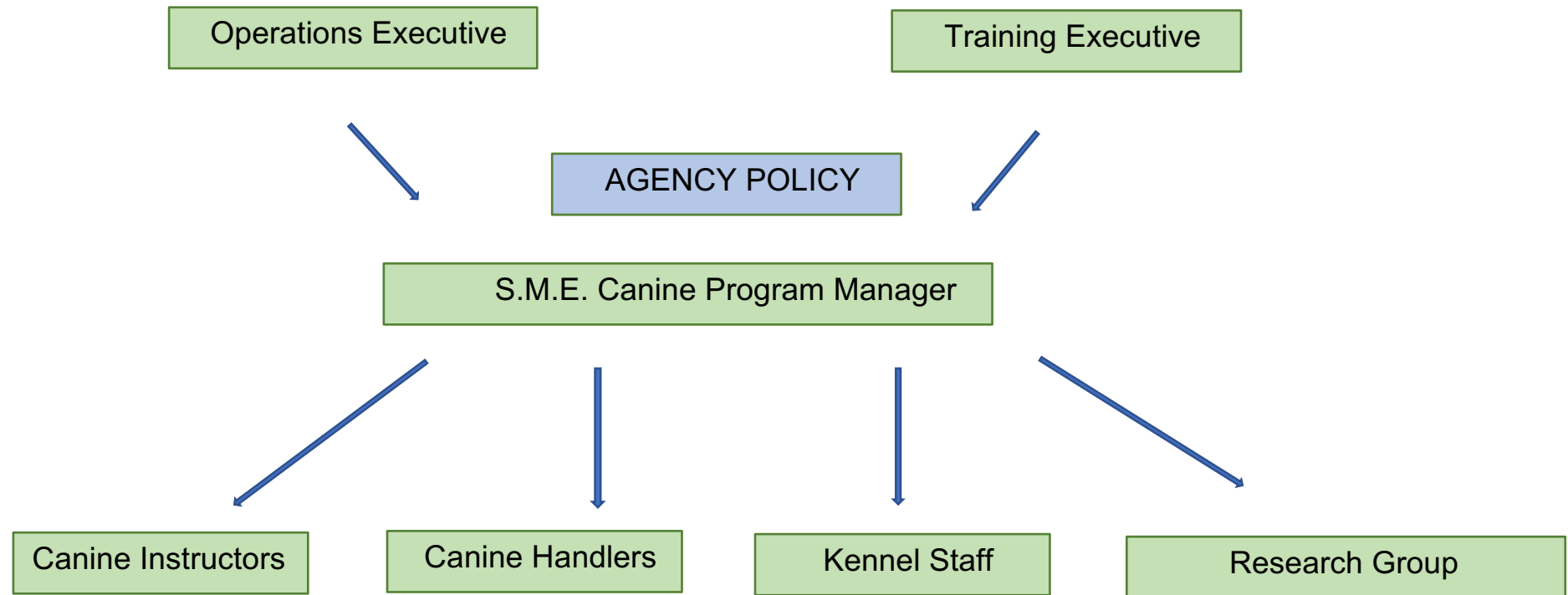
To obtain V.F.M. it is incumbent upon the agency to provide mission focused proficient and effective resources in support of search strategy. It is imperative that this is achieved whilst providing proper and sustainable care for the animals in any and all circumstances.

The financial review collates all investment and accountable costs relating to canine resources so as to provide executive management with accurate data from

which decisions as to the direction of development of this service may be made. Detailed analysis enables the agency to make decisions as to the future of the resource and / or any cost cutting that may be appropriate.

Forensic Canines can only provide Value for Money if there is a desire to solve serious offences against the person using the most appropriate resources

# Best Practice Chain of Command



# Canine Program Manager Responsibilities

## Operations

- Mission
- Policy
- Strategy
- Performance indicators
- Resilience
- Intelligence
- Performance Review
- Research and development
- Duty rotas

## Training

- Policy
- Training needs analysis
- Modular training plan
- Units of assessment
- Performance indicators
- Proficiency testing
- Professional development
- Generic Risk Assessment
- Training and care manual
- Training aids
- Research
- Infrastructure
- Training records

## Routine

- Project Initiation Document
- Ownership and responsibilities
- Canine unit strategy
- Canine unit policy
- Data recording and analysis
- Finance
- Kenneling
- Facilities management Vehicles
- Equipment
- Canine care
- Lay visitor scheme
- Kennel staff

## **8.0 CANINE UNIT GOVERNANCE**

Value for Money must relate to all aspects of detection canine capability from the purchasing of dog food to the deployment of resources within complex case investigations. To achieve a realistic level of value, consideration must be given to both quality and quantity. The price of goods and services does not necessarily reflect quality or value. Executives should be aware that a level of value will only be established through qualitative and quantitative testing principles.

The management of a canine unit in any context is more complex than one might first imagine. The required skill set of canine trainers and handlers and the proficiency of their canine partners are often underestimated by management with no previous experience in this field. Therefore, the governance of canine units should be maintained through the application of appropriate policy guidelines.

In an ideal world, a canine unit will be formed once policy is agreed and infrastructure is in place. With an established canine unit, the design and application of appropriate governance is achieved through a continual review process and upgrade procedure. There should always be a policy of improvement both in method and capability.

A continual review process should be in place for all canine programs. This ensures that the highest standards of proficiency and efficiency are maintained whilst protecting the responsible agency through robust systems relating to training, welfare, and care of the animals in our charge. Only through the adoption of appropriate policy, and the application of proficiency testing of canine teams, will an agency be protected against litigation due to injury to persons, death or damage to property.

The following comprehensive documentation should be in existence for canine units:

- Mission identification and publication
- Values
- Vision
- Policy document
- Handler contracts
- Project Initiation Document
- Training Needs Analysis
- Professional development policy and review process

- Modular Training Plan
- Generic Risk Assessment
- Comprehensive Training and Care manual
- Canine instructor development and proficiency review policy
- Detailed Training Records
- Proficiency testing regimen
- Detailed proficiency testing records
- Canine bite register
- Veterinary records
- Canine bite investigation
- Handler professional development records
- Equipment registers
- Continual review process guidelines
- Data storage database

Management styles differ within the industry, but it has been seen that the most proficient management system incorporates one person that is responsible for the above whilst answering directly to senior management at Director level. This ensures sustainable standards, improvement, and growth. It also provides for ownership and responsibility and a structured chain of command.

Scientific understanding of canine behaviour has increased greatly in the last twenty years. Outdated and scientifically unsupported theories pertaining to the behaviour of canines still persist in services and agencies that fail to review and update training methodology.

Training Needs Analysis and structured modular training design cannot be apportioned without robust policy, terms of reference, and standards.

The instructor's role, which in other agencies is one of supervision, is not filled with experienced, qualified, and competent personnel at this time. This is evidenced by the poor standards that were displayed during the review process.

## Strategic Training and Development Plan

### Objectives and Action Plans

COMPETENCY REQUIREMENTS		SKILLS PROFILING
Organisation Influences	Training & Development Infrastructure and Systems	Training & Development Options
Organisation Design and Structure	H.R. Management	Leadership Development
Business Process Improvement	Performance Management	Professional Development
Change Management	Talent Management	Skills Development
Equality and Diversity	Succession Management	Team Building
Organisation Values	Career Pathing	Team Development
Performance	Service Provider Management	Executive Coaching
Mission Outcome	Resource Management	Mentoring
Impact	Databases	Train the Trainer



## **Creation of Objectives and Action Plans**

**Mission Statement**

**Project Initiation Document**

**Set Policy and Strategy**

**Training Needs Analysis**

**Service  
Strategic Plan**

**HR  
Strategic Plan**

**Personal  
and  
Professional  
Development**

**Focus  
Groups**

**Identify Development Gaps: Present and Future**

**Set Service Training Objectives**

**Create a Training Action Plan**

**Define Units of Assessment**

**Ensure  
Necessary  
Systems**

**Access  
Resources**

**Design  
Training**

**Position  
Training**

**Deliver or Co-ordinate Training**

**Monitor Training Standards**

**Evaluate Training Standards: Assessment and Verification**

**Review**

**Revise Training and / or Training Plan**

## **9.0 CANINE PROFICIENCY**

Canine proficiency is dependent not only upon the training and proficiency of the canine, but also upon the skill set, motivation and dedication of the handler.

Canine teams must be validated as proficient in accordance with agency policy.

There are however certain criteria that must be met individually. These include:

Handler Skills

- Canine training, handling and interpretation of responses
- Understanding of Foundational Scientific Principles
- Search awareness, planning and application of systems
- Health, safety and husbandry

Canine skills

- Target odour recognition, generalisation and discrimination
- Control
- Search systems
- Environmental and contextual acclimatisation
- Behavioural socialisation

## **10.0 CANINE TEAM PROFICIENCY TESTING**

Canine teams must be validated, and Proficiency tested in accordance with agency policy. However, many opportunities arise during normal training and working practices to establish a continual benchmarking process. Benchmarking provides evidence of training method and allows for the opportunity to develop systems and practices that will lead to improvement.

## **11.0 CANINE MISSION DEPLOYMENT**

Canine teams should be deployed within a strategic search strategy, searching must not be speculative or compulsive.

## **12.0 MISSION EFFECTIVENESS**

Canine teams must be mission effective to provide Value for Money. It is not sufficient merely to be successful in training and validation tests. Canine program managers must carefully examine operational deployment reports and compare with known final outcomes to ascertain mission effectiveness.

## **13.0 CANINE TRAINING DELIVERY**

Canine training should be delivered within a modular structured regimen by suitably qualified, experienced and successful Subject Matter Experts. Methods and practices must be continually reviewed to ensure development and tactical improvement.

#### **14.0 CANINE TRAINING METHODOLOGY**

Canine team training methodology should be delivered in accordance with agency policy. A process of continual review and upgrades where required will ensure that Value for Money is achieved through strategic impact.

#### **15.0 RESILIENCE**

Resilience in the case of service canine units is vital for the success of the search mission. Instructors, experienced handlers, and proficient canines are resources that require much investment and are not readily replaced.

Canine Unit policy and strategic planning should encompass the planning of retirement and replacement of both human and canine resources.

Canines should be retired at a defined age, 8-10 years would be recommended, irrespective of health and proficiency. This allows for the planning of acquisition, training, and development to *mission ready* status in anticipation of loss of function.

#### **16.0 INTELLIGENCE**

Strategic intelligence is essential for the development of proficient and mission impactive services. It will guide managers towards identifying end user requirements, strategic goals and training needs.

#### **17.0 FACILITIES**

Facilities management can impact heavily upon annual budgets, it should focus upon the efficient and effective delivery of support services for the organisation. Continual inspection and review of requirements will serve to ensure integration of human resources, animals, systems, processes and technology within the agency. Agencies not only have a duty of care to human resources but also to the animals in their charge. Agency policy should clearly define the requirements for animal care, acquisition and disposal.

#### **18.0 DATA RECORDING AND ANALYSIS**

Agency policy should dictate the required data and subsequent analysis to fully support the maintenance, development and improvement of resources, and support services.

#### **19.0 SCIENTIFIC SUPPORT**

Executive management should seek to identify end user requirements and establish a system of scientific support, including research, that will ensure policed standards are reached, maintained and improved.

## **20.0 CONCLUSIONS**

Value for Money is directly attributable to quantifiable and qualitative evidence of mission effectiveness. Only through effective design, management of production, continual assessment, and mission driven application of a product may value for money be attained.

All canine search missions are directly related to end user requirements irrespective of the target substances involved. The achievement of this goal requires the support of effective search resources that provide very high assurance of mission effectiveness. This is only achieved through the application of scientifically supported methodology and practices delivered through Subject Matter Expert management to facilitators and mentors that are trained and qualified to exacting standards.

Executive management will succeed in the delivery of a quality service whilst providing Value for Money only through robust agency policy designed around the requirements of the end user and the delivery of mission impactful search resources.

## **21.0 DEVELOPMENT GUIDANCE**

Agencies may wish to review current practices and policy. Below are a number of suggestive topics that may assist:

*Canine Unit structure should contain the following:*

- Centralised, single point of contact Subject Matter Expert management
- Agency canine unit policy document
  - In line with the Agency Strategic Plan
- Mission statement
- Vision statement
- Canine unit policy
  - Dictates unchanging policy guidelines based upon Agency mission and impact requirements
- Standard Operating Procedures
  - Provides systems, procedures, and strategy that is continually reviewed and updated.
- Management guidelines
- Resilience strategy
- Canine unit accounting system and V.f.M. review policy

- Handler contracts
  - To ensure compliance with policy and provide a means of appropriate action regarding non-compliance.
- Project Initiation Document
  - Identifies mission
  - Identifies impact factors
  - Outlines program development
  - Delegates ownership and responsibilities
  - Identifies risk, and management of such
  - Dictates timelines for development
- Generic Risk Assessment
- Training Needs Analysis
- Modular Training Plan
  - Professional development of staff
  - Canine training
  - Handler training
  - Instructor training
  - Management training
- Research development
  - Training aids
  - Training methodology
  - Operational context infrastructure
  - Headspace analysis of contraband
  - Publications
- Comprehensive Training and Care manual inclusive of methodology and requirements of training staff.
- Detailed and appropriate Training Records
- Development and action plans
- Proficiency testing regimen
- Detailed proficiency testing records
- Nominal role
- Canine register
- Canine bite register
- Canine bite investigation reporting
- Veterinary records
- Handler professional development standards
- Handler professional development records
- Training facilitator terms of reference

- Contracts
- Qualifications
- Professional development standards
- Professional development records
- Accountability and proficiency testing
- Equipment registers
- Continual review process guidelines
- Unit review reports
- Budget planning, recording costs and accounting system.
- Home care policy
- Centralised kennelling policy
- Independent review and proficiency testing policy
- Kennel management
  - Staff education
  - Accountability
  - Oversight
  - Lay visitor scheme
- Planned development of training facilities
- Development of fit for purpose operational scenario search venues
- Scientific partnership for the purpose of research and development in all areas
- Working groups that research and review appropriate topics such as:
  - Training methodology
  - Validation
  - Proficiency testing
  - Acquisition, handling, storage and disposal of training aids
  - Equipment
  - Clothing
  - Canine acquisition
  - Handler suitability testing and review process
  - Canine care
  - Facilities
  - Vehicles
  - Training and care manual review
  - Policy review
  - Intelligence
  - Finance

Once the canine unit structure is in place agencies may look to the acquisition and retention of suitable instructional staff, canine resources, and specialist operatives (handlers) that display the potential to achieve the corporate mission.

Martin Grime

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