CURRENT AND EMERGING ISSUES FOR FORENSIC SCIENCE SERVICE PROVISION

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ANZPAA
Australia New Zealand Policing Advisory Agency

NIFS
NATIONAL INSTITUTE OF FORENSIC SCIENCE AUSTRALIA NEW ZEALAND

CONTENTS

EXECUTIVE SUMMARY

The data considered in the development of this report demonstrates that crime in Australia has been decreasing for a number of years (Australian Institute of Criminology, 2016). Property crime, sexual assault and family and domestic violence (FDV) offences against females, however, are among the crime types that are increasing in prevalence and are of the most concern (Australian Bureau of Statistics, 2016). Despite the rise in these crime types, the most common offences committed in Australia continue to be related to illicit drugs, with record seizure and arrest numbers.

The strategic directions of policing agencies are similar among jurisdictions in Australia and New Zealand, with investigations into FDV, national security, illicit drugs, and serious and organised crime being some of the major priorities. This report highlights the broad and continually growing scope of forensic science and outlines some of the current and emerging issues for forensic science service provision. It demonstrates the vast number of similarities between the issues and the crime types that they represent.

This report concludes that further resourcing pressures within forensic science are likely and that increased collaboration is a key element to prepare forensic science for the future. Furthermore, it is recommended that advancements in technology be fully utilised to aid in the identification, comparison and interrogation of datasets to unveil links in forensic data that can contribute to the criminal intelligence picture. It is anticipated that this will lead to the prevention of crime, further community confidence in policing and in turn less pressure on police and forensic science resources. Importantly, this report calls for education for forensic practitioners to move from a traditionally evidential focus to a more intelligence based approach.

INTRODUCTION

The Australia New Zealand Policing Advisory Agency (ANZPAA) National Institute of Forensic Science (NIFS) Research and Innovation (R&I) Strategy and Roadmap project aims to outline research priorities for forensic science in Australia and New Zealand over the next five years. The Roadmap will have a view to forensic science in 2030 and will assist industry, academia and ANZPAA NIFS in preparing each of the forensic science disciplines for the future by tailoring research to the identified needs of the community. Furthermore, the outcomes of the Strategy will improve the service that forensic science provides to the policing and intelligence environments. Throughout the project, information will be collected through surveys and consultation with forensic science service providers, policing organisations and academic institutions involved in forensic science research.

The purpose of this report is to identify current and emerging issues for forensic science service provision that may need to be considered in the development of the Roadmap. This will involve an interpretation of current crime statistics and policing priorities and consideration of how they are likely to impact forensic science service delivery. In scope disciplines for this work include the more 'traditional' forensic sciences such as crime scene analysis, fingerprints and criminalistics, as well as emerging areas for forensic science such as forensic intelligence and the continually growing area of digital forensics.

While current and emerging issues will be identified in this report, strategies to combat them will generally not be discussed, instead, the findings of this report will inform the development of the Strategy and Roadmap. These documents will outline how targeted research and other initiatives can be used to address any gaps or emerging issues identified.

ANALYSIS OF CRIME STATISTICS AND POLICING PRIORITIES

To accurately assess the current and emerging issues faced by forensic science, it is important to analyse the most recent crime statistics alongside the strategic direction of policing organisations. Crime statistics, while often not available real-time, are vital sources of information to evaluate current case loads and potential pressure on forensic science resources. The strategic directions of policing organisations are also pivotal sources of direction, reflecting community and political priorities that might indicate pressure points for forensic science service providers.

Nationally, crime statistics from Australian states and territories show that while the volume and rates of individual crime types fluctuate, overall crime in Australia has been decreasing for a number of years (Australian Institute of Criminology, 2016). Property crime, sexual assault and family and domestic violence[1] (FDV) offences against females, are among the crimes that are on the rise and are of the most concern (Australian Bureau of Statistics, 2016). These findings are similar to the 2014 figures from New Zealand, which show that the overall crime rate in New Zealand is on the decline. The New Zealand data highlights that sexual and dwelling assaults are the only two crime types to show an increase since 2003 (New Zealand Government, 2015). Robbery saw the largest decrease across the Australian and New Zealand crime figures (Australian Bureau of Statistics, 2016) (New Zealand Government, 2015).

In contrast to the overall Australian national figures, crime rates in the state of Victoria have been consistently on the rise since January 2011. Over the 24-month period from January 2013 to December 2015 the biggest increases were seen in justice procedures, and drug dealing and trafficking offences, with increases of 39.3% and 17.7% respectively. The increase in justice procedures from the previous reporting period was mainly driven by breaches of bail conditions and family violence orders (Crime Statistics Agency, 2016).

In 2015, the Northern Territory accounted for the highest FDV rate per 100,000 persons in Australia, with 7,740 total reported victims of FDV (1,668 per 100,000) (Australian Bureau of Statistics, 2016). More recent statistics from the Northern Territory government highlight that, up to April 2016, this figure has remained stable (Northern Territory Government, 2016). While a number of reforms have been put in place to support FDV victims and their families, recent focus has shifted toward the perpetrators and reducing potential reoffending. In 2015, NSW Premier Baird nominated FDV reoffending as a priority area for NSW. The NSW Bureau of Crime Statistics and Research (BOCSAR) recently undertook a study to compare reoffending rates among FDV offenders (Trevena & Poynton, 2016). Their finding suggested that short prison sentences (less than 12 months) are no more effective in deterring FDV-related and general reoffending than suspended sentences (Trevena & Poynton, 2016).

Some of the most up-to-date crime statistics available for Australia and New Zealand are road tolls. During the 12 months ending June 2016, there were 1,269 road deaths in Australia, an 8.5% increase compared to the previous 12 months, the biggest rise was seen in New South Wales and Tasmania with 28.3% and 24.2% rises respectively. While NSW road tolls have been on the decline since 2012, this sharp increase in the past 12 months returned the death toll to 2012 levels (Bureau of Infrastructure, Transport and Regional Economics, 2016). The New Zealand road toll is relatively steady from year to year, with 327 deaths in the 12 months prior to July 2016, a slight increase from the 310 in the previous 12-month period (Ministry of Transport, 2016).

Advances in technology as well as society's growing dependence on technology have changed the way in which crime is investigated and the types of crimes committed, with a notable increase in cybercrime offences. This presents a threat to Australian individuals, businesses and the Government (Attorney-General's Department, 2013). The increasing use of technology in crime has also resulted in an increase in digital based evidence, which is now part of almost every policing

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[1] Readers are cautioned that statistics related to FDV-related offences may be reflective of changes in reporting behaviour or policing detection.

investigation. As detailed in Table 1 below, advances in technology have also resulted in new equivalents to traditional crime types (New Zealand Police, 2015) (Australian Criminal Intelligence Commission). A survey conducted by the Australian Institute of Criminology on identity crime highlighted that 20.8% of the surveyed audience reported the misuse of their personal information at some time during their life (Australian Institute of Criminology, 2015). The Attorney-General's Department National Plan to Combat Cybercrime outlines the Australian Government's approach to combatting cybercrime (Attorney-General's Department, 2013). This national Plan and the New Zealand strategic plan outlines collaboration between agencies, education of the community and up-skilling policing members as priorities to combat this type of crime (New Zealand Police, 2015).

Table 1 – Traditional crime types and their cybercrime equivalent – Adopted from (Australian Criminal Intelligence Commission)

Traditional Crime	Cybercrime Equivalent
Fraud	Online fraud/mass marketed fraud, auction fraud, phishing
Burglary/malicious damage	Online hacking, denial of service attacks, malware/viruses
Child sex offences	Online child grooming, child pornography
Money laundering	Online payment systems, e-cash
Theft	Identity theft, bank website 'phishing' and movie, music and software piracy
Stalking	Cyber stalking, cyber bullying

The dark web, mostly known for drug marketplace sites such as Silk Road, is predominately made up of illegal pornography, drug hubs and counterfeit currency, among many other commodities and services. An emerging use of the dark web is in terrorism and important terrorist communications (Weimann, 2016). This presents new challenges for investigators as users of the dark web are often untraceable. Advancements in the technology of more commonly used devices such as mobile phones also presents issues for policing and the recovery of information, with more tech savvy criminals turning to third-party encryption software that protects communication from forensic investigation tools.

Over the 2014-15 reporting period, illicit drug offences were the most prevalent principal offences across Australia (Australian Bureau of Statistics, 2016). The 2014-15 Australian Criminal Intelligence Commission (ACIC) Illicit Drug Data Report (IDDR) outlines that drug detections at the Australian border for the reporting period are the highest on record, with record seizures of Amphetamine-Type Stimulants (ATS) during this period. The IDDR also outlines that domestic ATS seizures continue to rise, with the 32,768 seizures in 2014-15 the highest on record. Interestingly, clandestine laboratory detections continue to decrease and the majority continue to be addict-based, suggesting that the majority of ATS on the market is imported rather than manufactured locally (Australian Criminal Intelligence Commission, 2016).

Wastewater analysis (WWA) has become a better indicator of drug use within a community than the traditional method of user surveys. An example of WWA in Adelaide, South Australia assessed a range of drug metabolites and reported trends in number of doses per 1,000 people. Results of the study highlighted that the use of cocaine and MDMA significantly increases on weekends, and that the use of methamphetamine is over 10 times higher than other drug types and more stable over the week. The results also illustrate that methamphetamine, cocaine, fentanyl and oxycodone use has increased between 2011 and 2015, while the use of MDMA ('ecstasy') and heroin has decreased slightly (Tscharke, Chen, Gerber, & White, 2016). In an international setting, the value of this information for law enforcement has been investigated. It was found that, when combined with policing intelligence, the results from WWA could be used at both operational and strategic levels to inform policing and policy. (Been, Esseiva, & Delemont, 2016). In 2016, the ACIC received funding to expand and improve data sources for drug trends analysis through the implementation of a national pilot wastewater analysis program (Australian Criminal Intelligence Commission, 2016). To date, the WWA in Australia highlights the increasing use of illicit drugs and aligns with reported increases in the misuse of pharmaceuticals (Australian Institute of Health and Welfare, 2014). An increase in drug use inevitably leads to the exposure of police to unsocial behaviour and increases the risk of harm to policing members and the community.

The Australian Government's response to illicit drugs is underpinned by the National Drug Strategy 2010-2015. An updated version of this to cover 2016-25 is currently in development (Intergovernmental Committee on Drugs, 2015)

(Australian Criminal Intelligence Commission, 2016). The Australian Government, together with state and territory counterparts, invest heavily in strategies to combat the illicit drug trade, serious and organised crime and the harm it causes the community. Some of these initiatives and strategies assist policing, and in turn, forensic science in preparing or combating current and future challenges. Some of the current Australian initiatives are displayed in Table 2 below.

Table 2 – Current Australian initiatives to combat illicit drugs

Initiative	Detail
National Ice Taskforce (The National Ice Taskforce, 2015)	The final report, released in 2015 outlined thirty-eight sub-recommendations to address five main points: ▸ Support families, communities and frontline workers ▸ Target prevention ▸ Tailor services and support ▸ Strengthen law enforcement ▸ Improve governance and build better evidence.
National Ice Action Strategy (Council of Australian Governments, 2015)	Delivers significant additional funding to the health sector to reduce the demand for methamphetamine and provide effective support to help current users quit.
National Drug Strategy (Intergovernmental Committee on Drugs, 2015)	The new National Drug Strategy 2016-25 is in draft. It encompasses the same three pillars from the previous strategy, supply reduction, demand reduction and harm reduction. The strategy is aimed at improving health, social and economic outcomes for Australians by preventing the uptake of harmful drug use and reducing the harmful effects of licit and illicit drugs in our society.
New Psychoactive Substances	The Australian Government recently enacted the *Crimes Legislation Amendment (Psychoactive Substances and Other Measures) Act 2015*, which commenced on 5 September 2015. The Act introduced new offences into the Criminal Code to ban the importation of New Psychoactive Substances (NPS) on the basis of their effect, rather than their chemical structure.
Precursor Initiatives (PricewaterhouseCoopers, Attorney-General's Department, 2016)	All states and territories have controls to restrict the possession and sale of these chemicals and equipment to businesses that legitimately need to use them. However, the controls vary from jurisdiction to jurisdiction. This is a vulnerability that organised crime groups may look to exploit. The Attorney-General's Department prepared a Regulation Impact Statement on the costs and benefits of proposals to improve and harmonise precursor controls across Australian jurisdictions.
National Organised Crime Response Plan (Attorney-General's Department, 2015)	In May 2015, the LCCSC endorsed the National Organised Crime Response Plan (Response Plan) 2015–18, which sets out operational, legislative and policy priorities to combat key organised crime threats in Australia. The Response Plan identifies that tackling the increasing prevalence of methamphetamine is one of six key initiatives that Commonwealth, state and territory governments will address over the next three years.

A finding of the National Ice Taskforce was the need for improved data sources available for the central analysis of illicit drug trends (The National Ice Taskforce, 2015). The Enhanced National Intelligence Picture on Illicit Drugs (ENIPID) project involves the collection of methamphetamine, cocaine, heroin and MDMA samples from seizures made by jurisdictional police forces and is co-ordinated by the Australian Federal Police (AFP). Chemical profiling is performed on the samples to determine tactical and strategic chemical links on Australian streets and at the border. This project addresses advancements in forensic intelligence, investigation of serious and organised crime and collaboration and information sharing between policing jurisdictions with minimal impact on forensic and policing resources.

Comparing the policing structure between Australia and New Zealand highlights significant differences between the two countries. In Australia, the AFP is the national policing body. From a national and international policing perspective, the

AFP is responsible for the aspects towards the right hand side of Figure 1 below. Furthermore, each state and territory in Australia has their own police force that concentrates on the community policing aspects towards the left-hand-side of Figure 1. Joint task-forces and collaborative efforts are common between police forces and thus the functions shown diagrammatically below often cross-over.

Community safety Crime prevention Crimes against people Crimes against property Local drug crimes Road safety	Cyber investigations Countering violent extremism International cooperation Intelligence collection Emergency response and disaster victim identification Serious and organised crime investigations	International stability operations International capacity building Countering people smuggling Counter terrorism

Community Policing　　　　　　　　　　　　　　　　　　　　　**National and International Policing**

Figure 1 – Continuum of policing activity – Adopted from **(Connery, 2014) (Australian Federal Police, 2015)**

Each police force is required to tailor their strategic direction to the issues that are most prevalent in that particular jurisdiction. For example, the Queensland police service, whose jurisdiction is more prone to natural disasters than other parts of Australia outline that the increased risk of natural disasters and the impact of this on policing services as major strategic risk for the future (Queensland Police Service). However, other issues, such as the increased rate of FDV, are common across all. In contrast, New Zealand has a single police force that is responsible for the community and national policing focus outlined above. Thus their strategic plans have the most cross over between AFP National and State and Territory community policing than the Australian national and community policing bodies have to each other.

An important information source to aid in the identification of emerging issues for forensic science is the analysis of policing priorities and the strategic direction of policing agencies. Table 3 provides a high level summary of the policing priorities across the different jurisdictions. Some of these policing priorities are not directly aligned to the issues identified by the crime statistics. One of the main factors contributing to this perceived mismatch in data is that crime statistics, by definition, fail to accurately reflect where police action has led to the disruption of crime and more importantly what the impact to the community would have been if police did not intervene. This work includes, but is not limited to counter terrorism (CT) actions by police. Counteracting terrorism and the harm from extremism is a key priority for policing in Australia and New Zealand and more broadly around the world. The outcomes of the investment in resources from investigations, intelligence and forensics into CT matters are rarely truly realised or appreciated. An example of an overt CT police action is Operation Appleby, whereby arrests in Sydney prevented potential attacks on policing and defence buildings in New South Wales (Olding, 2015). Many hundreds of hours of work before and after the overt resolution of an investigation of this nature result in, statistically, very few arrests and in ideal scenarios, no victims. But, a number of terrorist attacks in recent global history from single-shooters or small groups have demonstrated the damage to communities that terrorism can have if these individuals are not stopped. For this reason, this assessment outlines that counter terrorism efforts are among the main focus points for policing, even though crime statistics alone for these countries do not highlight terrorism as a threat to the Australian and New Zealand community.

Table 3 – Major policing priorities for Australian and New Zealand policing agencies (NB: this list is not comprehensive)

Major Policing Priority	Australian Federal Police	NZ Police	ACT Police	NSW Police	NT Police	QLD Police	SA Police	TAS Police	VIC Police	WA Police
Address domestic, family and/or sexual violence		✓	✓	✓	✓	✓	✓	✓	✓	✓
Illicit drugs/diversion of pharmaceuticals	✓		✓	✓	✓	✓	✓	✓	✓	✓
Serious and organised crime	✓	✓	✓	✓		✓	✓	✓		✓
Increase confidence in policing	✓	✓	✓	✓	✓		✓		✓	✓
Counter terrorism	✓	✓	✓	✓			✓	✓	✓	
Alcohol related crime/harm				✓	✓	✓	✓	✓	✓	✓
Road safety		✓	✓				✓	✓	✓	✓
Property crime		✓	✓	✓				✓		✓
Youth crime		✓	✓	✓	✓					✓
Cyber/technology enabled crime	✓						✓			✓
Mental issues		✓				✓				✓
Firearm crime	✓							✓		
International law enforcement	✓	✓								
People smuggling	✓									
Child exploitation	✓									
Aviation security	✓									

An analysis of the strategic direction of Australian state and territory police agencies and New Zealand Police highlights many similarities in the planning for the future direction of community policing. Among a wide range of policing priorities, the main issues that are evident across the majority of policing jurisdictions in Australia and New Zealand continue to be traditional crimes and the issues surrounding them, such as:

▶ The reduction of domestic violence offenders and reoffenders

▶ Road safety and measures to reduce road fatalities

▶ The use and trafficking and production of illicit drugs, including the misuse of pharmaceuticals

▶ How drivers of crime such as alcohol and drugs influence crime rates

▶ The impact of terrorism on the community.

Many of the priorities listed above, such as counteracting the threat of terrorism and reducing the harm of illicit drugs also form some of the key priorities of the Australian Federal Police (AFP). But, from a national focus, the strategic direction of the AFP differs from community policing agencies. The strategic context paper (Australian Federal Police, 2015), together with the AFP corporate plan for 2015-19 (Australian Federal Police, 2015) outlines the AFP's future direction. Key priorities include the recovery of proceeds of crime and the disruption of money-laundering activities, the protection of specified individuals, establishments and events, the disruption of criminal gangs including the reduction of child exploitation and people smuggling and contributing to international law enforcement on behalf of Australia (Australian Federal Police, 2015).

The AFP future report due to be released late 2016, will detail the strategic direction of the AFP looking forward fifteen years. Initial findings from workshops held during the development phase, highlight that advances in technology, robotics and biometrics are likely to affect policing, including both the crimes committed and how they are investigated (AFP Forensics Capability Committee , 2016). Some of these include:

▶ The challenges of 3D printing ranging from the creation of homemade weapons and false fingerprints to bio-printing and eventually illicit drugs

▶ The advancements in robotics and nanotechnology, including the development of drones with GPS making them a potential delivery mechanism for a bomb or biological warfare agent

▶ The use of biometrics and bio-ware to influence decisions or monitor crowds.

Two other important policing priorities prevalent across the majority of policing agencies are community engagement and the need for collaboration between police forces and other government agencies. Many policing agencies are utilising social media more than ever to engage with the community to share photos, success stories and important safety warnings to the public. Criminal networks are widespread and resourceful and policing has recognised that collaborative efforts and information sharing are important aspects to tackling crime. While further work in this area is required, a number of policing and government agencies have formal and informal information sharing streams as well as joint taskforces and collaborative projects to tackle crime in a co-ordinated way.

CURRENT AND EMERGING ISSUES FOR FORENSIC SCIENCE

While overall crime rates are on the decline in Australia and New Zealand, it is clear that the demand on policing is higher than ever. The New Zealand police highlight the greatest demand on police in recent times to non-crime services such as interaction with the social sector and mental health sufferers, investigations relating to serious offending including family violence and an increase in complex investigations such as counter terrorism and serious and organised crime (New Zealand Police, 2015). With a growing demand for policing comes a growing demand for the forensic services that support it. This is not only for the traditional services involved in support investigations such as fingerprints, DNA and trace examinations, but for those less thought of such as digital forensics, forensic psychiatry, and related support services.

With an increase in complexity of investigations, increased use of technology and an increase in forensic information being collected for use in forensic intelligence, the issue of data handling, storage and effective systems for searching across disciplines is of growing concern to policing and forensic agencies. The issues below highlight the issues in policing that may have an impact on forensic science service delivery.

ISSUE 1: ADVANCES IN TECHNOLOGY

An emerging issue for forensic science is how the discipline is prepared for advancements in technology and thus technology enabled crime. Along with this comes the increasing need for data storage solutions, data integrity and systems that allow for useful data interrogation.

The threat of the dark web, cybercrime or the use of technology to plan or execute crime is growing exponentially. Perpetrators are usually early-adopters of technology and thus forensic science requires innovation through partnerships with universities or private companies who are leaders in technology to fully appreciate the extent of services available to criminals. Research and development in this space should be focussed on available cutting edge technology. Examples of this include the development of intelligent computing systems that can detect files involved in criminal activity such as 3D printing, child exploitation and extremist material. By developing automated systems such as this, more data can be searched in less time and the exposure of members to sensitive material can be reduced.

The mobile phone is no longer a device used for communication only, but rather an extension of one's self, involved in more and more aspects of the owner's daily activities. Advancements in technology allow tech savvy criminals to bypass telephone service providers to communicate information to one another, sharing documents, photos and other media. In order to address this, the ability to capture this transfer of information between services for use in investigations and intelligence collection is an ongoing requirement for forensic science.

The growing number of individuals and businesses affected by cybercrime has resulted in greater pressures on digital forensic teams to deliver results regarding the nature of the attacks and information about who is performing them. Digital forensic teams in policing agencies and forensic service providers have grown significantly in recent times. It is likely that the continued increased use of technology for crime, together with politically motivated initiatives to combat cybercrime, will put more pressure on the work these teams perform and will require further growth (Attorney-General's Department, 2013). Already established collaborative working relationships in the field of electronic evidence and digital forensics are important in combatting cybercrime with education and information sharing on emerging techniques being the key to improving the service they provide.

While expanding into new territories of data mining and surveillance through digital means and of digital devices is important, there is also a requirement to maintain proficiency and visibility in traditional methods. Recent policing operations have revealed that some perpetrators of crime prefer to go 'completely dark' by using hand-written letters

and mail to contact one another. It is important that forensic science doesn't lose the ability to detect and analyse traditional means of communication; rather, advances in technology should be used to reduce the number of hours required for current techniques. For example, the use of intelligent computing to compare questioned fingerprints to those held on national databases.

New Zealand police have adopted the use of mobile devices for members deployed in the neighbourhood policing teams with access to addresses and offenders so that they are more informed about the situation they are entering (New Zealand Police, 2015). In Australia, the Northern Territory Police have a similar mobile system for their members. The electronic recording of crime scenes is only used in a small amount of cases in some jurisdictions and this technology needs to be further developed to assist first-responders.

Finally, while forensic science relies heavily on the use of Information Technology (IT) systems to process and store information, management strategies for this data are almost non-existent. The growing amount of forensic data collected and potential for intelligence–led policing requires the development of systems that are capable of storing, searching and comparing this data across a number of disciplines and crime types. The identification of the emerging issues to address could provide an opportunity for the private sector to invest time and money in the development of systems that can aid policing.

ISSUE 2: FORENSIC INTELLIGENCE

Forensic science has traditionally been a tool to aid in the resolution of crime in the courts; however the information provided by forensic analyses is increasingly evolving to assist in tactical, operational and strategic decision-making (Australian Federal Police, 2015). Importantly, forensic intelligence should not be considered a new discipline in forensic science, but rather a new avenue of data exploitation. It is a consensus by forensic scientists and analysts to effectively use forensic data routinely collected to proactively inform investigations, policing and policy (Crispino, Rossy, Ribaux, & Roux, 2015).

For intelligence-led policing, successful policing operations often rely on reliable intelligence to inform the decision making of the lead investigator. However, due to the historical focus of forensic science, results of analyses are not shared or reported until they have met a pre-determined quality standard. Often at this point in time the intelligence value of the information has been lost. To increase the potential for intelligence information, forensic science professionals should move to a model where quality standards are maintained for court, but flexibilities are built in to allow the early release of information with the required limitations stated, as soon as possible.

With this in mind, education is required for practitioners to recognise that most forms of forensic evidence can serve both the courts and intelligence purposes. For example, the processing of a crime scene has long been performed by crime scene investigators (CSI) collecting evidence to assist in the judicial processes. The intelligence value that can be obtained from the physical evidence and DNA collected, however, should not be underestimated. This information has the potential to link otherwise unrelated scenes or criminal groups to one another. For drug investigations, chemical drug profiling can serve the justice system by chemically linking drug samples that will support or refute a hypothesis. Alternatively, drug profiling can service the broader role of forensic science in contributing to the criminal intelligence picture by determining the manufacture process of methamphetamine seized at the border or the source coca plant for a seizure of cocaine (Morelato, Beavis, Tahtouh, Ribaux, Kirkbride, & Roux, 2013).

In June 2016, the Australian government granted the AFP and the ACIC $1.6 million to invest in their big data capabilities. As outlined above, advances in technology have resulted in ever growing data sets, and systems need to be developed so that this data can be interrogated effectively for intelligence links to be identified. This will be the focus for this funding.

From a resourcing perspective, the increased demand on forensic information for intelligence purposes will result in a strain on forensic practitioners and laboratories as there are ever increasing demands for greater information provided in a timely manner. For example, requests for extra photos or for the processing of extra DNA samples that may not be required for court but may add to an intelligence picture. Research in this area should focus on methodologies that can be used for intelligence purposes only, that are fast, inexpensive and can be adapted, such that law enforcement agencies can focus on prevention and proactive policing.

ISSUE 3: SERIOUS AND ORGANISED CRIME

As outlined in policing priorities, the growing impact of serious and organised crime and the investigation into their activities is a major policing priority. The Australian Crime Commission estimated that in 2013-14, serious and organised crime cost Australia $36 billion, of which $15 billion is attributed to prevention and response costs (Australian Crime Commission, 2015). Serious and organised criminals are typically involved in a range of criminal activities; they are generally early adopters, using new and advanced technologies to undertake their criminal activities (Australian Crime Commission, 2015).

In August 2016, the Commonwealth Government announced an additional $3 million to extend the work of the Victorian arm of the National Anti-Gangs Squad (NAGS). The work of the Victorian NAGS is primarily focussed on the investigation into the illegal activities of outlaw motorcycle gangs in the State of Victoria (ABC News, 2016).

The Attorney General's Department national organised crime response plan 2015-18 includes a number of initiatives to combat organised crime. These initiatives cover many of the emerging issues for forensic science that are discussed in this report. This highlights the range of criminal activity that organised crime is involved in, but also the range of forensic services that support investigations. These range from tackling drugs and firearms to targeting technology-enabled crime and cybercrime (Attorney-General's Department, 2015).

For forensic science, an increased focus on serious and organised crime will inevitably result in an increase in complex investigations that will involve a number of different crime types and commodities. This will require forensic resources from a number of disciplines for each investigation. Some policing agencies have taken a consultancy and triage approach, where items are assessed by a team that comprises specialists from different disciplines. This happens in consultation with the lead investigator and exhibits are prioritised based on the goals of the investigation and evidentiary and intelligence value of each item. This reduces the impact on the specialist teams, resulting in quicker turn-around times for the results of the forensic analyses.

ISSUE 4: TERRORISM AND NATIONAL SECURITY

The official Australian and New Zealand strategic approach to terrorism recognises the need to prepare for, prevent, respond to and recover from a terrorist act (National Counter Terrorism Committee, 2012). Forensic disciplines have roles to play in all aspects of this plan in supporting the work of policing investigations and through the provision of timely forensic intelligence.

Much like many of the other issues outlined in this report, the increased focus on counter-terrorism is likely to uncover a number of other crime types. Most commonly these are to fund the intended terrorist activity or in the maintenance of a terrorist network. The Australian Transaction Reports and Analysis Centre (AUSTRAC) outlines that the main financing methods for terrorism in or from Australia are (Australian Transaction Reports and Analysis Centre, 2014)

- Charities and non-for-profit organisations
- Self-funding from legitimate sources
- Fraud, theft and drug trafficking
- Ransom payments.

The investigation of crime relating to terrorism is often performed by joint-taskforces from a range of agencies so that information from all government sources can be exploited in order to achieve the safest outcome for the public. As mentioned previously, the time investment from forensic teams in the work-up, resolution and post-resolution of terrorism related investigations is often not recognised. Advances in technology should be exploited to aid in the sharing of information between agencies, in the identification of extremist material and in the automatic recognition of activities consistent with terrorism. These initiatives would limit the impact of the forensic community's time and protect members from exposure to this material, which can often involve propaganda including graphic videos of previous terrorist activity.

ISSUE 5: ALCOHOL, ILLICIT DRUGS AND MISUSE OF PHARMACEUTICALS

As detailed above, illicit drug offences continue to be the highest recorded offence in Australia. The Australian Government has invested significant funding to combat this with a number of initiatives, some of which are detailed in Table 2.

Importantly, the involvement for forensic science in the National Drug Strategy (NDS) is widespread, with involvement across all three pillars of demand reduction, supply reduction and harm reduction. This involves pharmaceuticals and illicit drugs, alcohol and tobacco. Demand reduction is predominately targeting the reduction of drug use, especially first use. Much of the target is on prevention through price mechanisms and education prior to deter use, or treatment and community engagement for those already using. Supply reduction aims to restrict availability and access, predominately through active law enforcement. Harm reduction aims to reduce negative outcomes from drug use. This harm relates to the drug user and their children or other family members, with much of the effort relying on intervention by health or other government bodies to increase safety, including road safety (Intergovernmental Committee on Drugs, 2015). Forensic science is most involved in the supply reduction arm of the NDS. Here, it is involved in both the judicial and intelligence avenues of supply reduction for illicit drugs and their precursors, pharmaceuticals and the illegal importations of tobacco into Australia.

The changing nature of the drug environment coupled with a market that is continually growing, translates to a requirement for advancements in methodologies for drug detection, analysis and intelligence. With a focus on timeliness, research in this field should focus on opportunities that yield the most information in the shortest time frame. As previously discussed, a key way forward in the detection of drug, alcohol and pharmaceutical use in Australia and New Zealand will be with further development of wastewater analysis. This will no doubt include collaboration between government, private and academic institutions.

ISSUE 6: FAMILY AND DOMESTIC VIOLENCE

The prevention of family and domestic violence (FDV) and the treatment of its victims is a major priority for policing agencies across Australia and New Zealand. Traditionally, forensic science is only thought to be involved in the collection of evidence to aid in the court proceedings against FDV perpetrators, rather than with the crime prevention aspect. However, research into areas of forensic mental health and forensic behavioural assessments to determine the complexities behind offending and reoffending behaviours of FDV perpetrators is required to assist first responders and forensic psychiatrists limit FDV in the community.

Another area that forensic science plays a role in these offences is that of medical officers. For these types of repeat offences, appropriate evidence collection and documentation of injuries is as important as documenting a crime scene to support a case brought against a FDV perpetrator. In some jurisdictions there is limited forensic knowledge for the medical staff involved and this has the potential to impact law enforcement (Kelty & Julian, 2013).

A recent submission to the Royal Commission on Family Violence provides recommendations to aid in the understanding and response to complex criminal behaviours that result in FDV. Recommendations from this report include dedicated funding for research into FDV drivers, upskilling police officers to deal with and identify potential perpetrators during their community engagement efforts and support for perpetrator intervention programs to prevent reoffending (McEwan, Wood, Ogloff, & Norton, 2015).

ISSUE 7: FIREARMS

In July 2016, the Australian Government announced a $24.5 million investment into increasing firearms detection capability at the Australian border. This specific initiative involves building capacity in the AFP-led National Forensic Rapid Laboratory (NFRL) as well as other areas of the AFP (The Hon. Michael Keenan MP, 2016). It highlights the concern that the Australian Government has regarding organised crime and sourcing of firearms over the dark web. Firearms and ballistic forensic specialists are generally small teams in all policing jurisdictions. These increased efforts in detection will no doubt affect commonwealth and jurisdictional firearm specialists, as well as other disciplines of forensic science as other previously undetected criminal activity is identified. This will cause further resourcing pressures on forensic science and methodologies will need to be put into place to deal with the increasing demand on services.

In addition to the increased focus on traditional firearms, the 3D printing of firearms presents new challenges for law enforcement and forensic science. The increased availability and reduced cost of 3D printers has made such devices more accessible. In November 2015 the NSW Parliament passed laws in the Firearms and Weapons Prohibition Legislation Amendment Bill 2015 that prohibited the possession of the files used to 3D print guns. The fact that they are made from plastic and thus untraceable with metal detectors requires innovative detection methodologies or again, systems that can deal with the recognition of the files used.

ISSUE 8: ROAD SAFETY

The rising road toll has prompted road safety to be a major policing priority for all community policing bodies. The rising road toll identified in the past 12 months has put a strain on crash investigation units of Australian state and territory police forces, which typically lie within forensics and are quite small. The impact of an increase in road safety measures by policing to forensic science is more likely an increase in road-side drug and alcohol detection and thus an increase of samples to forensic laboratories.

Often, an increase in traffic stops in remote areas, freeways and transit points also results in the increased detection of trafficking of drugs and other illicit material throughout Australia via road. This in turn leads to further strain on forensic resources in these areas where a small team of forensic officers would service a large Local Area Command (LAC). For example, Hay, a small town in New South Wales is a common place for drug couriers to pass through en route to southern or western Australian states (ABC News, 2015).

CONCLUDING COMMENTS

This report has highlighted some of Australia and New Zealand's key issues with crime and the strategies that policing agencies will be implementing to address them. It also identifies how these issues and strategies will affect forensic science service delivery.

Importantly, the majority of the current and emerging issues for forensic science identified above have significant overlap, with much of the issues coming down to an increased pressure on resources for forensic science and the poly-crime nature of most criminals. R&I strategies that are implemented to address these should do so with the aim to relieve this impact rather than create a further strain to the already short staffed forensic service providers. Furthermore, this report has outlined that policing believes that collaboration will play a key role in the future and it should be noted that collaboration in forensic science is required. This should not only be between agencies, but potentially more importantly between disciplines of forensic science.

Given the overlap outlined above, the growing number of poly-crime committing perpetrators and resourcing pressures on policing and forensics, the focus of forensic science, or more importantly the collection of information for forensic intelligence purposes requires a shift of thought. To aid in prevention, and thus the more appropriate placement of resources, forensic science needs to change from concentrating on crime and evidence type and move towards looking at each item as a source of information. Focussing on how the tactical, operational and strategic intelligence gained from an examined item could fit into the picture of intelligence-led policing and uncover, together with other forms of information, answers to questions that are yet to be asked by policing. This would contribute to the future picture of forensic science and policing in preventing crime and giving other, non-law enforcement agencies the opportunities to target would-be perpetrators through education and support. Together with collaboration, computer and big data systems are required to allow for the effective interrogation of this information for intelligence purposes.

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