DEPARTMENT: PLANNING, MONITORING AND EVALUATION

DEPARTMENT: SOUTH AFRICAN POLICE SERVICE

Report on the Economic and Implementation Evaluation of the Incremental Investment in Forensic Services

Full Report

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LIST OF ACRONYMS AND ABBREVIATIONS

AFIS	Automated Fingerprint Identification System
AFTE	Association of Firearms and Tool Mark Examiners
ATM	Automated Teller Machine
CBA	Cost Benefit Analysis
CBRN	Chemical, Biological, Radiological and Nuclear
CJS	Criminal Justice System
CR&CSM	Criminal Record and Crime Scene Management
CRC	Criminal Record Centres
CSE	Crime Scene Examiners
CTS	Collaborative Testing Services
DNA	Deoxyribonucleic acid
DPW	Department of Public Works
DSSC	Daily Summary of Serious Crime
FSL	Forensic Sciences Laboratory
FTE	Full-Time Equivalent
IBIS	Integrated Ballistics Identification System
ICT	Information and Communications Technology
IIFS	Incremental Investment in Forensic Services
IT	Information Technology
KZN	KwaZulu-Natal
LCRC	Local Criminal Record Centres
NDoH	National Department of Health
NFDD	National Forensic DNA Database
PA	South African Police Service Act (No. 68 of 1995)
PSA	Public Service Act (No. 103 of 1994)
QDS	Questioned Documents Section
QM	Quality Management
SABS	South African Bureau of Standards

SADC	Southern African Development Community
SANAS	South African National Accreditation System
SANDF	South African National Defence Force
SAPS	South African Police Services
SAQA	South African Qualifications Authority
SARPCCO	Southern African Regional Police Chiefs Co-operation Organisation
SITA	State Information Technology Agency
SOP	Standard Operating Procedures
TMS	Technology Management Services
USA	United States of America
VIC	Victim Identification Centre
VIP	Very Important Person
VISPOL	Visible Policing
VSC	Video Spectral Comparator

GLOSSARY

Forensic sciences	Forensic Sciences refers to the application of any scientific knowledge or methodology to criminal investigations to prosecute the perpetrator or exonerate the innocent.
National Forensic DNA Database	Section 15G of the Criminal Law (Forensic Procedures) Amendment Act, 2013 establishes the National Forensic DNA Database (NFDD) and stores the DNA profiles of persons suspected to have, or who have committed a crime.
Backlog	Exhibits that have not been analysed within the target timeframe.
Calendar year	The calendar year runs from January to December
Case	Refers to a criminal event that is captured and logged by Visible Policing onto the Case Management System, and it issued with a CAS object number.
Accreditation	Relates to the formal processes undertaken by an independent body to determine whether a laboratory's staff, equipment, processes, procedures and work product meet certain nationally-determined quality standards.
Financial year	The government financial year, often denoted by YYYY/YY format runs from the 1 April to 31 March.
Forensic Science Laboratory	A laboratory that used an array of scientific techniques to analyse evidence collected from crime scenes, and produce reports for the investigations and court procedures.
Crime Scene Examiners	Refer to law enforcement officers who gather evidence from a crime scene.
DNA profile	The result of analysing the DNA of a particular individual at some locations to develop a unique alpha-numeric sequence that can be uploaded to the DNA database.
Polymerase chain reaction	Refers to a scientific technique that enables forensic analysts to create copies of precise DNA replications from a simple sample of DNA.
Polygraph	Is an instrument used to detect changes in physiological characteristics in a person's heart and breathing rates, and is commonly used as a lie-detector

EXECUTIVE SUMMARY

INTRODUCTION

By international standards, crimes levels in South Africa are unacceptably high and particularly violent. South Africa has amongst the highest homicide rates in the world. Although the levels of crime have declined since their peak in the mid-2000s, when surveyed, most households were of the view that crime has increased in their neighbourhoods. Whereas crime levels have dropped, the nature of the crime is also changing. Drug crime is on the rise and sophisticated syndicates with the resources to evade detection run trio crimes, which include car hijacking, business, and house robberies.

In 2006, concerned with the high levels of crime, the Government and Big Business established a working group to review the Criminal Justice System (CJS). The CJS review found that the CJS was characterised by marked dysfunction, fragmentation, blockages and obstacles. Systemic problems such as a lack of accountability, coordination, misallocation of resources and weak performance management hindered the functioning of the system. Personnel shortages, in the key areas, such as forensic services and detection, exacerbated the problems faced by the CJS. Finally, the lack of an enabling legislative framework that would allow the police to use fingerprints and DNA to detect offenders inhibited efforts to arrest and prosecute perpetrators.

CONTEXT OF THE EVALUATION

In 2007, Cabinet adopted the Seven-Point Plan. This plan outlines several reforms that can improve the efficiency of the CJS and address the blockages that prevent the system from "combating crime and reversing the unacceptable crime trends in South Africa." Interventions contained in the Seven-Point Plan cut across three main government departments: the South African Police Services (SAPS), the Department of Justice and Constitutional Development (DOJ&CD) and the Department of Correctional Services (DCS).

Although it was adopted in 2007, the Seven-Point Plan remains relevant and underpins the interventions set out in the Medium-Term Strategy Framework. It also contributes to Outcome 3, which aspires to a country where "all people in South Africa are and feel safe" by creating a CJS that can deliver justice for citizens. To support the implementation of the Seven-Point Plan, the National Treasury earmarked funding for SAPS. Of the total amount allocated to the SAPS, the Division: Forensic Services received a significant proportion of the funding. This supplemental funding became known as the "Incremental Investment in Forensic Services" (IIFS).

Between 2009/10 and 2014/15, about R6.2 billion of additional funding was allocated and spent on forensic services. Of this amount, about R2.9 billion was for technology upgrades, automation and equipment. Another R2.4 billion was spent on building capacity in the criminal records and crime scene management, forensic science laboratories and quality management functions. The Division: Forensic Services also received R868.9 million to recruit additional forensic analysts, crime scene examiners, and other forensic personnel.

This evaluation assesses the extent to which the IIFS has built capacity within the forensic services programme, and whether these changes have resulted in meaningful improvements in performance across the CJS. The Terms of Reference sets out the following Key Evaluation Questions (KEQ):

1. To what extent are the intended benefits of the incremental annual investment into the SAPS Forensic Services achieved?
2. Overall, how cost effective is the incremental annual investment into the SAPS Forensic Services?
3. What is working, what is not working in terms of the additional investment into the SAPS Forensic Services? Specifically, what are the operational constraints and challenges during implementation of the intervention (such IT, HR, procurement, etc.?)
4. How can the effectiveness of the incremental investment in SAPS Forensic Services be improved and what are the implications for the design of the intervention?

This evaluation covers the period between 2009/10 and 2014/15 and examines the effects of the IIFS across four provinces: Gauteng, Eastern Cape, Western Cape, and Limpopo. These provinces were selected for this evaluation as they benefited from a significant proportion of the IIFS.

METHODOLOGY

This economic evaluation of the IIFS combines two evaluation methods: **an implementation evaluation** and **a cost-benefit analysis**. In general, an implementation evaluation examines whether an intervention has been implemented as planned and identifies what aspects of the programme are working more or less well. The findings and recommendations from an implementation evaluation can strengthen the design of a programme, its efficiency, and overall effectiveness. In contrast, the cost-benefit analysis examines the resources and costs used by a programme and compares them to its benefits. It is important to note that although the intention of the evaluation team was to do a full cost benefit analysis, the lack of detailed and granular expenditure, performance, and administrative data made this impossible. Instead, the evaluation team opted for a practical approach in the form of a "soft" cost benefit. This approach examines what the funding was spent on and tracks the benefits of the IIFS across the CJS value chain. The evaluation uses a combination of tools and instruments to gather data including semi-structured interviews and surveys. For the cost-benefit analysis, the evaluation team combined and analysed the CAS, CRIM, and FSL databases across 11 crime categories.

LIMITATIONS OF THE STUDY

While this evaluation demonstrates the contribution of the IIFS to justice outcomes, it cannot attribute the results of the IIFS to the outcomes and impacts. Moreover, while random and representative samples of prosecutors, crime scene examiners, and laboratory technicians would have been ideal for the survey, it was not possible to sample in this way, as many officials did not have access to computers or a dedicated email address. Hence, while the findings of surveys reveal certain trends and patterns, they cannot be generalised to the broader programme.

DOCUMENTARY AND LITERATURE REVIEW

Empirical evidence shows that forensic evidence plays a significant and growing role in resolving criminal cases. While in 1963, scientific evidence was utilised in only 1% of crimes, at present in some crime categories almost all cases see some form of forensic analysis. Evidence from the United States shows that forensic evidence on ballistics, material traces, biological and latent prints collected in 97% of homicides played a significant role in obtaining a conviction at trial, after witness testimony in non-stranger homicides. In the United Kingdom, the DNA Database has improved the ability of police services to investigate and resolve crimes. The amount and type of evidence collected are linked to the kind of crime committed. Peterson et al. (2010) reveal that evidence is more likely to be gathered and analysed in serious offences such as murder and rape compared to less severe crimes. When compared to the United Kingdom, the United States, Australia, and Botswana, the South African forensics program, subject to the new amendments brought about by the Fingerprint Act and DNA Act is reasonably similar to comparator countries. The key difference appears to be around the extent of decentralisation. In the United States and Australia, crime scene examiners send forensic evidence to state and local forensic science laboratories. It is only where sophisticated or advanced analysis is required that evidence is sent to central or federal laboratories for analysis.

KEY EVALUATION FINDINGS

The findings of this study are organised in terms of five evaluative criteria, namely, relevance, effectiveness, efficiency, sustainability, and emerging impact.

Relevance

When evaluating the relevance of programme, it is important to assess whether its objectives are consistent with the requirements of the country, needs of the beneficiaries and policy priorities. South Africa has amongst the highest crime levels in the world. Against this background, the government recognised the pressing need to build capacity within law enforcement authorities. The SAPS is at the forefront of crime-fighting efforts, and at the time of the CJS review in 2007, it was apparent that SAPS lacked the capacity to detect and investigate the high volumes of crimes committed against citizens.

Forensic services were seen as one of the major bottlenecks in the system, and as a result, many crimes went undetected and un-investigated. Thus, the timing and emphasis of the IIFS was particularly relevant at the time and remains so. By accelerating investment in the upstream parts of the CJS value chain that are severely under-capacitated, the IIFS improves the police services' ability to detect crime. The downstream parts of the CJS, that is, the prosecution authorities and courts, benefit from the better quality and more reliable forensic evidence, which they use to bring charges against perpetrators, pass judgement and determine sentences.

While the rationale and need for the IIFS are clear, a key question is whether the design of the programme would achieve the policy objectives set out in the Seven-Point Plan. Overall, the evaluation finds that the design of the IIFS was logical and reasonably clear although the theory of change was not complete. The design of IIFS focused on forensic activities across the different

disciplines. Its emphasis on activities is appropriate, as the production of forensic evidence is very much an activity-driven function. That being said, the link between the outputs produced by the IIFS and the outcomes intended by the Seven-Point Plan are not well articulated. Part of the problem is that the Seven-Point Plan did not set measurable targets for the outcomes. Furthermore, as the design of the IIFS was left up to SAPS, with little input from other role-players in the CJS, less consideration was given as to how forensic services would benefit the downstream parts of the CJS.

Effectiveness

The objectives set out in the Seven-Point Plan are the yardsticks against which this study evaluates the effectiveness of the IIFS. The Seven-Point Plan essentially focused on two components of forensic services: criminal records and crime scene management as well as forensic science laboratories. In relation to **Criminal Records and Crime Scene Management (CR&CSM)**, the main challenges at the time of the CJS review was that:

- there were simply not enough crime scene examiners to attend to all crime scenes;
- the reliability of the crime scene evidence was called into question in courts, and
- criminal records were not available when required by detectives, prosecutors and the courts.

Since then, the IIFS has made inroads in dealing with some of these challenges. Increased personnel, equipment, and service points have expanded the reach of crime scene services and improved crime scene attendance. Between 2011/12 and 2014/15, the number of crime scene examiners grew from 759 to 1026. Of the four provinces selected for this evaluation, Limpopo experiences the highest increase in the number of crime scene examiners as part of SAPS' broader efforts to expand services to rural areas.

While the percentage of crime scenes attended rose from 52% in 2012/13 to 90% in 2014/15, this increase is mainly due to the changes in the policy on crime scene attendance. In 2014/15, the Division: Forensic Services removed certain offences such as shoplifting, common robbery, and malicious damage to property from the list of prescribed crimes that crime scene examiners had to attend. The effect of this change in policy is to reduce the time spent on collecting evidence from high-volume and low-value crime scenes and refocus the efforts of crime scene examiners on priority crime scenes.

Over the same period, the number of crime scene examiners certified as fingerprint experts declined by 0.6% across all provinces. The Western Cape has lost the most fingerprint experts, experiencing a decrease of 6.9% (31) followed by Gauteng with 4.8% (19). The decline in fingerprint examiners merit concern as their expert testimony in court raises the value of forensic evidence in judicial proceedings.

The IIFS has also led to considerable improvements in the volume and quality of crime scene evidence collected. Crime scene examiners report that they collect about 18% more DNA evidence from crime scenes when compared to the period before the IIFS started. Similarly, the turnaround time and availability of criminal records has improved considerably. By the end of 2014/15, 93% of

all criminal records were generated within 15 days. Having up-to-date criminal records provides judges with the information they need to make the right bail and sentencing decisions.

Despite this overall improvement in crime scene management, there are still not enough crime scene examiners to cope with the volume of crimes committed. Crime scene examiners are overextended and ration the amount of time they spend at crime scenes. Currently, crime scene examiners spend on average 45 minutes compared to an international norm of four hours at each crime scene. This trend is particularly worrying when it comes to priority crimes such a murder and rape where a hastily processed crime scene can affect the quality and reliability of crime scene evidence.

With regard to the **Forensic Science Laboratories (FSL)**, the CJS review found that:

- laboratories were ill-equipped and used obsolete technology,
- there were not enough analysts to perform the forensic analysis, and
- certain types of analysis such as DNA analysis were only carried out on request from prosecutors.

To overcome these challenges, the Division: Forensic Services has used the IIFS to invest in recruiting additional staff, modernising the technology and equipment in laboratories. The scale of the investment in technology, equipment, and systems is significant. About R2.4 billion of the IIFS was allocated and spent on the FSLs. Of this, the biology section receives about 65% (R1.6 billion) followed by ballistics with 17% of the total. The biology section receives the largest share of IIFS within the FSL to help it to prepare for the implementation of the "DNA Act." This piece of legislation empowers SAPS to collect, use and store biological samples. In other words, it creates the legal basis to collect, analyse and profile DNA.

Internationally, the use of DNA evidence by law enforcement agencies has risen rapidly. The Division: Forensic Services has followed this trend, and since 2012, made it compulsory for the FSLs to test and profile all biological samples collected. This decision has increased the number of entries received for DNA analysis from 54 042 in 2009/10 to 107 200 in 2014/15. Hence, it appears that the IIFS has allowed the Division: Forensic Services to expand its capacity for DNA analysis.

The increase in DNA analysis has knock-on effects on the National Forensic DNA Database (NFDD). Between 2009/10 and 2014/15, the number of profiles loaded onto an NFDD rose from 207 190 to 514 859. Over this period, the NFDD has generated leads and had some early successes in detecting repeat and serial offenders.

In light of the high levels of gun-related crime in South Africa, a key focus of the IIFS was on developing the FSL's capabilities for ballistic analysis. Before the IIFS, the technology used for ballistics analysis was outdated. By upgrading the Integrated Ballistics Identification System (IBIS), the IIFS has raised the identification rate from 2.4% in 2011/12 to 6.6% in 2014/15.

In relation to chemical analysis, the IIFS was well timed. Between 2009/10 and 2014/15, the volume of drug-related crime in South Africa increased by 2.5 times. Using the IIFS, the chemistry section

has recruited additional personnel, purchased additional equipment, and consumables. Without the additional funding made available through the IIFS, the chemistry section would not have coped with the increasing volume of drug exhibits.

These improvements in the forensic analysis have begun to benefit other parts of the CJS system. Amongst the prosecutors surveyed, the majority are pleased with the quality and timeliness of forensic evidence. About 73% of prosecutors said that there had been improvements in the efficiency with which exhibits are analysed in the FSL. Another 63% of respondents stated that the quality of forensic analysis has improved. When asked about the quality of forensic support and analysis provided by the FSLs, 71% of prosecutors surveyed indicated that the forensic analyses were both appropriate and sufficient. Another 76% of respondents thought that the analysis provided does stand up to legal scrutiny. When compared to six years ago, most prosecutors acknowledged there had been significant improvements in several aspects of forensic analysis. In contrast to the feedback provided by prosecutors, some of the detectives interviewed said that they do not have sufficient time and resources to use most of the forensic evidence they receive in the investigation of crime. These severe shortages in the number of detectives and the loss of skilled and experienced detectives within SAPS are likely to diminish the benefits of the IIFS within the CJS.

Efficiency

The efficiency criterion assesses whether the outputs of a programme have been delivered on time and in an economical manner. Much of the IIFS was used to procure systems, technology, and consumables. To put this in monetary terms, about R5.3 of the R6.2 billion of additional funding passed through the procurement systems. The evaluation found that the supply chain management processes were the source of major delays. First, current procurement regulations are not well-suited to the purchase of scientific equipment and consumables which must be validated and tested before they are purchased. Second, there is not enough capacity within the SAPS to manage the higher volumes of transactions and complex procurement processes. For example, SAPS' limited capacity to forecast demand for consumables has led to frequent stock-outs that affect the work of crime scene examiners. About 30% of crime scene examiners surveyed reported that they did not have sufficient and appropriate consumables to process crime scenes. Third, procurement processes for the acquisition of technology are lengthy and time-consuming. Large and expensive purchases of technology must go through the SAPS and SITA'S procurement systems. These procurement systems are not well coordinated and are the source of continued delays. Finally, interviewees and survey respondents have raised concerns around allegations of corruption associated with the IIFS. While it is not within the scope of this evaluation to interrogate issues relating to procurement irregularities, there is nonetheless a need for SAPS to examine why these problems have arisen.

Since the inception of the IIFS, the division has changed its turnaround time targets three times. Before 2010/11, the target was set in terms of calendar days whereas, from 2011/12, the indicator was framed in terms of working days. In 2014/15, the Division changed its target for turnaround times again, this time to differentiate between routine, non-routine and intelligence cases. This change brings the Division: Forensic Services in line with good international practice where laboratories distinguish between the turn-around times for different categories of casework. There is considerable variation across sections in achieving turnaround times. In 2014/15, the chemistry section analysed

50% of all entries within the targeted time, compared to scientific analysis section where 76% of entries was processed.

Overall, the Division has done well in reducing backlogs. Between 2009/10 and 2014/15, backlogs dropped from 47 660 to 3304. This reduction in the backlog is a notable accomplishment for the Division, considering that over the same period, the number of new entries received and hence the workload of the division rose rapidly.

Sustainability

With regards to the IIFS, sustainability examines the extent to which the benefits will continue to accrue to the Division, SAPS, and the CJS. Three factors promote the sustainability of the IIFS:

- The Division: Forensic Services has developed some capacity in planning and monitoring their activities. This provides an excellent platform for the Division to shift towards results-based planning that links activities to outputs and outcomes.
- There has been a definite improvement in the management of forensic services, and if this is maintained will contribute to better performance over time.
- The investment in equipment in equipment and technology will continue to yield substantial benefits in coming years.

Various factors adversely affect the sustainability of the IIFS. Forensic services do not work in isolation, and its success depends on how well other parts of the CJS function. The lack of coordination around the interventions that fall under the Seven-Point Plan undermines the effectiveness of the plan. Within SAPS, the critical shortages in the number of detectives mean that forensic evidence is used less effectively and fewer arrests are made on the basis of such evidence. Equally concerning is the high levels of charges withdrawn by prosecutors on cases with forensic evidence. Low levels of morale amongst crime scene examiners affect their productivity and are likely to raise the turnover of the Division, threatening the overall sustainability of the IIFS. Finally, inadequate and ill-suited physical infrastructure will limit the ability of SAPS to cope with the increasing demand for forensic analysis.

Emerging impact

The proportion of cases with forensics across the 11 types of crime selected for study rises from around 4% of reported crimes in 2009 to around 6% by 2015. This period coincides with the CJS Review and accelerated investment in forensics. Similarly, the proportion of murder cases with forensics that achieves a guilty verdict increases from 36.1% in 2009 to 50.7% in 2014. For rape, this percentage rises from 71.4% to 79.9%. These trends suggest that forensics has contributed to a higher conviction rate in these priority crimes.

CONCLUSIONS

The evaluation found that the IIFS has made inroads in addressing many of the challenges described by the CJS review. With the additional funding, the Division: Forensic Services has recruited more personnel, purchased equipment, modernised their systems and financed the operations of the

Division. As a consequence of these investments, turnaround times have improved, and backlogs have declined. It appears therefore that the IIFS has expanded the reach and capacity of forensic services, as intended by the Seven-Point Plan.

Beyond the Division: Forensic Services, the IIFS has fundamentally changed the use of forensic evidence in the CJS, and increased the proportion of guilty verdicts on cases where forensic evidence is present. By expanding the availability and use of forensic evidence in the CJS, the IIFS has begun to make an important contribution to justice outcomes in the country.

RECOMMENDATIONS

The IIFS has made significant strides in addressing the operational constraints faced by the Division: Forensic Services. Nevertheless, a few changes are needed to realise the benefits of the IIFS fully. Hence, the main recommendations emerging from this evaluation are as follows:

Recommendation	#	Detailed recommendations
R.1 The SAPS and DOJ&CD must coordinate their planning and strengthen their monitoring systems to realise the benefits of the IIFS.	R1.1	SAPS in consultation with the DOJ&CD must prepare a **five-year National Forensic Strategy** that sets out clear objectives, outlines the role of forensic services in the CJS, and determines milestones for the development of forensic sciences in the country.
	R1.2	The Division: Forensic Sciences must use theory of change and logical framework developed for this evaluation to develop a **results-based implementation plan**. The plan must include the following: ○ **Input indicators** measure the economy and value for money achieved by the IIFS (e.g. unit cost per entry analysed) ○ **Activity indicators** track the efficiency of operations (e.g. turnaround times) ○ **Output indicators** measure the quantity and quality of forensic analysis (e.g. percentage of cases that result in a positive, negative, or inconclusive result) ○ **Outcome indicators** quantify utilisation of forensic services across the CJS (e.g. the percentage of forensic cases that lead to a guilty outcome)
	R1.3	The Division: Forensic Services must develop a **monitoring plan** that identifies: ○ The source of information for these indicators ○ The data collection and validation protocols, including a set of rules around how the data is cleaned and analysed (in respect of CR&CSM and FSL admin data) ○ Frequency of data collection
	R1.4	The Division: Forensic Services must agree to a **set of targets** for the next three years. The Division should not change the target or the method of measurement over this period or until the target is achieved consistently, whichever happens first.
	R1.5	SAPS must establish the **statistical capacity** to use the data collected by the Division: Forensic Services and Division: TMS to track and monitor the influence of forensic services on court outcomes.
R.2 The SAPS must improve its financial management processes and supply chain management practices to deliver better value for money.	R2.1	The SAPS should maintain a **consolidated expenditure report** that shows how the IIFS is spent on compensation, good, services, and technology.
	R2.2	The Division: Forensic Services, in collaboration with the Chief Procurement Officer, should **diagnose the current weaknesses in their procurement system**, and identify potential improvements. Specific issues to be addressed as part of this exercise include the: ○ Challenges in purchasing equipment and technology for forensic services. ○ Appropriateness of rotating suppliers in respect of equipment and consumables that need to be pre-tested and validated. ○ Criteria used to measure value for money. ○ Substantially above-inflation increases in the prices of goods and services. ○ Allegations of procurement irregularities and the system deficits that give rise to them.
	R2.3	The Division: Forensic Services must ensure that **value for money** during procurement. Specifically, the Division must establish value for money criteria that applies to purchasing decisions in the forensic environment.
	R2.4	The Division: Forensic Services must update their **human resources plan** with estimates of the number of, and competency of staff needed to implement the “Fingerprint Act,” “DNA Act,” and handle the increased workload arising from the changing nature and levels of crime in the country.

Recommendation	#	Detailed recommendations
	R2.5	The Division: Forensic Services and the Division: TMS must prepare **a maintenance plan** that estimates how much funding will be required to maintain the equipment and technology procured as part of the IIFS, placing particular emphasis on those items that do not have an existing maintenance agreement.
R.3 The SAPS should consider providing additional funding to sustain these gains and cope with the increasing demand for forensic services.	R3.1	SAPS' senior management should review the staff plan of the division and **allocate additional positions** to the Division, with a particular priority given to crime scene examiners and forensic analysts.
	R3.2	The Department of Public Works, in conjunction with SAPS, should assess the **risk annually as required by the "DNA Act"** and submit an improvement plan with recommendations on how to address the physical infrastructure needs of forensic services.
R.4 The SAPS and the SITA must work together to integrate information technology systems necessary for the forensic services programme to operate efficiently.	R4.1	SAPS, in conjunction with SITA and the Department of Home Affairs, must set timelines to **expedite the integration of AFIS and HANIS**. The Division: TMS must monitor and report regularly on these deadlines.
	R4.2	The Division: TMS must collect, use and **integrate data from the CAS, CRIM, and FSL admin systems to monitor the utilisation** of forensic evidence and its contribution to case outcomes.
	R4.3	The Division: TMS establish **systems for data integrity and disaster recovery** that are aligned to best practices in line with the DNA Act
R.5 The SAPS must take steps to build skills, competencies and capacity amongst forensic personnel and enhance staff welfare	R5.1	The Division: Forensic Services must **monitor the overtime** worked by forensic analysts and examiners. Where overtime increases to harmful and unsustainable levels, the Division must review their resource allocation and establish a system to manage their staff's workloads.
	R5.2	The CR&CSM component must determine the feasibility of obtaining **accreditation for its training programmes**. To the extent possible, The CR&CSM component, together with the Division: Human Resources Management should develop an accredited programme for crime scene examiners that is recognised and registered with the South African Qualifications Authority.
	R5.3	The CR&CSM component must develop a **continuous professional development programme** so that crime scene examiners can access refresher courses. A training needs assessment should inform any such training programme. The programme must include a mentorship component so that recent hires can receive guidance from senior crime scene examiners.
	R5.4	The Division: Forensic Services, in collaboration with Division: Human Resource Management must undertake a **staff satisfaction survey** and identify actions to remedy the low levels of morale in CR&CSM.
R.6 The SAPS must train VISPOL and detective services in securing a crime scene and safeguarding forensic evidence.	R6.1	The Human Resources Division in SAPS must develop and rollout training to improve the **forensic awareness of VISPOL**.
	R6.2	VISPOL must establish monitoring systems to ensure that first responders **comply with the National Instruction for Crime Scene Management** (NI 1 of 2015). Deviations from compliance with the instruction must be analysed and where necessary, VISPOL should take corrective action.
	R6.3	SAPS must address the **critical shortages in detectives**, which constrain the use of forensic evidence in crime investigations.
R.7 The NPA and SAPS must interrogate the high levels of withdrawn charges in cases where forensics is present and develop plans to reverse this trend, where appropriate	R7.1	The NPA and SAPS should interrogate the **high levels of withdrawn charges** in forensic cases, and determine if any improvement actions can be taken to reduce the number of cases with forensics that are withdrawn.

1 INTRODUCTION

Forensic sciences refer to the application of scientific knowledge and methodology by law enforcement agencies to criminal investigations. The term "forensic sciences" encompasses a variety of disciplines ranging from biology (used in the analysis of DNA) to anthropology that helps to identify the human remains. Forensic sciences are no longer limited to natural sciences, increasingly 'softer sciences' such forensic psychiatry and psychology contribute to understanding the mental state of perpetrators and identify patterns of criminal activity.[1] Modern forensic sciences originated in the nineteenth century when early forms of fingerprint analysis were used to identify criminals. Over the last three decades, with advances in DNA analysis, forensic sciences have become a fundamental part of law enforcement.

Forensic sciences enhance the ability of police services to detect and solve crimes by using scientific techniques to collect, analyse and interpret critical evidence on when, where, how and by whom a crime was committed. They are an essential part of the investigative capacity of law enforcement agencies and can help identify perpetrators or exonerate the innocent.

1.1 Background to the intervention

After the first decade of democracy, severe shortages in capacity and significant inefficiencies plagued the Criminal Justice System (CJS). The combination of these factors constrained the ability of the system to detect crime, prosecute offenders, and adjudicate cases at a time when the crime levels were on the rise. Concerned with the high crime rate, the Government and Big Business established a working group to review the CJS.

The working group found that the CJS was characterised by marked dysfunction, fragmentation, blockages and obstacles. The absence of the required integration at the national level, lack of coordination structures, high levels of unaccountability, misallocation of resources, inadequate or incorrect prioritisation of projects, as well as incongruent objectives, measurements and performance indicators contributed to the malfunctioning of the CJS. Widespread personnel shortages in key areas, notably crime scene and forensic experts, were also identified as a critical issue.

In 2007, Cabinet adopted the Seven-Point Plan. It outlines various reforms that seek to improve the efficiency of the CJS and address the blockages that prevent the system from "combating crime and reversing the unacceptable crime trends in South Africa." Interventions contained in the Seven-Point Plan cut across three main government departments: the South African Police Services (SAPS), the Department of Justice and Constitutional Development (DOJ&CD) and the Department of Correctional Services (DCS).

Historically, forensic services were seen as one of the most ineffective parts of the CJS in South Africa. Plagued by shortages of skilled staff, inadequate laboratory facilities, equipment and weak information and technology systems; forensic evidence was only used in a small proportion of cases.

[1] (Legal dictionary, 2016).

In addition, the legislative framework did not support the collection, storage and use of fingerprint and DNA evidence in law enforcement.

While the Seven-Point Plan would require changes for all the role-players with the CJS, priority was given to forensic services within SAPS. The rationale for this decision was that the crime scene management, the availability of criminal records and forensic analysis are part of the 'front-end" of the value chain. If these areas are not working well, it impacts adversely on the prosecution of crimes, court proceedings and sentencing. Furthermore, the Seven-Point Plan recognised that building forensic capacity would require substantial investments in equipment, technology, infrastructure, and personnel, and therefore, would need additional funding for this purpose.

1.2 Background to the evaluation

To support the implementation of the Seven-Point Plan, the National Treasury earmarked funding for SAPS. Of the total amount allocated to the SAPS, the Division: Forensic Services received a significant proportion of the funding. This supplemental funding became known as the "Incremental Investment in Forensic Services" (IIFS) and is the subject of this evaluation. Between 2009/10 and 2014/15, about R6.2 billion of additional funding was allocated and spent on forensic services. Of this amount, about R2.9 billion and the majority of expenditure was for technology upgrades, automation and equipment. Another R2.4 billion was spent on building capacity in the criminal records and crime scene management, forensic science laboratories and quality management functions. The Division: Forensic Services also received R868.9 million to recruit additional forensic analysts, crime scene examiners, and other forensic personnel.

1.3 Purpose of the evaluation

This evaluation assesses the extent to which the IIFS has built capacity within the forensic services programme, and whether these changes have resulted in meaningful improvements in performance and justice outcomes. The Terms of Reference sets out the Key Evaluation Questions (KEQs) as follows:

1. To what extent are the intended benefits of the incremental annual investment into the SAPS Forensic Services achieved?
2. Overall, how cost effective is the incremental annual investment into the SAPS Forensic Services?
3. What is working, what is not working in terms of the additional investment into the SAPS Forensic Services? Specifically, what are the operational constraints and challenges during implementation of the intervention (such IT, HR, procurement, etc.?)
4. How can the effectiveness of the incremental investment in SAPS Forensic Services be improved and what are the implications for the design of the intervention?

The study covers the period between 2009/10 and 2014/15 and focuses on the IIFS, that is, additional funding made available to SAPS for forensic services. Furthermore, the evaluation examines the effects of the IIFS across four provinces: Gauteng, Eastern Cape, Western Cape and Limpopo. These provinces were selected because they benefited from a significant proportion of the IIFS, and have amongst the highest crime levels.

2 CONTEXT OF THE EVALUATION

2.1 Problem definition

2.1.1 Crime trends in South Africa

The incidence and perception of crime in South Africa are high by international standards and affects both the safety of its citizens, and the workings of the economy. United Nations statistics,[2] for example, suggest that South Africa has the highest recorded incidence of murder and rape in the world, per 100,000 population. Overcoming this legacy of crime has been a policy priority for many years, and since the advent of democracy, the government has undertaken numerous initiatives to ensure that 'All South Africans are and feel safe'. For instance, the National Crime Prevention Strategy, adopted in 1996, was designed to shift focus from political violence to increase the emphasis on crime, especially the prevention of crime.[3] Another major intervention was the 2010 Forensic Procedures amendment of the Criminal Procedure Act, 1977 to provide for the compulsory taking of fingerprints. Significant fiscal resources have also been expended. In the 1980's approximately 5.5% of the budget was devoted to the leading criminal justice departments. This grew to 9.1% in 1994/5 [4] and increased further to 10.1%[5] in 2014/15.[6]

However, issues remain with the resourcing of the criminal justice system. For example, the total size of the police force as at March 2015 was 193 692 (150 950 staff hired in terms of the SAPS Act and 42 742 in terms of the PSA). This number equates to a police-to-population ratio of 1:358, against a UN benchmark of 1:450. There are currently 1 138 police stations with a vehicle to personnel ratio of only 1: 3.70.[7] While some additional protection is provided by the substantial private security industry, poorer and thus often more vulnerable members of society are the least likely to be able to afford private security services.

From the point of view of ensuring efficient, effective and equitable spending on crime deterrence, it is important to match expenditures with the actual burden of crime on society. In other words, more money should be spent on big problems (with particularly severe consequences, or which affect large numbers of people) than on small ones. Also, an effective criminal justice system should eventually start to change the pattern of crime, by increasing the likelihood of detection, punishment, and by incarcerating offenders. The following analysis of crime in South Africa seeks to illuminate these issues.

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[2] (Harrendorf, Heiskanen, & Malby, 2010)

[3] (Omar, 2015)

[4] (Rauch, 2000, p. 6)

[5] (National Treasury, 2015, p. 58)

[6] This consists of Police Services and Law courts and Prisons

[7] (SAPS, 2015, p. 17)

2.1.2 Types of crimes

While South Africa continues to have extremely high levels of crime, there is evidence that the extent of criminal activity has somewhat decreased in recent years. An SAIRR report of crime trends in South Africa between 1994 and 2004 found that crime levels peaked in 2002/2003, and have since declined. This is confirmed by examining the SAPS data for 2005/06 to 2014/15, as seen in Figure 1 below. During this time the total number of crimes recorded increased at an average annual rate of 0.3% from 2.15 million to 2.21 million, but on a per, 100 000 population basis, declined from 4 509 in 2005/06 to 4 086 in 2014/15, at an average annual rate of 1.1%.[8]

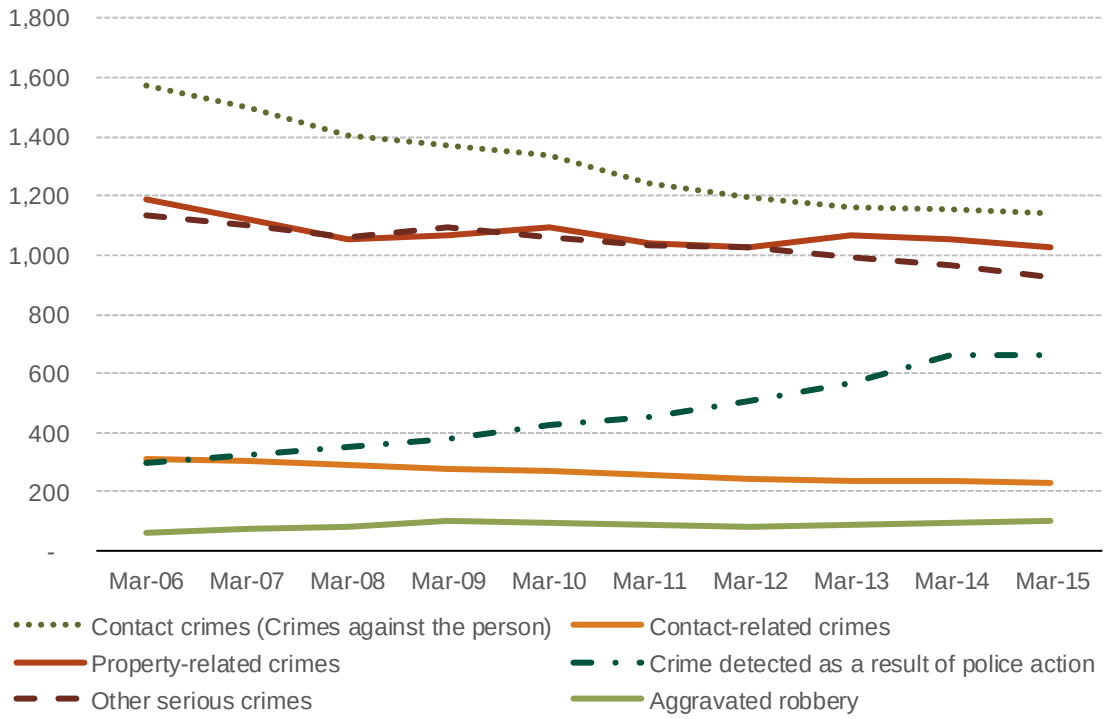
Figure 1: Overall crime trends between 2005/06 and 2014/15

Source (SAPS, 2015)

Figure 2 below provides more detail, by breaking down crime growth rates per 100 000 population by the major crime categories used by SAPS. In most of these categories, crime rates are falling, and contact and contact-related crimes, in particular, are more than a quarter down over the period. However, two groups are experiencing quite substantial growth. Aggravated robbery is up by 65% over the period, and crimes detected as the result of police action have more than doubled.

[8] Mid-year population estimates employed for rates calculations from Statistics SA as reported by (De Kock, Kriegler, & Shaw, 2015, p. 44)

Figure 2: Trend of main categories of crime (per 100 000 population)

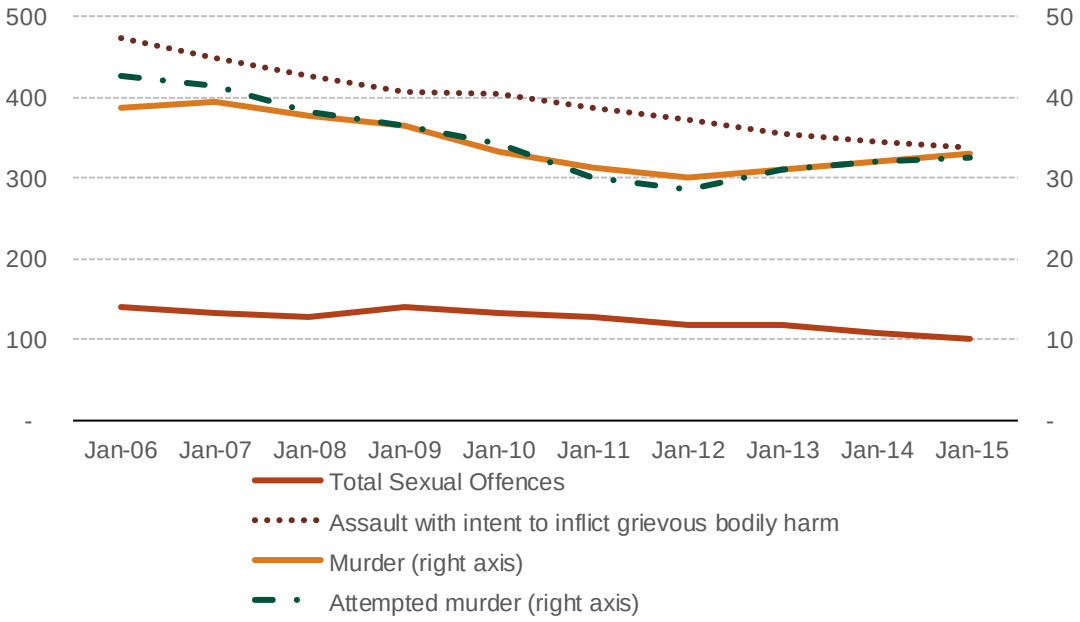


Source: (SAPS, 2015)

It should be recognised that crimes detected as a result of police action are problematic from the point of view of analysing underlying trends in criminal activity. The issue is that greater effort by the police will lead to more arrests in these areas, and thus that more incidents do not necessarily reflect more criminal activity.

Figure 3 provides a breakdown of each category and its subcomponents by crime type, on a per 100 000 population basis. This data shows some interesting trends, which is now analysed in more detail by cluster of crime types. The first and most encouraging is that, for certain types of major violent crimes like murder and rape, there are distinct downward trends in a number of incidences, as shown in Figure 3 below. These high profile crimes have a substantial impact on the extent to which citizens are and feel safe, and thus are crucial from a policy point of view. While the decreasing trend is encouraging, relative to international levels, they remain far too high, and thus will continue to be a policing priority for the foreseeable future. It should also be noted that murder and attempted murder rates have shown slight increases again in recent years.

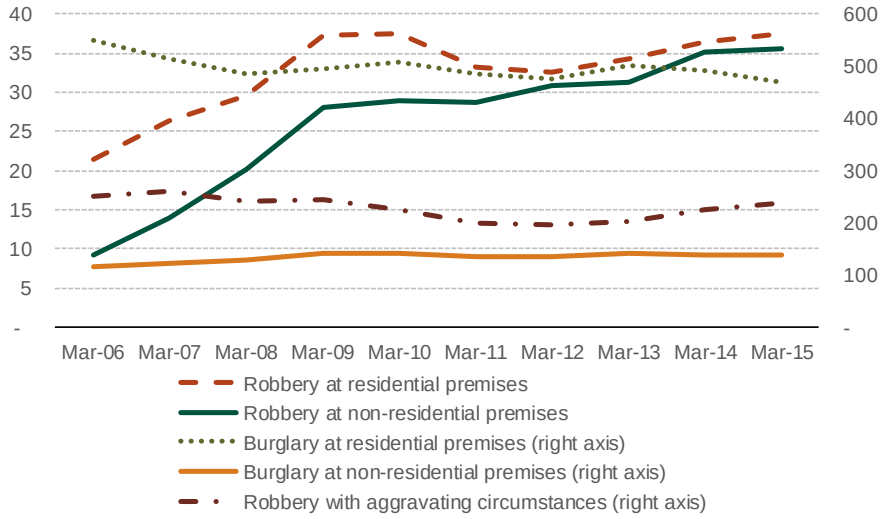
Figure 3: Major violent crimes



Source: (SAPS, 2015), *Statistics SA, own calculations*

Trends in various types of property crimes are less encouraging than other groups. Figure 4 shows data for five kinds of robbery and burglary. In robbery, the victim is present, while in burglary, theft takes place during when no one is present at the premises. Robbery is thus both a contact crime and a property crime, and is consequently more serious in nature. It is thus concerning that robbery at residential and non-residential premises have both strongly increased over the period. Small decreases in burglary at residential premises and robbery with aggravating circumstances do not offset this entirely (and in fact robbery with aggravating circumstances is somewhat higher in recent years again). Burglary at non-residential premises is also slightly higher.

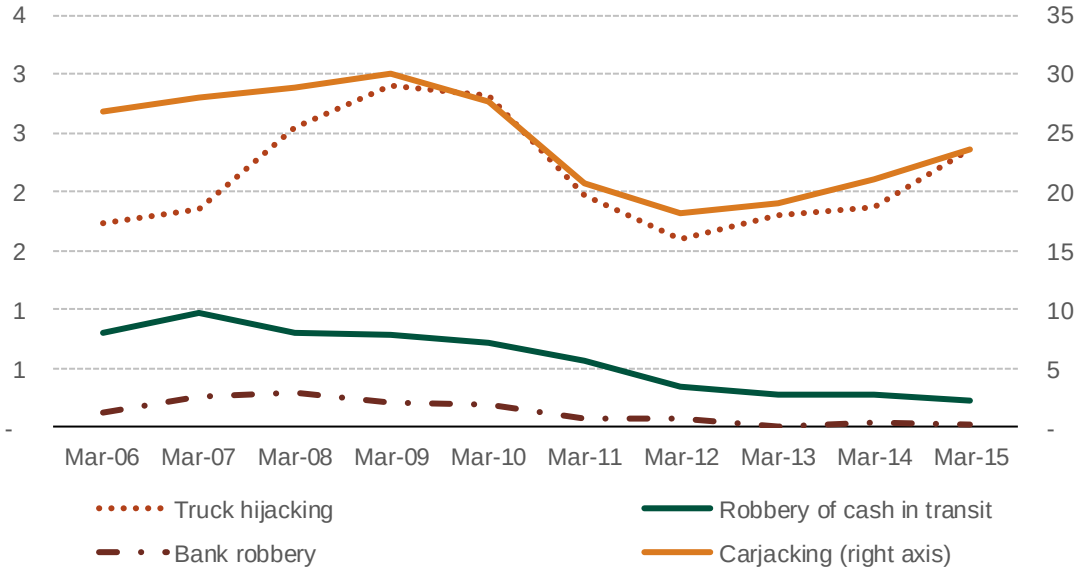
Figure 4: Robbery and burglary



Source: (SAPS, 2015), *Statistics SA, own calculations*

More progress has been made in some other forms of high-profile aggravated robbery, particularly as regards cash in transit heists and bank robbery, where instances are trending quite strongly down. While truck and car hijackings decreased sharply from 2009 to 2012, they have begun to increase again in recent years (see Figure 5).

Figure 5: Other aggravated robbery

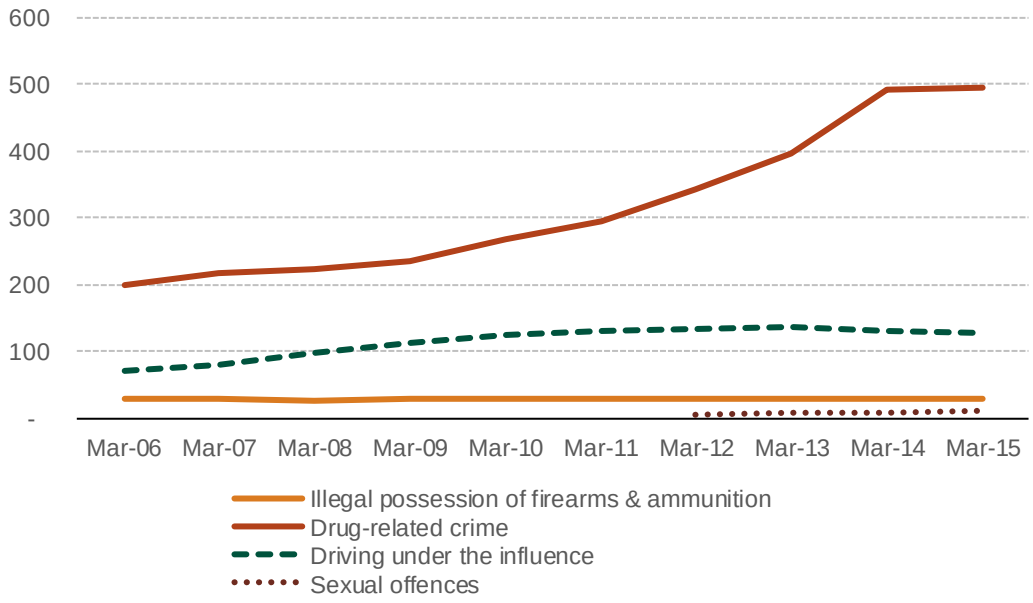


Source: (SAPS, 2015)*, Statistics SA, own calculations*

Figure 6 shows the breakdown in types of crimes detected by police action. These are crimes that are not reported by the public, but are picked up by police action, such as road blocks and SAPS intelligence operations[9]. As can be seen, the vast majority of such crimes are drug-related. The data does not distinguish between types of drug-related crime, such as, possession of small amounts for own use, versus organised crime involvement in drug smuggling and distribution. It is, however, likely that the bulk of incidents are for possession. From the point of view of forensics, drug-related crimes impose a relatively high burden, as securing a conviction usually requires a test of the substance seized to confirm that it is, in fact, an illegal drug, and is a costly use of forensic resources for a low-value high-volume crime.

[9] (Brodie, 2015)

Figure 6: Crime detected as a result of police action



Source: (SAPS, 2015)*, Statistics SA, own calculations*

2.1.3 Perceptions of crime

As the policy commitment of the criminal justice system is to ensure that South Africans not only are safe but feel safe, managing perceptions of crime is a major component of policy outcomes. Statistics SA has undertaken extensive work in surveying such perceptions of crime. The annual Victims of Crime Survey (VOCS) is a national household survey, whose primary objectives are to:

- Provide information about the dynamics of crime from the perspective of households and the victims of crime.
- Explore public perceptions of the activities of the police, prosecutors, courts and correctional services in the prevention of crime and victimisation.
- Provide complementary data on the level of crime in South Africa in addition to the statistics published annually by SAPS.[10]

The 2014/15 VOCS found that "most of the households were of the opinion that the levels for both violent and non-violent crimes had increased in their areas of residence during the period of 2011 to 2014." This widespread perception that crime levels are increasing undermines the credibility of the crime statistics released by SAPS, which since 2001 in many cases suggest that crime rates are falling.[11]

[10] (Statistics South Africa, 2012)

[11] (Rense.com, 2015)

Table 1 shows the crimes which households perceive as being most common, and fear the most. It is notable that forms of property crime, which SAPS data indicates are increasing, are seen to be the most common (first four categories), and also are most feared (first three categories).

Table 1: Crimes perceived by households to be the most common and feared in South Africa, April 2014–March 2015

	Crime perceived to be most common		Crime feared most	
Crime type	**'000**	**Per cent**	**'000**	**Per cent**
Housebreaking/burglary	10 025	65,9	9 657	63,6
Home robbery	6 496	42,7	7 563	49,8
Street robbery	6 406	42,1	6 564	43,2
Pick-pocketing or bag-snatching	3 950	26,0	4 003	26,4
Assault	3 276	21,5	3 789	25,0
Business robbery	2 916	19,2	2 663	17,5
Murder	2 681	17,6	5 714	37,6
Sexual assault	2 529	16,6	4 659	30,7
Livestock/poultry theft	2 427	15,9	2 501	16,5
Car theft or any type of vehicle	1 908	12,6	1 675	11,0
Vehicle hijacking	1 707	11,2	2 552	16,8
Corruption in public service	938	6,2	1 273	8,4
Child abuse	830	5,5	1 914	12,6
Bicycle theft	722	4,7	885	5,8
Mob justice/vigilante group	684	4,5	1 334	8,8
Other property crimes	587	3,9	321	2,1
Crop theft	496	3,3	1 041	6,9
Fraud	459	3,0	816	5,4
Political violence	354	2,3	1 132	7,5
Identity document theft	345	2,3	1 230	8,1
White-collar crime	316	2,1	750	4,9
Other	200	1,3	210	1,4

Source: Statistics SA VOCS 2014/15

2.1.4 Data sources and concerns

Crime statistics must be interpreted with some care. Firstly, absolute numbers of incidents are typically less revealing than a per capita measure of crime incidence (per 100 000 persons is the convention usually followed). This is because changing population growth rates are likely to affect the incidence of crime.

Secondly, not all crimes are reported.[12] The official crime statistics thus will tend to under-report actual incidence, and such under-reporting is more likely to be substantial in less severe crime categories. For example, petty theft is much less likely to be reported than major theft, or theft of insured items. Cultural factors contribute to systematic under-reporting of sexual crimes in particular,[13] and the Medical Research Council has estimated that only one in nine rapes are reported to police.[14] Levels of reporting can then be further affected over time by changing perceptions of the performance of the criminal justice system. For example, if the system's handling of sexual violence is perceived to have improved, rape and sexual assault victims may become more likely to report, resulting in an increase in the official statistics as regards sexual violence.

Thirdly, the behaviour of the police force itself can affect levels of detection of certain crimes. For example, a concerted effort to reduce prostitution is likely to be associated with more arrests for prostitution, and thus the data captured by the police will reflect a spike in prostitution activity.

Finally, errors may occur in the criminal justice system as regards the recording and storing of criminal records. For example, the police officer to whom a crime is reported may record it inaccurately, or at worst case, refuse to record it. Recorded data may then sometimes be destroyed or mishandled.[15]

The SAIRR estimated that 1.7 million (52%) crimes were not reported to the police in 2011. These figures include a number of serious crimes, including 82 000 unreported cases of house robbery, 8 000 unreported car hijackings and approximately 1 000 unreported murders.[16] These estimates were based on Stats SA data collected from a sample of 31 000 households (including hostels).[17]

The South African Police Service annually releases official crime statistics which, while the best available source of data on crime trends, are subject to some of the concerns raised above. These statistics differentiate between the following categories of crime:[18]

- Crimes against the person (contact or violent crime), which are counted per victim (i.e. murders or armed robberies).

[12] (ISS Crime Hub, 2015)

[13] (Jewkes & Abrahams, The epidemiology of rape and sexual coercion in South Africa: An Overview, 2002) In addition to cultural issues, victims of sexual offences may face psychological, institutional, and practical barriers that prevent them from reporting the crime.

[14] (ISS Crime Hub, 2014, p. 3)

[15] (De Kock, Kriegler, & Shaw, 2015, p. 7)

[16] (SAIRR, 2015). It should be noted that this is based on a survey of victims of crime, and their reporting of crime to police. Not all crimes rely on reporting to the police – as pointed out by (De Kock, Kriegler, & Shaw, 2015), "because even if a murder isn't reported, there is usually a body to be found." This approach is thus likely to systematically over-estimate under-reporting of crimes.

[17] (SAIRR, 2015)

[18] (ISS Crime Hub, 2015)

- Property-related crime and other crime types, which are counted per incident, although they may affect a number of different victims (i.e. a residential burglary).

Each crime is given a crime code which is categorised in terms of the Daily Summary of Serious Crime (DSSC) codes. These codes are used for crime statistic reporting purposes. Emanating from the DSSC codes are 21 priority crimes which are grouped into five broad categories. These are as follows:[19]

- **Contact crime (crimes against the person):** murder, attempted murder, sexual offences, assault with intent to inflict grievous bodily harm, common assault, common robbery and robbery with aggravating circumstances (with aggravating circumstances defined as included one of the following: carjacking, truck hijacking, bank robbery, robbery of cash in transit, robbery at residential premises or robbery at non-residential premises).
- **Contact-related crime**: arson and malicious damage to property;
- **Property-related crime**: burglary at residential premises, burglary at non-residential premises, theft of motor vehicle and motorcycle, theft out of or from motor vehicle and stock-theft.
- **Other serious crime**: all theft not mentioned elsewhere, commercial (fraud-related) crimes and shoplifting.
- **Crimes detected as a result of police action**: illegal possession of firearms and ammunition, driving under the influence of drugs or alcohol, drug-related crime, and sexual offences detected as a result of police action (which includes prostitution, keeping a brothel and public indecency).[20]

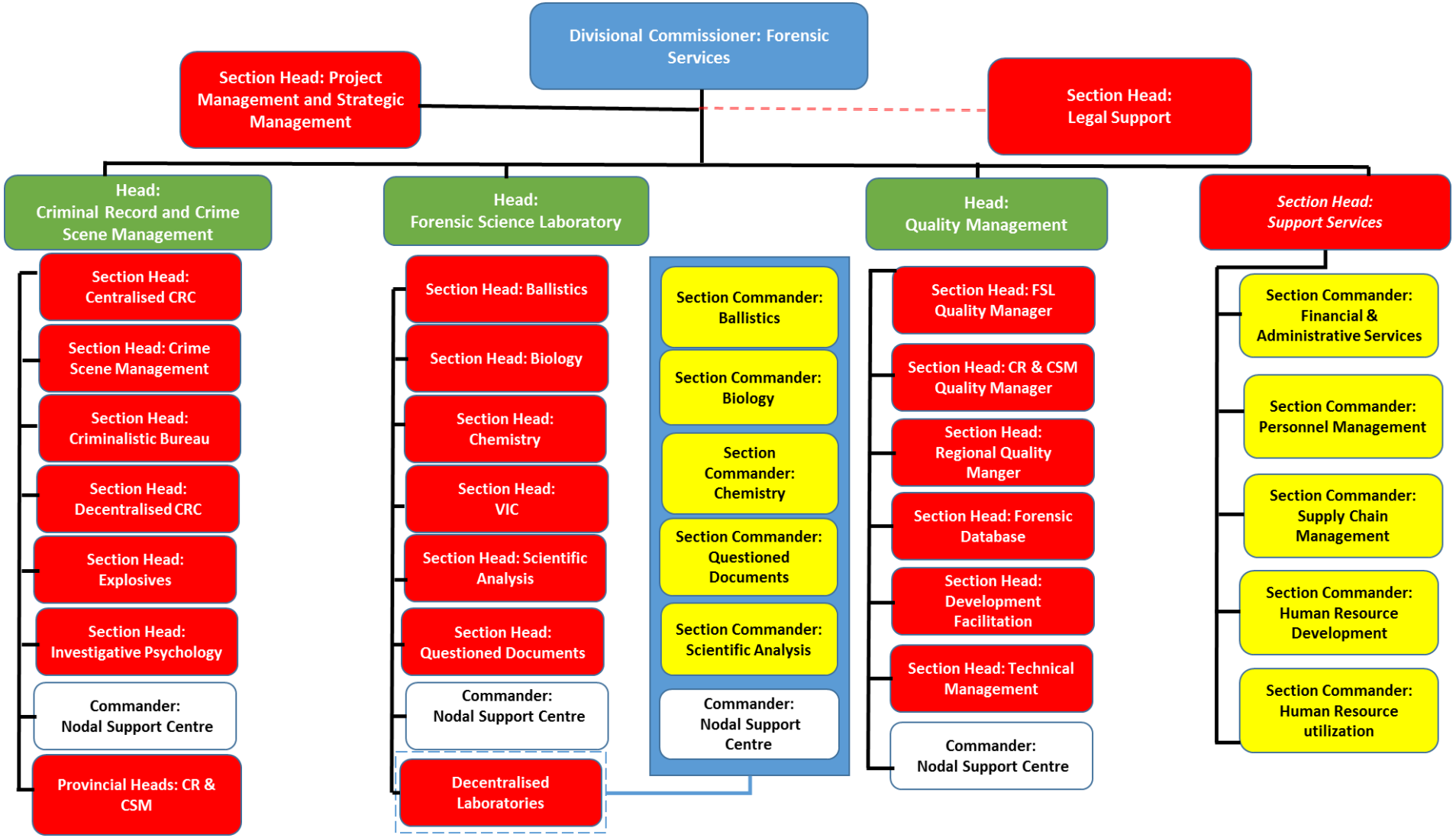
2.2 Forensic services in South Africa

In South Africa, the forensic programme is located within the SAPS, although mortuary services fall under the National Department of Health. Within SAPS, the Division: Forensic Services is located in the Detective Services Programme, and comprises of four components, namely the Forensic Sciences Laboratory (FSL), Criminal Record and Crime Scene Management (CR&SCM), Quality Management (QM) and Support Services (SS), as depicted in Figure 7. As this is an implementation evaluation, the effects of the IIFS on each of these components is examined in greater detail.

[19] (SAPS, 2015, p. 3)

[20] The counting unit and classification of the various crimes can be gleaned from the Annual Report (SAPS, 2015, p. 112)

Figure 7: Organisational Structure of the Division: Forensic Services



Source: Division: Forensic Services

Traditionally, forensic services are involved in the investigation, detection and prosecution of crimes.

- When a crime is committed, it is typically reported to the police through the 10111 call centre.
- A uniformed officer is sent to scene to make an assessment of the nature of the reported incident.
- If necessary, the uniformed officer will secure the crime scene and call a detective (crime scene manager) who will then take charge of the investigation of the crime.
- If evidence is to be collected, crime scene examiners from the Local Criminal Record Centre (LCRC) will typically be requested by the detective to process the crime scene using specialised equipment and techniques;
- The evidence collected at the crime scene will then be taken by the crime scene examiner to the LCRC laboratory for analysis. The crime scene examiner will also submit appropriate exhibit material to the FSL for analysis.
- The FSL will then conduct the necessary forensic analysis submit the forensic findings in the format of a section 212 affidavit in accordance with the Criminal Procedure Act to the detective assigned to the case.
- The detective uses the results to make an arrest or closes the file if a suspect cannot be identified.
- If an arrest is made, the suspect is taken to court for a bail hearing. The suspect's criminal records are produced by the Criminalistics Bureau at the hearing.
- If the case goes to court, forensic findings in the format of the section 212 affidavit will be submitted as *prima facia* evidence by the State Prosecutor to the court. In some cases, the analyst may also be requested by the court to provide the forensic findings in person as oral evidence.[21]

2.3 Theory of change and logical framework

The theory of change shows the pathways through which an intervention contributes to outcomes. Theories of change are built on evidence, research or an intuitive understanding of how a programme works[22]. In the case of forensic sciences, there is little empirical evidence in South Africa on how forensic science contributes to better law enforcement outcomes. This problem is not unique to South Africa, and as Julian *et al.* (2011) argue, much of the research to date has focused on the scientific and technological aspects, with less focus on the effectiveness of forensic services.[23] Thus, in constructing the theory of change, the evaluation team sourced information from programme documentation, international research and empirical studies.

Figure 8 depicts the theory of change and shows how improvements in forensic services works through the criminal justice system to ensure that **all South Africans are and feel safe**. Two long-term outcomes contribute to this impact. The first long-term outcome is a **lower levels of crime**. Crime levels are expected to fall as conviction rates and sentencing improves. The forensic services programme supplies courts with criminal records that contain reliable information on the severity and frequency of an offender's crimes. Increased convictions also act as a deterrent to crime. While

[21] Detective Manual and CSM Policy

[22] (Funnel & Rogers, 2011)

[23] (Julian & al, 2011)

crime deterrence is not easily measured, it is still a significant result of improvements in forensic capability. The risk of apprehension relies heavily on the perceived ability of law enforcement authorities to detect crimes and identify suspects quickly. Forensic evidence increases the likelihood of apprehension of would-be offenders. The dotted arrows in the upper parts of the theory of change reflect the limited empirical evidence to support the contribution of forensic sciences to these outcomes. Reductions in crime levels are also made possible if high-risk offenders are remanded into custody at their bail hearings. In turn, the **correct bail decisions** depend on the timely availability of updated criminal records. The lower parts of the theory of change focus on the outputs and intermediate outcomes that emerge as a result of the IIFS.

- The government provided additional funding through the IIFS to improve the crime scene attendance, enhance the reliability of evidence collection, reduce the turnaround times for criminal records, and enhance the timeliness and quality of forensic analysis within laboratories.
- If these activities are performed as planned, it results in **high quality and timely forensic evidence**, which in turn improves the ability of SAPS to investigate and detect crimes.
- If the offender is identified, then they are **charged on the basis of forensic and other evidence**. Otherwise, an equally important outcome for the CJS is that forensic evidence can serve to **exonerate the innocent**.
- If the case goes to court and forensic evidence withstands legal scrutiny, then it **contributes to increased convictions.**
- An alternative pathway arises when forensic evidence also encourages **plea bargains** and reduces the expense of taking a case to court.
- If forensic evidence raises the number of convictions through the courts or plea bargains, it enhances the chances that perpetrators are caught and acts as a deterrent to crime.
- Through increased convictions and crime deterrence, the IIFS contributes to the overarching goal of "all people in South Africa are and feel safe."

The theory of change depends critically on the ability of first respondents to secure a crime scene and preserve physical evidence. It should be noted that the theory of change presented here is intended to represent the main expected results of the IIFS. It is not an exhaustive list of all aspects of the programme or the Division: Forensic Services more broadly; as this could result in an overly complex representation of the programme.

The theory of change rests on a number of assumptions:

1. Forensic processing capacity is fixed in the short term but variable over the long term.
2. There is a pool of qualified and suitable candidates to fill the positions within the FSL and staff turnover rates stay within acceptable levels.
3. Processes for crime scene management are followed and monitored by VISPOL and Detective Services.
4. Predictable increases in demand for forensic services (which means that regulation, legislation and policy frameworks remain the same). Also, improvements in forensics do not cause substantial increases in the number of crimes reported.
5. Detective and medical staff are trained in the taking of buccal and bodily samples.
6. Appropriate legislation exists that allows for the taking of the evidence that is most likely to be relevant, reliable and informative. In addition, the level of reported crime does not fluctuate substantially.

7. Other parts of the theory of change (e.g. NDOH'S mortuaries) have processes in place to collect reliable samples for further testing).
8. Detectives have sufficient knowledge and capacity to evaluate and interpret forensic evidence and act on it.
9. Court officials and detectives can interpret forensic evidence appropriately.
10. Courts and other contributing factors to obtaining a conviction (e.g. witness testimony and detective work) are functioning sufficiently to use forensic evidence properly and secure convictions. In addition, improvements will only cause a change in the numerator (number of convictions) and not in the denominator (number of cases recorded).
11. More accurate bail decisions mean that fewer of those released on bail will attempt to escape prosecution, or commit repeat crimes while on bail.

Overall, the results suggest that the theory of change is a reasonable depiction of the pathways through which the IIFS works to influence justice outcomes. As such, the theory of change only needs minor improvements (see Figure 9). The revised theory of change now includes monitoring activities that explicitly measure the influence and contribution of the IIFS to justice outcomes. Nonetheless, the SAPS made some critical assumptions in the design of the IIFS. These assumptions, as the evaluation reveals, do not always hold and diminishes the benefits of the IIFS to the CJS. As these assumptions are the preconditions for the successful implementation of the programme, it is worth elaborating on them further:

1. The IIFS assumes that trained and experienced staff will remain within the Division: Forensic Services and contribute to the development of forensic services. This assumption fails to take into account the fact that forensic analysts are scientists whose skills are in high demand from other government departments and the private sector. Consequently, some sections within the Division: Forensic Services experience high turnover rates.
2. Related to this is the assumption that crime scene examiners can deal with the gruesome and violent crime scenes they work in for long periods. The evidence suggests otherwise. Crime scene examiners report being demoralised and traumatised, prompting many of them to leave the Division: Forensic Services.
3. Another assumption is that VISPOL and detective services will follow the crime scene procedures to preserve the crime scenes. The evaluation reveals that police first responders often do not adhere to processes, and there have been instances where evidence has been contaminated and destroyed.
4. The IIFS is premised on the assumption that detectives will use forensic evidence in their investigations. One of the main findings emerging from this evaluation is that SAPS does not have enough detectives to investigate cases and use forensic leads.
5. Finally, the programme assumes that forensic processing capacity is fixed in the short term but variable over the long term. SAPS has not established new forensic facilities since the opening of the Western Cape laboratory in 2011/12. If rising crime levels continue to drive up demand for forensics, eventually backlogs will begin to increase as the division quite literally runs out of space.

A logical framework that sets out the inputs, activities, outputs, outcomes and impacts of the IIFS and indicators is attached in

Figure 8: Theory of change

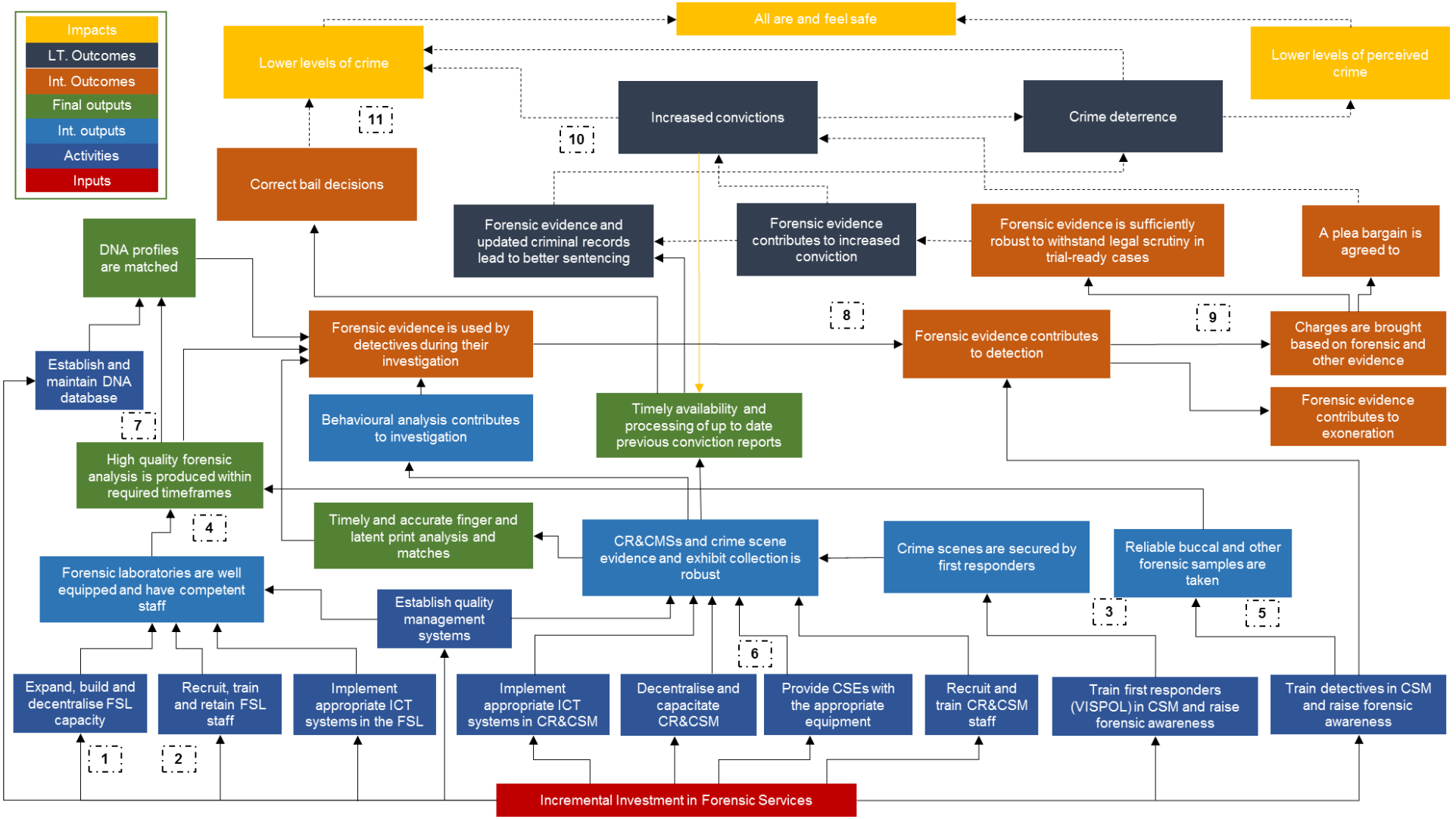
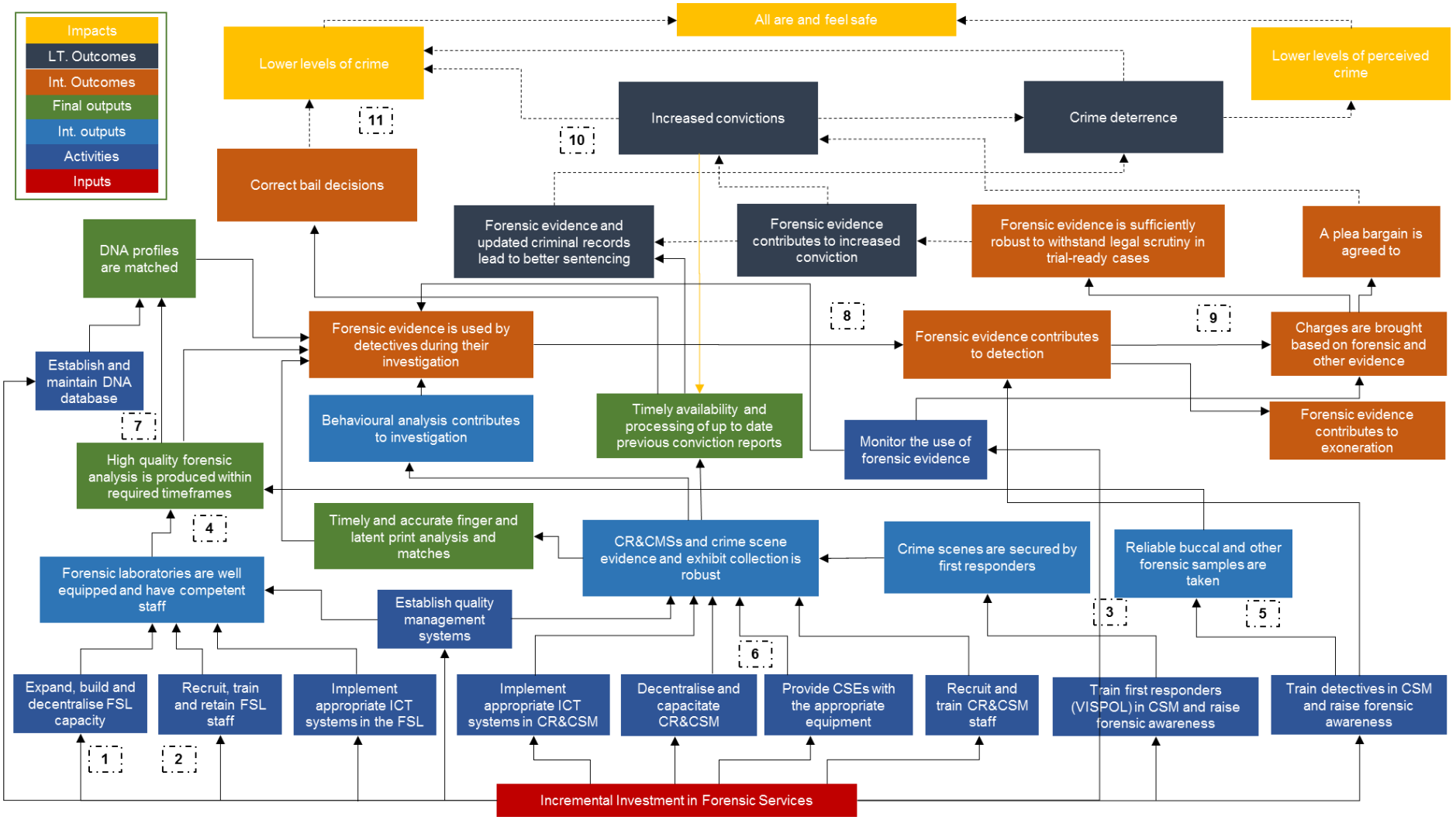


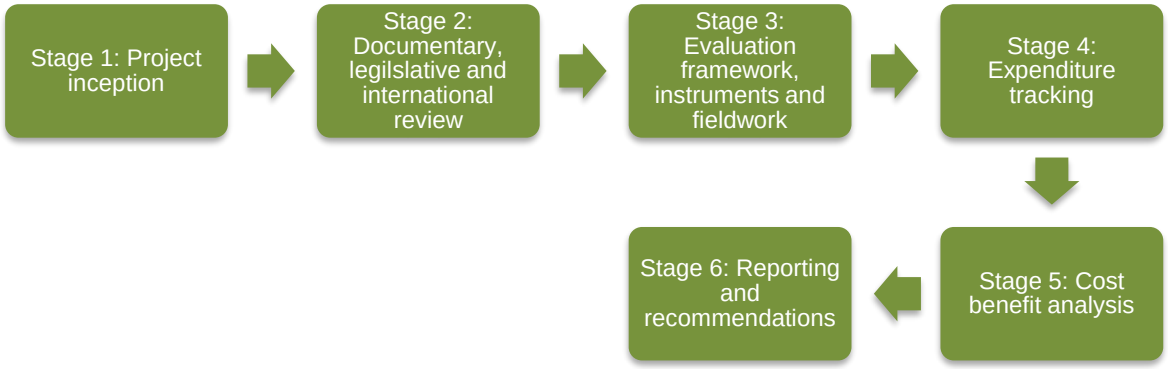
Figure 9: Revised theory of change for the IIFS



3 METHODOLOGY

The DPME and the SAPS commissioned an economic evaluation of the IIFS. This economic evaluation of the IIFS combines two evaluation methods: an implementation evaluation and a cost-benefit analysis. An implementation evaluation examines whether an intervention was implemented as planned. The findings and recommendations from an implementation evaluation can strengthen the design of a programme, its efficiency and overall effectiveness. On the other hand, a cost-benefit analysis examines the resources and costs used by a programmes and compares them to the benefits of the programme. This evaluation incorporates both methodologies and is carried out in six stages, as depicted in the diagram below.

Figure 10: Project stages



3.1 Evaluation stages

3.1.1 Project inception

The project started with an inception meeting between the core members of the evaluation team, members of the DPME, SAPS and the NPA. During the meeting, a number of matters were discussed including a discussion around how the project team would deal with sensitive results as well as compiling a list of the key informants. Due to the sensitive nature of the material that DNA Economics would come in contact with, SAPS undertook to facilitate security clearances for all the researchers involved.

3.1.2 Documentary, legislative and international Review

The inception phase was followed by a documentary, legislative and international Review. The documentary review component of this report examined all the relevant programme documentation supplied by the SAPS on the CJS revamp programmes and external literature on the programme's performance. The legislative review looked at the relevant Acts and associated regulations that form the legislative framework that governs the South African policing environment and in particular forensic services. An international review was also done to compare South Africa's forensic system to the design and structure of systems in a range of countries.

3.1.3 Evaluation framework, instruments and fieldwork

In developing an evaluation framework, a draft theory of change was developed that shows how the IIFS contributes to better justice outcomes. The theory of change was presented to the PSC on the 19th and 20th of May 2015 and to officials from the DPME, SAPS, and NPA on 29 May 2015. Based on the feedback from these workshops, the theory of change was revised and finalised. Included in the evaluation framework, was the logical framework and a set of indicators that outlines how progress should be measured.

The PSC agreed to five evaluation criteria that needed to be examined during this evaluation. These are:

- **Relevance** refers to the extent to which the objectives of an intervention are consistent with the requirements of the country, needs of the beneficiaries and policy priorities.
- **Efficiency** is a measure of how economically resources and inputs have been used and converted into results.
- **Effectiveness** assesses the extent to which the IIFS has achieved its intended objectives and whether any unintended consequences might have moderated the success of the programme.
- **Sustainability** examines the potential for sustaining the benefits of the IIFS after it has ceased.
- **Emerging impact** highlights the primary and secondary long-term effects produced by an intervention (Peersman, 2014).

Interviews were conducted with respondents across all sections in the FSL, CR&CSM and QM as well as with VISPOL and detective services. In addition, interviews were conducted during field visits to Limpopo, Gauteng, Eastern Cape and the Western Cape. A full list of interviews can be found in the fieldwork report that accompanies this evaluation report.

3.1.4 Expenditure tracking

Expenditure on the CJS Revamp programme was provided for the period between 2009/10 and 2014/15. Using this data, the evaluation team traced expenditure on the IIFS. As the spending information was provided at the Standard Chart of Accounts (SCOA) level 3 and not per project level, the information received was not sufficiently detailed to perform any in-depth analysis of costs. The evaluation team also received high-level estimates of expenditure on personnel with almost no detail on how many new recruits were funded from the IIFS. The issues encountered around the reliability and completeness of the expenditure data is discussed in section 3.2.

3.1.5 Cost-benefit analysis

Cost-benefit analysis is a useful tool in policy evaluation. In its simplest form, it assesses whether the costs of a programme are exceeded by its benefits. However, in practice, the results of a CBA are typically more nuanced, not least because it is often not possible to monetise all costs and benefits, and thus come up with a net result. A cost-benefit analysis on the IIFS requires detailed information to estimate the costs and to quantify the benefits of the investment. Since the level of detail required was not available, the evaluators adopted a “soft” cost benefit analysis. The methodology combines information from the FSL admin database, CAS and CRIM databases to trace the outcomes of cases from the laboratories to the court over a ten-year period. This may well be the first study that attempts

to follow cases from crime scenes to court to assess the influence of forensics on justice outcomes in South Africa.

It is important to mention that this economic evaluation is about the *contribution* and not the *attribution* of the IIFS to justice outcomes. Attributing the effects of one intervention in a complex system such as the CJS is nearly impossible. Therefore, the emphasis on the "soft" cost benefit analysis is on finding trends and patterns that illustrate how forensic services influences downstream parts of the CJS.

3.1.6 Reporting and recommendations

Four provincial and one national working papers were produced for this evaluation. The working papers assess the implementation of the IIFS in the provinces and at the national level. This report synthesises the findings from the working papers and incorporates the analysis of the results from the implementation evaluation and cost benefit analysis.

3.2 Data limitations

Gathering reliable and consistent financial and non-financial information has been a challenge over the course of this evaluation. Economic evaluations require detailed financial and non-financial data to track the expenditure on an intervention and assess its benefits. Expenditure data is analysed to determine what, how and when public funds were spent. Non-financial data, which consists of administrative and performance data provides valuable insights into the results and benefits achieved by the intervention.

For the IIFS, some performance data and administrative data was made available by the Division: Forensic Services. However, even when information was available, there were large discrepancies between different sources. For instance, there were considerable differences between the staffing numbers provided by the Division: Forensic Services and individual units. The reasons for these differences rests in the way information is monitored and tracked within the division and SAPS more broadly.

In respect of financial information, it is harder to determine what funds were allocated and spent through the IIFS. Part of the problem lies in the way the budget for the IIFS is managed within SAPS. Three divisions are responsible for expenditure against the IIFS: the CFO's office which administers the budget for compensation of employees, TMS which controls the information technology budget, and the Division: Forensic Services. While, it is apparent that the Division: Forensic Services and TMS work in close cooperation to determine what the IT budget is spent on, information on the compensation of employees is not shared between the division and the CFO's Office.

As a result, the Division: Forensic Services' quarterly reports, account mainly for expenditure on goods and services, and some assets. Therefore, while these reports help to piece together a picture of how the IIFS was spent, they do not tell the entire story. It is also worth mentioning that the quarterly reports contained some inconsistencies which influence the quality of the analysis. For example, the evaluators note that there are two different numbers for the expenditure by the CR&CSM and the FSL components for the same year. Additionally, in one or two cases, there were simple errors where

for instance the numbers did not add up. In these cases, ideally, the evaluator would go back to the source data, and attempt to correct the error. The evaluation team only received the correct POLFIN data in June 2016, almost 18 months after the study had begun.

Moreover, there is some disagreement over the personnel numbers. The staff numbers drawn from the PowerStats system do not reflect the actual organisational structure over the evaluation period. It is evident that the Division: Human Resources did not update the organisational structure over time to reflect the approved organisational structure of the Division: Forensic Services.

As a result of the discrepancies in numbers, the managers within the Division: Forensic Services consequently disputed the numbers provided by the PowerStats system. It is clear that the mismatch between the reported personnel numbers by component and section and the actual staff complement merits concern, and raises questions about the overall reliability of the personnel data.

4 FINDINGS FROM THE LITERATURE REVIEW

4.1 International review

Forensic sciences are expected to contribute to outcomes within the criminal justice system. In this section, the evaluation team examines the extent to which these contributions have been reliably established in the available empirical literature. It should be noted that considerably more detail on the international review is provided in the Appendix 2.

Forensic evidence plays a significant and growing role in resolving criminal cases. While in 1963, scientific evidence was utilised in only 1% of crimes, at present in some crime categories almost all cases see some form of forensic analysis.[24] There is a widespread belief that forensic sciences enhance the ability of police services to detect and solve crimes, by using scientific techniques to collect, analyse and interpret critical information on when, where, how and by whom a crime was committed.

However, the role forensic analysis plays in case resolution has to be understood within the wider framework of each case and the criminal justice system as a whole. 'Solvability factors' such as "*elapsed time between the discovery of the offense and its report to, or response by, the police; the taking into custody or naming and placing of a suspect at the preliminary investigation stage; and the presence of witnesses who viewed the crime and/or offender*,"[25] are often of greater importance to the resolution of cases than the presence and analysis of forensic evidence.

Figure 11 below graphically shows the funnelling effect that occurs in the justice system. At each step of the process, from the time a crime occurs until a conviction is achieved, a significant amount of attrition occurs in which crimes make it to the next step. The presence and use of forensics

[24] Parker & Peterson, 1972, quoted in (Peterson, Sommers, Baskin, & Johnson, 2010, p. 187)

[25] (Peterson, Sommers, Baskin, & Johnson, 2010, p. 139)

evidence at each phase of the process is one of the factors that affect how many crimes go to the next step of the funnel, and thus the ultimate success of the justice system.

Figure 11: The funnel of justice system outcomes

Source: Own extrapolation, loosely based on (Peterson, Sommers, Baskin, & Johnson, 2010, p. 3)

To illustrate, research from the United States shows that while forensic evidence is a good predictor of arrest in aggravated assault cases, the results of forensic analysis had little influence on the arrest decision. Rather, forensic evidence supported and validated the arrest decision in court after detectives had used traditional investigative techniques to identify suspects.

In contrast, forensic evidence on ballistics, material traces, biological and latent prints collected in 97% of homicides played a major role in obtaining a conviction at trial, after witness testimony in non-stranger homicides. This suggests that any theory of change should reflect the importance of other aspects of the CJS value chain such as effective visible policing, good detective work and prosecutorial capabilities on conviction rates. That being said, there appears to be fairly good evidence that forensic analysis can play a significant role in improving criminal justice outcomes[26, 27] (although some studies have found little or ambiguous effects).[28]

The use of DNA testing and profiling can transform law enforcement, by allowing the police to consistently and reliably link crime scene evidence to a single individual.[29] Empirical evidence on the effectiveness of DNA profiling supports its increased used by law enforcement authorities. Werret and Sparkes (1998), quoted in Julian *et al.* (2011), demonstrate that the ability to collect, store and

[26] (Peterson, J; Mihajilovic, S; Gililand, M;, 1984)

[27] (Wilson, Weisburd, & McClure, 2011, p. 22)

[28] (Wilson, Weisburd, & McClure, 2011, p. 5)

[29] (Wilson, D; McClure D; Weisburd, D, 2010)

match DNA to a crime scene, and to connect one crime scene to another, has improved the ability of police services to investigate and resolve crimes in Great Britain.[30]

The international evidence emphasises that the rate at which forensic evidence is used varies substantially across different crime types. As per Peterson et al (2013), a fairly typical dispersion of rates of evidence collection by crime type looks something like this:

> *"This study showed that physical evidence was collected and analyzed in only 20–30% of all serious crimes. Further, this rate varied greatly by crime type. For example, the police collected physical evidence in virtually 100% of murder and drug cases and 75% of rape cases, but in only 10–20% of attempted murders, 33% of burglaries, and 20% of robberies."*[31]

Furthermore, the frequency with which physical evidence is collected and analysed depends on to a large extent on the perceived solvability of the crime, and its seriousness. If a crime is serious and difficult to solve, evidence collection efforts intensify, whereas less serious crimes typically see more evidence collection when their solvability is good. This implies that examining only the impact of forensics on case outcomes in the subset of cases where physical evidence has been collected likely to bias the results in unpredictable ways.

A systematic review done through the Campbell Collaboration attempted to summarise the evidence on the contribution of forensic evidence to better investigative and justice outcomes.[32] The study confirms that the pathways through which forensic sciences contribute to outcomes in the criminal justice system are involved. For instance, the findings from randomised controlled trials show that DNA analysis does indeed make a positive contribution to investigative processes, but mostly in volume-crimes such as burglaries. But the use of costly DNA profiling in these types of crimes raises practical questions for law enforcement agencies around the cost-effectiveness of this technique. For policy makers, limited research on the effectiveness of forensic sciences makes it difficult to decide on the areas, techniques and methods within this broad discipline to invest in.

The limited empirical evidence on the impact of forensic sciences on the criminal justice system has two important implications for this evaluation, and in particular, the development of the theory of change. First, while positive contributions of forensic science to outcomes and impacts in the criminal justice system can be posited, there is limited empirical evidence to support the upward linkages in the theory of change. In other words, the causal relationship between outputs and outcomes, and impacts cannot be inferred reliably.

This lack of research is not unexpected as forensic science is a relatively new discipline in law enforcement with much of the research focusing on the technology and science, rather than the

[30] (Julian & al, 2011)

[31] (Peterson, Hickman, Strom, & Johnson, 2012)

[32] (Wilson, D; McClure D; Weisburd, D, 2010)

impact of forensics on the criminal justice system.[33] Therefore, in an economic evaluation such as this one, the benefits of an investment in forensics need to be defined cautiously.

4.1.1 Key findings of the review of international forensic science systems

To better gauge the efficacy of the design of South Africa's forensics sciences system, it is useful to cross-compare it with other comparator countries. In particular, such an exercise allows contextualization of SA's forensics program through the analysis of how other countries have institutionalised and implemented their respective forensics programs in comparison to SA.

To achieve this, an international comparison study was undertaken by the evaluation team; comparing forensic sciences in SA to the United Kingdom, the United States, Australia & Botswana across five theme areas, namely, legislative differences; institutional arrangements; crime scene investigation; forensic science laboratories and performance indicators. It should be noted that what was compared was primarily differences in the formal design of the forensic system, rather than issues with the consistent application of this framework, as a full comparison of all practical aspects of these systems would be a far more intensive and costly exercise.

In the interest of space, only the main conclusions of the review conducted are provided here, while the full review can be found in the literature review document carried out during the early phases of the evaluation.[34]

Taken as a whole, the South African forensics program, subject to the new amendments brought about by the Fingerprint Act and DNA Act, is by and large reasonably similar to comparator countries. However, there are some differences, in particular:

- South African **legislation compels authorised personnel to take fingerprint and DNA samples** by way of a statutory requirement. Comparator countries typically allow for taking of samples under various circumstances such as conviction or suspicion but these are procedural decisions rather than statutory requirements.
- South Africa's forensic laboratory structures are **highly centralised** compared to the U.S which is highly decentralised. The centralised nature of SAs laboratories is likely to enable streamlined deployment of standards, processes and procedures.
- Unlike the UK which has a wholly independent forensic sciences regulator (the FSR) which performs an oversight function (albeit with no legal status), SA does not have an independent regulator per se, but rather **relies on lab accreditation** (which is an ongoing priority with the FSL).
- In terms of policy priorities in forensics, South Africa has a **focus on violence against women and children** while international comparators prioritise areas such as cyber-crime, anti-bullying and gang-related crime.

[33] (Julian & al, 2011)

[34] (DNA Economics, 2015)

- Performance monitoring also appears to differ in that during the period under review, SA sets the same turnaround target of 28 working days across disciplines within the forensics program, whereas in the US, **performance targets differ by discipline** (e.g. ballistics will differ in comparison to biology), but also will differ from lab to lab depending on the county, city or state in question.

5 FINDINGS FROM THE NATIONAL IMPLEMENTATION OF THE IIFS

5.1 Programme design

5.1.1 Rationale for the IIFS

Faced with unacceptably high levels of crime in South Africa, the Government in collaboration with the Big Business Working Group established a Working Group to review the Criminal Justice System (CJS) in 2006. The Working Group proceeded to undertake extensive consultations with stakeholders across the CJS, to evaluate the level of effectiveness of the system as a whole. The review found that the system was characterised by marked dysfunction, fragmentation, blockages and obstacles, the absence of the required integration at the national level, lack of coordination structures, high levels of unaccountability, misallocation of resources, inadequate or incorrect prioritisation of projects, as well as incongruent objectives, measurements and performance indicators. Personnel shortages in the major areas, notably crime scene and forensic experts, were also identified as a critical issue.[35]

In addition to identifying capacity and coordination constraints, the Working Group also noted that inadequate regulations and legislation prevented SAPS from collecting, storing and using fingerprinting and DNA in their investigations. The review recommended that amendments to the pre-existing law to address these bottlenecks and challenges.

After the assessment, the CJS Review Working Group came up with a set of recommendations that would subsequently become known as the "Seven-Point Plan". Cabinet approved the Seven-Point Plan on the 7th of November 2007. The plan's intent is to create a modernised, efficient, effective and transformed CJS that is coordinated and well-managed at every level.

Following the approval of the Seven-Point Plan, the National Treasury specifically and exclusively appropriated funds for CJS programmes and projects. While the Seven-Point Plan would require changes for all the role players with the CJS, all of these funds were initially allocated to SAPS based on the agreement that a significant proportion of the funding would go towards the forensic services programme. At the time, Office for the Criminal Justice System Review (OCJSR), which was tasked with coordinating the implementation of the Seven-Point Plan, chose forensic services as the focal point for investment for the following reasons:

[35] (Parliamentary Monitoring Group, 2014)

- Crime scene investigation, fingerprinting, exhibit collection and analysis represent some of the "front-end" parts of the CJS value chain; and therefore insufficient capacity or quality in these areas affects all downstream parts of the value chain such as prosecution and judicial proceedings.
- Forensic Services was one of the most ineffective parts of the system, and it was deemed that these severe shortcomings could not be addressed without substantial increases in the budget allocation to the forensic system; whereas other areas of the Seven Point Plan could be addressed without substantial budgetary increases to the affected departments.

The following weaknesses (amongst others) in forensic services were highlighted[36]:

- Staff number and skills shortages in terms of both forensic analysts and crime scene experts; as well as great difficulties in retaining skilled staff in these areas.
- Shortages of critical equipment and vehicles. As a result, for example, crime scene examiners were usually forced to share vehicles and even relatively basic equipment such as cell phones and cameras. This meant that one investigator often had to wait for another to finish before the next scene could be investigated.
- Severe weaknesses in several systems used by the FSL and the CR&CSM; for example the inability to generate criminal records within target timeframes (e.g. 48 hours for a bail hearing) created not only additional costs through increased remand detention, but also adversely affected bail verdicts and sentencing decisions.[37]
- The inadequacy of legislation regarding the collection, storage, use and destruction of fingerprint and DNA evidence.
- These shortages resulted in severe weaknesses in investigative capacity and quality. For example, at the time of the CJS Review, only 60% of crime scenes that necessitated a crime scene visit were attended to[38] and the time spent at each crime scene was well below international best practice.[39] The knock-on effects of this poor performance on other parts of the system contributed to low detection and conviction rates.

5.1.2 Planning for the IIFS

The IIFS began without an approved implementation plan. Instead, on an annual basis, the Division: Forensic Services prepared activity and business plans that were submitted to the National Treasury to access funding. This activity based planning approach has worked well for the division in monitoring their processes. However, activity based planning has a number of shortcomings:

[36] Based on Forensic Services CJS document provided by Forensic Services as well as interviews with key officials within the constituent parts of the CJS.

[37] From an interview with Wille Scholtz from the OCJSR

[38] Willie Scholtz 2010: Report on Forensic Services in the CJS

[39] Forensic Services CJS Document provided to DNA Economics by Brigadier Joe Smith

- It focuses planning on inputs and processes (what the organisation must do) with little attention to outputs and outcomes (what the organisation must achieve). This can lead to situations where organisations lose sight of the outcomes intended by policymakers.
- It encourages the use of numerical targets, inputs and process indicators. This singular focus on numerical targets can encourage perverse behaviours in law enforcement. For example, turnaround time targets can incentivise forensic analysts to declare inconclusive or negative findings to close an entry. Therefore, numerical targets should be used in conjunction with other monitoring mechanisms such as quality reviews.
- Activity planning detracts from a medium to longer-term focus. For the Division: Forensic Services, the emphasis should be on developing medium to long-term plans that illustrate how they contribute to the CJS.

Each of the activities identified by the Division: Forensic Services are linked to **eight** objectives based on the Seven Point Plan (see Table 2). These eight objectives are replicated in the table below.

Table 2: Objectives of the CJS Revamp Programme

1. To ensure a forensic human resource capacity, responsive to the needs of the CJS	5. To establish an enabling mechanism for improved business performance and the accreditation of the forensic service laboratories
2. To advance the development of personnel in forensics	6. To create forensic awareness
3. To provide support to the criminal investigation and judicial process through the detection, collection and use of quality forensic evidence	7. To expand and decentralise the Forensic Service and Criminal Records and Crime Scene Management capacity
4. To ensure the provision of reliable and timely forensic processing, analysis & examinations to support the fairness and effectiveness of the CJS	8. To facilitate the modernization of systems

All funding through the IIFS is allocated to one of these objectives. While this approach has its merits, it also has a few drawbacks and shortcomings:

- Almost any project or programme remotely related to forensic services can be allocated to at least one or more objectives. How then does the division prioritise its projects and programmes? Would a project fall under objective **one** be a higher priority than objective **six**?
- The objectives tend to overlap and are broad in scope. For example, what types of systems would fall under objective **eight** - "facilitating the modernization of systems"? Would a server and network upgrade that expands the number of fingerprints processed by the Automated Fingerprint Identification System (AFIS) fall under objectives **eight**, **seven** or **three**?
- The objectives are not clearly linked to the outcomes of SAPS or the outcomes intended by the CJS Revamp programme. How does the objective of establishing "an enabling mechanism for improved business performance and the accreditation of the forensic service laboratories" contribute to achieving CJS outcomes?
- Performance indicators have not been developed to monitor, measure and track the achievement the eight objectives. This approach raises the question: How does the division

measure its progress in advancing "the development of personnel in forensics" or ensuring "forensic human resource capacity that is responsive to the needs of the CJS"?

Part of the problem arises from the fact that the Seven-Point Plan did not set targets for the CJS. Thus, as one of the objectives of the IIFS was to increase the availability of high quality and timely forensic evidence for detectives and prosecutors, a simple measure of this objective is the proportion of cases with forensics where the prosecutors bring charges. However, there are no performance indicators to monitor these outcomes within SAPS or the broader CJS. It is therefore difficult to measure whether the IIFS has made measurable progress in achieving the outcomes in the Seven-Point Plan.

While there are certain weaknesses in the design and planning of the IIFS, various positive aspects warrant further mention. The IIFS has responded to the changing patterns of crime. In response to the increasing number of ATM bombings, the IIFS was used to purchase equipment and build capacity in the explosives unit. Similarly, it contributed to building much-needed capacity to analyse DNA in response to the promulgation of the Criminal Law (Forensic Procedures) Amendment Act, Act 37 of 2013 (commonly referred to as the "DNA Act"). In many areas, the IIFS has allowed the Division: Forensic Services the flexibility to make decisions based on their needs. As a result, the Division has established new disciplines within the forensic services programme and deepened capacity in others.

5.2 Programme resourcing

5.2.1 Expenditure on forensic services

The IIFS was allocated to accelerate spending on Forensic Services within SAPS. Between 2009/10 and 2014/15, the Division: Forensic Services received R17.8 billion in funding, as Table 3 shows. This funding consisted of a baseline allocation of R11.6 billion and additional funding of R6.2 billion through the IIFS. Over the period, total expenditure rises rapidly at an average annual rate of 19%. FSL expenditure grew marginally faster than the Criminal Records Centre, increasing at an average annual rate of 21%, driven mainly by the additional funding made available through the IIFS.

Table 3: Expenditure on the Forensic Services Programme

	Audited outcome (R'000)						
Description	**2009/10**	**2010/11**	**2011/12**	**2012/13**	**2013/14**	**2014/15**	**2009/10-2014/15**
Criminal Record Centre	842 198	1 157 722	1 330 229	1 582 422	1 924 927	2 015 769	8 853 267
Forensic Science Laboratories	593 531	1 033 281	1 922 434	1 922 434	1 779 130	1 736 564	8 853 267
Total	**1 435 729**	**2 191 003**	**3 252 663**	**3 504 856**	**3 704 057**	**3 752 333**	**17 840 641**

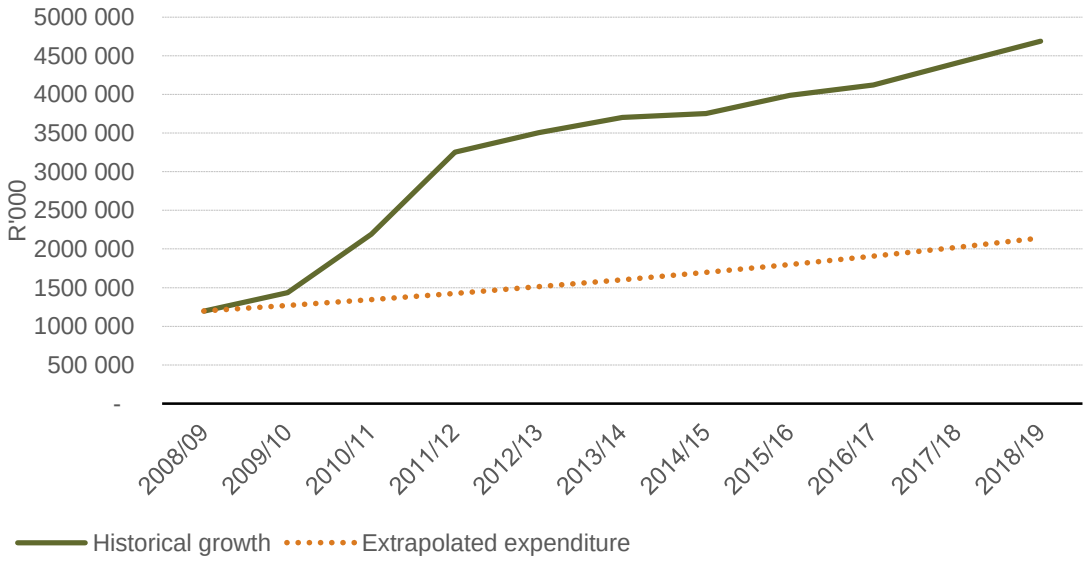
Source: National Treasury's Estimates of National Expenditure (various years)
Note: The term "Criminal Records Centre" includes expenditure on crime scene management.

Whereas the IIFS accelerates investment in forensic services, additional funding was also allocated to modernise information technology within the CJS through the Integrated Justice System (IJS) modernisation programme. Delineating the funding allocated between these two programmes is hard because of the way the transactions were recorded in the Estimates of National Expenditure.

Nevertheless, Figure 12 reflects the effect of the CJS and IJS allocations on a budget of the Division: Forensic Services.

Had the Division: Forensic Services budget allocation has grown in line with inflation, their total allocation would have been much lower, or about R9 billion less over the period. Over the medium term, allocations to the Division: Forensic Services are expected to rise above inflation, and is a reflection of the government's commitment to investing in forensic capacity.

Figure 12: Projected growth in the Division: Forensic Services



Source: DNA Economics calculation

There are considerable variations in how the National Treasury treated the funding through the CJS Revamp programme over the evaluation period. The National Treasury has vacillated between providing earmarked and discretionary funding for the CJS Revamp programme. Unlike earmarked funding, the discretionary funding allows an organisation to make decisions on how and when funding is spent. Hence, by not specifying the use of funds, the National Treasury has given SAPS greater leeway to shift funding to other areas within the *Detective Services* budget programme.[40]

The proportion of funding allocated to the IIFS is an internal decision taken by SAPS. The funding decision is relatively straightforward. The Division: Forensic Services submits a 3-year budget bid (with their project plans) to the Chief Financial Officer, outlining the goods and services and capital assets they want to procure. The bid committee then decides on how much funding is allocated to the different types of expenditure and specific projects. TMS administers the budget for all technology related projects and is responsible for procuring or upgrading technologies and systems, whereas FSL and CR&CSM control their budgets.

[40] This change in approach has allowed SAPS to reduce expenditure on compensation of employees and allocate an amount of R500 million towards capacity building efforts that will benefit the detectives in 2014/15.

There were concerns raised by some officials about the approach to budgeting. This is despite the existence of set procedures in the Division: Forensic Services to ensure that all senior managers participate in budgeting and monitoring processes. Nonetheless, some officials claim that the budgeting and allocation process lacks transparency. In particular, the criteria for allocating funding between CR&CSM and FSL is not well understood. Perhaps, part of the confusion arises because the IIFS business plans were developed on an annual basis, primarily to respond to the immediate needs of the different components. This created some uncertainty over how much was allocated to the components and sections within the Division: Forensic Services. In addition, in-year adjustments to the budgets had to be made because of procurement delays. These factors also explain the large swings in expenditure between years. For instance, investment in the FSL jumped from R594 million in 2009/10 to R1.9 billion in 2011/12, and after that began to decline. In contrast, CR&CSM experienced a 22% increase in expenditure over a single year, between 2012/13 and 2013/14.

5.2.1.1 Expenditure through the IIFS

Between 2009/10 and 2014/15, the National Treasury allocated about R 8.9 billion to the *Detectives* budget programme through the CJS Revamp programme. The Division: Forensic Services which falls under the purview of the *Detectives* programme received R6.2 billion through the IIFS. This represents about 69.7% of total funding allocated through the CJS, as shown in Table 4. The bulk of the expenditure was spent on purchasing equipment and technology to modernise and upgrade CR&CSM and the FSLs. Although the IIFS began in 2009/10, spending started in earnest in 2010/11. It is important to mention that as there is a significant time-lag between the production of forensic evidence and its effect on justice outcomes (as cases take time to get to court), it may be too early to evaluate the consequences of the later years of the IIFS on the CJS.

Table 4: Expenditure on the IIFS funded through the CJS allocation, 2009/10 to 2014/15

R' million	2009/10	2010/11	2011/12	2012/13	2013/14	2014/14	Total
Technology, automation and equipment	153.80	296.50	674.50	604.00	484.00	715.30	2 928.10
Criminal Records and Crime Scene Management	22.60	220.40	172.50	182.60	304.50	312.10	1 214.70
Forensic Science Laboratories	2.10	127.60	275.30	219.50	267.50	275.50	1 167.50
Compensation of employees	-	100.40	202.50	131.20	179.10	255.70	868.90
Total	**178.50**	**744.90**	**1 324.80**	**1 137.30**	**1 235.10**	**1 558.60**	**6 179.20**
Total as a percentage of CJS funding allocated to SAPS							**69.7%**

Source: Division: Forensic Services and Technology Management Services
Note: There were no monies spent on compensation of employees in 2009/10

If the expenditure is apportioned to the Division: Forensic Services' different components, then 53.5% of total spending was spent on CR&CSM whereas 46.5% of spending went towards FSL (and quality management) over the full period.

5.2.1.2 Expenditure on goods and services

About R5.3 billion of the IIFS went towards goods and services as well as capital assets. Almost all of this expenditure went through the SAPS' and SITA's procurement systems. Interviewed officials report that supply chain systems are inefficient and characterised by slow and time-consuming processes. Furthermore, they point out that the procurement procedures set out in the legislative framework are ill-suited to the purchase of scientific equipment and chemicals which must be validated and tested before they can be utilised by the Division. Officials report that every time the Division changes suppliers, a practice required by procurement regulations because of the low number of providers in the market, consumables and equipment had to be re-tested and validated at the cost of time and expense. This practice has worsened delays in the procurements and led to stock-outs.

There are some problems that arise during the procurement process that have contributed to delays in the purchase of consumables and equipment within the division. They are as follows

- **Acquisition planning**: There is limited capacity to forecast the demand for equipment and consumables, and plan for the purchase of these items with the Division: Forensic Services. About 30% of crime scene examiners surveyed report that they did not have sufficient and appropriate consumables to fulfil their duties. Frequent stock-outs point to weaknesses in procurement planning within the division.
- **Requirement definition:** Inadequate specifications have led to situations where the equipment purchased was not fully compatible with existing systems, and had to be reconfigured to work, at some cost. Another issue raised during interviews was that the equipment and technology were not always fit for purpose and did not deliver value for money.
- **Tendering**: A source of frequent delays is the bureaucratic process involved in getting internal authorisation for tenders, particularly for large and expensive purchases of technology. Interviewed officials in the TMS division point out that the number of signatories and approvals required before a tender is issued can take months to obtain. There are even further delays if the SITA administers the tender.
- **Evaluation and selection:** There are only a few firms that can supply the type of equipment and consumables purchased by the Division: Forensic Services. Thus, it is often the case that only a few providers can respond to a tender bid. In the forensic environment, procurement delays have arisen because of the contestation of awards by unsuccessful providers through the judicial process. These contested cases can take years to resolve. In the meantime, supplies for the laboratories cannot be ordered, or are being ordered in slight quantities to remain below the threshold for an open tender.
- **Contract award:** While the time it takes to complete an SLA has improved, it remains a challenge for the division, particularly when SITA is involved in the procurement process.
- **Contract management:** There are also legitimate reasons for the delays; factors such as delays in shipment and clearances for imported products are beyond the control of providers. Nevertheless, delays also happen because suppliers are not managed effectively.

One of the unintended consequences of the IIFS was that it made a pool of money available to the division, without setting clear criteria for the use of the funding. Coupled with the lack of a clear and

results-based implementation plan, this has fostered a situation where the focus was on spending the CJS funding, and not necessarily always driving the best value for money from purchases or supporting best forensic practices. In group discussions, officials noted that the priority was to spend the CJS allocation within the year.

Finally, interviewees and survey respondents have raised concerns around allegations of corruption associated with the IIFS. While it is not within the scope of this evaluation to interrogate issues relating to procurement irregularities, there is nonetheless a need for SAPS to examine why these problems have arisen.

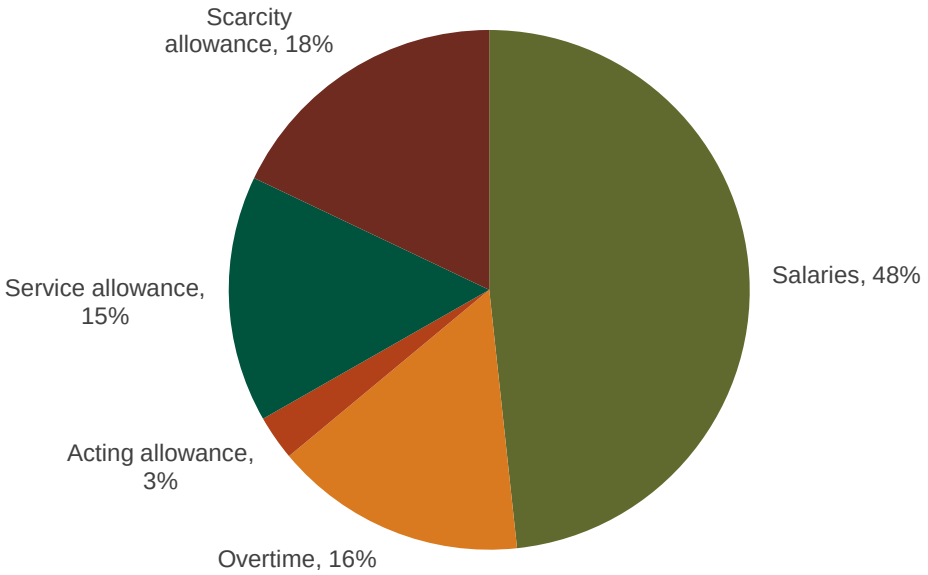
5.2.1.3 Expenditure on personnel

About R1 billion was allocated for the compensation of employees from the CJS Revamp programme, of which R868.9 million was spent on the Division: Forensic Services. While, the funding allocated to salaries was intended for new recruits, 52% of expenditure on compensation of employees was spent on overtime and allowances to (i) clear the backlog, (ii) cope with the higher workload and (iii) retain staff (see Figure 13).

The CR&CSM component receives the largest share of expenditure on compensation of employees. Approximately R 628.9 million was spent on the CR&CSM component compared to R240.5 million on the FSL component for the period under review.

It is important to caveat these findings on the analysis of compensation of employees. Information on staffing is not updated regularly, and personnel budgets are managed by the Chief Financial Officer, with little information made available to the Division: Forensic Services. Interviewed officials note that the Division: Forensic Services had little control on how the IIFS was spent on personnel. For example, no information was available on how many recruits and positions were funded from the IIFS. Insufficient information on the personnel spending therefore limits any further analysis of expenditure on compensation of employees as well as other forms of cost analysis.

Figure 13: Breakdown of expenditure on compensation of employees, 2009/10 to 2014/15



Source: Chief Financial Officer

5.2.2 Human resources

Between 2010/11 and 2014/15, the staff complement of the Division: Forensic Services grew at an average annual rate of 5%, rising from 6 098 to 7 475. By 2014/15, the CR&CSM component have become the single large component within the division and accounted for about 72% of all personnel employed (see Table 5). Its staff complement grew at a rate of 4% per year mostly as a consequence of the decentralisation of the criminal records function, and the recruitment of additional crime scene examiners.

The staff complement in the FSLs grew at an average annual rate of 5%; moderately faster than the CR&CSM section. Recruitment has primarily focused on building capacity in specialist disciplines such as Chemistry, Questioned Documents, Scientific Analysis and Biology within the four FSLs.

Table 5: Growth in personnel within the Division: Forensic Services

Section	2010/11	2011/12	2012/13	2013/14	2014/15	2010/11-2014/15 Annual Average Growth Rate
Criminal Records and Crime Scene Management	4597	4979	5210	5380	5366	4%
Forensic Science Laboratories	1378	1407	1458	1479	1680	5%
Office of the Divisional Commissioner and Support Services	123	266	478	340	252	18%
Quality Management	-	-	-	209	177	ND*
Total	6098	6652	7146	7408	7475	5%

Source: Division: Forensic Services
Notes: The Component: Quality Management was established in 2013/14, and therefore no data is available for prior years*
No personnel information is available for 2009/10
For the sake of simplicity, the evaluators have combined the management and support sections

Between 2010/11 and 2014/15, personnel in the Divisional Commissioner's Office and Support Services section increased at an average annual rate of 18%, significantly faster than any of the other components. The rapid growth in personnel reflects an increase in administrative staff to support the expansion of the Division and manage the higher expenditure resulting from the IIFS. The increase in personnel numbers is the result the decision to appoint contracted services (e.g. cleaning and security) as full-time employees to quell a labour dispute and is not a true reflection of an increase in administrative capacity.

In fact, there is some evidence that administrative capacity has not keep pace with the growth in administrative work of the Division. The procurement section seemingly lacks the personnel to source quotations, draft contracts, authorise expenditure on forensic equipment, goods and services, forecast demand and manage stock. Insufficient personnel and capacity is a key factor in the delays and challenges encountered during the procurement process.

One of the objectives of the IIFS is to build technical capacity within forensic services. The change in technical personnel can be measured through the number of appointments made in terms of the South African Police Act (No. 68 of 1995). Employees appointed in terms of the Public Service Act (1994) are administrators and support personnel, whereas staff appointed in terms of the South African Police Act (1995) are officers bestowed with law enforcement powers and who perform technical work within the laboratories. While the FSL experiences a significant increase in the number of technical personnel (see Table 6), the Division also hired fewer administrators because the priority was to fill professional positions. Even when appointments were made in terms of the Public Service Act (No. 103 of 1994), they were for laboratory assistants or administrators that are specially trained to perform elementary forensic processing.

Hence, interviewed officials within the FSL report that the administrative capacity has declined, and that forensic analysts are performing an increased amount of administrative work. The reliance on forensic analysts to perform administrative tasks increases their workload, and is a potentially costly and inefficient use of personnel. Not only are forensic analysts paid more than administrators, but additional costs (such as overtime) are incurred if analysts spend less time on processing forensic evidence during regular work time.

Table 6: Percentage of staff appointments in terms of the South African Police Act (1995)

Description	2010/11	2011/12	2012/13	2013/14
Criminal Records and Crime Scene Management	63%	62%	62%	62%
Forensic Science Laboratories	42%	68%	67%	66%
Management and Support Services	42%	23%	17%	39%
Quality Management				86%
Total	**63%**	**61%**	**60%**	**62%**

Source: Division: Forensic Services
Note: Data for the 2009/10 and 2014/15 is not available

The proportion of technical to administrative staff in the CR&CSM component has remained constant, averaging about 62% over the period. About 38% of all employees in CR&CSM are administrators or support personnel. This relatively large proportion of support staff is justified by the

significant amount of administrative work involved in capturing, collecting and managing criminal records. Personnel records show that a large contingent of data capturers, typists and administrators are employed by the component. Some of these recruits were funded through the IIFS, even though the funding was intended for the recruitment of crime scene examiners and forensic analysts. In essence, it appears that the IIFS funding was used to support the growth in personnel more broadly within the Division: Forensic Services. This is despite the fact that the Seven Point Plan called for an increase in crime scene examiners and forensic analysts.

Benchmarking the personnel complement of the FSL against its international counterparts is tricky, not in the least because the personnel numbers for South Africa are not broken down by category of employee. It is therefore not possible to distinguish between an analyst and manager within the FSL. Nonetheless, there are some interesting insights from international experience around how laboratories are staffed abroad. The only data available publicly is for forensic laboratories in the US. A census of Forensic Crime Labs in the US shows that analysts account for about 60% of all employees in the lab followed by managers (14%). Clerical and administrative support staff is much lower and accounts for 9% (see Table 7) of all employees in the laboratory[41].

It would seem that labs tend to keep the clerical support to a minimum, with the highest proportion of administrators found in larger federal laboratories, which is the equivalent of the national FSL. This suggests that laboratories have tried to develop technical support that provides specialist assistance to forensic analysts. The technical support includes laboratory assistants and technicians who work in close collaboration with analysts to expedite analysis, maintain and calibrate equipment and perform certain basic forensic tasks such as tagging forensic evidence. This practice is to some extent already happening in South Africa, although such staff are classified as administrative and clerical staff within SAPS so it is not possible to determine how much technical support staff are employed in the laboratories.

Table 7: Positions of employees in publicly funded forensic crime labs, by type of jurisdiction in 2009

Type of position	State	County	Municipal	Federal	Total
Analyst/Examiner	64%	56%	54%	57%	60%
Technical support	10%	6%	6%	11%	9%
Manager	15%	15%	11%	13%	15%
Clerical support	9%	9%	6%	14%	9%
Crime scene technician	1%	10%	17%	2%	6%
Other	1%	4%	6%	2%	3%

Source: (Durose, Walsh, & Burch, 2009)
Note: Federal government is the highest level of government in the United States. Municipal, county and state are all subnational government units.

[41] (Durose, Walsh, & Burch, 2009)

5.3 Programme implementation: CR&CSM

The CR&CSM component focuses on crime scene management with an emphasis on crime scene processing, evidence collection, as well as the storage and maintenance of criminal records. This component provides decentralised services in all nine provinces. Capacity is decentralised in the form of LCRCs that provide services such as the crime scene investigations and examination at all crime scenes they attend. LCRCs render services such as the taking of fingerprints, specialised photography, drawing of plans of crime scenes, drafting techniques, facial identification, updating of criminal records, fingerprint investigations and the collection of forensic evidence (such as biological samples, bullets, etc.) There are 92 local criminal record centres countrywide, 71 of which include crime scene labs.[42] These crime scene laboratories (not to be confused with the FSLs) process latent prints and other evidence (e.g. shoe prints) to help identify persons of interest or perpetrators.

The CR&CSM component consists of the following sections:

- **Decentralised CRC** monitors and evaluates the performance of CR&CSM section. It does this by conducting inspections of dockets and photographic evidence and monitors the overall positive and identification rates for the section against the targets set out in the annual performance plan. The section also oversees a small folien factory that produces the film required to lift fingerprints. The decentralised CRC is also responsible for building capacity within CR&CSM by setting the curriculum for the training of crime scene examiners and lab technicians.
- **Centralised CRC** issues police clearance certificates, manages the database of wanted persons and develops profiles for criminals. This section also administers the Automated Fingerprint Identification System (AFIS) and checks the quality of information on the system.
- **Crime Scene Management (CSM)** comprises of two sub-sections: crime scene investigation and crime labs. Crime scene investigation provides specialist evidence collection expertise needed in certain priority crimes or attends to complicated crimes scenes, where evidence is not immediately visible. The section can perform facial reconstructions for remains decomposed or burnt beyond recognition. The CSM section also oversees the crime scene laboratories spread across the country. Their role is to set guidelines and procedures for analysing fingerprints, body prints and other exhibits received by the crime scene labs. Crime scene laboratories specialise in lifting fingerprints off printed, porous and other hard-to-process surfaces and increase the likelihood that the print is identified.
- **Criminalistics Bureau** creates, updates and removes criminal records stored on AFIS. The Bureau maintains fingerprint and photographic information on convicted offenders and individuals awaiting trial. It also updates the criminal records of suspects, if a “guilty” verdict is returned and expunges the record if a “not guilty” verdict is received from the court. This new section performs three distinct functions. It:
    - Produces criminal records for arrested persons and prisoners awaiting trial and convicted felons, when the offenders are known. This information is used in bail and sentencing hearings.

[42] Source: Forensic Services CJS Document provided to DNA Economics by Brigadier Joe Smith

  - Performs fingerprint or latent print searches on remains or decomposed bodies when the identity of the person is unknown.
  - Performs criminal record searches when requested by employers, recruitment agencies and the general public.
- **Explosives** section is responsible for rendering explosives control as mandated under the Explosives Act (No. 26 of 1956) and related regulations, bomb disposal and explosives auditing and destruction. This section regulates the purchase, use and storage of all explosives that do not fall under the control of the South African National Defence Force (SANDF). It also attends to all incidences where explosives may be recovered, cases where arson is suspected, and incidents involving hazardous substances. Also, the section supports the SAPS' Very Important Person (VIP) unit by conducting sweeping actions for the Presidency and VIP visitors to South Africa.
- **Investigative Psychology** supports the investigations of cases where there appears to be no external benefit to the suspect or where the motive for the crime seems to be unknown. The section supports the investigation of the crime by rendering assistance to detectives during investigations of psychologically motivated crimes, such as serial murders and serial rapes. The section also follows up on forensic leads, received from the FSL.
- **Decentralised CR&CSM** sections are located in each province and oversee the performance of LCRCs.

5.3.1 Personnel

In 2007, the Ministerial Work Group on the CJS review identified crime scene attendance as one of the areas needing urgent reform. Citing an international benchmarking exercise, the study revealed that the number of crime scenes attended to, by crime scene examiners was significantly lower than international best practice. Thus, the Seven Point Plan identified Crime Scene Optimisation and strengthening Criminal Record Centres as fundamental reforms in developing the forensic capability. Table 8 shows the growth in personnel within the CR&CSM section between 2010/11. Here again, it is important to caveat the findings, as there are large discrepancies between the numbers of staff provided by the individual sections and those provided by the Division. For example, the Investigative Psychology section reports that it has 12 staff members in 2014/15 compared to the 20 members indicated by the Division.

Table 8: Growth in personnel within the CR&CSM component

Section	2010/11	2011/12	2012/13	2013/14	2014/15	Average annual growth rate
Criminal Record Centre	362	628	663	174	70	-41%
Centralised CRC	43	40	43	163	111	24%
Decentralised CRC	4	3	2	21	15	33%
Crime Scene Management	1	6	8	27	138	123%
Criminalistic Bureau	0	0	0	161	311	66%
Explosive Unit	167	11	4	293	304	15%
Investigative Psychology	5	6	7	16	20	35%
LCRC: PC (Nodal Support)	224	257	323	339	283	6%
LCRC	3791	4028	4160	4186	4114	2%

Total	**4597**	**4979**	**5210**	**5380**	**5366**	4%

Source: Division: Forensic Services
Note: Information is not available for 2009/10

The effects of the decentralisation are seen in the movement of personnel between the various sections in the CR&CSM section, but there has also been an increase in the absolute number of staff within the section. The following changes within the CR&CSM section are worth mentioning, and reflects areas where the IIFS was concentrated:

- The Crime Scene Management section experienced a substantial increase in staff, partly because of re-organisation of the component. Interviews with officials suggest that the additional funding made available through the IIFS has allowed the section to employ more scientists to work in the crime scene laboratories[43]. These graduates are also employed at higher salaries, and drive up the costs of fingerprint analysis. Traditionally, crime scene examiners were recruited from the VISPOL or detectives and were often Constables or Serjeants. Whereas the starting salary for a constable is R142 140, graduates enter the SAPS as warrant officers and earn an entry salary of about R225 546.[44]
- The explosives section has benefitted significantly from the IIFS. Between 2010/11 and 2014/15, the staff complement grew at an annual average growth rate of 15%. Through funding received from the IIFS, the Explosive unit has increased the number of offices, including strengthening the complement of staff at ports of entry (e.g. airports), in light of the increasing threat of terrorism. Included under the explosives section is a diving section, responsible for recovering of evidence in water bodies. Although the diving section does not fit natural within the bomb disposal section, it is located in this section for the sake of expediency.
- The Investigative Psychology section has seen an increase in personnel, albeit from a low base. This section typically recruits detectives to provide the investigative support and clinical psychologists to develop profiles of offenders.

The LCRC accounts for 77% of all personnel employed by the CR&CSM. Two factors contribute to the growth in staff within the LCRC. First, the decentralisation of the criminal records functions to LCRCs. Typically, the LCRC assists in taking fingerprints from suspects, searching for criminal records, photographing suspects and linking them to other crimes. As access to the AFIS has expanded, more service points had been created in the LCRCs that could access the system, upload fingerprints and perform searches. With the expansion of AFIS, additional staff needed to be employed and trained to use the system.

Second, the total number of crime scene examiners has increased by an average annual rate of 10%. In 2014/15, crime scene examiners accounted for 28% of all personnel in the LCRC (see Table 9). This increase is still below the number of crime scene examiners required given the number of crime scenes that need to be examined. Although the increase in crime scene examiners is an

[43] Crime scene laboratories should not be confused with FSL. Crime scene laboratories use advanced scientific methods to lift fingerprints from porous and other non-traditional material.

[44] (South African Police Services, 2015)

important accomplishment, the numbers are still lower than their 2007 levels (1 691) reported in the CJS review.

Over the same period, the number of fingerprint experts declined. Interviewed officials suggest that once a crime scene examiner attains expert status, they are sought out by the private sector. Crime scene examiners also highlight how tough it is to become certified as a fingerprint expert. Examinations and tests are difficult, and few make it through. Consequently, there a fewer fingerprint experts to provide expert testimony in courts. The decline in fingerprint examiners merits concern as their expert testimony in court raises the value of forensic evidence in judicial proceedings and contributes to conviction rates.

There is a common perception within CR&CSM that recruits don't stay long enough within an LCRC to gain meaningful experience, while, senior crime scene examiners leave to join other divisions within SAPS or the private sector. According to interviewed officials, the high turnover rate leaves little time to build crime scene experience. Officials highlight that it takes about three years for a crime scene examiner to become proficient at their work. If a crime scene examiner leaves before or immediately after completing their training, the return on the investment in training is minimal.

Table 9: Growth in crime scene examiners and fingerprint experts

	2011/12	2012/13	2013/14	2014/15
Total number of employees in CR&CSM	**4979**	**5210**	**5380**	**5366**
Of which:				
Crime scene examiners	*759*	*776*	*916*	*1026*
Fingerprint experts	*632*	*610*	*615*	*620*
Subtotal	***1391***	***1386***	***1531***	***1646***
CSE ad FE's as a % of CR&CSM personnel	28%	27%	28%	31%

Source: DNA calculations based on information from the CR&CSM section

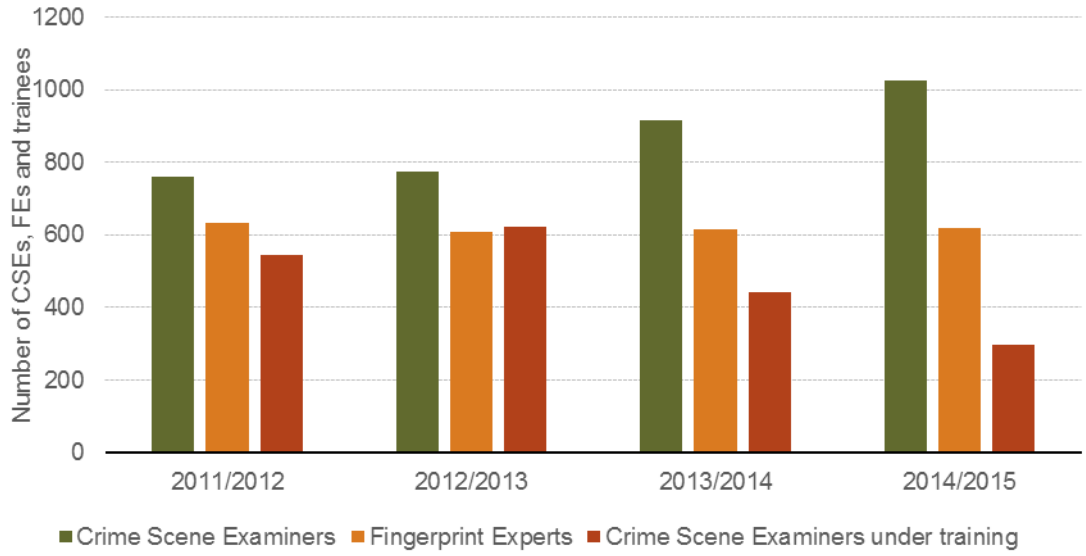
Interviewed officials also suggest that the nature of the work performed by crime scene examiners makes retaining them difficult. Given the profile and levels of crime in South Africa, crime scene examiners are frequently exposed to violent and disturbing crimes scenes and work long hours. Moreover, they cover vast distances during their shifts and are also rushed at crime scenes. The analysis reveals that crime scene examiners who attend up to 20 scenes a week take on average 2.65 hours to travel and process a scene. Many of them report that they spend on average about 45 minutes at the scene itself, compared to the international norm of four hours.

Fatigue, despondency and a lack of experience can all impact on the quality of crime scene evidence. The lack of experience of crime scene examiners can be particularly problematic in this environment. Even through, there are standard operating procedures that guide the work of crime scene examiners; there is no a substitute for experience. Research from Australia and the US confirms the importance of expertise in the examination of a crime scene. An experienced crime scene examiner can think "on their feet" and not just apply standard and uncreative approaches to evidence recovery.

Experience also assists the crime scene examiner in understanding what courts are looking for, and factors that will increase or decrease the credibility of crime scene evidence in court[45].

Figure 14 shows the influence of the IIFS on training specifically amongst crime scene examiners and fingerprint experts. Between 2011/12 and 2014/15, 1909 officials underwent training. Trainees included new recruits fresh from completing their basic training, transfers from other divisions, and existing crime scene examiners and fingerprint experts. This estimate is high, and should be interpreted with caution, as some officials might have participated in more than one training opportunity. As the data does not break down the officials under training by the different categories, it is not possible to identify the number of unique participants in the training and estimate the drop-out rate.

Figure 14: Number of crime scene examiners and fingerprint experts

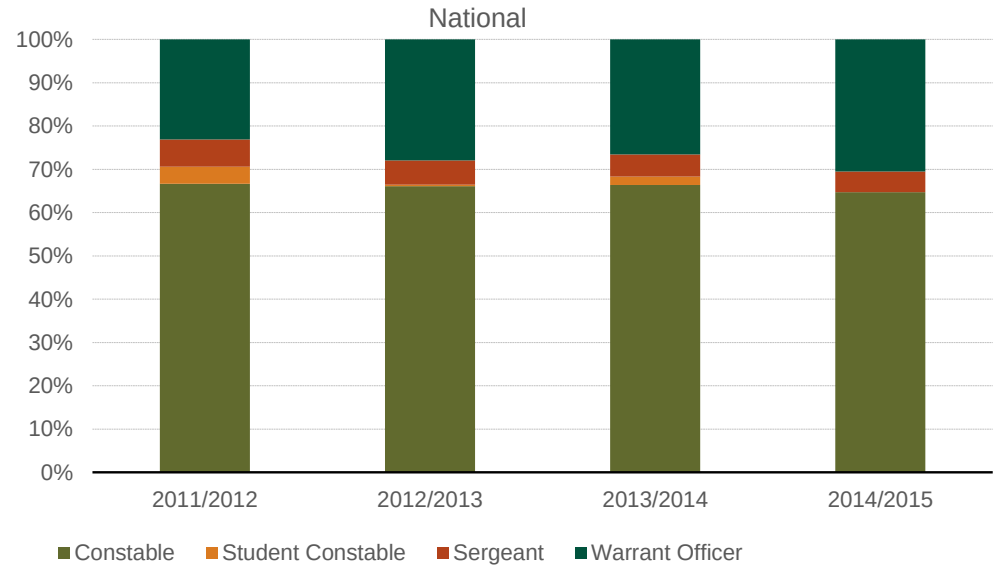


Source: DNA Economics calculations based on information received from CR&CSM

The IIFS has increased the number of crime scene examiners who enter SAPS in higher-ranking positions. In 2011/12, the percentage of warrant officers as a proportion of all crime scene examiners stood at 23%, as Figure 15 shows. Since then, the IIFS has been used to attract graduates with an undergraduate degree in natural sciences by offering them higher entry salaries (equivalent to a warrant officer position). This practice contributes to the increase in warrant officers as a proportion of all crime scene examiners, which rises to 31% by 2014/15. Interviewed officials confirm that the decision to attract graduates was taken on purpose and sought to capacity for scientific analysis in CR&CSM. Recruiting graduates with scientific expertise is particularly important if the CR&CSM is to cope with advances in forensic methods used in the processing of crime scene evidence.

[45] (Kelty, Julian, & Robertson, 2012)

Figure 15: Crime scene examiners by level



Source: DNA Economics calculations based on information received from CR&CSM

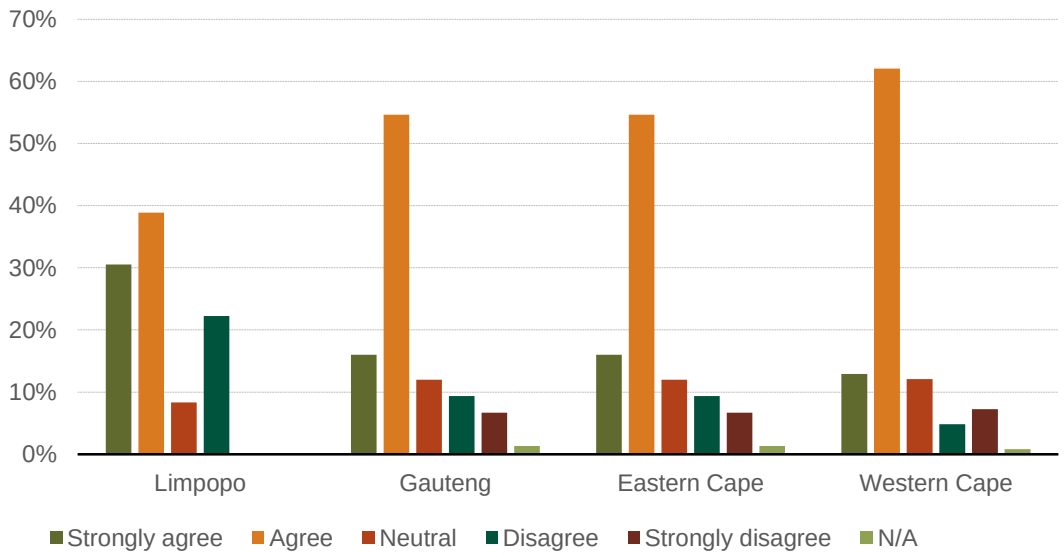
5.3.2 Training

All new recruits must undergo a 10-week basic course to become a crime scene examiner. After that, it takes up to three years for a crime scene examiner to complete their training programme. In the intervening years, the trainee crime scene examiner works under the supervision of an experienced crime scene examiner.

As part of this evaluation, a survey of crime scene examiners was completed. A total of 521 CR&CSM employees completed the survey. More than 60% of the sample joined the CR&CSM section before 2009 when the IIFS commenced. The questionnaire asked crime scene examiners whether they have received sufficient training to fulfil their duties. On average, about 71% of respondents agreed or strongly agreed that they received adequate and appropriate training (see Figure 16). However, there is some variation in the level of satisfaction with the training received by crime scene examiners within the provinces covered in this evaluation.

Only 69% of crime scene examiners in Limpopo agreed or strongly agreed that they received enough training, compared to 75% in the Western Cape. One possible explanation for this variation is the different approaches to training. The Western Cape province uses a dedicated facility which can be configured to simulate a crime scene, in addition to the training prescribed by the national office.

Figure 16: Have you received sufficient and appropriate training to fulfil their duties?



Source: Crime scene examiner's survey

Respondents who were dissatisfied with the training were concerned about the quality of the internal training programme. They felt that the training programmes should have been subject to accreditation or to some form of quality assurance processes. Others noted that they were left to their own devices, and did not have adequate supervision during their training period.

Within the CR&CSM, it appears that members of the explosives and investigative psychology have received extensive training between 2009/10 and 2014/15. Upon joining the section, new recruits undergo an 11-week training course as bomb technicians. The pass rate typically ranges from 50% to 60%, and those trainees that fail may return to their sections within the SAPS.

Successful recruits are then mentored and supervised over the next three to five years. Given the high-risk nature of the explosive section's work, staff are regularly trained on the use of specialised equipment. According to officials in the section, the IIFS funded most of the training. The section estimates that about R5.7 million was spent on training between 2009/10 and 2014/15. This estimate is not corroborated by the financial information retrieved from POLFIN, and made available by the CFO, only R3.7 million was spent on training by the explosive's section between 2013/14 and 2014/15. No expenditure on training was recorded for the period between 2009/10 and 2012/13. This is another example the discrepancies in data and confirms the need for caution in interpreting the data.

5.3.3 Technology, equipment and consumables

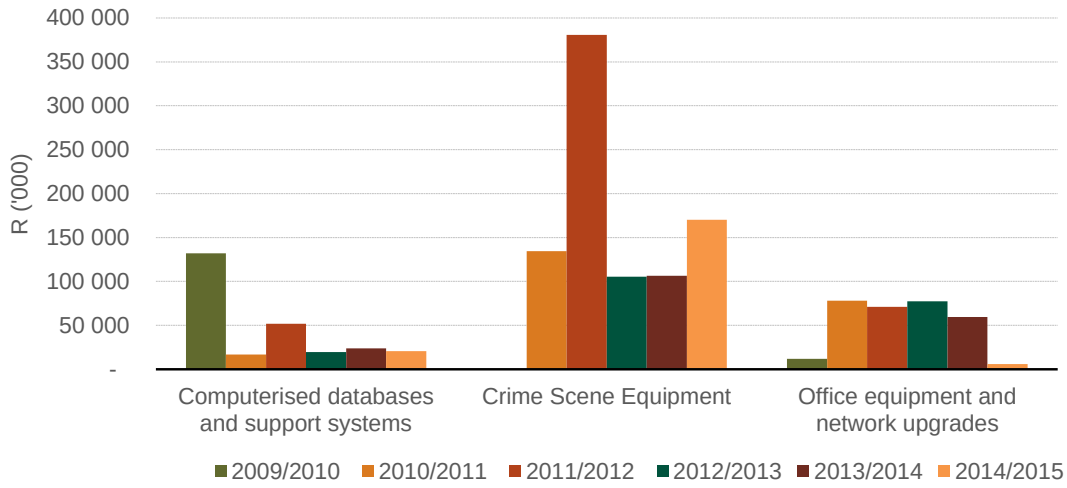
Between 2009/10 and 2014/15, the Division: Forensic Services spent R1.46 billion on technology and equipment for the CR&CSM component. This expenditure can be classified into three categories of goods and services:

- **computerised databases and support systems** that allow for the storage, searching and comparison of fingerprints and the management of criminal records;

- **crime scene management equipment** used by crime scene examiners to detect forensic evidence; and
- **office hardware and network upgrades** needed to operate the databases and manage criminal records within LCRC.

Most of the funding (approximately 61%) was spent on modernising and upgrading crime scene equipment, as Figure 17 shows. Another 18% was devoted to expanding databases such as AFIS to increase the number of fingerprints that could be processed and on the setting up JUDIS, the disaster recovery system for criminal records. The rest of the expenditure was on upgrading the LCRCs' end-user equipment and network infrastructure.

Figure 17: Expenditure on technology and equipment for the CR&CSM section



Source: DNA calculations

At the time of the IIFS' inception, crime scene examiners did not attend all crime scenes, used outdated methods to collect evidence, and were not trained to detect and collect DNA evidence. Since the IIFS, there have substantive changes in the recovery of crime scene evidence. As the expenditure analysis reveals, a large portion of the IIFS was used to supply crime scene examiners with equipment and technology they need to identify forensic evidence efficiently and effectively. Specifically, IIFS helped to introduce the latest technology in the form of alternative light sources and high-resolution cameras to crime scene investigation.

The introduction of portable forensic light sources has been a major innovation in the field of forensic sciences. It has not only improved the time taken to process a crime scene but also enhanced the quality of evidence collected. Forensic light sources can be used to detect a broad range of forensic evidence including blood, bodily fluids, organic materials, and certain types of fibres. These light sources enable crime scene examiners to search a crime scene quickly and detect trace evidence

that would otherwise not be visible to the naked eye.[46] They are particularly useful in identifying biological evidence that needs to be sent for laboratory analysis. One of the positive outcomes of the investment in these light sources is that it has increased a number of exhibits forwarded to the lab for DNA testing.

Aside from the light sources, the IIFS was also used to purchase cameras that capture the high-resolution photographs of the crime scene. Good quality crime scene photos, as interviewed officials tell us, are an important visual aid in court proceedings, and help to convey the severity of the offence.

Nowadays, crime scene examiners have modern and better equipment because of the IIFS. The analysis shows that between 2012/13 and 2014/15, expenditure on equipment per crime scene examiner increased from R56 518 to R96 247.[47] To investigate the effect of the IIFS on the availability of the right equipment, the survey asked crime scene examiners if they had enough and appropriate crime scene equipment. About 60% of crime scene examiners were satisfied with the crime scene equipment they had. Only 19% of respondents were dissatisfied with their equipment (see Figure 18).

Similarly, crime scene examiners were asked whether they were satisfied with the amount of consumables and chemicals they received. On this matter, only half of the respondents felt that they had received enough consumables and chemicals to discharge their duties. Crime scene examiners expressed frustration with the quality of fingerprint powders, the delays in the purchasing of powders and the frequent stock-outs. In their words, crime scene examiners said that:

> *"Takes long time to replace or order chemicals" – Warrant Officer, North West*
>
> *"The chemicals we had expired a long time ago" – Crime Scene Investigator, Eastern Cape*
>
> *"Currently, no members have gloves to attend crime scenes, orders are in, but did not receive them, members buy out of their own pockets" – Lieutenant Colonel, Free State*
>
> *"We don't have enough brushes, powders and chemicals" – Constable, Gauteng*

Crime scene examiners expressed concerns around the inadequate, inappropriate and expired consumables. Although the CR&CSM component sets standards for consumables, crime scene examiners were worried about the quality of consumables they received. There could be a few explanations for these concerns. Consumables may indeed not be appropriate for the type of work performed, conditions under which they process crimes scenes, and equipment used by examiners. Another reason, suggested by the management of the CR&CSM, may be that crime scene examiners do not know how to use the consumables and equipment correctly.

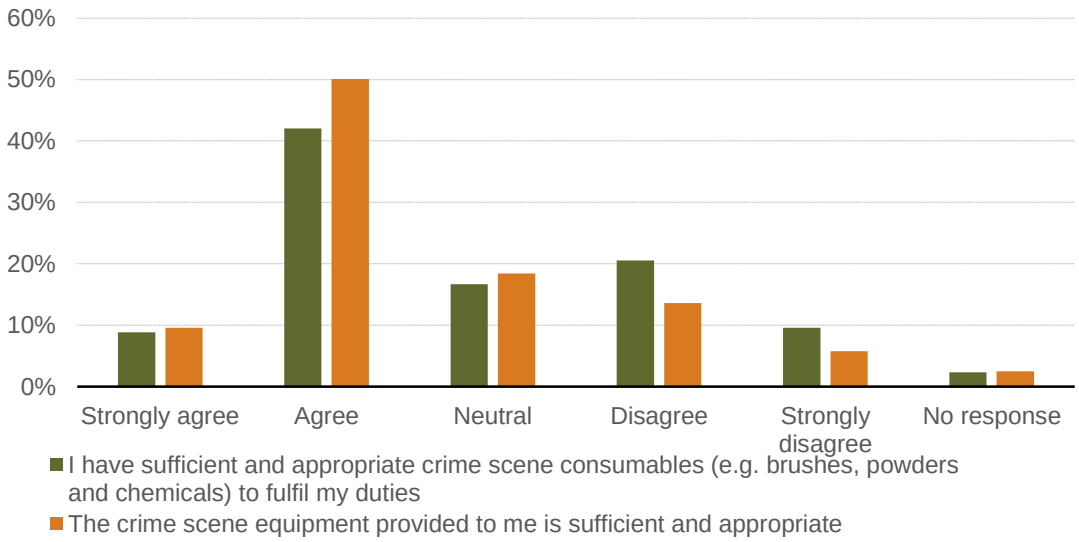
[46] (Bashinski & Patterson, 2003, p. 15)

[47] Although, this reflects mainly expenditure on cameras and light sources, other items such as the cyane fuming tent cannot be excluded from total expenditure because detailed line item expenditure is not available in the dataset.

Stock-outs and delays in procurement are a major challenge within the Division and not just CR&CSM. The concerns raised by crime scene examiners reflect the difficulties experienced by the Division in managing their inventory and procuring consumables promptly. The root cause of the problems lies in the restrictive procurement rules, under which the CR&CSM component, is required to change suppliers regularly without having the time to test and validate their products.

Some changes are already underway to address these problems; the quality management section is developing processes to check and verify consumables and equipment before issuing tenders. However, the problems also stem from the lack of coordination between support services within the Division: Forensic Services and the CFO's office on matters relating to supply chain management. In the past, this has resulted in delays in the tendering and procurement process. These types of inefficiencies can only be addressed through better coordination between these two sections in the acquisition process.

Figure 18: Level of satisfaction with crime scene equipment and consumables



Source: Crime scene examiner's survey

5.3.4 Workload

International studies show that the workload of crime scene examiners influences the quality of their work product.[48] Crime scene examiners that have more time to look for evidence and process a crime scene perform better, and feel fulfilled by their work. Thus far, the analysis shows that the IIFS has: moderately increased the number of crime scene examiners, recruited examiners with better qualifications; and modernised the equipment used by crime scene examiners. However, none of

[48] (Kelty, Julian, & Robertson, 2012)

these improvements by themselves will contribute to better quality forensic evidence, if the workload of crime scene examiners remains high and unmanageable. Despite the introduction of a 40-hour flexi-time system[49], under which crime scene examiners report to work in different periods to alleviate their workload, crime scene examiners still report working extra hours. The average time spent for a crime scene examiner on processing a crime scene is significantly lower than the international norm of four hours. Until such time as capacity is built amongst crime scene examiners to effectively attend to crime scene, the quality of processing remains an area of concern.

5.3.4.1 Utilisation of crime scene services

Crime scene examiners do not investigate all crime scenes; they are only meant to be called out for particular DSSC. SAPS has a list of prescribed crime types that examiners must attend. The list sets out the types of crimes, where forensics is likely to achieve better justice outcomes. Detectives are expected to assess the nature and severity of the crime and call out the crime scene examiner. A measure of how well this process is working is the utilisation rate. This ratio is calculated by dividing a total number of crime scenes reported (by DSSC) by the number of crimes scenes attended.

Interpreting the utilisation rate with any measure of confidence is hard. On the one hand, a low utilisation rate could mean that detectives are making the wrong decisions at crime scenes by not calling out the crime scene examiners when they are needed. Detectives are frequently placed in a position where they have to make a call on whether to call a crime scene examiner to a scene that has been contaminated by the public or washed away by weather.

On the other hand, low utilisation rates could mean that a significant proportion of crimes do not require the presence of a crime scene examiner. For instance, most culpable homicides arise from drunken driving, and in these cases, it is up to the police to administer a breathalyser test, which is a critical piece of evidence in the court system. Therefore, if detectives are making the right call, they are saving the CJS the unnecessary expense of using costly forensic evidence collection capacity. However, if evidence that should be collected is not recovered from a crime scene, then victims might not receive justice.

Utilisation rates have been traditionally low – only about half of the crimes reported under the particular DSSC codes were attended to, by a crime scene examiner in 2012/13 and 2013/14. This trend is reversed in 2014/15 when the number of crimes reported drops sharply. This drop coincides with changes in the policy on crime scene attendance. In that year, SAPS revised the prescribed list of crimes and removed certain offences such as shoplifting, common robbery and malicious damage to property. By eliminating certain high-volume, low-value crimes from the list of prescribed crimes, SAPS ensured that forensic resources are channelled towards priority crimes.

[49] The flexi-time system takes into account crime scene patterns in provinces to ensure that there are enough crime scene examiners at any given time.

As Table 10 shows, the mean crime scene attendance drops significantly between 2012/13 and 2014/15. This decline happens because of the simultaneous increase in the number of crime scene examiners and the decrease in the number of crimes attended. Changes to the prescribed list of the offences reported to the CR&CSM lead to a decline in the number of crimes reported and attended in 2014/15. The net effect of this policy change was to reduce the workload of crime scene examiners and make better use of scarce crime scene resources.

Table 10: Crime scene attendance

	2012/13	2013/14	2014/15
Number of crimes reported to the CR&CSM	988 089	987 575	568 603
Number of crime scenes attended	515 590	553 656	509 159
Number of crime scene examiners	776	916	1 026
Utilisation rate of CR&CSM[50]	*52%*	*56%*	*90%*
Mean crime scene attendance per examiner[51]	*664*	*604*	*496*

Source: DNA Economics calculations based on information from data received from the Forensic Division
Note: Data for 2009/10 to 2011/12 was not available

5.3.4.2 Crime scene attendance

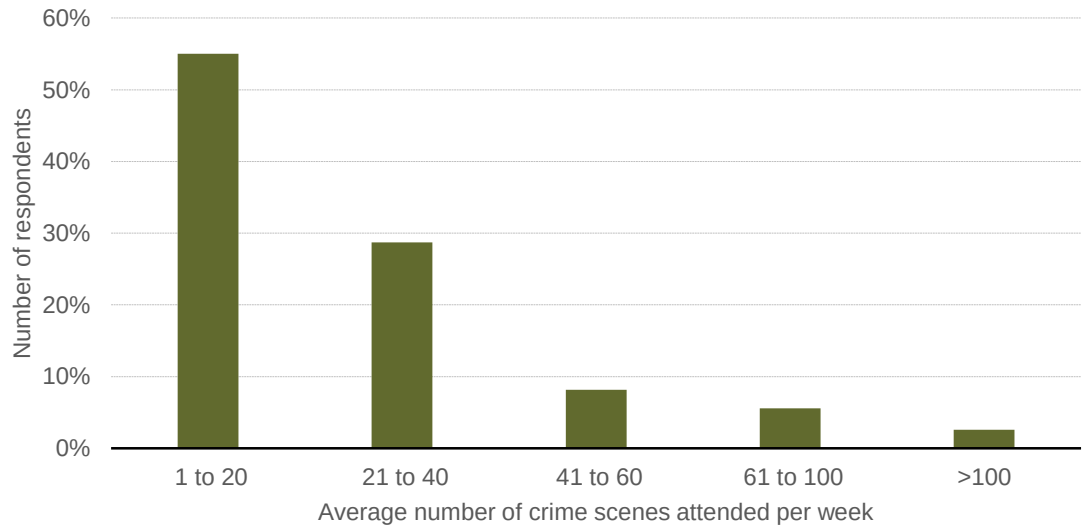
On average, crime scene examiners attended to 496 crime scenes in 2014/15 or about 14 crime scenes per week in a 35-week year.[52] The evaluators asked crime scene examiners to identify how many crime scenes they attended per week in 2009 when the IIFS was first introduced. About 55% of them indicated that they attended between 1 and 20 crime scenes on average per week, while another 29% attended between 21 and 40 crime scenes per week. It seems that some respondents did not interpret the question correctly or exaggerated their workload and reported visiting more than 100 crime scenes in a week. Estimates of the workload from respondents should be interpreted with caution, as there is a tendency to overstate the number of crime scenes attended. Notwithstanding the limitations of these self-reported statistics, the average number of crime scenes visited is closer to 14 per week. If crime scene examiners spend on average 2.65 hours at each crime scene, they spend about 37 hours per week attending to crime scenes, spending on average between 45 and 90 minutes at each crime scene. In addition to collecting evidence, crime scene examiners also spend time completing paperwork, court documentation and other administrative tasks at the LCRCs.

[50] Utilisation rate of crime scene examiners is calculated by dividing the number of crimes reported by the number of crime scenes attended.

[51] Mean crime scene attendance is calculated by taking the total number of crime scenes attended divided by the number of crime scene examiners.

[52] After taking into account public holidays, SAPS' annual leave policy, and an average of 10 sick days per year, in effect crime scene examiners work 35 weeks in a year.

Figure 19: How many crime scenes did someone in your current position usually attend per week six years ago (or when you started if that is less than six years)?



Source: Crime scene examiners survey

The survey asked respondents about overtime because this was an issue raised by the division during the inception phase of the project. About 59% of crime scene examiners said that they worked between 1 and 10 hours overtime, while about 25% of crime scene examiners reported that they work between 11 and 20 hours over their normal time, as Table 11 shows.

Based on this data, it is possible to estimate the average amount of overtime worked per week. Those crime scene examiners who attend up to 20 crime scenes per week tend to work on average 13 overtime hours, while those that attend between 41 and 60 crime scenes work an additional 18 hours per week. The analysis reveals that the more experienced crime scene examiners (recruited to the component before 2009) tend to attend more crime scenes than newer recruits. Crime scene examiners from Gauteng go to more crime scenes than other provinces. Hence, it seems that crime scene examiners in urban areas have a higher workload than their rural counterparts.

Table 11: Average number of overtime hours

Number of crime scenes	Average number of overtime hours
Between 1 and 20	13
Between 21 and 40	15
Between 41 and 60	18

Source: Crime scene examiners' survey

5.3.4.3 Type of forensic evidence recovered

The type of forensic evidence recovered from crime scenes has also changed, influenced by the promulgation of the "Fingerprint Act" and "DNA Act". Crime scene examiners who joined the CR&CSM section before 2009 report that they now collect DNA and other forensic evidence from 18% more crime scenes per week than before the IIFS. In parallel, there is a moderate increase in

the number of crime scenes at which fingerprints are collected. Therefore, it appears that the IIFS is that it has been particularly effective in expanding the collection and analysis of DNA evidence in the CJS.

Table 12: Types of evidence collected at the crime scene

	2009	2015	% change
% of crime scenes with fingerprints	59	65	7
% of crime scenes with DNA	37	55	18

Source: Crime scene examiners' survey

5.3.5 Performance

Fingerprints are one of the early forensic leads on perpetrators and can exclude victims or other persons, unconnected to the crime present at a crime scene. In this way, fingerprint identifications play a major role in the investigation process by linking perpetrators to the crime and excluding certain persons from the investigation.

5.3.5.1 Identification rates

A crime scene examiner will try to lift off the fingerprints of suspects from specific areas within the crime scene and take fingerprints of persons at the crime scene for exclusionary purposes. If these fingerprints can be analysed, then the crime scene is labelled as a "positive." Of all crime scenes with positive rates, the number of fingerprints matched against an existing set in a computerised database is termed an "identification".

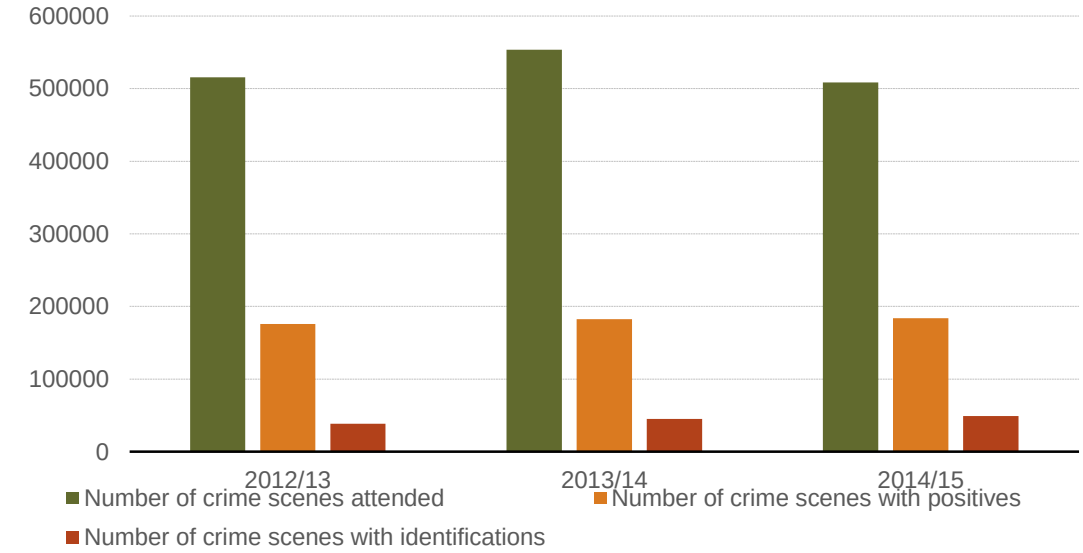
The data below is not easily interpreted. For instance, in 2014/15, the CR&CSM attended 508 619 crime scenes and were able to lift viable fingerprints from 183 972, or a "positive rate" of 36%. Typically, several factors that affect this "positive rate" such as the skills of the crime scene examiner and the availability of advanced fingerprinting techniques that lift prints off delicate surfaces. Other factor such as the premeditation of the crime and the knowledge of the perpetrator also affect identification rates. For instance, crime scene examiners report that criminals often avoid leaving their fingerprints at crime scenes by wearing gloves which seemingly suggests that planned crimes are more likely to result in lower positive rates.

Figure 20 shows the number of crime scenes from where viable fingerprints were lifted, and identifications made, and confirms the funnelling effect in the CJS, discussed previously. Both the number of positive prints lifted and identification rate has improved marginally. In 2012/13, 34% of all crime scenes attended yielded at least one positive fingerprint while fingerprints were matched to a criminal record in 22% of all cases through AFIS[53]. The positive and identification rates improved marginally in 2014/15, mainly due to the lower number of crime scenes attended. The increased number of positive identifications reveals a worrying trend. Presently, the CR&CSM matches

[53] Note that for some high profile crimes, fingerprints are matched manually against other databases such as HANIS, maintained by the Department of Home Affairs. These identifications are excluded from this statistic.

fingerprints against the eight million individuals with existing criminal records. An increasing number of identifications points to rising rates of recidivism, with repeat offenders committing many of the newer crimes.

Figure 20: Number of crime scenes where fingerprints have been lifted and identified



Source: DNA calculations based on turnaround times
Note: Data for 2009/10 to 2011/12 was not available

The number of records held by the AFIS limits the matches that can be made against a lifted print. Efforts are underway within the CJS to address this shortcoming by integrating AFIS and HANIS, the computerised database of fingerprints maintained by the Department of Home Affairs. This ongoing process has been delayed for many reasons. Initially, the problem was that the legislative framework did not allow for records collected for administrative purposes to be used for criminal investigations. There were also concerns about the constitutionality and potential violations of privacy in using personal information collected by Home Affairs to identify suspects. When it was promulgated, the "Fingerprint Act" paved the way for the integration of AFIS with other fingerprint databases.

Whereas expanding the CR&CSM's access to fingerprint records makes sense, the benefits need to be weighed against the potential costs of the integration:

- Expanding access to fingerprint records is likely to increase the percentage of identifications. Currently, the AFIS system estimates the likelihood of a match, which is then checked and confirmed by a fingerprint expert. If the number of records that AFIS can match a set of fingerprints to, increases substantially (from the current 8 million to over 50 million on the HANIS database), then more fingerprint experts will be needed.
- More matches, in turn, will increase the investigative workload of detectives. It is likely that additional identifications will include a combination of new offenders and innocent persons who might have been at the crime scene. Detectives will need to investigate further to pinpoint the perpetrator and exclude the innocent.
- Having access to a larger database of fingerprints is also likely to influence the practices of crime scene examiners, who may respond by collecting more prints in the hope of getting a match.

5.3.5.2 Turnaround times for criminal records

The timely availability of criminal records contributes to better justice outcomes. Investigators and prosecutors rely on the CRC to supply updated and accurate information on suspects. On average, the CRC generates 1.2 million records every year, 94% of which are done with 20 days (see Table 13). Just over a quarter of a million records are updated every year. The Seven-Point Plan was introduced to address challenges around the availability of criminal records. Interviewed officials note that before the IIFS, the unavailability of criminal records stymied the efforts of prosecutors to get suspects remanded into custody or raise the bail amount. As a result of the IIFS, and in particular the increased staff in LCRCs and the CRC, reports are generated faster and available to detectives, prosecutors and judges. Between 2012/13 and 2014/15, the turnaround time target was reduced from 20 to 15 days and is the main reasons for the decline in the percentage of criminal records processed within the target.

Table 13: Criminal records generated and updated

	2012/13	2013/14	2014/15
Total number of records generated	1 201 643	1 218 869	1 223 005
Total number of records generated within target	1 164 990	1 119 843	1 138 275
Total number of updates to criminal records	304 594	285 518	290 949
Total number of records updated within target	247 178	251 381	262 810
% of criminal records generated within target	*97%*	*92%*	*93%*
% of criminal records updated within target	*81%*	*88%*	*90%*

Source: DNA Economics calculations based on information received from the Division: Forensic Services
Note: In 2014/15, the target was reduced to 15 from 20 days in the preceding year

5.3.6 Feedback from crime scene examiners

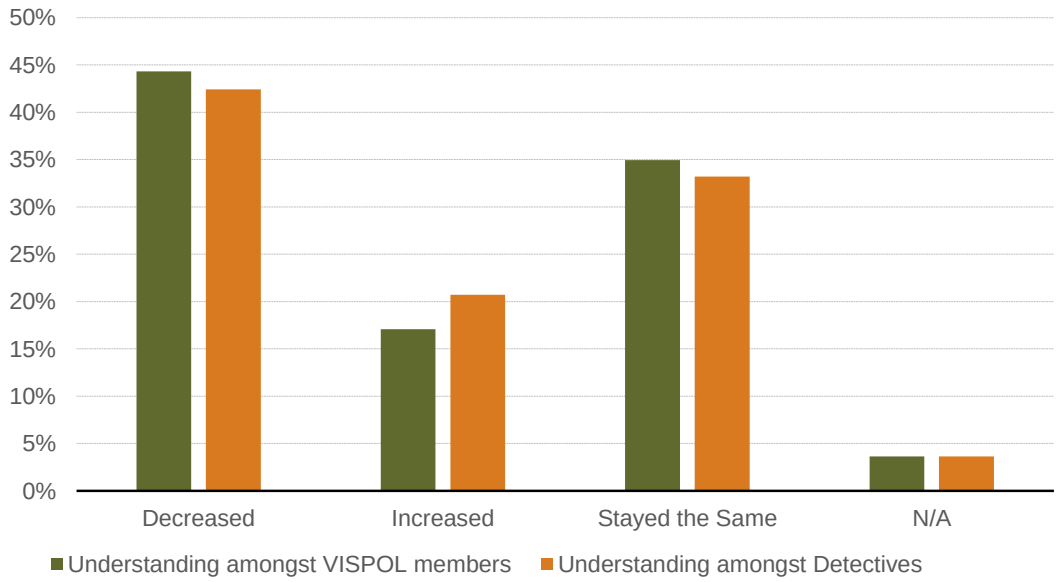
The crime scene examiners survey provides some useful insights into how the IIFS has impacted on their work and highlights the challenges they face. The evaluators asked crime scene examiners to identify the factors that have changed the number of crime scenes attended in a week over the past six years. About 75% of crime scene examiners reported that they visited more crime scenes, although about 52% of them noted that the number of crime scenes had also increased.

The effectiveness of forensic services depends on the preservation of the crime scene and evidence. If the crime scene is contaminated or evidence is destroyed, the link to the perpetrator is lost, and the likelihood of victim(s) getting a fair justice outcome is greatly diminished. Without forensics, detectives have to rely on less credible forms of evidence, such as witness testimony to get a conviction. Negotiating a plea bargain, as prosecutors surveyed as part of this evaluation, is made easier when forensic evidence can clearly link the suspect to the crime scene.

It is the role of first responders to secure the crime scene and prevent the destruction of evidence. Over 40% of crime scene examiners thought that the understanding amongst detectives and visible policing of how to secure a crime scene has decreased over the past six years, as shown in Figure 21. The inability of first responders to secure a crime scene may indicate a lack of awareness about the importance and use of forensic science in law enforcement. Interviewed officials note that forensic awareness needs to be continuously re-enforced through training and refresher courses, to embed

this knowledge and skill amongst VISPOL and detectives. Thus, the current model of training, includes forensic awareness as a once-off component of basic training may not be enough for VISPOL. Crime scene examiners also highlight that first respondents regularly run out of Personal Protective Equipment (PPE), such as gloves and shoe covers needed to prevent contamination of the crime scene.

Figure 21: Understanding of how to secure a crime scene and collect evidence



Source: Crime scene examiners' survey

Morale appears to be low within the CR&CSM. This is not surprising given the often violent and gruesome nature of the crimes that examiners see, but also their long working hours. However, crime scene examiners raised some organisational issues that contribute to low morale. The loss of experienced members is seen as a major setback for the section. Not only are experienced members more efficient at processing crime scenes, but they play a crucial role in mentoring new recruits. Another factor that contributes to the low spirits amongst crime scene examiners is the perceived promotion of less competent candidates. Respondents indicated that these appointments compromised the quality of leadership.

Some crime scene examiners thought that the targets set by the CR&CSM created perverse incentives, and encouraged them to collect evidence from crime scenes irrespective of whether such evidence was beneficial to the investigation. As one crime scene examiner surmises:

> *All evidence is collected just to show that something was collected because the targets are set so high that there is not scope for the investigator to be selective and focus on quality.*
>
> *Captain – Western Cape*

In follow-up discussions with the management of the CR&CSM, they pointed out crime scene examiners should not be collecting all evidence, but rather making smart decisions around where to look for evidence and what to collect. According to them, the equipment funded by the IIFS is

supposed to help crime scene examiners find the evidence. Nevertheless, the underlying reasons for the concerns raised by crime scene examiners are worth considering. It may be that the targets are creating perverse incentives for crime scene examiners to collect as much evidence as possible to meet the positive and identification targets. Another possibility is that crime scene examiners are not quite sure how to use the equipment effectively to collect appropriate evidence.

5.4 Programme implementation: FSL

FSLs apply scientific techniques to analyse crime scene evidence. Forensic analysis can help identify perpetrators, link them to crime scenes, and in serial cases, connect different crime scenes to each other. They build a picture of how the crime happened when it took place, and who was present when it happened. Forensic laboratories achieve this by examining the physical evidence, or remnants of activities, victims, perpetrators and witnesses, collected from the crime scene to either identify suspects for detectives or eliminate suspects early on in the investigation.[54]

FSLs located in the Eastern Cape, KwaZulu-Natal, Gauteng and Western Cape deliver forensic services to the entire country. Not all laboratories provide the full array of services, but over time the division has been working on decentralising the provision of different forensic disciplines. That said, the service offerings of laboratories depend on a variety of factors including the demand for different types of forensic services, the crime profile of the jurisdiction served by the laboratory, and the extent to which the benefits of decentralised services outweigh the costs thereof. There are good arguments for centralising highly specialised services or those with low demand such as questioned documents, and devolving services in high demand.

The FSLs in South Africa are structured broadly in line with their international counterparts, and offer the following types of services:

- **Forensic biology** is the application of genetic and microbiology techniques to law enforcement, by mainly using scientific techniques (e.g. Polymerase chain reaction) to amplify and quantify any blood and bodily fluid sample to obtain a forensic DNA profile.[55]
- **Ballistics** is concerned with the study of the pathway, motion and effects of bullets and other projectiles fired at a crime scene. This discipline plays a pivotal role in identifying the firearms, ammunition, bullets and cartridge cases involved in a crime, and can link a suspect to the use of a firearm by examining the markings on a firearm or gunshot residue.
- **Forensic chemistry** encompasses the analysis of organise and inorganic material to determine their origin and composition. This discipline uses a wide array of techniques to examine trace material found at a crime scene to understand and confirm their chemical composition.[56]
- **Victim identification** relies on physical and biological anthropology to recover, identify and analyse human remains.[57]

[54] (Julian & Kelty, 2012)

[55] (American Academy of Forensic Sciences, 2016)

[56] (Chemistry Explained, 2016)

[57] (American Academy of Forensic Sciences, 2016)

- **Scientific analysis** deal with all trace material from a crime scene that cannot be immediately identified, and requires specialised scientific analysis to determine its provenance and composition.
- **Questioned documents** involve a comprehensive analysis of writing styles, instruments and writing medium to verify their authenticity.

Between 2009/10 and 2014/15, the staff complement within the FSL increased from 1378 to 1680 growing at an annual average rate 4%. Over the period, about R1.4 billion was spent on improving technology and automation. This part of the report analyses to the workload and performance of the different sections within the FSLs.

It is important to note that the quantity and quality of analysis set out in this report depends on the information provided by each section to the evaluators. Some forensic disciplines had more data whereas others had less. As a result, there are variations in the depth, length and structure of each sub-section.

5.4.1 Forensic biology

The demand for forensic biology has increased significantly over the period under review. Before 2009, cases were only submitted for DNA analysis if there was a request for such analysis from the prosecutor or the detective. As such, samples collected from the crime scene were sent for presumptive testing to determine whether there was blood and bodily fluids were present on the material or surface. Nowadays, all biological samples collected from crimes are sent for DNA analysis.

The biology section within the FSL defines their objective as to analyse *evidentiary material of biological origin, example, body fluids, hair and human tissue with the aim of accomplishing the highest possible degree of human identification through forensic DNA analysis and microscopic comparison (specifically on hair)*".[58] This analysis links persons to a crime scene, and can either implicate a suspect or eliminate persons unconnected with the crime, but present at the crime scene as potential suspects. A forensic DNA profile can be compared with profiles from other crime scenes to identify repeat offenders or serial cases.[59]

The biology section performs three types of analyses.[60] The first kind of analysis relates to DNA, which makes up the majority of cases handled by the biology section. There are three key steps in DNA analysis: the recovery of evidence including blood, semen and human tissue; preliminary testing of such samples; and DNA analysis and the generation of DNA profiles.

The second type of analysis relates to trichology - the study of hair to determine unique characteristics that can be subsequently compared to a reference sample. This analysis reveals key

[58] (SAPS, 2013)

[59] (SAPS, 2014)

[60] (SAPS, 2014)

facts about the person such as their race, the area of the body from where the hair originates, the use of a dye or bleach on the hair, and the manner in which the hair was removed. It also allows for microscopic comparisons whereby observed structural similarities in the hair are used to compare samples from crime scenes to control or reference hair samples.

The biology section comprises of a national office which sets the standards for the four provincial laboratories in Gauteng, Western Cape, Eastern Cape and KwaZulu-Natal. It is important to mention that the Eastern Cape and KwaZulu-Natal FSLs only perform presumptive tests to identify the presence of biologicals in the samples received. If the presumptive test is positive, then the sample is sent to the biology section in the Western Cape and Gauteng respectively for confirmatory tests.

Only sending samples that pass the presumptive tests to the laboratory for testing reduces the cost of DNA analysis. Interviewed officials in the Eastern Cape laboratory were concerned that using couriers to send biological samples could break the chain-of-custody. However, case law and the regulations supporting "DNA Act" allows for the use of couriers to transport samples, and thus their concern is unfounded, but it does reflect a lack of understanding of the legislative prescripts by forensic analysts who are required to comply with them.

5.4.1.1 Personnel

Between 2009/10 and 2014/15, the staff complement of the biology section grew at an annual average of 3%. Much of the growth in new personnel occurred in a single year between 2013/14 and 2014/15 when the division recruited about 56 new forensic analysts. Therefore, at the time of writing this report, forensic analysts in the section were relatively new and inexperienced. As observed in Figure 22, personnel grew the faster in the provinces; particularly in KwaZulu-Natal, which established new capacity for presumptive testing in 2012, and in the Western Cape. Much of the growth in personnel was funded from the IIFS, although this information could not be corroborated because information on detailed personnel expenditure was not available to the research team.

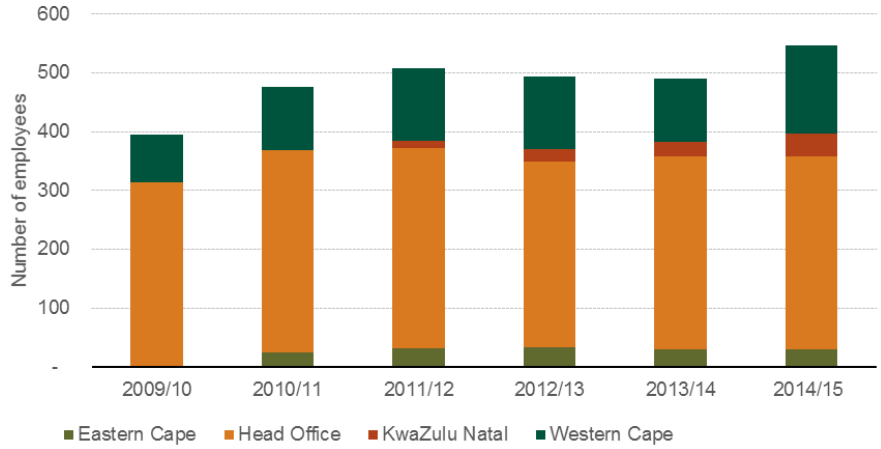
The section has also seen an increase in the proportion of forensic analysts to administrators. Priority was given to recruiting forensic analysts over administrative positions by SAPS' executive management[61]. This decision, however, has a negative impact on the efficiency of the section. Using the relatively more costly forensic analysts to do administrative work is inefficient and drives overtime expenditure in the division.

Has the IIFS helped to attract and retain forensic analysts? Although the IIFS has funded the expansion of the biology section, finding appropriately, qualified staff is challenging. To apply for the position of the forensic analyst, potential candidates must have an academic qualification in natural and life sciences equivalent to an NQF Level 7, or in other words a bachelor's degree. Retaining staff is also a challenge, as the section tends to lose analysts to other departments, most notably the Department of Health and the Department of Agriculture, as well as private laboratories. Given the extensive training provided to forensic analysts, their skills are often highly sought after. The

[61] (SAPS, 2015)

difficulties in expanding and growing the section can be seen in the figure below. Between 2011/12 and 2013/14, the section lost about 18 staff members.

Figure 22: Number of staff, biology section



Source: DNA Economics calculations based on information from the Division: Forensic Services

Growth in the number of exhibits analysed has outpaced growth in staff. Between 2009/10 and 2014/15, the average annual growth in exhibits analysed was 13% compared to a 6% increase in forensic staff.[62] As crime scene examiners are collecting more biological samples from crime scenes, the number of exhibits that require analysis has been rising.

Now that the DNA Act has come into effect, the workload of the section is expected to increase further. DNA buccal samples will now have to be taken from arrested persons in terms of priority crimes (e.g. murder, rape, sexual assault) set out in Schedule 8 of the Act when charged and from convicted offenders. It is estimated that the impact of this provision will increase the demand for DNA analysis from its current level of processing approximately 35 000 to 650 000 buccal samples per year, and will have significant resource implications. Although the IIFS has made significant inroads in developing capacity in the biological section, the full impact of the DNA Act will only be realised outside of the period under review, after March 2015. It is likely these legislative changes will lead to a shortage forensic analysts is the biology section in the coming years.

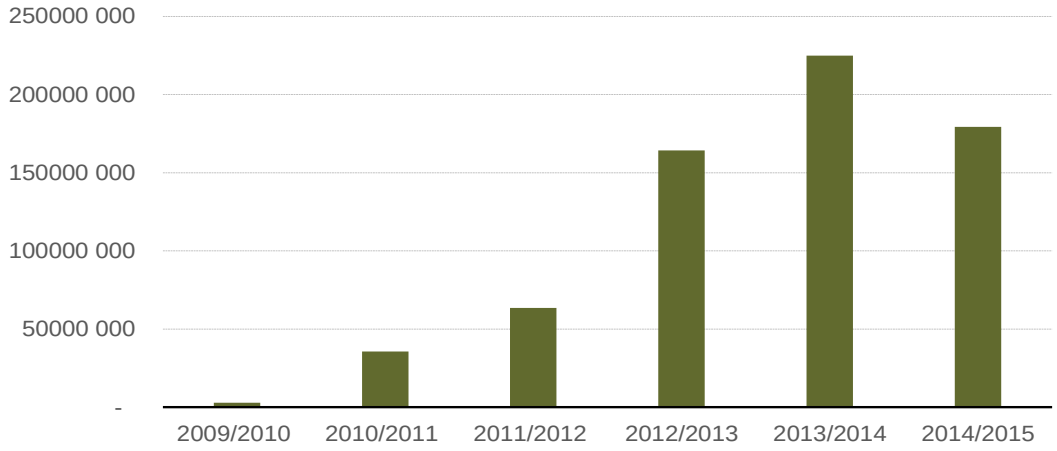
5.4.1.2 Technology, equipment and consumables

In total, R670.5 million was spent on technology and equipment through the IIFS between 2009/10 and 2014/15, as depicted in Figure 23. Expenditure on technology and equipment peaked at R224.8 million in 2012/13, driven by the installation of the RI-LANE, an automated system that helps to perform the Polymerase chain reaction (PCR) and electrophoresis analysis. Another R29.6 million was spent on maintaining the Genetic Sample Processing System over the period. Both these investments were meant to enhance the productivity of the FSL, by improving the processing times

[62] Detailed data on staff was not made available, and thus had to use employees per section as a measure.

of DNA samples. In light of the growing number of exhibits processed by the lab, the rest of the spending was mostly on expanding storage capacity for samples in the FSLs.

Figure 23: Expenditure on technology projects funded by IIFS, biology section

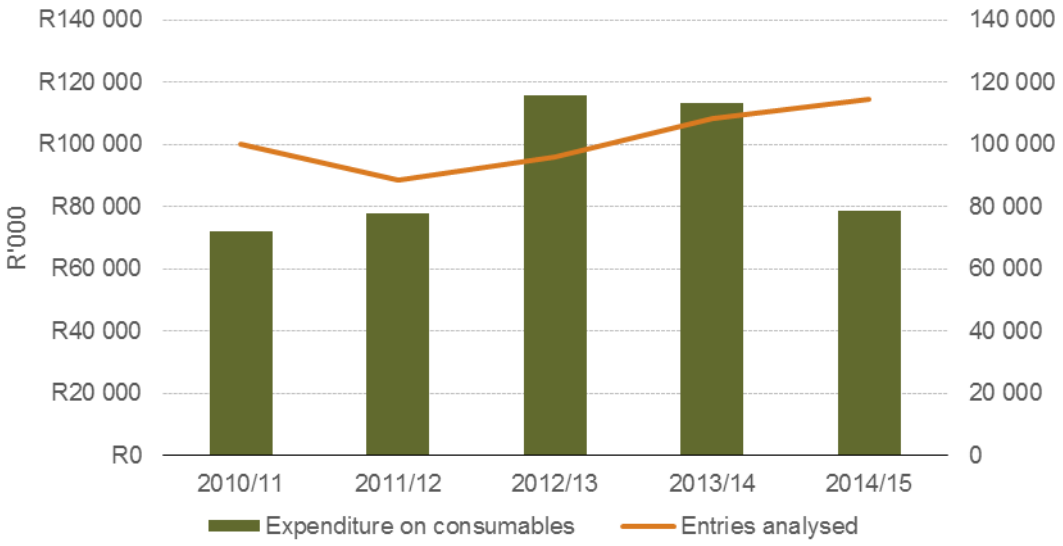


Source: DNA calculations based on data from TMS

About R457.5 million was spent on consumables for the biology section, and funded by the IIFS over the period under review, as shown in Figure 24. While this might seem like a substantial expenditure on consumables, it is important to note that the number of entries analysed has grown over the period. Moreover, the analysis reveals that the amount spent on consumables per entry analysed declined from R721.40 in 2010/11 to R 686.54 in 2014/15. This decrease is possibly due to the investment in technology that has made the processing of entries more cost-effective.

One of the concerns raised during interviews was the ability of the section and division to manage their demand for consumables. Consumables, particularly the chemicals used in the analysis of forensic evidence often have a limited self-life, and therefore inventory management ensures that the consumables that remain usable and have not expired. If consumables and inventory are not managed well, it opens up the laboratories' findings to contestation in court and leads to unnecessary losses if consumables have to be disposed of. Interviewed officials have suggested that procurement problems have delayed the purchase of consumables in the past, particularly those needed for the analysis of DNA. As a result, the laboratories have been forced to procure small quantities of consumables at a time, under the competitive tendering thresholds. Smaller orders ten to make the consumables more expensive.

Figure 24: Expenditure on consumables compared to entries analysed, biology section



Source: DNA calculations based on POLFIN data and information from the Division: Forensic Services

5.4.1.3 Workload

There are two important measures of workloads: case load per forensic analyst and turnaround time. The primary vertical axis in Figure 25 plots the number of cases analysed by each forensic examiner, whereas the secondary axis shows the percentage of cases completed within the targeted timeframe. The targeted time varies over the 5-year period from 35 calendar days[63] in 2009/10 to 28 working days in 2011/12. In 2014/15, the targeted timeframe was split between 28 days for routine, 63 days for intelligence and 75 days for non-routine cases[64]. The latter refers to the cases where a reference sample exists against which the sample collected at the crime can be compared. To compare the results in 2014/15 to other years, the evaluation team estimated an equivalent measure. In other words, the evaluators estimated how many cases would have been completed in 28 days within the 2014/15 year.

The entries analysed per employee varies considerably across years. Nevertheless, some trends can be observed[65]. Employees achieve targets better in years where their caseload is lower whereas higher caseloads tend to lower the achievement of targets. Another cause of the drop in performance in 2012/13 is the reduction in the target timeframe. This change was prompted by the improved performance in 2010/11 when 92% of entries were analysed. However, it seems that in deciding to

[63] 35 days was measured from the point the entry was assigned to an analyst to its completion.

[64] These measurements are taken from the time the exhibit enters the laboratory to the time it is completed.

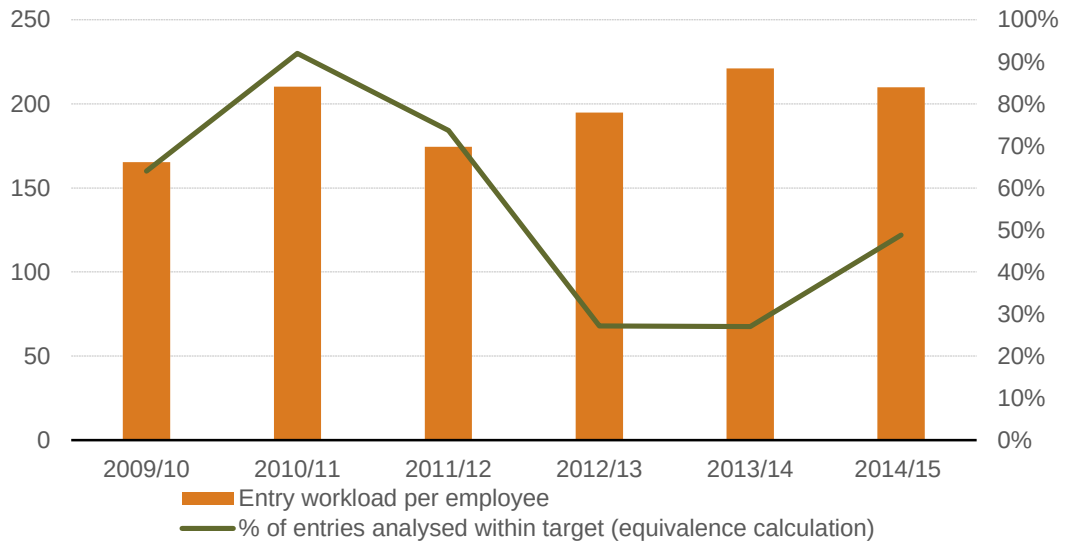
[65] We use the number of employees because it is not possible to differentiate between forensic analysts and managers using the current information on personnel.

reduce the targeted timeframe, the division failed to take into account the combined impact of processing more entries in a shorter timeframe.

As a result, the number of entries analysed within target declined to 27% in 2012/13, improving to 62% in the following year. In 2014/15, the division once again changed the target splitting entries into three categories: routine, non-routine and intelligence cases with different timeframes. As 69% of all cases are now processed within 63 days, the decline in the achievement rate was not as pronounced as expected if the target were maintained at 28 days for all entries. There have been three changes to the targets and the way they are measured (e.g. shift from the calendar to working days) in the space of 5 years.

These changes make it difficult to compare the performance of the biology section over time and has caused some upheaval in the FSL, with analysts struggling to meet the targets. For technical reasons, the evaluators could not survey forensic analysts[66]. However, there are potentially unintended consequences associated with chasing targets. In forensic laboratories, there is always the possibility that analysts will have no incentive to perform further testing on complicated samples to meet the deadline.

Figure 25: Workload per employee and % entries analysed within target, biology section



Source: DNA calculations based on data from the Division: Forensic Services
Note: The evaluators used the number of employees per section as data on the number of forensic analysts was not available.
The number of entries for 2013/14 in the annual report are reported as 45 292 and reflects only routine cases. The evaluators, therefore, have extrapolated the figure for the total number of entries analysed by adding back the net backlog of entries processed to the number of entries received

[66] Unlike CR&CSM, the forensic laboratories did not have a dedicated intranet where the survey link could be placed. The project steering committee therefore thought it was best to not survey forensic analysts. This is unfortunately as the survey of crime scene examiners provide useful insights into the challenges and benefits of the IIFS.

Box 1: Perverse incentives in forensic science laboratories

The US has experienced countless scandals in recent years around their forensic system. A paper by Roger Koppl and Meghan Sacks demonstrates the range of perverse incentives within the system. For example, certain states allow the forensic laboratory to recover the cost of any testing from the convicted felon. This provision in state law creates an incentive for analysts to match the forensic evidence to the defendant. This practice frequently happens in forensic sciences, where an element of subjectivity is present, such as blood splatter analysis, questioned documents, trichology and even DNA profiling (if the sample is compromised). As the authors point out, the act of submitting a suspect's sample to the laboratory makes the analyst more inclined to announce a match and confirm that the suspect is guilty. Where evidence is ambiguous, a forensic analyst must make a determination. This judgement will be informed by the forensic analyst's perception of the guilt of the suspect, the strength of his or her desire to avoid convicting an innocent person, and any financial rewards that might reward the laboratory for the conviction (as in the pay-per-conviction practice). In general, there is a range of perverse incentives built into the forensic system that pushes analysts to demonstrate results. These incentives influence their behaviour and the credibility of their analyses. Some of these problems are addressed by having a stronger case review system. Alternatively, an oversight board could be established to conduct blind reviews of the work product of the forensic laboratory.

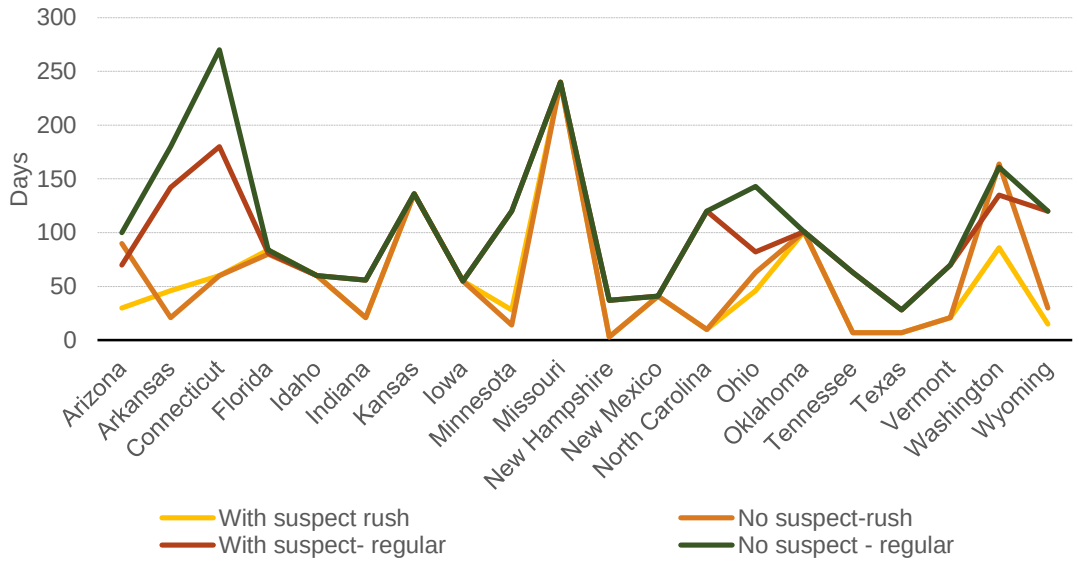
Sources: (Reason foundation, 2011), (Eapen Thampy, 2014)

Some data on turnaround times is available for the US. Although turnaround times cannot be compared directly to the South African experience because of the different ways in which the information is collected and calculated, international benchmarks are still useful. A national survey of forensic laboratories in various states in the US yields some interesting information on turnaround times. It seems that most laboratories have some way of differentiating between crimes. In some priority crimes, the investigating officer may request a "rush job", especially in instances where there is a suspect and DNA testing is needed to confirm their involvement in the crime.

As seen in the figure below, the turnaround time on a rush job varies from 3 days in some laboratories to 240 in others laboratories. Laboratory size appears to play a significant role in reducing turnaround times, as the DNA analysis processed in larger laboratories tends to be automated to some extent. On average, rush jobs with suspects took about 55 days to complete. There was, however, considerable variation between the minimum time (3 days in New Hampshire) and maximum time (115 days in Missouri). Average turnaround times are much higher when no reference sample is present, and it takes 109 days to complete the analysis. Although the metrics used to measure turnaround times cannot be directly compared, a few lessons emerge from this analysis. Rush cases are the equivalent of priority cases in South Africa, which are processed within 14 days; a turnaround time significantly lower than the US average of 55 days.

The South African FSLs also perform better in cases where no reference sample exists. The biology section in the South African FSL also has priority cases which are to be completed with 14 days, although data on the number of such cases and their completion rate within target was not provided to the project team. By differentiating between "rushed" (or priority) and "regular" cases, when there is and isn't a suspect, laboratories are targeting their resources to cases that have the highest likelihood of being prosecuted.

Figure 26: Turnaround time for DNA cases across laboratories in 20 states in the US



Source: (Hayes, 2010)
Note: the evaluators have used converted all timeframes into days, and used the maximum in a given range of timeframes for this analysis

5.4.1.4 Performance

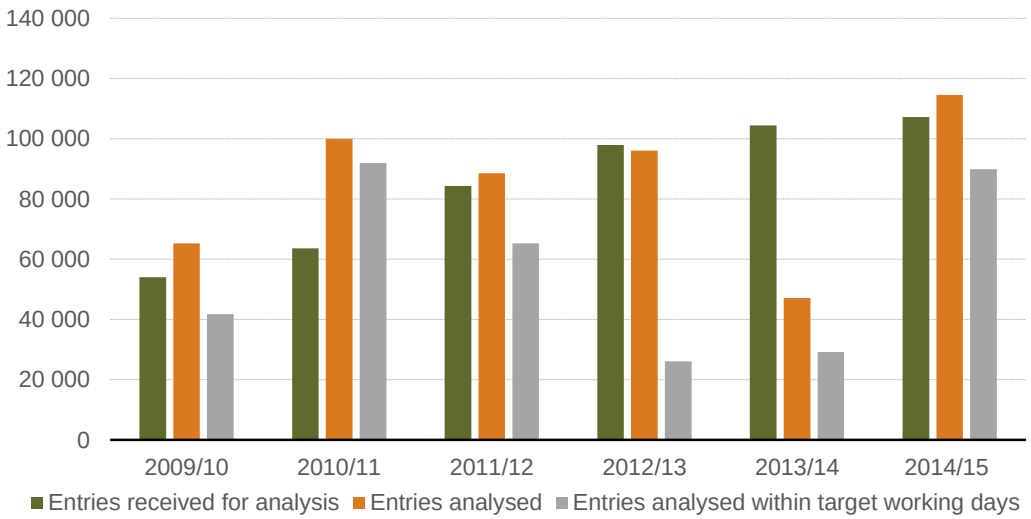
As mentioned earlier, the FSL divides its cases into a routine, non-routine case and intelligence case. Non-routine cases are those with more than ten exhibits or where a reference sample is collected for comparison. [67] When dealing with a non-routine case, the forensic analyst has to develop or adapt a methodology to test the sample. Formulating a scientific method takes innately more time, and thus non-routine cases tend to have a longer turnaround time.

Figure 27 below shows a breakdown of the performance of the biology section since the inception of the IIFS. The number of entries received for analysis has almost doubled since 2009/10, growing at an average annual rate of 14% per year. This increase is fuelled by the decision taken in to test all DNA samples instead of those that are requested for by the state prosecutors.

The figure below shows that the workload has a substantial effect on the number of entries analysed within the targeted timeframe. As the number of entries received for analysis increases, the capacity of the FSL to complete the analysis within the timeframe target decreases. Coupled with a reduction in the timeframe, the proportion of cases completed within the timeframe drops to 27% in 2012/13. In the next year, the number of entries analysed drops sharply as a result of delays in the automation of the biology lab, despite the fact that staff remains the same. It seems that the introduction of automated processes has contributed towards reducing the backlog.

[67] Reference samples can be taken from the victim, family, police officers or other non-suspects present at the scene

Figure 27: Number of entries received and analysed, biology section



Source: Division: Forensic Services
Notes: The entries analysed figure for 2014/15 was not available and therefore has been extrapolated from annual reports
The higher entries within target working days consists of 28 409 routine cases (processed within 28 days) and 61 908 intelligence cases (processed within 63 days)

The evaluators now turn our attention to backlogs. A backlog refers all entries that have not been completed within the targeted timeframe at any given time. During the documentary review, the evaluation team picked up various errors in the way that the FSL reports on its performance and its backlog. For example, the 2013/14 annual report states of the 104 484 entries received, only 47 118 were analysed. Of all the entries analysed, 29 259 were done within the target timeframe. It follows that the entries that were not analysed (57 366) should be brought forward into the following year to reflect a growing backlog. However, the figures contained in the annual report are probably wrong, and it is far more likely that these numbers reflect the routine and not all cases.

The biology section has spent much effort and resources in dealing with the backlogs. Why are backlogs so important in the forensic system? Fundamentally, backlogs are a measure of the capacity shortfall within laboratories. When the number of entries exceeds the ability of the laboratories to process them, then the backlog grows.[68]

Rather, when evidence is collected and submitted to a laboratory, it can be broken down into multiple entries that go to different disciplines for analysis. Evidence from the scene of a murder may include a bullet, cartridge and biological traces. The bullet and cartridge will go to the ballistics section as one entry with two exhibits whereas the biological traces may be broken down into 1 or more exhibits and sent to the biology section. Although backlogs are an important measure of the efficiency of a forensic laboratory, their impact on the justice system is even more important. Crime scene evidence that takes months to process can delay an investigation and prosecution. Laboratories as the

[68] (Michigan State Police, 2016)

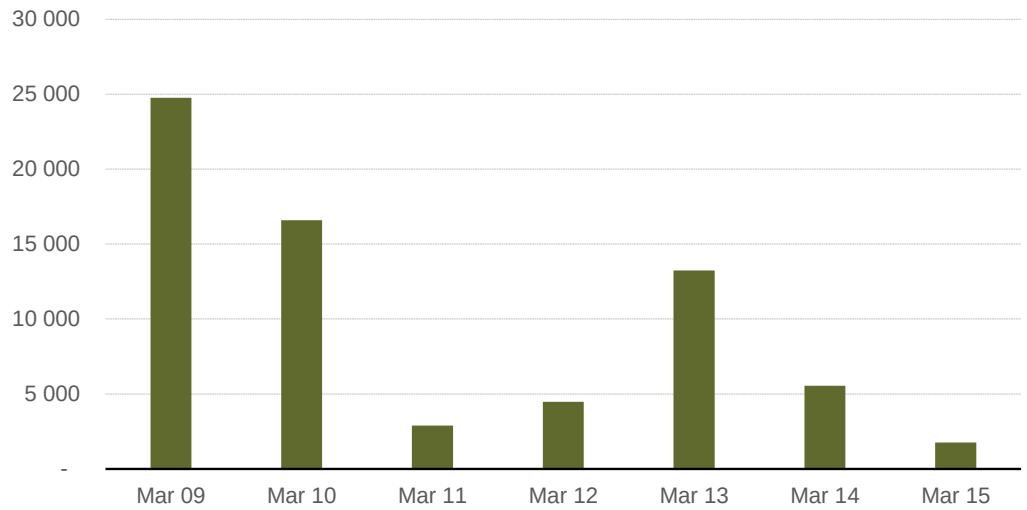
international review shows, tend to have some form of prioritisation; often analysing exhibits where a reference sample exists to help confirm or eliminate a suspect from the investigation.

Many factors influence the backlog in a laboratory. The most common reason for a growing backlog is an increase in demand for forensic analysis. Upstream improvements in the collection of evidence and more reported crime are all factors can increase the workload of the labs, and in turn the backlog. In the case of the IIFS, officials report that crime scene examiners now have better equipment to identify biological evidence at crime scenes and are thus collecting more samples, and even smaller samples because they know that the labs have the technology to analyse them. Policy changes within the division have also affected the workload of the laboratory and their backlogs. At the beginning of 2012/13, the division decided that all biological samples would be analysed. As a result, the biology section's backlog rose in 2012/13.

The capacity and capabilities of a laboratory can also influence the backlog. Factors such as the experience of forensic analysts, levels of automation and the reliability of technology and systems also impact on the capacity of a laboratory to analyse the entries. In relation to the biology section, officials report that there have been a few problems with the semi-automated systems used to analyse DNA. Some of these problems relate to suppliers and providers of equipment. Given the specialist nature of the laboratory systems, there is often is no official supplier in South Africa and parts are not easily available. Therefore, when these systems break down, parts have to be imported and has caused significant delays in the processing of cases. When the semi-automated systems are not operating, DNA analysis has to be done manually.

In other instances, procurement delays have meant that the biology section has run out of consumables and chemicals needed to operate the systems. Despite an increase in demand for their services and supply side constraints, by 2014/15, the section had reduced its backlog to 1755 in 2014/15 from 24 755 in 2009/10 (see Figure 28). The rising backlogs in 2013/14 was the result of delays in the roll of the CI and RI lane technologies.

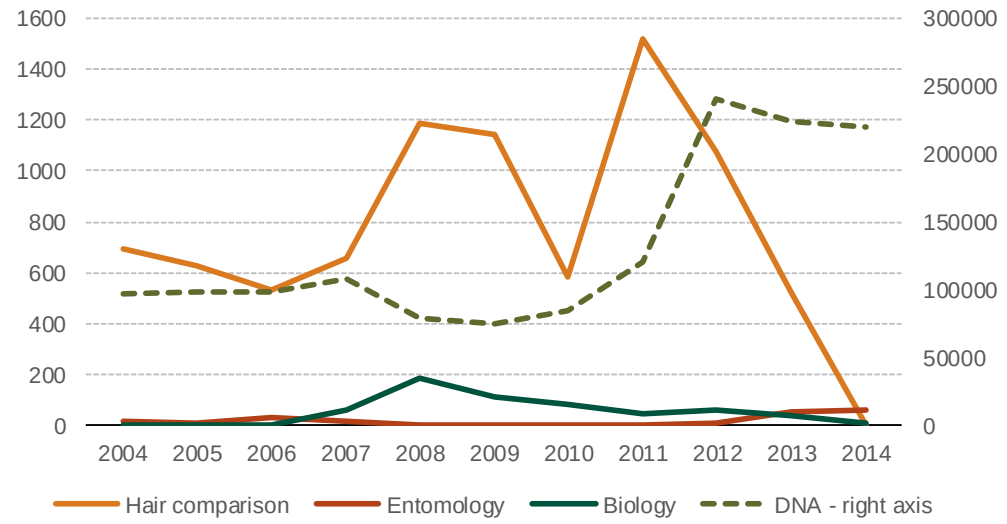
Figure 28: Number of backlog entries, biology section



Source: DNA calculations received from Division: Forensic Services

When cross-checked against the raw FSL database (see Figure 29), it does confirm that DNA analysis (the only time series on the right axis), is by far the lion's share of the workload of the division, and that the volume of DNA analysis has grown dramatically in recent years. Activity in hair comparison has in contrast fallen off, possibly because of increased reliance on DNA as an identification methodology. Some increase in entomology examinations also seems to be occurring.

Figure 29: Number of exhibits examined by type, biology section



Source: CAS and FSL systems, own calculations
**N.B.: The dates above refer to calendar years and not financial years*

5.4.2 Ballistics

The ballistics section examines firearms and firearm-related evidence as well as tool marks. It compares bullets and cartridges to firearms and links marks to the instrument that made them. There are three subsections within the ballistics section:

- **Mechanical and Metallurgical Engineering** plots the trajectory of bodies and parts, hence the component investigates mainly vehicular failures and major accidents.
- **Ballistics Analysis** compares microscopic markings left behind on bullets and or cartridge cases during the discharge of firearms. They also analyse tool marks to identify the tools that could have made them. Much of the component's work focuses on the four sub-fields of ballistics: internal ballistics (the propulsion of a projectile), intermediate ballistics (the projectile's transition to unpowered flight), external ballistics (the trajectory of the projectile) and terminal ballistics (the effects of the projectile at the end of its flight on its target or the object it hits) and intermediate ballistics (the interaction between bullet and target just before impact).
- **Integrated Ballistics Identification System (IBIS)** is an automated system for the analysis of firearm specimens. Established in 1997, IBIS stores computerised comparison images of fired bullets and cartridge cases retrieved from crime scenes or test fired ammunition from exhibit firearms. All firearms owned by the SAPS officers are scanned onto the IBIS system. Firearms

belonging to the metro police is currently in the process of being scanned into the IBIS system. The scanned images are compared to scanned images of bullets and cartridges with similar class characteristics and yield potential matches. IBIS leads, if found, are then passed onto the Ballistic Analysis Subsection, which analyses the matches under a microscope and confirms/refutes the result.

The ballistics section consists of a national office which sets the standards for the four provincial laboratories in Gauteng, Western Cape, KwaZulu-Natal and the Eastern Cape. The ballistics sections in Gauteng, and the Western Cape have twice the number of IBIS stations in these provincial laboratories compared to KwaZulu-Natal and the Eastern Cape. Plans were afoot to establish a ballistics laboratory in Mpumalanga. This laboratory was supposed to be completed by June 2013 but in the end did not materialise because of a lack of funding. To cope with the demand for IBIS and ballistic analysis, entries from the provinces that do not have a laboratory are distributed amongst the four laboratories according to their workload.

Over the period of the IIFS, it is estimated that about R100 million was spent on goods and services, and equipment in the ballistics section. Expenditure increases from R 431 633 in 2010/11 to R45 million in 2014/15, an almost ten-fold increase.[69] Another R 206 million was spent on technology solutions to automate the work of the ballistics section and purchase newer and more advanced technology.[70] These estimates exclude any amounts dedicated to compensation for employees for which data is not available.

5.4.2.1 Personnel

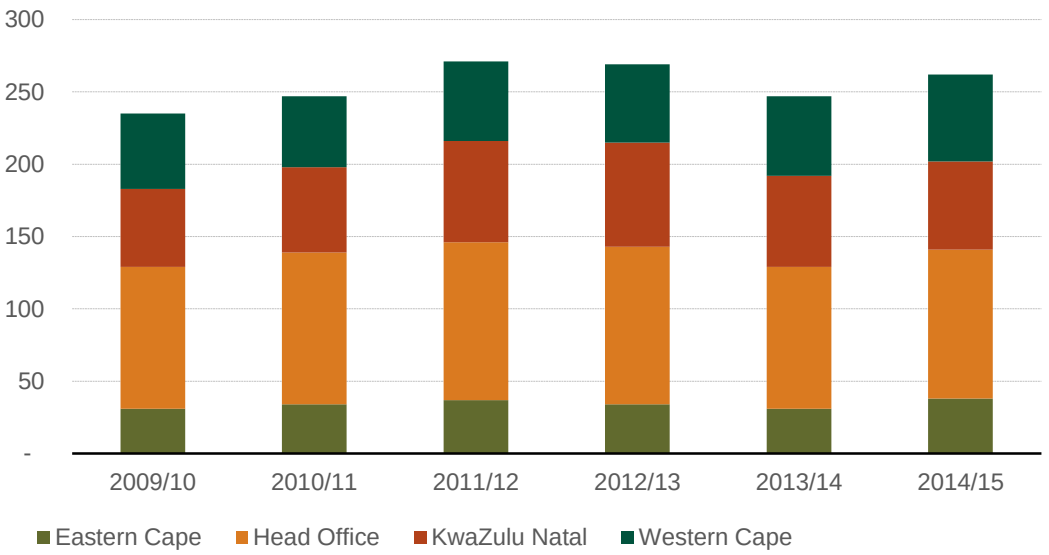
Of all the sections within the FSL, the ballistics section experiences the slowest growth in personnel between 2009/10 and 2014/15. Interviewed officials report that this is mainly because fewer positions were allocated to this section when compared to other sections. Again, the lack of physical facilities has restricted the number of new recruits that could be hired.

Recruiting professionals for ballistics analysis is challenging. Applicants must have either have a professional engineering qualification or professional technician qualification (i.e. holders of an NQF Level 6 qualification or higher). For entry level positions at the engineering sub section, recruits do not need to be registered with the Engineering Council of South Africa yet. Applications for advertised vacancies have been overwhelming. However, not many applicants met the minimum requirements. In light of the high-profile cases, the section is called on to testify in; the section has introduced a more rigorous approach to the selection of candidates. All shortlisted candidates undergo a job evaluation that tests their existing knowledge of firearms, guns or engineering.

[69] Based on information from POLFIN

[70] This estimate is based on data received from TMS. We have allocated expenditure on systems and technology based on the information recorded in each project plan.

Figure 30: Number of staff, ballistics section



Source: Information received from the Division: Forensic Services

Overall, the ballistics section experiences a marginal increase in staff between 2009/10 and 2014/15, suggesting that the IIFS did not have much of an effect on personnel in this division. Much of this growth is seen in two provinces: the Western Cape and KwaZulu-Natal. In relation to the Western Cape, this is unsurprising as interviewed officials noted that most gun crime is associated with the purchase and sale of drugs in the province. Given the sharp increase in drug-related crime, the FSL in the Western Cape has received an increasing number of requests for ballistic and chemistry analysis.

Whereas the section has not had much difficulty in recruiting entry-level positions, filling senior positions is not easy. In part, the decline in staff between 2012/13 and 2013/14 was due to the establishment of the Quality Management component. Senior and more experienced staff were shifted to the new component, and as a consequence the ballistic section loss substantial capacity. This re-organisation of the FSL is particularly detrimental to the unit, as new recruits can only be assigned to complex cases for after at least two years, or after they have been deemed competent to act as expert witnesses. It is also important to note that growth in staff is moderated by the loss of existing staff, who have also left the section for opportunities abroad or the private sector.

There are two types of training offered to ballistics personnel: internal and external training. The ballistics section provides specialist ballistic training internally to new recruits. Training is based on the Association of Firearms and Tool Mark Examiners (AFTE) training manual, and other standard texts, while competency tests consist of a theoretical examination conducted by an external service provider and mock trials.

Where the ballistics section does not have in-house expertise, external training has been sought. The IIFS has been particularly effective is in funding external training. A total of R5.3 million was spent on external training for the ballistics section using the IIFS. This expenditure represents about 6% of the total spend on training for the Division: Forensic Services. It is important to say that this

figure may underestimate the cost of training, as it excludes expenditure on travel and subsistence for attending international training events and in-house training provided to new recruits.

5.4.2.2 Technology, equipment and consumables

According to data from TMS, a total of R206 million was spent on technology and systems. Much of this expenditure was for the upgrading the Integrated Ballistics Identification System (IBIS), most of which has been funded through the IIFS since 2009. The IBIS has undergone several upgrades since its installation in 1997 following benchmark testing in 1995. The original system scanned the firearm specimens into two-dimensional images. In other words, the system was only able to represent the lines and markings on the surface of a specimen without including the spatial orientation and depth of the image.

In this regard, the accuracy of the analysis was mainly dependent on the lighting angle. Between 2009 and 2014, the IIFS funded an increase in the number of workstations that capable of running IBIS. Moreover, the IIFS also funded the upgrade to the IBIS in 2014 that led to the introduction of three-dimensional analysis for bullets only, while cartridge analysis remained two-dimensional. This upgrade improves the accuracy and reliability of the results of the ballistic analysis, increasing the hit rate when there is a large quantity of "noise" in the database. The latest version of IBIS has full 3-dimensional functionality which uploads and scans both cartridge cases and bullets and was received as part of the 2014 upgrade to the IBIS system.

Box 2: The IBIS upgrade and delays in the procurement process

The IBIS upgrade is an important lesson for the division. It exemplifies how delays in the procurement process impact on forensic services and leads to backlogs. There were three sections involved in the upgrade of the IBIS: TMS, FSL and Quality Management (QM). Due to the heavy reliance on IT infrastructure by the IBIS, the procurement of the upgrade was led by the SAPS' Technology Management Services (TMS) with input from the SITA. The ballistics section with support from the QM section performed a thorough needs analysis that informed the development of the system specifications for the tender process. For example, the specifications required that the system has an uptime of at least 95% including daily preventative maintenance.[71] The specifications were included in the contractual arrangements as performance criteria. The terms of the contract stated that SAPS would become the owners of the upgrade and that the service provider would provide all software updates over the next five years and enter into a five-year maintenance contract. The IBIS upgrade was however plagued by delays in the SITA procurement processes, taking up to 14 months from approval to implementation. This delay leads to a situation where eventually the SAPS servers no longer had any additional capacity to host the upgrade. The IBIS system slowed down until it was no longer able to process scanned images and provincial offices were instructed to stop uploading police weapons onto the system. When the system eventually came back online in towards the end of 2014, there was a build-up of backlogged cases and the section struggled to keep up with the turnaround target of 28 working days.

Source: Interviews with the ballistics section

The ballistics analysis section spent about R22 million between 2011/12 and 2014/15 on consumables. Included in this amount, was R 848 857 for ammunition. For the ballistics section to

[71] The system also requires that at least 1000 samples are scanned in the system every day.

match a candidate weapon to one fired at a crime scene, it must replicate the conditions under the suspect fired the gun, and compare the bullets and cartridge against those found at the crime scene. Therefore, having ammunition available is a crucial input into the testing process. Even with the IIFS funding available, the section finds it difficult to source commercial ammunition.

5.4.2.3 Workload

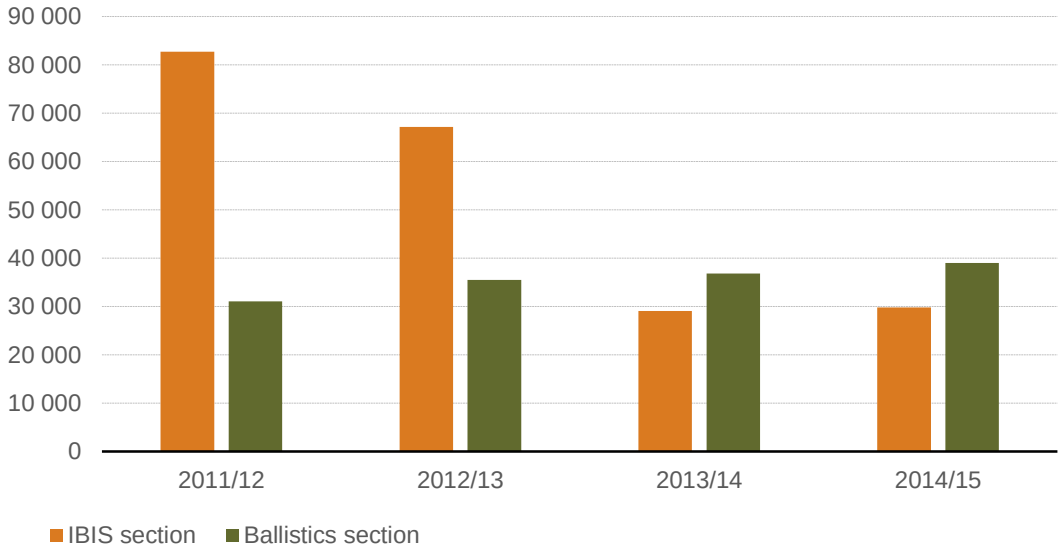
This evaluation uses the following measures to track the workload of the ballistics unit over the evaluation period:

- Firearms and cartridges scanned onto IBIS;
- Workload per analyst; and
- Requests for analysis made to the ballistics analysis subsection.

The IBIS and ballistics subsections work in tandem. Matches from comparisons against IBIS images are sent to the ballistics analysis subsection for validation and confirmation. As shown in Figure 31, the number of entries received rises gradually and peaks in 2011/2012. The peak can be attributed to a policy change that required the ballistics section to register all police firearms and store them on IBIS. This created a surge in demand for ballistics at a time when the IBIS system's capacity to scan and store images was slowing down. To cope with the system's capacity deficits, the ballistics section allowed the scanning of the firearms of police officers but restricted their acquisition onto the system. The IBIS service provider also helped to alleviate the workload pressures by conducting searches on their servers, and sending the results back to the ballistics section for review and confirmation. Another key factor that influences the workload of the section is the timing of the requests for scanning. Police stations tended to submit scans of their firearms in large batches, thus overwhelming the IBIS system. For example, the number of entries received from the Western Cape doubled from 12 451 (in 2008) to 30 576 (in 2009).

The number of entries received by the IBIS section has declined over time mainly due a fall of police firearms submitted for acquisition. However, ballistics analysis section is receiving an increasing number of entries. In other words, although fewer images are uploaded on IBIS, more results from the system are being analysed for matches.

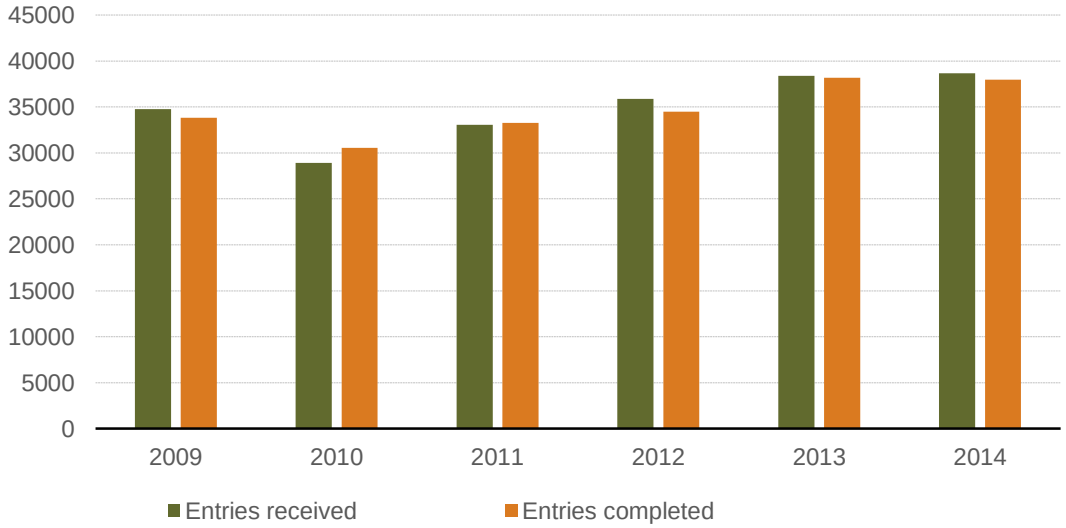
Figure 31: Number of entries received, IBIS and ballistics sections



Source: FSL Ballistics Section submission to DNA Economics
**N.B.: Data was not available for the 2009/10 and 2010/12 years*

The net difference between entries received and entries analysed influences how the backlog grows or shrinks over time. In those years, when the entries analysed and completed exceed the number of entries received, the ballistics section makes some headway in reducing their backlog. In contrast when entries received exceed the number analysed and completed, then the backlog rises. The data shows that although the number of entries received has increased, the section has managed to keep up with the increased workload, mainly due to technological improvements funded through the IIFS.

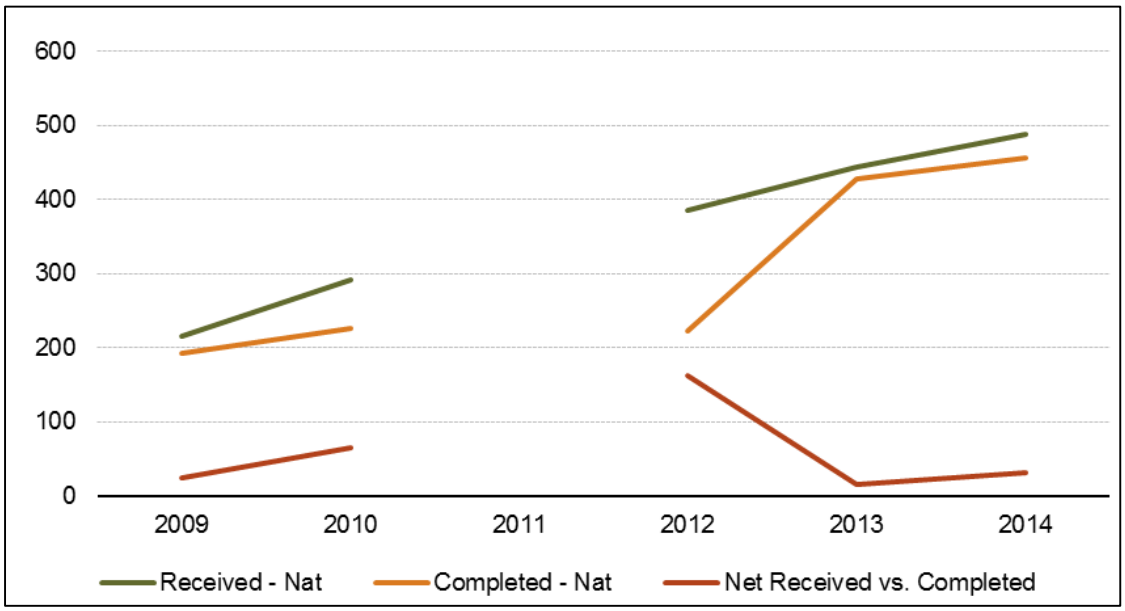
Figure 32: Number of entries received and analysed, ballistics section



Source: FSL Ballistics Section submission to DNA Economics
**N.B.: The dates above refer to calendar years and not financial years*

Data for the Mechanical and Metallurgical Engineering subsection is only available for five years between 2009 and 2014. The number of entries appears to be increasing, however, it is not possible to infer much else from the available data.

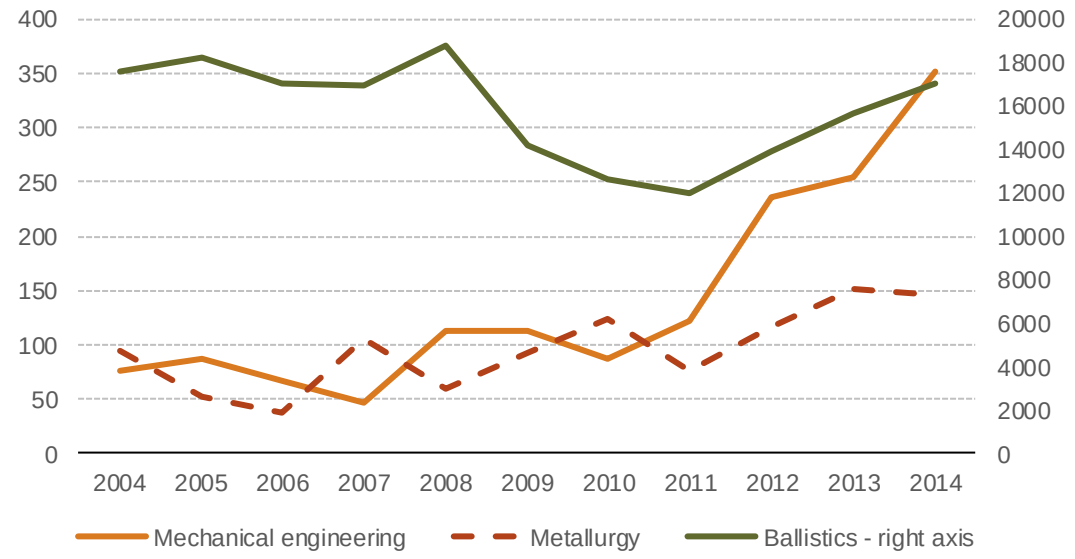
Figure 33: Number of entries, Mechanical and Metallurgical Engineering subsection



Source: FSL Ballistics Section submission to DNA Economics
**N.B.: The dates above refer to calendar years and not financial years*

The research team again cross-checked this performance data against the raw FSL database. The results are shown in Figure 34. The data splits out mechanical engineering and metallurgy, and as can be seen confirms both that there is growth in this category, and that much of it comes from the mechanical engineering division. While the metallurgy and mechanical engineering numbers largely correspond to those in Figure 33, suggesting that the bulk of these forensic cases are picked up despite the fact that the forensics database received included only some crime types, the ballistics numbers are much lower than those in Figure 32. This reflects the exclusion of major crime types like drug offences from the sample requested. In recent years, however, the database numbers do confirm that there was first a decrease in numbers of ballistics exhibits processed, and then an increase.

Figure 34: Number of exhibits examined by type, ballistics section



Source: CAS and FSL systems, own calculations
**N.B.: The dates above refer to calendar years and not financial years*

Ballistics is the only section that provided the evaluation team with the number of forensic analysts employed. The analysis reveals that cases per analyst increased rapidly over the six-year period, peaking at 638 cases per analyst in 2012. To deal with this higher workload, the section paid about R 1.7 million in overtime or an equivalent annual payment of R2 782 per analyst. Contrary to expectations, even though the cases per analyst declines to 392 in 2013 and 311 in 2014, overtime payments remain high at R1.9 million and R2.1 million respectively. Whereas the average overtime spend per analyst was R1 699 in 2011, it increases by four times reaching R6 894 in 2015. This rapid growth could be due to the rising number of requests for ballistic analysis, received by the section (see Figure 31). It is reasonable to assume that the most complicated cases would go to analysts with more experience and increase the overtime hours they work. In all likelihood, the overtime funded through the IIFS has been instrumental in helping the ballistics section to manage their rising workload.

Table 14: Workload per analyst and overtime, ballistics section

	2009	2010	2011	2012	2013	2014
All entries completed*	74 278	85 176	102 711	171 527	96 888	81 354
Cases per analyst	316	345	379	638	392	311
Overtime (Rands)	677 424	-	632 537	1 774 245	1 904 719	2 134 328
Overtime per analyst	R 2 143	-	R 1 669	R 2 782	R 4 856	R 6 874

Source: DNA Economics' calculation based on data received from the ballistics section
Note: All entries completed is the sum of all entries processed by the IBIS and ballistics analysis subsections

5.4.2.4 Performance

The upgrade of IBIS together with new equipment funded through the IIFS has led to significant improvements in the accuracy and reliability of the results produced by the ballistics section. Before the installation of IBIS in 1997, SAPS conducted benchmark tests where the accuracy of the section

was measured at one against 2 000 with an accuracy of 80%. By 2015, interviewed officials highlight that the benchmark has improved to 100% accuracy for a comparison of 1 against 123 634 for cartridge cases.[72]

The effectiveness of the IBIS system, like the AFIS system, depends on the size of the database of images against which it runs its comparisons. To increase the number of images, it has access to; the SAPS has decided to register all police and private security weapons onto IBIS. However, the merits of this initiative are however not widely accepted. Internationally, the cost effectiveness of reference databases such as IBIS remains a contested issue. Critics argue that these databases are expensive investments for the low amount of hits they achieved. Another point raised by detractors is that the expenditure spent on expanding database capacity to store images of scanned firearms for the amount of crimes committed by these firearms is costly. Nevertheless, the debates on the effectiveness of firearm registration are heavily influenced by the country context and the nature of gun crime.

The international review shows that such initiatives have been abandoned because of they are not seen as cost-effective. Interviewed officials highlight that in State of Maryland; a programme to register all new firearms was scrapped after ten years because it was prohibitively expensive and contributed little to the solving of crimes involving firearms. Having said that, this test was performed on fairly outdated IBIS technology. Since this test, the accuracy of the tests has improved considerably with newer technology; likely contributing to an improvement in efficiency and decrease in the cost of testing.

Opponents to the registration of all firearms have also argued that with repeated use, the characteristic markings made by a firearm will change as components are replaced and standard wear and tear grinds down the grooves in a firearm, undermining the effectiveness of testing.

Despite the lack of evidence around the effectiveness of the firearm registration scheme, the ballistics section argues that these studies outlined above were largely based on the less accurate two-dimensional analysis. Furthermore, it takes upwards of 8 000 shots to start changing the characteristics of a firearm. The conclusion to this debate will not only have a bearing on the future workload of the ballistics section but will possibly impact future reforms to the Firearms and Control Act (2000).

The ballistics section categorises its cases according to their level of complexity. The more complex the case is, the more points it receives. A level 1 case earns 80 points, while a level 8 case earns 200 points. Each analyst is expected to reach a target of 400 points a day. Cases are further divided into routine and non-routine cases where the threshold for non-routine cases is 2 000 points and more.

The section aims to complete 93% of all routine cases within 28 working days, and 76% of non-routine cases must be analysed and finalised within 75 working days. In 2012/13, only 75% of routine

[72] This was found during a recent benchmark test performed by the section.

cases were finalised; this subsequently rose to 99% in the following year, before decreasing again to 53% due to the lapsing of the IBIS maintenance contract. This analysis illustrates how processes such as procurement can jeopardise the potential success of a programme such as the IIFS.

The effectiveness of ballistics analysis is measured through the hit rate that is the number of positive matches based on the number of acquired images on the IBIS. As Table 15 shows, the hit rate has increased substantially. It appears that the IBIS upgrade is starting to yield benefits as the cumulative number of acquired images expand.

Table 15: Performance of ballistics section over time

YEAR	2011/12	2012/13	2013/14	2014/15
Number of Hits	2012	1200	1706	1962
Number of Acquisitions	82751	67129	29079	29767
Hit rate (%)	2.4%	1.7%	5.9%	6.6%

Source: FSL Ballistics Section

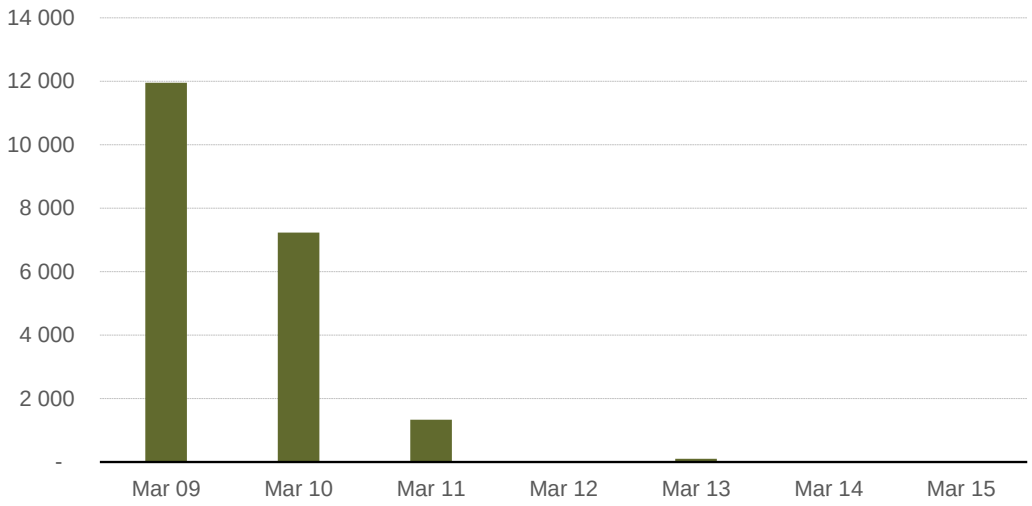
International comparisons are difficult with ballistics, as jurisdictions use different approaches to measuring the hit rate. A study by the Bureau of Alcohol, Tobacco, Firearms and Explosives (AFTE) reveals that the more evidence that was entered into an IBIS, the greater the chance of a match. The analysis indicated that by entering specimens drawn from both cartridge cases and bullets the probability of a hit increased. Using a sample of 12 law enforcement agencies across the US the hit rates ranged from 7.5 to 38.5 and averaged 13.4%.[73]

At first glance, it seems that the ballistics hit rate in South Africa is below the international average. However, any comparisons on the hit rate should be interpreted with caution. In the US, comparisons are only made against guns involved in crime, whereas the South African IBIS contains firearms from various law enforcement agencies including the police and metro police (i.e. a larger pool of firearms). Furthermore, the hit rate is South Africa is based on linking cases, whereas in the US the hit rate is calculated at exhibit level which will naturally give a higher hit rate that when based on case-linked hits.

As depicted in Figure 35, the ballistics section has addressed the majority of its backlogged cases over the three-year period. Dealing with backlogs is an area where the section has been particularly successful. Not only has the ballistics section addressed its backlog, but it has also guarded against the formation of new backlogs.

[73] (AFTE, 2005)

Figure 35: Number of backlog entries, ballistics section



Source: Data received from the Division: Forensic Services

Going forward, one of the factors that will hinder performance is the lack of space and appropriate facilities to house the ballistics sections. Interviewed officials highlight that for certain disciplines such as ballistics, facilities need to be equipped with specialised infrastructure and equipment. Current laboratories, particularly those owned by private owners or public works, cannot be customised to suit the requirements of ballistics testing. Eventually, the lack of physical infrastructure will become a binding constraint on the ballistics section.

5.4.3 Chemistry

The analysis conducted by the chemistry section can be divided into three categories:

- **Drug identification cases** where substances are sent to the laboratory for identification, classification and (weight) measurement. These cases form the vast majority (up to 90%) of the work conducted within the chemistry section.
- **Chemistry investigations** are fire investigations that determine the origin and causes of fires, as well as clandestine laboratory investigations.
- **Toxicology** is a small number of cases which typically involves poison analysis as part of wider police investigations. This work should not be confused, and does not overlap, with the work of the National Department of Health Forensic Chemistry Laboratories) which uses biological and chemical analysis to determine the cause of death.
- **Fire Debris Analysis** is a small number of cases involving the analysis of fire debris for the presence of accelerants.

Between 2010/11 and 2014/15, about R83.5 million was spent on goods and services by the chemistry section. About R47.4 million of the IIFS was dedicated to the purchase, maintenance and repair of laboratory equipment.

5.4.3.1 Personnel

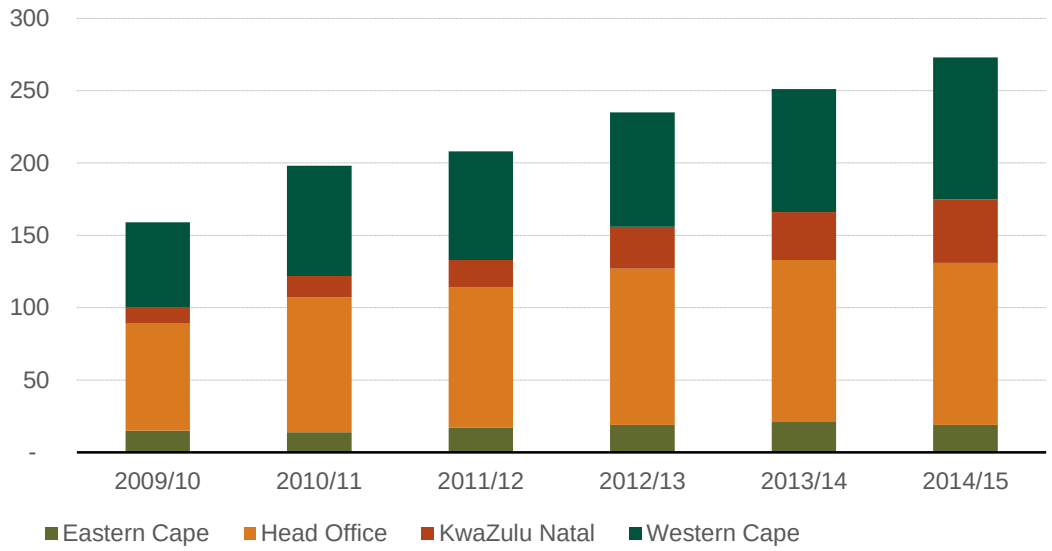
Figure 36 shows how the staff complement within the chemistry section has increased since the inception of the IIFS. Nationally, the total staff size has grown from 159 in 2009/10 to 273 in 2014/15, growing at an average annual rate of 11%. This is mainly due to increases in the staff employed by the Gauteng (Head Office), KwaZulu-Natal and Western Cape laboratories. The increase in staff is particularly pronounced in the Western Cape, which receives the highest number of drug-related cases in the country. Drug-related crimes rose by 345% between 2004 and 2015 and is closely related to gang activity in specific areas within Cape Town.

Nonetheless, the workload of the FSLs is not only affected by the rapid increase in drug-related crime but also by the way in which SAPS handles these cases. Interviews with officials within the section suggest that there is greater emphasis on arresting users of drugs; an approach which drives up the number of exhibits sent to the forensic laboratories, but does not necessarily stem the rise in drug-related crimes. Focusing on users rather than dealers and syndicates means that significant amounts of low-volume and value exhibits are collected and sent to the forensic laboratories for analysis. The influx of drug-related crime exhibits has overwhelmed forensic services in the Western Cape. Discussions with FSL personnel highlight that the problem would have been much larger without the forensic capacity of the Western Cape Laboratory coupled with the assistance of other provincial laboratories.

The IIFS has also been used to establish and strengthen the chemistry section with the KZN laboratory, in response to the changing patterns in drug crime in South Africa. Areas in KZN have become an incubator for new types of drugs. Nyaope (also known as whoonga or wunga) is made from heroin, marijuana and anti-retroviral drugs, and is widely available and used in the province. An amendment to the Drugs and Drugs Trafficking Act (No 140 of 1992), also contributed to an increase in the workload of the section.[74]

[74] (Health24, 2014)

Figure 36: Staff complement over time, chemistry section



Source: Information received from the Division: Forensic Services

During interviews, the section indicated that it had no major problems in finding and retaining regular chemical (drug) analysts, other than experiencing a shortage of people able to handle advanced cases; e.g. the analysis of bath salts and designer drugs. Serious problems are, however, experienced in retaining fire investigators; where turn-over rates are said to be exceedingly high. Fire investigators, after receiving the high-quality training in forensics, typically have lucrative opportunities alternatives in the private sector - particularly through insurance companies – where significantly higher salaries and better career progression prospects are available.

The amount of training provided to staff of the chemistry section has increased substantially over the last six years, according to interviewed officials. According to POLFIN data, only R 5.2 million of the IIFS was spent on training over the period; this amount translates into approximately R 3 920 spent per employee. Since training is mostly provided internally, it is done so at a relatively low cost). That being said, analysis also receive external training on advanced equipment. Some interviewed officials suggested that a key benefit of the formal and external training is that it improves the credibility of analysts when testifying in court. Typically, in their Section 212 affidavits, analysts must declare their qualifications and experience before reporting on their results.

5.4.3.2 Technology, equipment and consumables

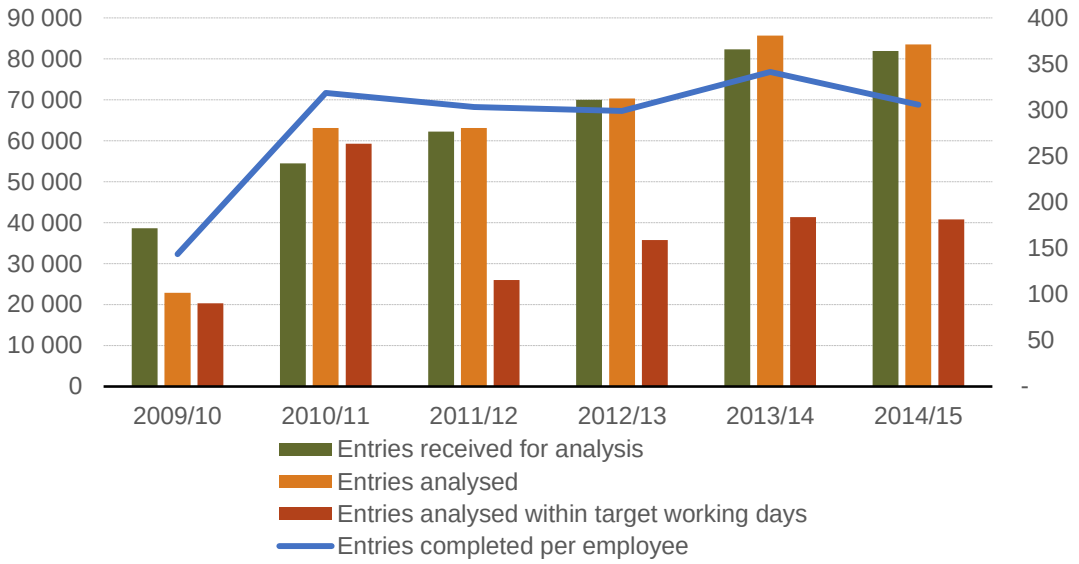
Many of the purchases over the period were made to keep pace with the increased demand from a higher number of drug identification cases and increased staffing levels. The capacitation of the Plattekloof laboratory was also a major expenditure item. Data received from TMS shows that expenditure on technology, systems and equipment was roughly R28 million. Specialised equipment such as spectrometers and chromatography systems were purchased to develop the section' capacity to analyse the composition of drugs and other substances. Part of the IIFS was used to improve the security of the laboratories, through the installation of RFID solutions that enable tracking and tracing of case files, and CCTV within the labs themselves and at storage sites. This expenditure cannot be specifically allocated to the chemistry section budget as it incurred was for the benefit of several sections.

Interviewed officials suggest that the lack of physical infrastructure and its ageing nature are the key challenges moving forward; with new workbenches, additional space and streamlining of existing space required to reduce the risks of contamination. Additionally, the safety of drug storage facilities was highlighted as a key risk, where facilities do not always meet desired safety and security standards.

5.4.3.3 Workload

The workload of the chemistry section has increased significantly between 2009/10 and 2014/15. The number of entries received for analysis grew at an average annual rate of 15% over the period. Over the period, growth in personnel has not kept pace with the increase in entries received for analysis, and fuelled by higher levels of drug-crime. As a result, the entries analysed per employee rose from 143 in 2009/10 to 306 in 2014/15, peaking at 341 entries in 2013/14.

Figure 37: Number of entries received and analysed, chemistry section

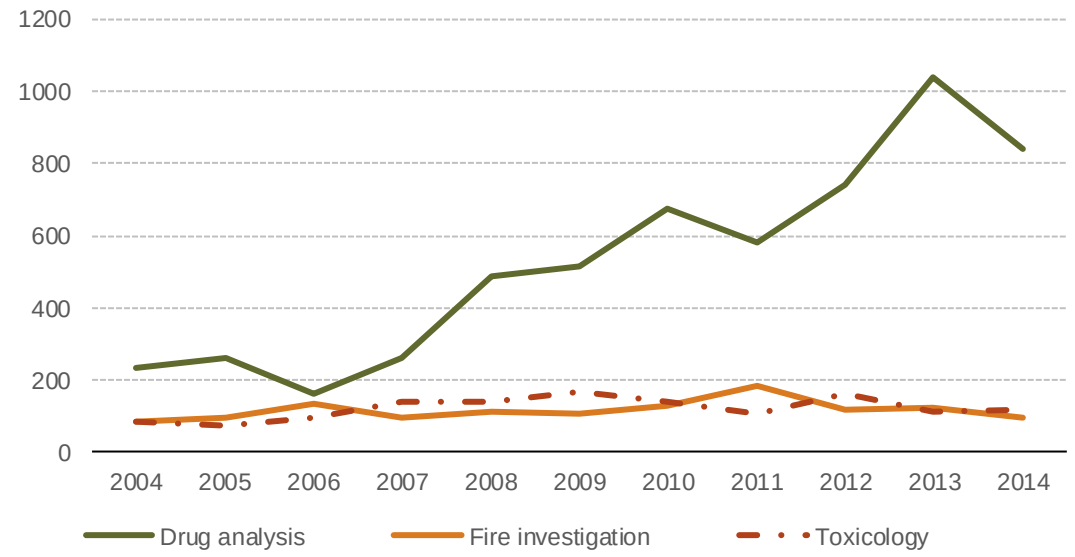


Source: DNA Economics' calculations based on data from the chemistry section

Cross-checking was again performed against the raw forensics database received by the team, although the value of this cross-check was greatly reduced by the failure to include drug-related crimes in the data request. [75] The resulting analysis is shown in Figure 38 below. It confirms that drug cases are the majority of the workload of the division, and have risen sharply over time. The number of fire investigation and toxicology exhibits examined, on the other hand, has not changed much over the period.

[75] Drug crimes were (perhaps erroneously) not seen as a primary focus of the cost benefit analysis at the time of the data request. However the project team would suggest that similar analysis is also performed for other crime types such as drug crime; which would provide a more complete picture of the work of this (and other) sections.

Figure 38: Number of exhibits examined by type, chemistry section



Source: CAS and FSL systems, own calculations
**N.B.: The dates above refer to calendar years and not financial years*

5.4.3.4 Performance

Table 16 provides a breakdown of the performance along the main performance criteria since the inception of the IIFS. The proportion of entries analysed within target has been substantially lower in recent years than in 2009/10 and 2010/11 explained by two trends. Firstly, there is a rapid increase in the volumes of entries received for analysis. Entries processes per employee rose rapidly over the evaluation period. Second, there has been a change in the way the target is measured. Before 2011/12, turnaround times were measured from the time an entry was assigned to an analyst. This was changed subsequently, and the countdown to the target began from the time an exhibit entered the laboratory. Effectively, this means that the turnaround time in 2012/13 measures the time taken by the laboratory to complete its analysis and not the time taken by individual analysts.

Table 16: Entries completed within target, chemistry section

Chemistry						
	2009/10	**2010/11**	**2011/12**	**2012/13**	**2013/14**	**2014/15**
Entries received for analysis	38 634	54 404	62 230	69 981	82 298	81 899
Entries analysed	22 802	63 044	63 065	70 255	85 629	83 477*
Entries analysed within target working days	20 294	59 261	25 935	35 749	41 353	40 725
% of entries analysed within target	89%	94%	41%	51%	48%	50%
Target number of days	35	35	28	28	28	28

Source: Data received from the chemistry section
Note: Data for 2014/15 reflects only routine cases
** Data was not available for the number of entries analysed and therefore had to be calculated using an average of the entries analysed in three preceding years.*

As a result of these changes, the target now does provide an accurate reflection of the efficiency of the section. For example, the average time taken to complete an entry (turn-around time) has decreased substantially from 234 to 45 days (see Figure 39). Turnaround times by laboratory reveals some significant variations across provinces. The Western Cape laboratory deals with the highest number of drug-related cases in the country. Its average turnaround times have decreased by 81% between 2009/10 and 2014/15. This improvement can be attributed to a combination of factors:

- The IIFS has invested in equipment, technology and maintenance that increased the productivity of the chemistry section.
- The Division: Forensic Services has become much better at allocating the workload across different laboratories. Drug related cases, especially those from the Western Cape, are assigned to laboratories across the country.
- The decline in the average turnaround times is also due to a decision taken by the division to in 2013 to stop analysing cannabis samples through the lab; as the physical characteristics of cannabis are typically easy to prove in court. This decision has helped reduce the strain on the section and has to some extent moderated the rate of increase in the number of entries.

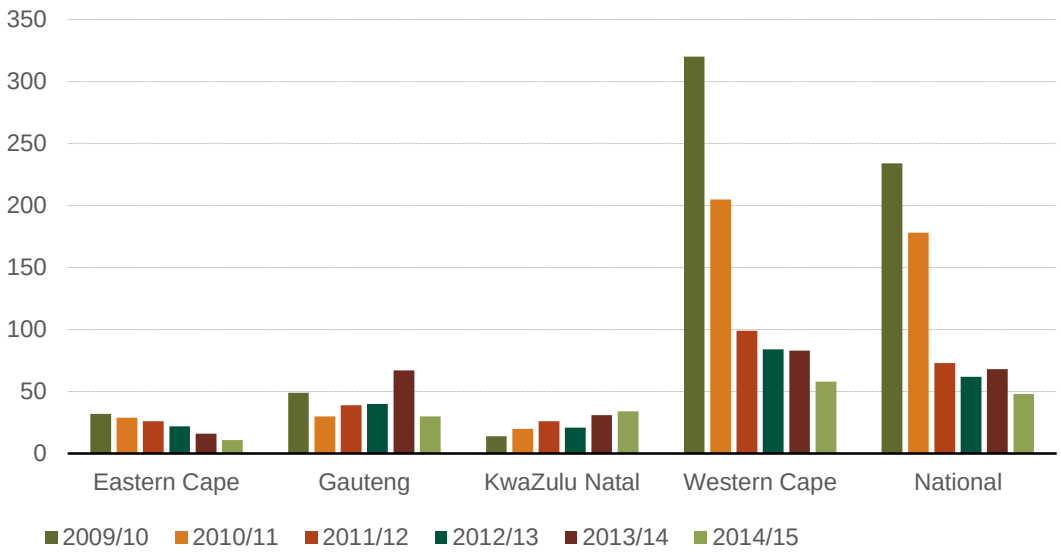
It appears that the laboratories now tend to focus their efforts on hard, new and designer drugs; a strategy prioritises cases involving high-value and risky drugs in the forensic value chain. This approach makes sense in light of the changing nature of drug-related crime in South Africa. As Figure 39 shows, most laboratories have experienced a decline in turnaround times[76], except for KwaZulu-Natal, where turnaround times increased by 143% due to environmental challenges.

There are two reasons for this increase. The Division: Forensic Services appointed more personnel to the chemistry section, which subsequently took on more cases. The province has also seen an increase in the drug-related crime, particular in relation to new and designer drugs that require more and complicated analysis. Therefore, re-orientating the capabilities of the chemistry section to process new and emerging drugs seems like a sensible approach.

Histograms of turnaround times are mapped out in the statistical appendix that accompanies this evaluation report. In relation to the chemistry section, it confirms that the number of cases has increased significantly but also that the turnaround times has declined over time. This in itself is a laudable accomplishment in light of the explosion in drug-related crime in the country.

[76] Please note that turnaround times are not provided for other sections as this data was not provided to the project team despite several requests.

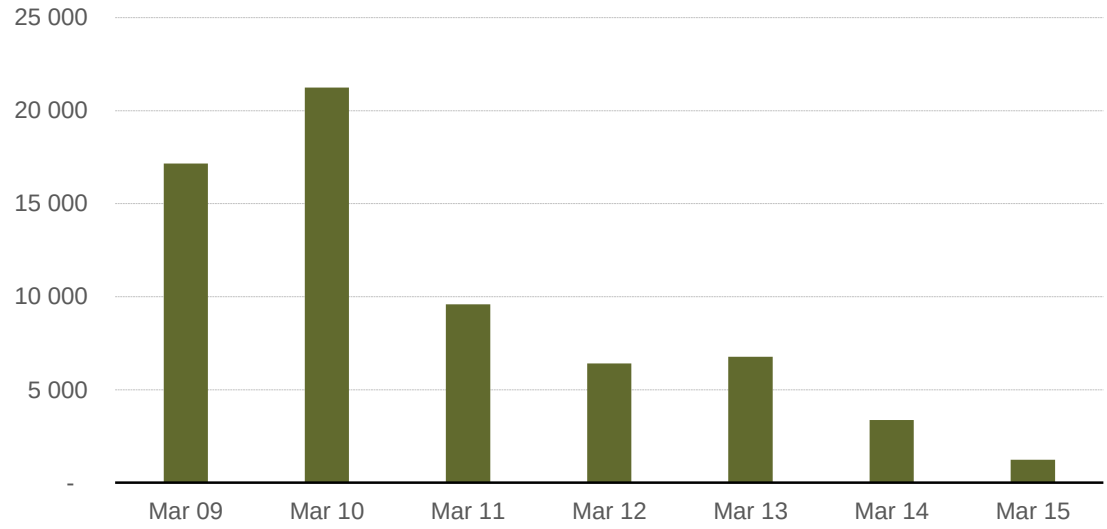
Figure 39: Average turnaround time for all entries, chemistry section



Source: *Data received from the chemistry section*

Another key indicator of improved performance is the substantial reduction in the backlog over time (Figure 40), despite the increased demand for their services over time. By 2014/15, the backlog had dropped to 1 228 from 17 169 in 2009/10, when the IIFS started. This decline represents a 93% decrease despite a rapidly increasing workload. Over the period under review, it seems that the chemistry has done particularly well in addressing backlogs.

Figure 40: Number of backlogged entries over time, chemistry section



Source: Data received from the Division: Forensic Services

5.4.4 Scientific Analysis Unit

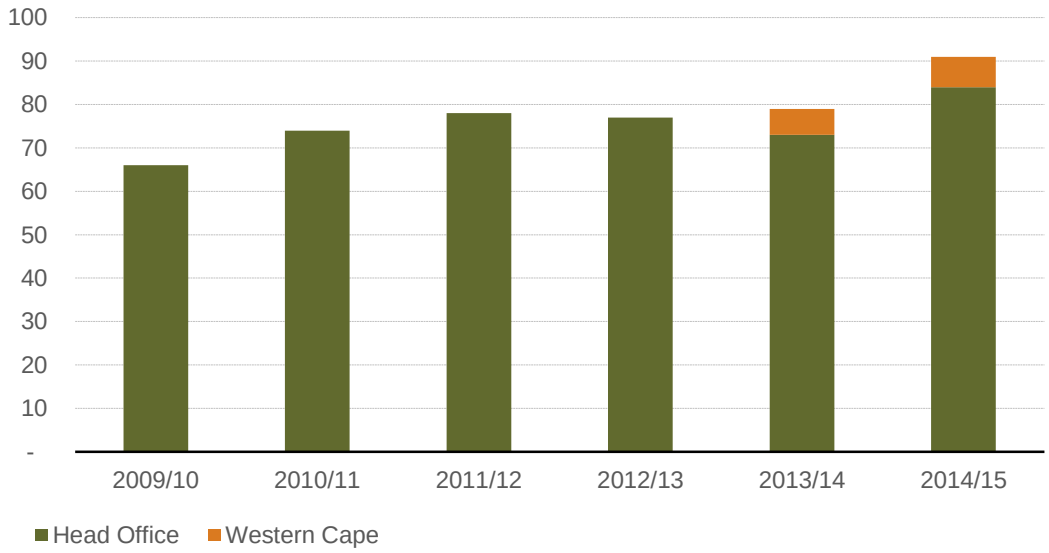
The Scientific Analysis Section deals with all cases that do not fall directly under the purview of the other sections. Before 2012/13, the functions were performed under Chemistry, but the Scientific Analysis Section was subsequently established as a new section within the Division: Forensic Services. The Scientific Analysis Section deals with a range of different types of analysis. These include but are not limited to:

- **Primer residue** involves the analysis of gunshot residue that comes from the discharge of a firearm and relates the residue to the primer used in the cartridge case.
- **Precious metals** involve using scientific methods to analyse the composition, structure and origin of precious metals.
- **Material analysis** refers to the analysis of organic (e.g. soil) and inorganic material to identify the composition, origin and structure to provide insights into the nature of the crime as well environmental crimes.
- **Trace Analysis** is the analysis of unknown or known substances such as paint, explosives, tear gas, and fibre to understand the elements that they are comprised of, and relate them to their point of origin or manufacture.
- **Polygraph, image and photography** or the combination thereof involves the use of advanced techniques and psychological measurements to enhance an investigators' understanding of the crime and suspect.

5.4.4.1 Personnel

The staff complement has increased with the Scientific Analysis Section as observed in Figure 41 below. Once again, the figures provided to the evaluation team by the Section and the Division: Forensic Services do differ, albeit these differences are not sizeable in nature. The IIFS has enabled the Scientific Analysis Section to increase its personnel from 66 in 2009/10 to 84 in 2014/15. The staff complement consists of analysts and support staff as well as polygraph and image staff employed in the provinces. The major change brought about by the IIFS was to decentralise some of the functions of Scientific Analysis Section to the Western Cape. Although this is not reflected in the estimates provided to the evaluation team by the Division, interviewed officials report that there is one analyst employed in KwaZulu-Natal to perform polygraph functions (see Table 17).

Figure 41: Number of employees, Section Analysis Section



Source: Information received from the Division: Forensic Services

Table 17: Scientific Analysis Section Personnel as at March 2015

Personnel strength	Gauteng	Western Cape	KwaZulu-Natal	Total (National)
Analysts	64	8	1	73
Support personnel	20	1	0	21
Total	84	9	1	94

Source: Data provided by Scientific Analysis Section

Interviewed officials note that the Scientific Analysis Section could employ more personnel but had limited space to accommodate any additional staff. Consequently, their approach has been to pay staff for overtime to reduce the backlogs.

When it comes to recruiting new employees, the section noted that they did experience problems with finding and retaining people. If staff left, it was often to other sections within the SAPS. As an inducement for staff to stay, the SAPS provides a Scarce Skills Allowance (SSA) of R1 500 to all analysts that are employed for more than three years.

The IIFS has been used by the Scientific Analysis Section to build the knowledge and skill of existing and new staff. The evaluators are told that training is primarily done externally, and staff received an accredited qualification or part qualifications. Given the varied and technical nature of the work of the section, there was always a risk that the internal qualification may not be recognised, especially in court, and thus external training is preferred over internal courses. Between 2009/10 and 2014/15, the Scientific Analysis Section spent about R5.3 million on external training. This amounts to approximately R10 252 per employee and is the highest amount spent on external training across all sections.

5.4.4.2 Technology, equipment and consumables

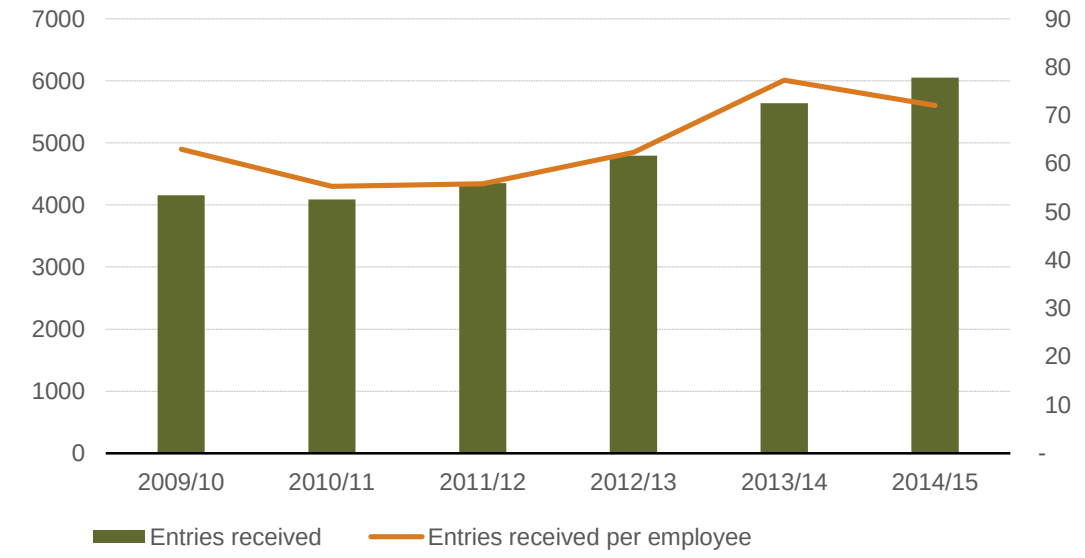
Approximately R 23.3 million was spent to equip the Scientific Analysis Section with newer equipment and technology. Specialised equipment such as a spectrometer was purchased to conduct *in situ* analysis of evidence without opening it. Additionally, a significant amount of the IIFS was spent on upgrading, replacing and purchasing new equipment for the analysis of precious metals. Interviewed officials note that the volume of precious metals submitted to the Scientific Analysis Section for analysis rose from 3.3 to 31.6 metric tonnes between 2009/10 and 2013/14. The rise is fuelled by police actions aimed at kerbing illegal mining.

Apart from building capabilities for conducting scientific analysis, the IIFS has helped to strengthen the capacities of the Scientific Analysis Section to analyse and enhance digital evidence from digital equipment, images and voice recordings.

5.4.4.3 Workload

The number of entries received for analysis by the Scientific Analysis Section grew at an average annual rate of 8% over the period. Relatively speaking, the section has the smallest caseload per employee. On average, for each employee, 72 cases were received.

Figure 42: Number of entries received and workload per employee, Scientific Analysis Section



Source: DNA Economics' calculation based on data received from the Scientific Analysis Section

5.4.4.4 Performance

The turnaround time for processing routine forensic evidence is 93% in 28 days. However the target for the Scientific Analysis Section is 75% over 28 days. As seen in Table 18, barring a dip in 2012/13, the percentage of entries processed within the target timeframe has improved. The change in the way turnaround time is measured explains the drop in 2012/13.

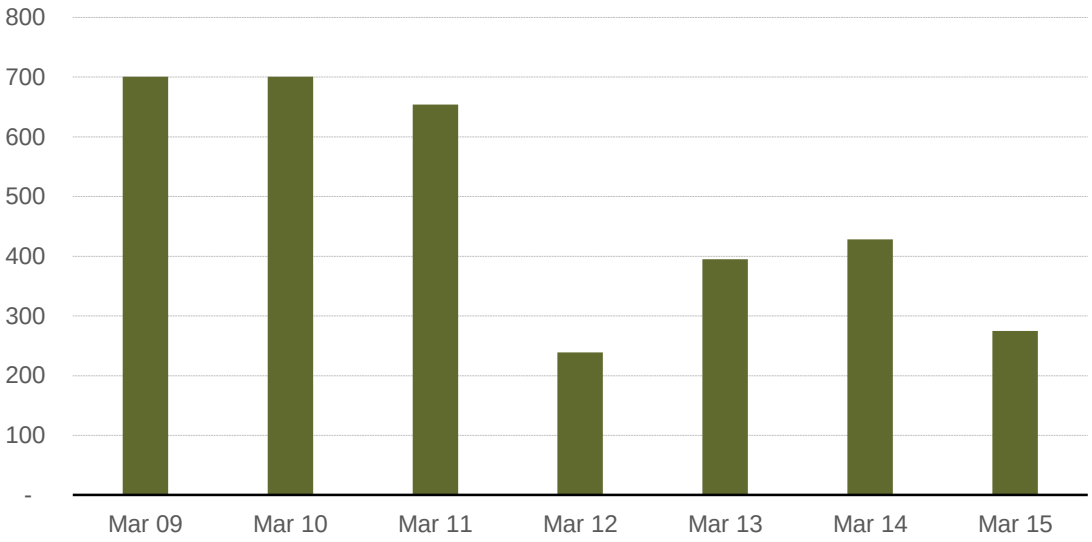
Table 18: Entries processed within target timeframe, Scientific Analysis Section

	2011/12	2012/13	2013/14	2014/15
Turnaround time	50%	39%	61%	76%

Source: Information received from Scientific Analysis Section

The increase in the backlog in 2012/13 and 2013/14 is due to the change in the way in which backlogged was measured. All cases that were not completed within 28 days of being received by the laboratory were included in the backlog. Nonetheless, the Scientific Analysis Section has made progress in reducing the backlogs and reaching its target in 2014/15, as can be seen in Figure 43 below.

Figure 43: Number of backlogged entries, Scientific Analysis Section



Source: Information received from the Division: Forensic Services

5.4.5 Victim Identification Centre

The VIC Section was established in 2011/12 to perform *ante mortem* and *post-mortem* services to assist with the identification of unknown bodies and the recovery of remains of victims on disaster/crime scenes.[77]

Forensic analysts are also called to crime scenes to collect additional evidence and perform *in situ* analysis. This third set of analyses typically involve the analysis of blood spatter patterns; the collection of odonatological (plant related) & entomological (insect related) evidence; the taking of mummified fingerprints or the gathering of fingerprints from decomposed bodies; exhumations; and the drawing of 2D and 3D facial reconstructions.

[77] (SAPS, 2012)

5.4.5.1 Personnel

Interviewed officials report that the staff complement for the VIC in 2014/15 comprised of 22 personnel. However, the numbers provided to the evaluation team by the Division: Forensic Services show that there were 17 staff members in the unit. Interviewed officials noted that the IIFS had been utilised to employ more personnel, particularly forensic analysts, as there has been an increased demand for the VIC services since its establishment. However, recruiting forensic analysts have been a challenge as there is a dearth of highly specialised analysts to undertake certain aspects of the work.

The VIC provides internal training and external training. Most of the external courses relate to specialised topics such as ion chromatography, inductively coupled plasma, the exhumation of human remains, cold-case review course, advanced remote sensing and recovery of buried human remains course and advanced craniofacial superimposition.

According to the expenditure recorded on POLFIN, about R 7.67 million of the IIFS was spent on training by the VIC. Effectively, this amounts to an investment of about R191 535 per employee since the establishment of the VIC.

5.4.5.2 Consumables, equipment and systems

Not much of the IIFS was spent on equipment and systems for the VIC. The evaluators estimate that between 2012/13 and 2014/15, R1.1 million of IIFS was dedicated to equipment for the VIC, and about R8.3 million was spent on consumables. Officials report that some consumables, while purchased for the VIC were used by other sections.

5.4.5.3 Performance

There are no performance reports for the VIC for the year 2011/12. Subsequent annual reports only record the entries received and those that were analysed within 28 days. The 'routine entries analysed within 28 working days' is the single indicator that is constantly reported over this period and is replicated in Table 19. In relation to routine entries, the VIC has maintained a high completion rate. Without further information on the non-routine cases, there is not enough information to fully assess the performance of the VIC.

Table 19: Routine entries analysed within 28 working days

	2012/13	2013/14	2014/15
Routine entries analysed within 28 working days	518 (100%)	1 529 (98.8%)	3 233 (99.5%)

Source: (SAPS, 2013, p. 138)*;* (SAPS, 2014, p. 183) & (SAPS, 2015, p. 228)

5.4.6 Questioned Documents Section

The Questioned Documents Section (QDS) is divided into two subsections:

- **Document analysis** which largely focusses on the analysis of authenticity. This includes handwriting analysis, bank (card and cheque) fraud analysis, currency analysis and analysis of documents such as passports, birth certificates and identity documents.

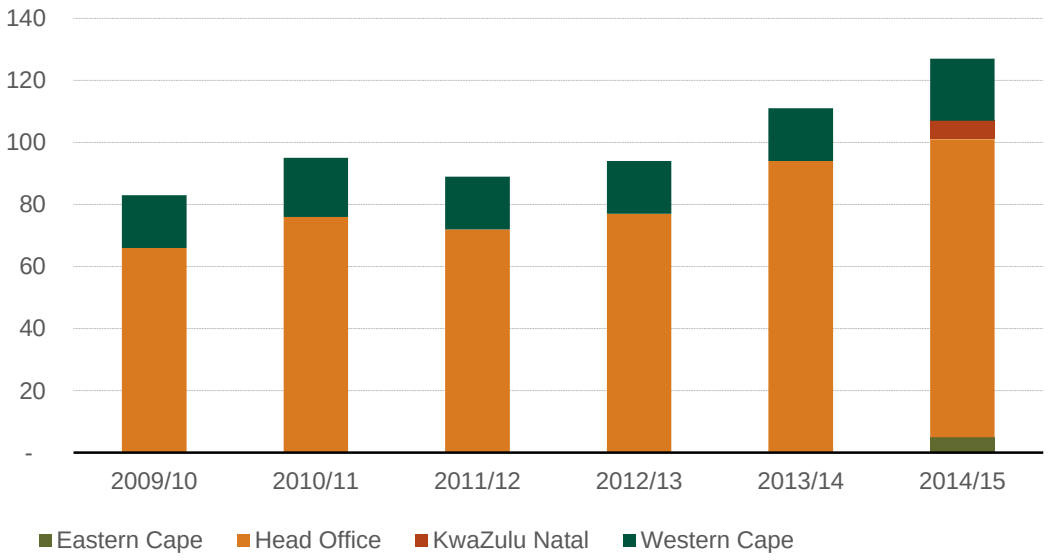
- **Chemical analysis** which looks at the chemical composition of materials. This sub-section examines coins and casino chips, paper and black dollar analysis, ink and dye analysis (e.g. security dyes on currency). The results allow the SAPS to establish if a material is genuine as well as to link various crimes based on the unique chemical composition of materials. This subsection was created as a result of the IIFS funding.

The QDS is located in the Eastern Cape, KwaZulu-Natal, Western Cape and Gauteng FSL. Of these, the IIFS funded the establishment of the KZN (since Q2 in 2011/12) and Eastern Cape (since Q2 in 2013/14) units.

5.4.6.1 Personnel

There are differences between the figures on the staff complement of the QDS provided to the evaluation team by the section and the division. According to the QDS, the total staff complement of the section has increased from 72 to 104 between 2009/10 and 2014/15. Figures received from the Division: Forensic Services show that the section's personnel grew from 83 to 127 over the same period. It is unclear why these discrepancies exist in personnel numbers.

Figure 44: Staff complement over time, QDS



Source: *Information received from the Division: Forensic Services*

There was a sharp increase in personnel in 2013/14 when 24 warrant officers were appointed. Staff appointments have largely been in the newly established chemical analysis subsection, where the entry requirement is a BSc degree in Chemistry, National Diploma in Analytical Chemistry or equivalent. Thus, these appointments have mainly been of personnel from outside the SAPS. Once appointed, new staff members enter into an internal certification process that includes six levels/modules of competency tests, at least three years of practical experience and a practical examination which includes a mock trial.

While the certification programme is not an SAQA accredited qualification, only certified competent members are allowed to provide expert testimony in court as expert witnesses, according to interviewed officials. For the period 20019/10 to 2014/15, there have been 27 QDS members that have been summoned to testify as expert witnesses in 352 cases. The section encouraged staff members to further their education, by giving them a 10% bonus for each module completed.

While recruitment has not been difficult; staff retention has been moderately challenging. From 2009/10 to 2014/15 there were seven resignations and four transfer requests. Members of the Questioned Documents Section have skills that are particularly attractive to the banking sector, particularly in combating document fraud.

The staff turnover may also be partially attributed to the professionalisation of Forensic Services. Under the IIFS, the Section has introduced a requirement that all new appointments at Warrant Officer level and above must have as a minimum an NQF Level 6 qualification in natural sciences. The result is that this has placed a glass ceiling on the older yet more experienced members that joined the section before the introduction of this requirement. While they may not meet the new academic requirement, the experience of the senior officers makes them more productive. Hence the loss of these senior members has a negative impact on performance. The academic requirement, therefore, meets the Division's aim of improving human capacity but at the same time has the unintended consequence of discouraging the advancement, development and empowerment of forensic services personnel.

To address this concern, a draft staff retention policy is in the process of being developed. According to interviewed officials, this will amongst other initiatives seek to:

- Continue the scarce skills allowance;
- Allow for the appointment of senior members that do not meet the new academic requirement to the position of Warrant Officer;
- Proceed with the bonus initiative for private study (introduced in 2013); and
- Seek SAQA accreditation for the internal competency tests.

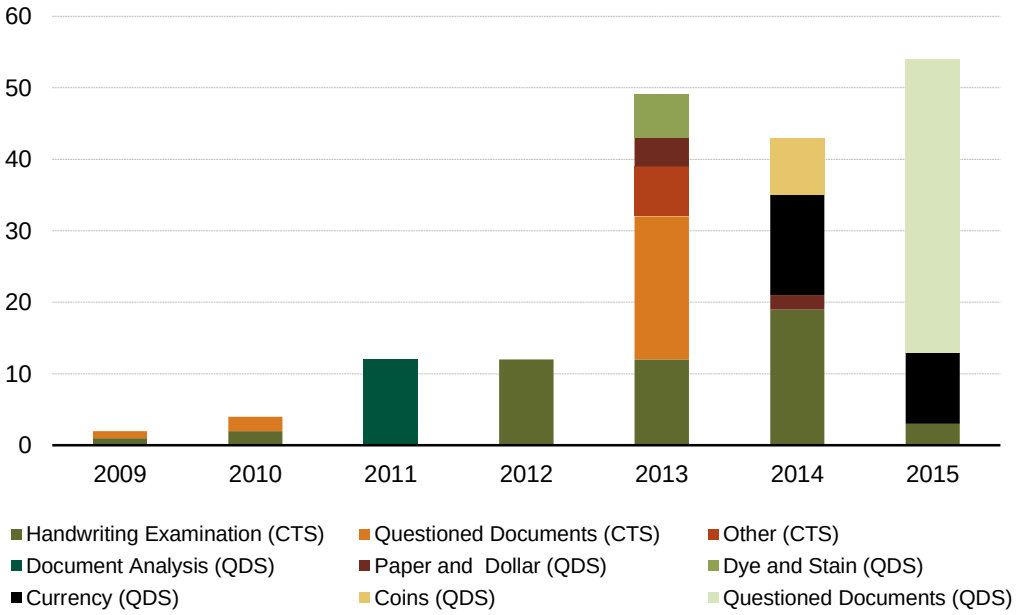
Between 2009/10 and 2015, the QDS spent about R 2 million on external training, or about R 3 384 on each employee within the section. Examples of the high costs specialist courses include:

- Digital Forensic Document Training offered in 2011/12 at the cost of R250 000 for ten students,
- Raman Spectrometry Training offered in 2011/12 at the cost of R160 000 for 16 students.
- Video Spectral Comparator (VSC), 6000 & ESDA training, offered in 2011/12 at the cost of R120 000 for 16 students
- Inductive Coupled Plasma Advance Training offered in 2012/13 for R 100 000 for eight students
- Advanced Bitmap Analysis Training offered in 2012/13 for R 200 000 for four students.

Upon admission to the section, new recruits must first work with an experienced member for at least three months. During that period, the analysts are expected to complete the first module of the theoretical component. Only after completing an independent assessment test is the analyst allowed to work independently and proceed to the next levels of the competency tests.

In addition to the competency tests, the section also conducts annual proficiency tests to check that the analysts still have acceptable levels of operational knowledge. Before the implementation of the IIFS, only a few analysts were tested by the internationally recognised Collaborative Testing Services (CTS) Pty. In 2012, a management decision was taken to try and get more analysts to undergo regular proficiency testing. Regular testing would help the section to identify training gaps and develop training interventions. All analysts who fail the proficiency tests are withdrawn from conducting casework and a remedial intervention is developed. From 2009 to 2015 there has been an increase in the number of members tested as noted in Figure 45. These proficiency tests were initially offered exclusively by external service providers, however; increasingly these are now also provided by internal examiners within the section. Overall, the IIFS has funded the appointment of new recruits to the QDS and helped to improve the expertise of personnel by financing regular training and competency testing.

Figure 45: Number of staff that took proficiency tests



Source: FSL QDS submission to DNA Economics

5.4.6.2 Consumables, equipment and systems

As with other sections, the QDS benefited from increased expenditure on equipment, technology and systems. About R5.7 million was spent on equipment for the QDS, while R 1 million was spent on consumables, which is not surprising given that the QDS does not require many consumables. Interviewed officials note that the equipment has improved the quality, timeliness and reliability of the analysis produced by the QDS. For example, the video spectral comparators enhance images not visible to the naked eye and thus allow analysts to make conclusions with greater certainty. In terms of equipment, one challenge experienced was with regards to the incompatibility of certain components of the Liquid Chromatography-Mass Spectrometer. The components had been purchased separately in 2010/11 at a total cost of R4.5 million, but as a result of an inadequate testing before the acquisition, the equipment has not been as effective as expected.

5.4.6.3 Workload and performance

The analysis of the workload and performance of the QDS is made harder by the unavailability of consistent data for the period between 2009/10 and 2014/15. Nonetheless, the workload of the section, as measured by the number of entries received for analysis, has declined over time. Finalisation rates amongst cases remained high, averaging 101% as the section made inroads in dealing with their backlog. The average number of cases handled by each member of staff declined from 531 to 284, this mainly due to the increase in staff employed between 2012/13 and 2014/15.

The number of entries received for analysis peaked in 2012/13, driven by the large batch of cases requiring chemical analysis submitted by the South African Reserve Bank in that year. Although expenditure through the IIFS helped to decentralise the questioned document functions, provincial capacity only came into effect towards the later part of the evaluation. The new provincial office in KwaZulu-Natal only started receiving cases in 2011/12, whereas in the Eastern Cape's staff was only capacitated in 2014/15.

The percentage of cases completed within the targeted timeframe are not always comparable across years. Before 2013/14, cases were not segmented into routine and non-routine cases. In other words, while in 2012/13, 86% of all cases were finalised within 28 days, this indicator includes routine and non-routine cases. The 94% achievement reported in 2013/14 might at first glance appear to reflect an improvement. However, this percentage excluded non-routine cases, which typically take a long time to finalise.

Currently, non-routine cases are all handwriting cases. Plans are in place to adjust the definition of non-routine cases to include all cases where the number of exhibits requiring analysis by a single QDS analyst exceeds ten. Table 20 provides a breakdown of the performance along the main performance criteria since the inception of the IIFS.

Table 20: Workload and performance information, QDS

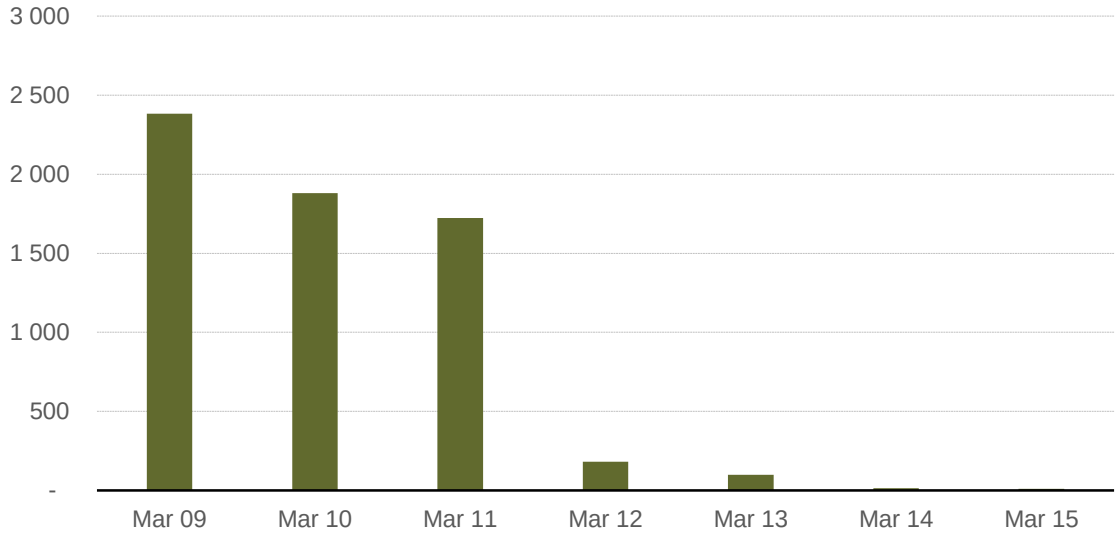
Questioned Documents Section						
	2009/10	**2010/11**	**2011/12**	**2012/13**	**2013/14**	**2014/15**
Entries received for analysis	No data	No data	41621	48406	39358	29705
Entries analysed/finalised	No data	No data	43543	45501	41600	29512
Total staff	72	78	82	77	97	104
Average number of cases finalised per member of staff	-	-	531	591	429	284
Overtime expenditure (Rand)	No data	No data	No data	No data	No data	No data
Overtime worked (hours)	No data	No data	No data	No data	No data	No data
% of cases finalised within 28 working days	No data	No data	No data	86%*	-	-
% of routine cases finalised within 28 working days	-	-	-	-	94%	97%
% of non-routine cases finalised within 75 working days	-	-	-	-	92%	92%
Average % of cases finalised within target	No data	No data	No data	86%	93%	95%

Source: FS Question Documents Section 4th Quarter Performance Reports 2012/13, 2013/14, and 2014/15

**Before 2012/13, cases were not segmented into routine and non-routine*

Figure 46 shows the backlog in the QDS over time. The number of backlog cases has been in decline, and by 2014/15 had nearly been eradicated. It follows that despite the increase in the entries received for analysis, the section has managed its backlog effectively, by managing its workflow and using overtime to increase capacity temporarily.

Figure 46: Number of backlogged entries, QDS



Source: Data received from the Division: Forensic Services

Box 3: Justice delayed but not denied: the story of Betty Ketani

After four years of investigation and two years of courtroom battles, the Betty Ketani case has finally been closed. Judge Ranchod found Carrington Laughton and two police officers brothers, Carel and David Ranger guilty of killing Betty Ketani, a mother-of-three, who moved to Johannesburg in search of a job.

Judge Ranchod acknowledged that the handwriting analysis, along with DNA evidence and the testimony of three accomplice witnesses weighed heavily on his decision to convict the accused. Even though one piece of evidence on its own might not have been sufficient to be conclusive, Ranchod's verdict was reached by taking into account both forensic and testimonial evidence. The combination of the various pieces of evidence proved that the written confession found under a carpet was the genuine article, and the author of it was the accused, Carrington Laughton. In his judgement, the judge said that he found the testimony of forensic handwriting expert, police officer Marco Van der Hamme, particularly convincing. Seventeen years after her murder, Betty Ketani's family finally have justice, in part due to rigorous and credible forensic analysis.

Source: http://ewn.co.za/2016/02/17/Three-convictions-secured-in-Betty-Ketani-murder-trial

5.4.7 Feedback from prosecutors

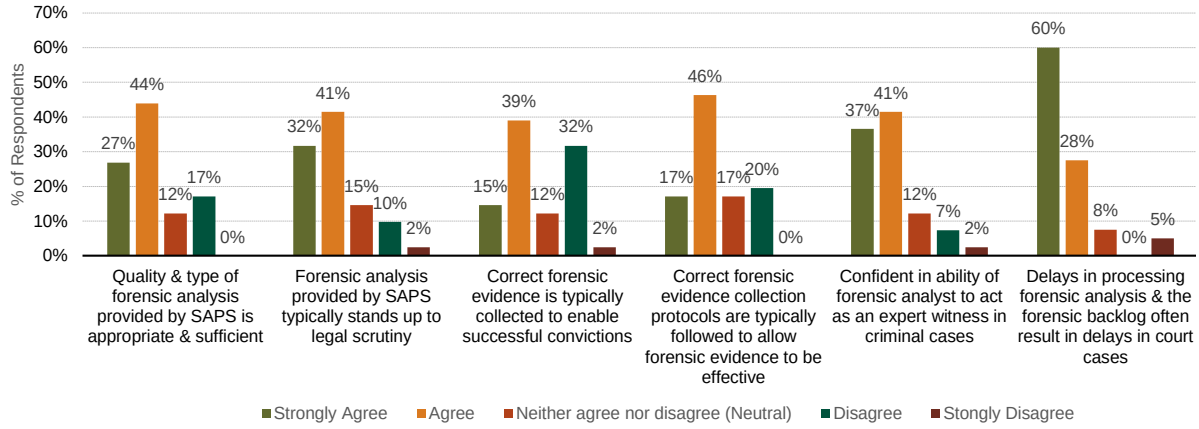
In the context of this evaluation, the evaluators surveyed selected prosecutors to understand their views and perceptions of the quality and timeliness of forensic analysis and reports. This purposive sample was created with the help of the NPA's provincial officials who provided the evaluation team with a list of prosecutors who frequently worked with forensic evidence. A total of 41 National Prosecuting Authority (NPA) employees completed the survey during October 2015. The surveyed

prosecutors are in a good position to evaluate the impact of any changes within the Division: Forensic Services as a result of the IIFS.

Overall, the respondents were highly satisfied with the quality of forensic support and analysis provided by the forensic analysts. Figure 47 summarizes their responses. When asked about the quality of the forensic analysis furnished by the SAPS forensic analysts, 71% of respondents indicated that the forensic analyses were both appropriate and sufficient. A similar response was provided concerning the ability of forensic analysis provided by the SAPS to stand up to legal scrutiny with 76% (33% strongly agreed and 43% agreed) of respondents indicating that the analysis provided does, in fact, stand up to legal scrutiny.

Delays in processing forensic analysis and forensic backlogs and their impact on delays in court cases have come out quite strongly as a key issue. A total of 92% of respondents agreed that delays have an adverse impact on court cases. In fact, none of the respondents disagreed with this statement.

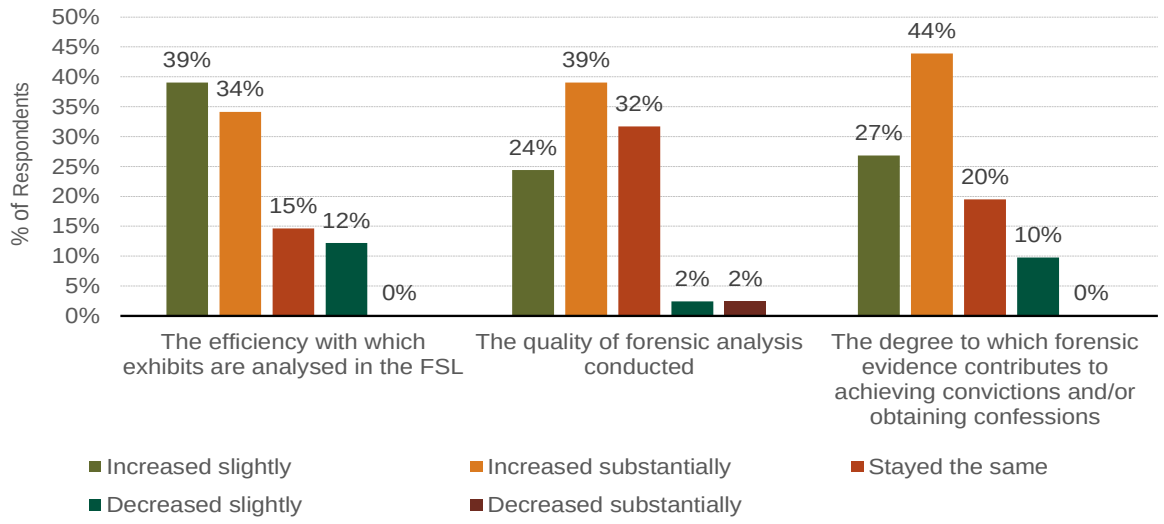
Figure 47: Appropriateness and sufficiency of the type of forensic analysis provided to NPA



Source: Online Survey of NPA members

When compared to six years ago, there have been significant improvements in several aspects of forensic analysis. As Figure 48 shows, 73% of respondents indicated that there had been improvements in the efficiency with which exhibits are analysed in the FSL. Another 63% of respondents stated that the quality of forensic analysis conducted has improved. Encouragingly, 71% of prosecutors noted an improvement in the extent to which forensic evidence contributes to achieving convictions and/or obtaining confessions.

Figure 48: Improvements in aspects of forensic analysis compared to 6 years ago



Source: Online Survey of NPA members

Overall, the respondents acknowledge improvements in the quality and efficiency of forensic analysis and these improvements have had a direct impact on their ability to obtain convictions. However, some respondents remained concerned with the quality of reports and increased backlogs.

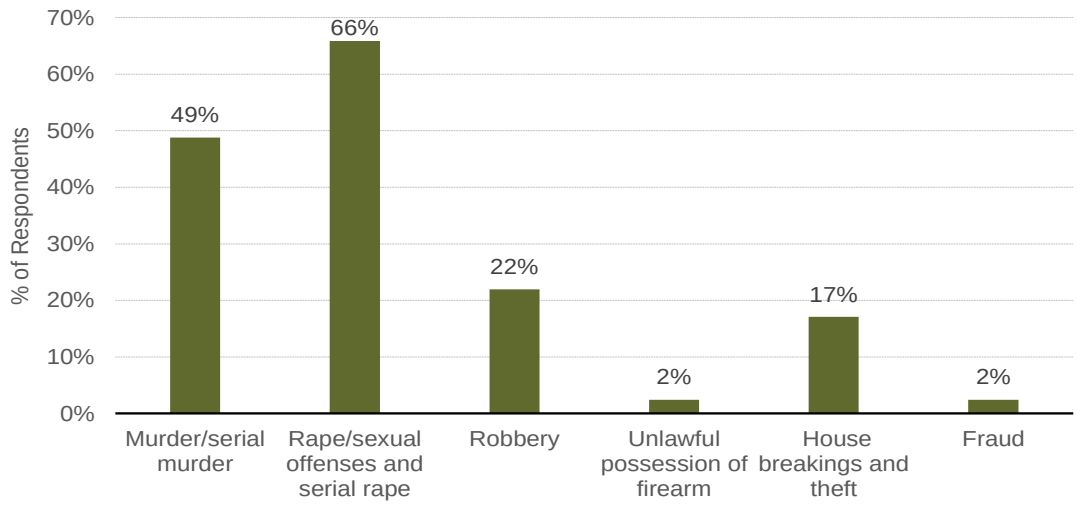
Below are some quotes taken directly from the free-text responses

"Forensic analysts are highly competent and credible witnesses. The presentation of their evidence has lessened my concerns about obtaining sufficient corroboration for state witnesses, especially single witnesses and children." - State Advocate from the Western Cape

"Management is now more helpful in getting analysts to court. Those who attend court come better prepared and are of great assistance to prosecutors" – Senior State Advocate from KwaZulu-Natal

About 78% of the respondents indicated that forensic evidence and analysis have started to play a bigger role in supporting the prosecution of crime. When asked whether there are any particular types of crimes where forensic evidence plays a greater role in prosecutions than before, 66% of prosecutors said that forensic evidence is playing a larger role in rape/sexual offenses cases, followed by 49% of prosecutors indicating the same for murders/serial murders (see Figure 49). This finding corroborates the trends picked up in the cost benefit analysis that shows the increasing contribution of forensics to guilty verdicts in rape and murder. About 80% of all convictions in rape cases and about 50% of all convictions in murder cases included some forensics.

Figure 49: Types of crimes where forensic evidence is playing an increased role



Source: Online Survey of NPA members

5.5 Programme implementation: Quality management

The Quality Management (QM) component seeks to establish quality assurance processes, which ensure that forensic analysis and evidence is reliable, accurate and meets the desired quality standards. Quality assurance in the forensic environment refers to a set of planned and systematic actions that are designed to improve the confidence of users in the reliability of analysis.

Before 2013/14, the biology section was one of the few sections with a dedicated quality management sub-section. This does not mean that quality management was done solely by the biology section, but rather that these activities were spread all across the Division: Forensic Services. To establish coherence and consistency in their quality management activities, the Division: Forensic Services decided to centralise these processes into one component that would provide guidance and direction to the rest of the sections on all matters relating to quality assurance.

The Quality Management component consists of various sections:

- **Nodal support** provides management and administrative support to the entire section.
- **Forensic database management** maintains and operates the NFDD in line with the provisions of the "DNA Act" to perform comparison searches to identify forensic DNA investigative leads. Their activities include establishing safeguards to protect the information contained in the NFDD, and expunging DNA profiles after the prescribed period. The section also oversees the operations and utilisation of the forensic investigative leads generated in other databases such as AFIS and IBIS.
- **Quality management FSL** develops and issues guidance on forensic processes and practices for the different disciplines within the laboratories. It promotes the use of standard methods that are internationally recognised and accepted in the analysis of forensic evidence. Furthermore, the section performs compliance audits and inspections, facilitates hazard identification and risk assessments, conducts incident investigation and management, facilitates medical surveillance,

promotes a safe laboratory working environment, manages the disposal of waste and fosters compliance with the Occupational Health & Safety legislative framework in the FSL.

- **Quality management CR&CSM** issues protocols and guidance on the management of criminal records and crime scenes. It develops standard operating procedures that guide the work of crime scene examiners. Furthermore, the section performs compliance audits and inspections, facilitates hazard identification and risk assessments, conducts incident investigation and management, facilitates medical surveillance, enables a safe laboratory working environment, manages the disposal of waste and fosters compliance to the Occupational Health & Safety legislative framework in the CR&CSM component.
- **Technical management** ensures that the equipment is calibrated and maintained, promotes compliance with ISO standards (required for accreditation), performs validation studies on methods to make sure that the forensic methods are reliable and accurate, furthers research and development to develop forensic science, and resolves problems experienced during forensic analysis.
- **Quality Management Regional** is responsible for the implementation of a quality management system in the provinces and regional FSL and CR&CSM. This subsection ensures that provinces implement their processes in line with national standards.
- **Development Facilitation** is mainly responsible for training and development of forensic analysts in the division, by providing in-service specialised forensic training; coaching and mentoring of forensic analysts. The section also develops and rolls out forensic awareness programmes, both internally within the SAPS and externally to the public.

The NFDD is located within the Quality Management component because of the “DNA Act’s” requirement to establish an arms-length relationship between those who analyse and sequence the DNA of suspects and convicted persons, and officials who access and maintain the DNA database. The separation of the DNA analysis and the database ensures that no official can manipulate the DNA profile and compromise the integrity of the DNA database, and is in line with international practice.

5.5.1.1 Personnel

Table 21 shows the distribution of staff across the quality management component in 2014/15. Based on discussions with officials, the quality management component is still being established and has not yet reached its planned staffing levels. Therefore the staff complement is likely to increase over the next few years. It is unclear to what extent the IIFS funded the quality management component. It seems that the component drew its staff from other components

A key risk for the Division: Forensic Services is that the quality management component will not be allocated enough personnel and positions to support the laboratory accreditation process. In order gain accreditation, all existing and new forensic methods must be validated against the ISO standards before being deployed into the components and sections. The accreditation process is time-consuming and costly, requiring a specialist expert to ensure that the laboratory is ready for accreditation.

Given, that the IIFS from 2015/16 has been incorporated into the baseline, and no earmarked funding will be available to forensics, there is a high risk that the quality management section may not be able to recruit the personnel needed for the accreditation processes.

Table 21: Personnel within the Quality Management Section

Quality Management	2014/15
Nodal Support	7
Forensic Database Management	32
Quality Management FSL	40
Quality Management CR & CSM	12
Quality Management Regional	44
Development Facilitation	23
Technical Management	19

Source: Staffing figures provided to DNA Economics by Division: Forensic Services
Note: Personnel figures for 2013/14 were not available.

Over the coming years, the number of DNA profiles loaded on the NFDD is expected to increase. More forensic analysts will be needed to verify potential forensic DNA leads generated by the Forensic Database Management section. Once a lead is found, the section passes then onto detectives who should use this information to track down perpetrators and make arrests. Currently, forensic analysts performing the comparison searches and verifying forensic leads are primarily funded through overtime. Interviewed officials point out that the NFDD section has not been adequately resourced and that this lack of capacity may hinder the Division's continued ability to produce forensic leads.

One of the constraints uncovered during this evaluation was that forensic leads generated by the NFDD were under-utilised by detectives. These leads often link identified perpetrators to multiple crimes scenes or crime scenes to crime scenes. Over the evaluation period, interviewed officials note that the NFDD has successfully helped to identify repeat and serial offenders (see Box 4). The leads produced by the NFDD have been especially helpful for the task teams established by the police to respond priority crimes, according to interviewees. They have been less successful in getting detectives, to follow through on them. Overworked detectives often have scant time to keep up with leads. Detectives also report that they are under pressure to close cases, and forensic leads can be a nuisance.

Nonetheless, with the expansion of AFIS, IBIS (funded through the IIFS) and the NFDD, the Quality Management will be able to consolidate forensic leads from the different databases, helping to build a strong case for detectives and increasing the evidentiary value of their leads over the medium to long term.

5.5.1.2 Performance

Between 2013/14 and 2014/15, the Quality Management component was allocated R97.6 million from the IIFS. Compared to other components, expenditure on quality management is relatively small, and possibly not significant enough to pick up any evidence on the effects of the IIFS. Officials report that the IIFS has funded the development of standard operating procedures, workshops,

forensic awareness and vacancies. The funding was also utilised to expand and strengthen proficiency testing with the laboratories. However, none of this feedback could be confirmed through an analysis of the POLFIN dataset as it does not contain detailed expenditure on the QM component.

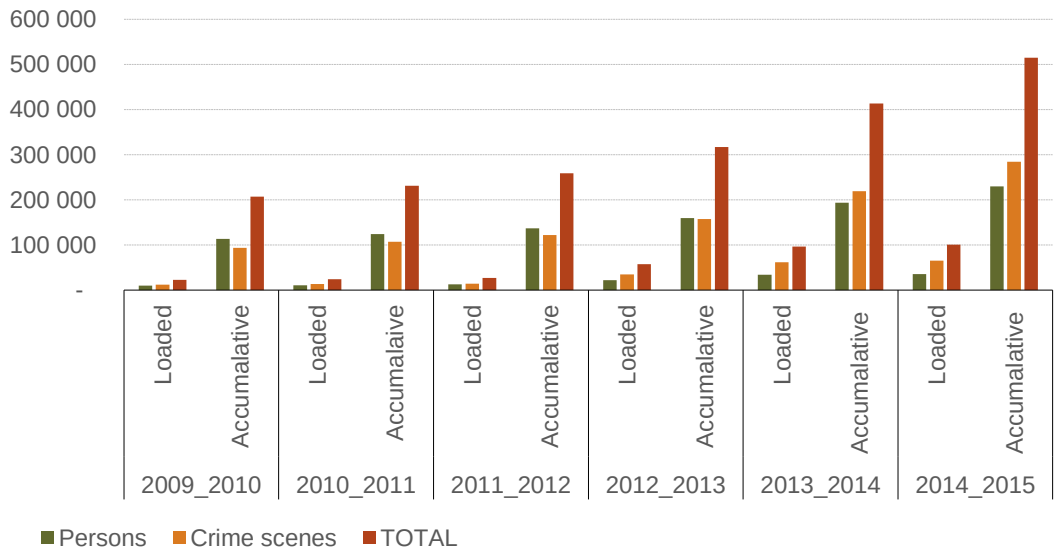
It may be too early to evaluate the effects of the IIFS on the quality management component. Nonetheless, in its short history, the component has implemented interventions that have had an impact on the quality of forensic analysis. Between 2013/14 and 2014/15, interviewed officials noted that they had:

- Introduced several safe standard operating procedures
- Introduced and granted funding for personal protective clothing for VISPOL and detectives to avoid contamination of the crime scenes, and minimise the risk of compromising the integrity of the evidence.
- Developed guidelines for first responders detectives to help them in securing a crime scene, including contributing to the National Instruction for Crime Scene Management.
- Spot checked and visited crime scenes to check for adherence to the guidelines.
- Checked the analysis performed by the laboratories to ensure that they met forensic standards.
- Standardised the entry requirements for all forensic analysts.
- Enhanced and aligned several of the specialised forensic training programmes to education and training quality assurance guidelines.
- Facilitated medical surveillance and hazard identification and risk assessments.
- Validated more than fifty-nine forensic methods according to the ISO17025 guidelines.

Over the period, the Quality Management component has also undertaken initiatives to promote forensic awareness amongst VISPOL, detectives and the general public. Much effort has been made in collaborating with non-profit organisations such as the DNA PROJECT to promote awareness amongst the public around how to prevent the contamination of a crime scene.

In relation to the performance of the NFDD, even though the Act had only become operational on the 31st March 2015, the number of profiles loaded onto a DNA database has gathered pace over the last three years of the evaluation period. This growth in profiles is the result of the rapid increase in DNA testing and the collection of buccal samples from arrested and convicted persons. Between 2009/10 and 2014/15, the cumulative number of profiles loaded grew at an average annual rate of 18% (see Figure 50). This growth is expected to intensify over the medium term as the legislative provisions around the taking of buccal samples are implemented.

Figure 50: Number of forensic DNA profiles loaded onto the NFDD



Source: Quality Management component

Box 4: How the NFDD is putting a new face to crime solving?

Serial Rapist Mpho Rakgwake, dubbed the Dobsonville rapist, started his criminal spree in 2007 when he was 17 years old. He robbed his victims of money and cellular phones before raping them. The successful conviction of South Africa's youngest serial rapist began with the National Forensic DNA Database, which linked DNA from eight cases in Dobsonville, Roodepoort and Jabulani. These leads were communicated to the police task teams, established by SAPS to follow up on priority crimes. Police task teams increasingly rely on DNA leads to trace and arrest perpetrators of crime. Assisted by the Investigative Psychology Unit, detectives eventually found and arrested Mpho Rakgwake. Seven years after he began raping his victim, the Dobsonville rapist was found guilty on 61 charges, including 21 charges of rape, 17 charges of kidnapping, six charges of unlawfully possessing firearms and ammunition, five charges of aggravated robbery and six charges of robbery. He received six life sentences and 232 years' incarceration.

Source: http://www.iol.co.za/news/crime-courts/sas-youngest-serial-rapist-jailed-for-life-1794582

Finally, a major part of the QM component's function is to prepare the FSL for accreditation. Accreditation is not a legislative requirement, but it is important for the users of forensic services and bolsters confidence in the laboratories' offerings. However, one of the objectives of the CJS Revamp was to accredit the FSLs. Currently, the QM component has adopted a graduated approach to accreditation, whereby they accredit one process and then work to get subsequent processes/phases accredited until the section is fully accredited. The Section: Forensic Database Management that manages the NFDD has implemented a quality management system in accordance with the ISO 9001 requirements and has already initiated the process of certification against this standard with the approved certification body. Accreditation processes have begun in the biology section in light of the importance of DNA testing as a forensic method. The lack of suitable and safe physical infrastructure for laboratories remains on obstacle to accreditation. However, without the cooperation of the Department of Public Works, this problem cannot be resolved.

6 FINDINGS FROM THE PROVINCIAL CASE STUDIES

To understand differences and challenges within the Division: Forensic Services in different provinces and the changes that have resulted from the IIFS into SAPS Forensic Services, DNA Economics conducted a number of interviews with forensic personnel within the Forensic Science Laboratory (FSL) and the Criminal Records and Crime Scene Management (CR&CSM) units in four provinces: Gauteng, Limpopo, the Eastern Cape and the Western Cape. In addition, interviews were conducted with Detective Services and Visible Policing personnel in each of these provinces, to incorporate the views of the primary users of forensic services.

6.1 Eastern Cape

As is the case nationally, the rate of contact crimes in the Eastern Cape (EC) has reduced significantly over the last decade; although some increases in, for example, murder have been increasing since 2011/12. The large rural population of the province together with high unemployment rates influences the types and incidence of crime; for example, the four precincts with the highest rates of stock theft nationally are all located in the EC.[78]

6.1.1 CR&CSM

Detectives interviewed stated that "huge improvements" had been observed in the work of the LCRCs in the Eastern Cape, particularly with regards to the lifting of fingerprints at crime scenes. Detectives also stated that SAPS 69 reports are now generated within a satisfactory period of time. However, a number of challenges were said to remain in LCRCs – as reflected through a range of interviews conducted with detectives, VISPOL and CR&CSM officials:

- The time taken to arrive at the crime scene is still perceived as often being too long. Interviewed VISPOL officials suggested slow response times are a particular concern in rural locations, given the large size of the province and the low quality of many of its roads. The elderly in remote locations are often specifically targeted by criminals in the province. LCRC decentralisation is said to have helped in this regard, but more still needs to be done.
- There are still delays in the receipt of section 212 reports (the affidavits by forensics experts used as evidence in court). Criminal identification processes and the section 212 reports are being done by 2 different divisions, and are uncoordinated. Typically identification is completed before the section 212, which is also needed for the issue of an arrest warrant, and this thus delays the arrest of identified persons.
- Photograph albums and videos currently are seen as taking too long to come back, with the development time of photos being the main cause of delay. Senior officials often need to be involved to ensure that this type of analysis is prioritised.

[78] Crime Hub, 2014. https://www.issafrica.org/crimehub/top-20-precincts-per-category

6.1.2 FSL

Interviewed detectives suggest that the waiting time from the submission of an entry to the EC FSL to the finalisation of the forensic report by the lab has reduced substantially in recent years; with the time now often being only two weeks for Chemistry and Ballistics, whereas it was often several months in the past. This has reduced the time taken to resolve cases. In addition, detectives suggested that for drug cases conviction rates have improved, although they didn't think that more arrests were necessarily being made in ballistics.

The Questioned Document section was still relatively new in the province, with relatively few cases. Its introduction did however seem to have improved turn-around times compared to when all document exhibits had to be sent to Pretoria.

The following challenges were identified:

- Detectives indicated that the need to drive to Port Elizabeth to deliver and collect FSL exhibits and reports can be expensive and time consuming; and hence a more cost effective approach should be considered.
- As full DNA analysis is not currently performed by the EC FSL, and DNA analysis must be done by the Western Cape FSL, waiting periods are still a problem in the EC Biology section.
- Detectives also suggested that the chain of custody is a big problem for DNA samples in the Eastern Cape. In particular, the seal of the package is often broken in the Eastern Cape lab to perform non-DNA analysis, before the exhibit is sent to Pretoria for DNA testing. This makes the DNA results open to attack in court. This is particularly seen as an issue where DNA is the only evidence in a case.

6.2 Western Cape

Within the Western Cape criminal activity declined between 2004 and 2009 but increased since 2010. Between 2004 and 2015, the number of reported crimes grew at an annual average rate of 17%. The growth in criminal activity is fuelled by large increases in certain types of crime. Drug related crimes rose by 345% over the 11-year period, and is closely related to gang activity in specific areas within Cape Town. Drug related crime makes up one in every five crimes in the province.

6.2.1 CR&CSM

The main findings within the Western Cape CR&CSM section were:

- Previously a lack of skilled Crime Scene Examiners (CSEs) was seen as a major issue within the province, resulting in slow response times and insufficient time at crime scenes. This was particularly seen as an issue for drug related crime, where crime scenes are often outside and prone to contamination and which can be dangerous to attend. Respondents indicated a significant improvement in CR&CSM capacity, as reflected for example by the increase in the number of LCRCs between 2010 and 2015 from 11 to 21. Additionally consumable and equipment purchases, particularly Spheron Cameras, were reported to have resulted in significant improvements in the effectiveness of CSEs.

- While there are some indications of improvements in positive matches and crimes with identification, the performance improvements do not appear significant based on the available data. A particular concern in the current system appears to be a lack of forensic awareness amongst first responders. Similarly, interviewed detectives suggested that while they found value and benefit in increased forensic evidence and analysis they often did not have sufficient capacity to use this analysis to its potential. A lack of accommodation and storage were also identified as key on-going issues.

6.2.2 FSL

The main findings in terms of the WC FSL section were:

- Significant resources arising from the IIFS have been utilised to strengthen forensic services within the Western Cape. SAPS built a Forensic Services Laboratory (FSL) in Plattekloof in 2012. This laboratory consolidated all the main forensic sections (previously dispersed throughout the province) within one building, to facilitate collaboration and thus expedite forensics analysis. The laboratory was purposely designed for forensic analysis, and equipped with technology, that enhanced the speed and quality of forensic analysis.
- The FSL in the WC has also seen substantial increase in the number of administrative and technical staff. The increase has been particularly notable within the Biology section. This increase has been mirrored by an increase in demand, which notably also results from the Eastern Cape's Biology analysis being done in the WC.
- The most significant achievement was the reduction in the provincial backlog from about 14 000 entries in 2012/13 to only 800 at the end of 2014/15. Nonetheless even though the IIFS strengthened the capacity of the FSL, there were still insufficient resources to analyse all entries within the specified target period in certain sections. Most notably, within the Chemistry section interviewed respondents indicate that shortages of staff continue to exist due to rapid increases in drug-related crime. Accordingly, some chemistry entries had to be sent to Eastern Cape to analysed.
- Additionally the introduction of the DNA Act put significant extra strain on the case registration and the biology section. The number of buccal samples is expected to grow rapidly over the next few years, increasing the number of entries submitted to the FSLs.

6.3 Limpopo

In Limpopo total criminal activity declined between 2004 and 2010, but has then increased since 2011; largely as a result of steep increase in drug-related crime. In 2015, most crimes were committed in the areas in and around Polokwane, Seshego, Thohoyandou, Mankweng, Tzaneen and Westenburg. The patterns of crime however differed significantly across the various areas, particularly between rural and urban areas (such as Polokwane). It is important to note that there are is no Forensic Science Laboratory within Limpopo, so this section will focus exclusively on CR&CSM capacity within the province.

6.3.1 CR&CSM

The main findings in terms of the Limpopo CR&CSM were:

- The IIFS has resulted in substantial staff and resourcing increases in the province. The total number of operational staff has increased from 143 in 2009/10 to 276 in 2014/15. These additional appointments have been largely candidate crime scene experts and laboratory technicians for the crime scene laboratories. In terms of equipment and consumables, a number of vehicles were purchased along with computers, specialised equipment such as cameras, powders and chemicals for processing crime scenes. Four new offices were provided access to AFIS.
- It is understood that in Limpopo fingerprints that are lifted from a crime scene are processed at the Crime Scene Laboratories whilst the other forensic evidence is couriered through a third party service provider to the FSL in Pretoria. The absence of an FSL in Limpopo means that it can be argued that the SAPS chain of custody is broken while the evidence is in the hands of the courier service. Forensic Services should clarify their position on this issue.
- The most effective purchases under the IIFS were said to be consumables such as printer toners and powders, and specialised crime scene management equipment that had previously only been available to the specialised unit from Gauteng. The use of some of the equipment remains a challenge however as training on the use of the equipment is usually only provided by the supplier only once (when the equipment is delivered). Negotiating after sales support that incorporates additional training might be useful. Use of equipment such as the eight 360º cameras that were purchased under the IIFS is not easy without significant competency in computers.
- Interviewed officials claim that additional storage and office space is still needed; a point commonly raised across provinces.
- Interviewed Detective Services and VISPOL personnel reported a notable improvement in responsiveness of the LCRCs as well as more rapid identification of leads through the DNA Database, all of which made possible as a result of the IIFS.

6.4 Gauteng

Overall crime trends in Gauteng have shown a decrease since 2004, although there was a marginal increase in 2014 and 2015. Most of the major categories of crime have been in decline since 2004, with the exception of drug-related crime which has been rising rapidly throughout the country. As can be expected, in terms of geographic spread, most of the reported crimes in Gauteng are committed in the urban areas of Johannesburg and Pretoria.

The national FSLs are located in Gauteng, and have been extensively evaluated in this report. However, as these labs service many provinces, the interviews with FSL personnel were not seen as Gauteng level interviews - but rather national level interviews - and hence are not included in this section.

6.4.1 CR&CSM

The main findings in terms of the Gauteng CR&CSM were:

- The IIFS has resulted in an increase in the number of appointments, particularly in terms of laboratory technicians at the crime scene laboratories and crime scene experts. However, staff retention remains a challenge, and according to exit interviews this is largely due to the

traumatic and stressful nature of the job, as well as the poor opportunities for progression. In the explosives section in particular, the Section was struggling to offer remuneration that could compete with mining houses for explosives experts.

- In terms of performance, the evaluators might expect that the number of crime scenes attended might increase due to capacity increases; however, in Gauteng this was not the case; a small reduction in the number of crime scenes visited was observed in recent years. In practice there are a number of additional factors that may reduce the number of crime scenes attended. For example, in 2015, SAPS conducted a number of sweeps through inner city neighbourhoods under Operation Fiela. Undocumented migrants and wanted suspects were arrested and their fingerprints and DNA samples drawn. These operations drew some capacity away from the Gauteng CR&CSM, reducing their capacity to attend crime scenes. This is evidenced by the fact that the number of crime scenes attended declined quite sharply, whilst the number of fingerprint cases received for investigation and exhibits collected and processed largely remained unchanged.
- In general, it was reported that there has been a significant improvement in the type of expertise training received. In terms of conferences, not all officers are able to attend, but the internal debriefing sessions are an opportunity for attending officers to share their experiences and ideas.
- The main challenge currently faced by the Gauteng CR&CSM is that of accommodation, both in terms of office space and space for the laboratories. For example, at present lab technicians are not appropriately spaced, and lab ventilation is sometimes poor. A second major concern is that the supply chain process is felt to be undesirably long, complex and constantly evolving.

7 FINDINGS FROM THE COST-BENEFIT ANALYSIS

Cost benefit analysis is a useful tool in policy evaluation. In its simplest form, it can allow an assessment of whether the costs of a program are exceeded by its benefits or vice versa. However, in practice, the results of a CBA are typically more nuanced, not least because it is often not possible to monetise all costs and benefits, and thus come up with a net result. In the preceding sections, this evaluation report has described and analysed the implementation of the IIFS. Against the theory of change, the implementation evaluation:

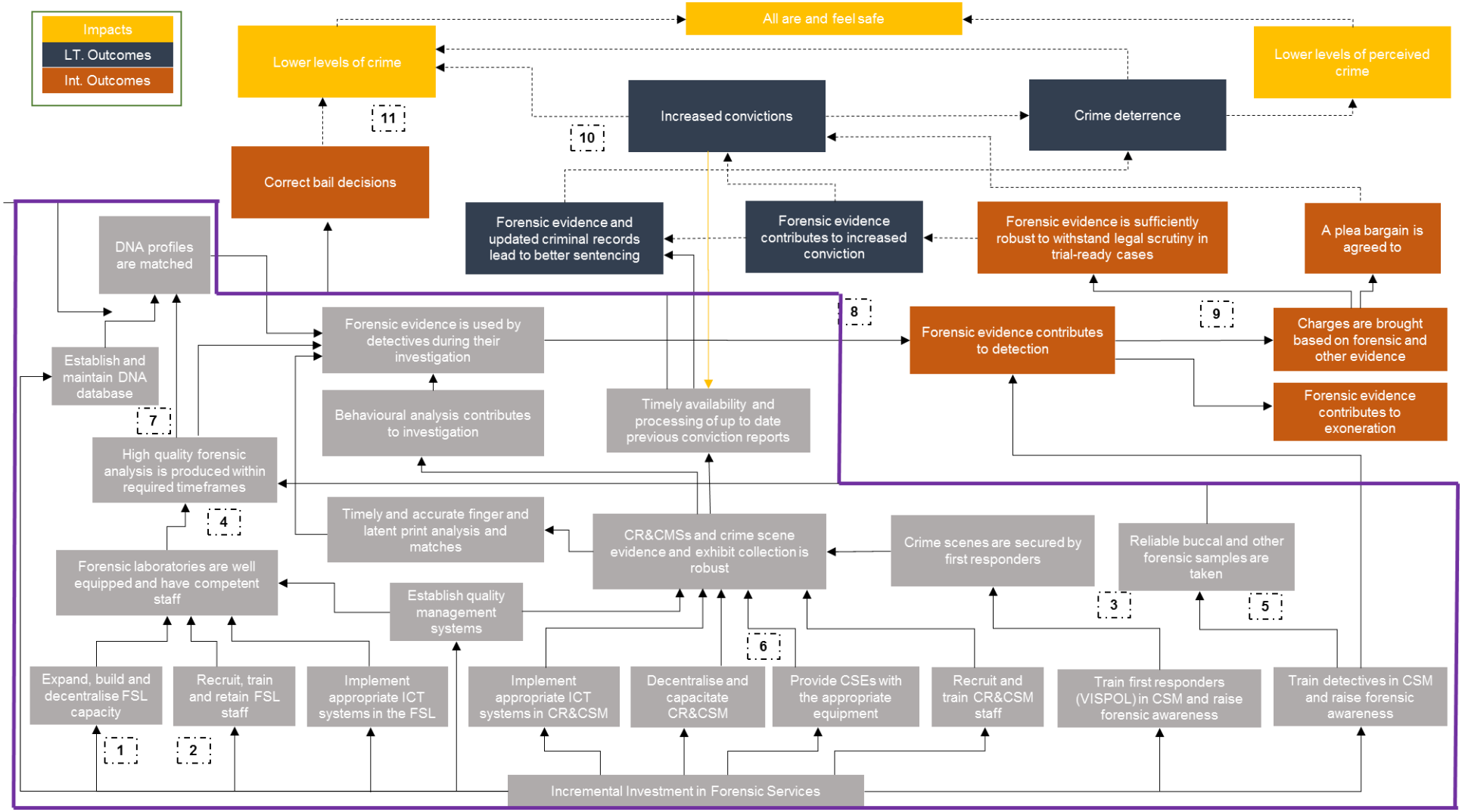
- Describes how the IIFS was implemented
- Analyses what the IIFS was spent on by component and section
- Assesses the changes in performance and the achievement of results over the evaluation period
- Identified areas that are working well or less well within forensic services.

The shaded blocks in the theory of change (replicated in Figure 51) show aspects of the theory of change already covered in the implementation evaluation. The evaluation now turns to the cost benefit analysis.

As the dashed lines at the higher levels of the theory of change suggest, the causal links between final outputs and outcomes, and between outcomes and impacts become weak as forensic evidence moves upstream within the CJS. This brings to the fore an important distinction between the sphere of control and the sphere of influence that the Division: Forensic Services has over forensic evidence.

At the lower levels of the results chain, the Division: Forensic Services has some control over the availability, quality and timeliness of forensic evidence and analysis. As forensic evidence works its way through the CJS, the division has less control over the impact of forensic evidence on justice outcomes. Attributing the effects of the IIFS on forensic evidence to observed justice outcomes would be hard, nonetheless, the evaluators can trace the *contribution* of forensic evidence to outcomes through the CJS.

Figure 51: Theory of change and the cost benefit analysis



7.1 Costs

In previous sections, the evaluators discuss how the IIFS was spent, and this analysis does not bear repeating. The central question that needs to be answered here is: how cost-effective was the IIFS? However, to respond to this question, the evaluators must first ask: what is cost-effectiveness? The Australian Productivity Commission defines cost-effectiveness as "achieving the maximum level of output for a stated level of inputs or costs"[79]. In order analyse the cost-effectiveness of forensic services, it is necessary to compare expenditure to outputs. In this instance, the final output of the forensic analysis is "high-quality analysis produced within required timeframes" as the theory of change illustrates. As the timeframes and methods for measuring these timeframes vary considerably over the evaluation period, the evaluators use a simpler measure – "the number of entries analysed" as a proxy.

The evaluators recognise that unit costs are rough measures of cost-effectiveness. In this evaluation, where there is limited expenditure data to work with, unit costs can provide valuable insights on changes in the quantity and price of inputs used to produce a service or highlight any shifts in the productivity of the division.

In 2009/10, the Division: Forensic Services spent an average of R 6 480 on analysing each case entry it received. By 2014/15, the average expenditure per entry had risen to R12 515. This translates into an annual average growth rate of 13.2% and implies the unit cost of case analysis rose faster than inflation over the evaluation period.

Since about 47% of total expenditure through the IIFS was on technology, it is possible that this type of spending is driving up unit costs, and masks trends in the underlying operational expenditure of the division. To obtain a better perspective on the growth in operational costs, the evaluators exclude expenditure on technology from the calculations. If this is done, the average cost per entry analysed increases to R 10 129 in 2014/15, growing at a moderately slower annual rate of 11.2% compared to 13.2%.

Nevertheless, growth rates are still rising faster than inflation and the annual average growth rate in case entries. One plausible explanation is that the cost of inputs has increased above inflation over the period. This may be due to two factors:

- **Procurement challenges**: The evaluators understand from some interviewed officials that the forensic laboratories have been ordering smaller quantities of consumables while a case is contested in court. It is also possible that the small pool of suppliers has enough market power to increase prices.
- **Employment costs**: With the division employing more graduates with scientific degrees at warrant officer level, the cost of employment would have risen. Another aspect that could also

[79] (Productivity Commission, 2013)

be driving the higher than inflation increase in unit costs is the amount of overtime paid by the division.

Table 22: Unit cost associated with analysing a case entry

Description	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	Average Annual growth rate
Number of entries analysed#	221 548	318 665	323 388	380 921	318 317	299 835	6.1%
Total expenditure by the Division: Forensics Services (R'000)*	R 1 435 729	R 2 191 003	R 3 252 663	R 3 504 856	R 3 704 057	R 3 752 333	19.2%
Average unit cost per entry	***R 6 480***	***R 6 876***	***R 10 058***	***R 9 201***	***R 11 636***	***R 12 515***	***13.2%***
Expenditure funded through the IIFS (R'000)^	R 178 500	R 744 900	R 1 324 800	R 1 137 300	R 1 235 100	R 1 558 600	43.3%
Average IIFS expenditure spent per entry	***R 806***	***R 2 338***	***R 4 097***	***R 2 986***	***R 3 880***	***R 5 198***	***37.3%***
Total expenditure by the Division: Forensic Services excluding major technology (R'000) ^	R 1 281 929	R 1 894 503	R 2 578 163	R 2 900 856	R 3 220 057	R 3 037 033	17.3%
Average cost per entry (excluding technology)	***R 5 786***	***R 5 945***	***R 7 972***	***R 7 615***	***R 10 116***	***R 10 129***	***11.2%***

*Sources: # SAPS Annual Reports (2009/10 to 2014/15), * Estimates of national expenditure, ^ own calculations from POLFIN and TMS data*

7.2 Benefits

While the expenditure analysis as discussed in the preceding sections clearly shows that substantial expenditures have been undertaken in the forensics space, it remains to be seen whether these expenditures have had any impact on justice system outcomes. This is the next phase of the cost benefit analysis.

In the international review, the evaluators examined the international evidence for a link between forensics use and justice system outcomes, and found that while forensics can play a role in securing convictions, it does so in a highly complex environment in which forensic evidence is only one of the factors affecting outcomes, and is typically not the most important of those factors.

Teasing out the effect of forensics changes on justice system outcomes is thus likely to be a complex process. Cognisance must also be taken of potential confounding variables. For example, the emphasis on improving justice system outcomes which resulted in the IIFS has also produced an emphasis on improving investigative practices in the detective services division. As a result, the

detective division has reported that their specialist tasks team are now better at finding and using witness testimony in court cases. Both the IIFS and improvements in detection are designed to have some effect on improving conviction rates.

As shown in Appendix 2, the international experience suggests that the use of forensics differs widely by type of case. A brief look at the South African crime data confirms that this is also the case locally (please note that Box 5 provides detail on the source of this data). Table 23 below shows that while almost three-quarters of rape cases reported resulted in some examination of forensic evidence between April and March 2015, only 0.3% of shoplifting cases collected forensic evidence.

Table 23: Percentage of reported cases where forensic exhibits are examined by FSL, 11 crime types

	Year to March 2015
Murder	49.1%
Culpable Homicide	4.9%
Rape	74.2%
Sexual Assault	14.5%
Burglary (Business)	5.7%
Burglary (Residential)	2.9%
Stock Theft	1.4%
Shoplifting	0.3%
Truck Theft	3.0%
Theft From MV	0.9%
MV Infringement	0.6%
Total	**5.7%**

Source: CAS and FSL databases

It seems reasonable to conclude that forensics use is more likely to affect justice system outcomes in types of crimes where forensics is used more often. Improved forensics should thus improve conviction rates in rape much more than in shoplifting. Examining differences in conviction rates between crime types is thus one way of stripping out the effect of confounding variables and isolating the impact of forensics on justice system outcomes.

Box 5: Data sources used

The data employed in the analysis in this section was obtained directly from the CAS, CRIM and FSL Admin systems maintained by the police, for crimes reported within the 2003/04 to 2014/15 financial years. However, the data on the resolution and analysis of these crimes includes information up until the start of 2016.[80] CAS, CRIM and FSL Admin data was linked on the basis of an Internal CAS Object Number, which is a unique identifier assigned to a particular case.

The police use the CAS system for the registration, administration, monitoring and progress tracking of cases. In terms of this analysis, CAS provides information on the Province, Station, Type of Crime, Manner of Closure and Date Reported/Registered/Closed for each case. CAS data was used as the source for all crimes

[80] January 2016 for CAS and CRIM, and February 2016 for FSL Admin.

committed during the period; across the categories of crime analysed. The data was then supplemented with data from the CRIM system, which contains detailed, accurate information from the court's system. In particular, the CRIM system provides detailed data on the result of hearings for all cases that went to court. Whereas the CAS system collects and stores data primarily at the level of the criminal incident itself, the CRIM system collects and records data at the level of the accused person. In some cases, there are inconsistencies between the values recorded in CAS and those in CRIM. Where reconciliations needed to be made for such discrepancies, CRIM was regarded as the golden source for data on accused persons; since it is the audited source used for the generation of previous conviction reports; whereas less rigour and control is applied to the entering of data on the CAS system.

The final source of data is the FSL Admin system. The system is used as the administrative tracking and monitoring system within the Forensic Science Laboratories and records detailed information on all aspects of a forensic analysis conducted from the date the entry is registered in the lab until the analysis is completed. In this study, FSL Admin provided data on which lab processed evidence, the types of analyses conducted, the dates on which the analyses were started and completed, the examiner and various other fields cataloguing findings of the analysis.

These are large, complex systems that are operated somewhat independently of each other, are used for a wide variety of varying purposes and have evolved to serve these purposes over extended periods of time. Combining data from these three sources provides a rich, unique dataset, but this complexity means that results should be interpreted with caution and with an understanding of system limitations. To some extent the complexity of these systems and their differences are due to the complex nature of the criminal justice system itself. For example, a single CAS number can relate to multiple crimes with multiple accused individuals, and even more forensic exhibits. The crime for which conviction ultimately occurs can differ from the offence which was originally reported, and the date of resolution of the case can differ widely for each defendant.

However, there are also issues with data quality. For example, it was hoped that the “manner of closure” field from the CAS database, would provide useful evidence as to how cases had been concluded. However, in practice, this field was found to be unreliable in many cases. For example, the evaluators were informed that stations would frequently mark cases as closed while forensics evidence was being processed, and then re-open them at a later stage, possibly to reduce the number of open cases on the system.

To avoid values for “manner of closure” that could be misinterpreted, the database was stripped of entries containing the result of hearings other than “Guilty”, “Withdrawn” and “Not Guilty”. The removed verdicts included “ROT: Unavailable”, “ROT: Expunged”, “Duplicate” etc., which were reported to have been used in an inconsistent manner by the database managers.

Similar issues were found in the FSL Admin system as regards to the “Date Assigned” and “Date Completed” fields. Accurately filled in, these fields should provide an assessment of how long it takes to process forensic exhibits. However, in practice, the manner in which they were completed seemed to be highly dependent on the examiner that performed the analyses. There are many instances of dates not being filled in, or of dates of completion being earlier than dates assigned (for some examiners, the average time taken to complete entries was negative).

It should be noted that the findings of the analysis are reliant on the quality of this data, and although every attempt has been made to clean it and ensure consistency, the lack of integration between systems and (in some cases) lack of data entry quality standardisation (in CAS and FSL Admin in particular) could potentially still affect the accuracy of our findings.

Turning to the theory of change, if the IIFS increases the availability, quality and timeliness of forensic evidence, it follows that more crimes will be detected, perpetrators arrested or the innocent exonerated. In turn, prosecutors will be more willing to bring charges on the basis of robust evidence, and therefore more cases will go to court. If more cases go to court, conviction rates are likely to increase, where the prosecutor bears the burden of proof and must prove beyond a reasonable doubt that the crime has taken place and that the accused is guilty. In these types of adversarial systems, the forensic evidence tends to strengthen a prosecutor's case.

However, in practice, the CJS is a complex system, and many confounding factors affect the ability of forensic services to influence justice outcomes. For instance, if there aren't enough detectives to investigate crimes, forensic evidence might be left unused. Nevertheless, the theory of change shows that the IIFS contribute to four types of benefits:

- **Benefits to forensic services**: These refer to the direct benefits to the Division: Forensic Services, its components and sections that lead to improvements in the availability of services; the quality and timeliness of forensic analysis. Measures of direct benefits, discussed in earlier sections, include the turnaround times and changes in the backlog.
- **Benefits to detective services:** Forensic evidence helps detectives to identify perpetrators and exonerate the innocent. The increased use of forensics in reported cases, particularly regarding forensic-heavy cases (e.g. murder and rape) will contribute to detection but also to the exoneration of the innocent.
- **Benefits to the CJS cluster**: These are advantages of the IIFS beyond SAPS to the broader CJS cluster. In the judicial system, the benefits of the IIFS would include an increase in the percentage of cases that use forensic evidence that leads to a guilty verdict.

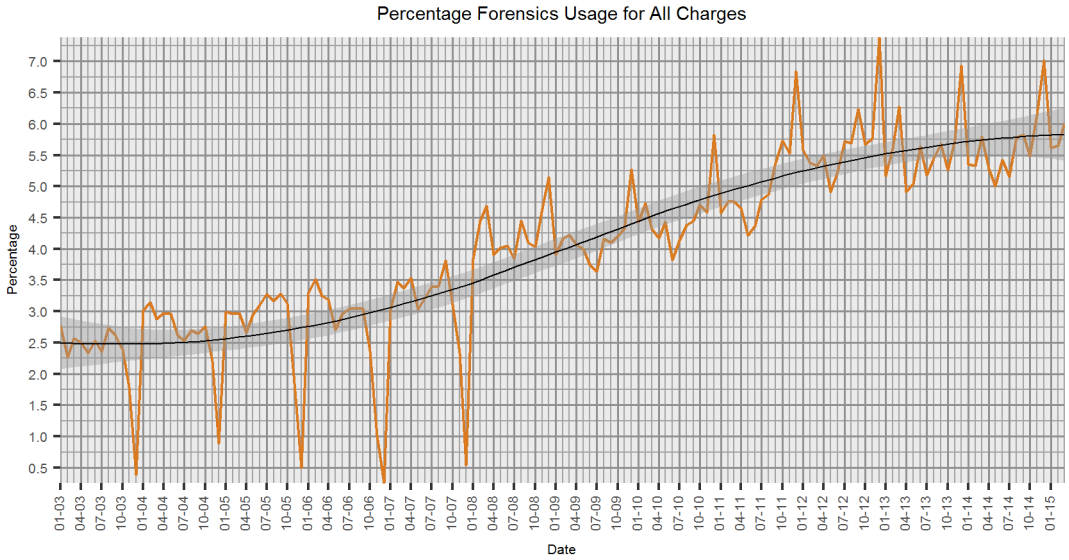
7.2.1 Benefits to detective services

The evaluation selected eleven crime types for this study ranging from murder and rape to burglary and theft. All cases used forensic analysis, albeit to different extents, and can be grouped into forensic-heavy and light cases. Murder and rape are seen as forensic-heavy cases. These cases often use more than one type of forensic analysis. In a murder case, forensic evidence collected at the crime scene might include fingerprints, DNA samples and ballistics. Some crime scenes need additional techniques such as blood splatter analysis. Forensic-light cases include burglaries and theft; these are high-volume crimes where one type of forensic evidence is collected (e.g. fingerprints).

Analysis of the CAS and FSL data strongly suggests that use of forensics is increasing, which confirms the results of the implementation evaluation. As the figure below shows, there is a relatively clear trend, from an average of around 2% of reported crimes seeing some use of forensics in 2003 to around 6% by 2015 for the 11 DSSC codes selected for this study. From 2008, there seems to be a marked improvement in the use of forensics in cases. This period coincides with the CJS Review and adoption of the Seven Point Plan. It seems that these policy changes had already begun to have a positive impact on forensic services, even before the first IIFS allocation was made in 2009/10. Thus, it seems as if some efficiency improvements were influenced by factors other than the IIFS within the division.

It is also evident that the Division: Forensic Services has improved its ability to manage seasonal variations in the supply of forensics. Before 2008, there were major drops of forensic evidence produced in November and December every year. Since then, the division has used overtime to manage the decline in capacity at certain times of the year. This approach allows the division to operate at capacity throughout the year, and supply timely forensic evidence and reports to detectives.

Figure 52: Use of forensics in 11 crime types *



Source: CAS and FSL systems, own calculations
** Murder, Culpable Homicide, Rape, Sexual Assault, Burglary (Business), Burglary (Residential), Stock Theft, Shoplifting, Truck Theft, Theft From MV, MV Infringement*

The graphs for each of the 11 crime types reviewed are attached as an appendix. In each crime category analysed, use of forensics has increased over the period, both in types of crime where forensics use is fairly rare and where forensics are commonly used. For example, while only 0.05% of shoplifting cases saw forensics use in the year to February 2004, 0.25% did in the year to February 2015; while in the most forensics-heavy category, rape, use of forensics went from 50.5% to 74.1% of cases.

The evaluators were asked to test whether the IIFS had a statistically significant effect on justice outcomes. The outcome was set as the percentage usage of forensics in all charges. The combined dataset constructed from the FSL Admin, CAS and CRIM is a time series, and therefore observations are strongly correlated with each other.

The evaluators, therefore, use a variant of the Auto-Regressive Integrated Moving Average (ARIMA) model that is appropriate for this type of crime data, and can account for seasonal variations. There was a significant amount of seasonal variation around November and December (particularly pre-2008) when the forensic laboratories operated with fewer analysts during the end of year/holiday season. The seasonal ARIMA (termed "SARIMA") model projects future values of an observed process (in this case forensic usage across all charges) based on its inertia.

To test whether the IIFS has had a statistically significant effect in on the utilisation of forensics across all charges, the evaluators used the aggregate estimates of expenditure per section from POLFIN. Cross-cutting and TMS expenditure was allocated to each section in proportion to the total expenditure. This approach is not unreasonable, as sections such as biology with the largest staff complement and expenditure drew a significant amount of cross-cutting spending on end-user equipment and network upgrades.

Since the evaluators only had annual estimates of expenditure, with no timing for in-year cash outflows, expenditure through the IIFS was assigned uniformly on a monthly basis. The evaluators caveat our analysis by saying that the evaluators have effectively assumed no information about the timing of cash flows, which represents a serious drawback in trying to gauge the effect of the IIFS. Nevertheless, since information on the IIFS cash flows is not available, the evaluators had no option but to assume that they are evenly distributed throughout the year. This uniform distribution of expenditure data leads to multicollinearity issues in the data. In other words, the explanatory variables are linear combinations of the other explanatory variables.

To overcome this problem, the model sums individual expenditures into total expenditure. Total spending was then expressed as a cumulative sum to denote the level of spending from the IIFS present in the system, and finally, it was transformed into percentage form, where each month's level was expressed as a percentage of final cumulative expenditure.,

- The TOTAL variable represents the cumulative IIFS expenditure.
- Two dummy variables for the extreme November and December seasonality are included in the regression.
- The variable Sar1 is an autoregressive used capture seasonal dependence.

The SARIMAX model was then fitted to each of DSSC codes forensics usage series and the aggregate forensics usage series. Standard hypothesis testing can be done by seeing if the confidence interval of the coefficients includes zero. If the confidence interval does include zero, the evaluators may conclude that the variable is not significant at the 5% significance level. Table 24 shows the results.

Table 24: Results from the SARIMA model

ALL CHARGES			
Coefficient	Estimate	Standard Error	Statistically significant
sar1	0.684	0.0586	Yes
Nov	-0.2457	0.3621	No
Dec	-0.323	0.3621	No
TOTAL	0.0089	0.0814	No

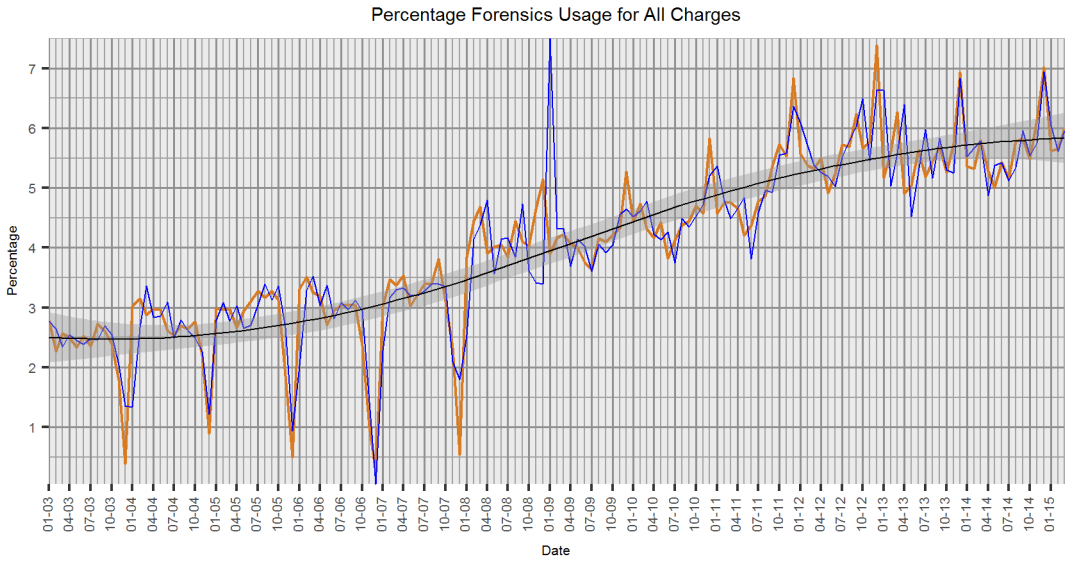
Source: DNA Economics

It should be noted that in most of the individual time series run on each of the eleven DSSC codes, November and December turned up as significant dummy variables as well as showing practical significance. Total expenditure was not statistically significant for most DSSC codes, and where it was, the practical significance of the result was negligible. Again, this is due to the data not allowing

us to model the true underlying expenditure processes. With the limited data at our disposal, it appears that total expenditure through the IIFS is not statistically significant, and therefore the evaluators cannot reject the null hypothesis. That being said, this methodology may be more successful when better data becomes available, and is an exercise that could be replicated by SAPS.

Given the limited amount of data available to perform any meaningful statistical analysis, descriptive techniques offer a way to visualise trends and identify structural changes in the use of forensics across all charges.

Figure 53: Fitted SARIMA model



In Figure 53, the orange line represents the percentage forensics usage for all charges. The blue line represents the fitted (and forecasted) values from the SARIMA(0,1,0)(1,0,0) model. The black line is a LOWESS curve, and the surrounding grey shading represents the 95% confidence interval from the local regressions. The confidence interval shows that standard regression techniques would fail as the majority of the data lies outside the shaded region. Nevertheless, it is a useful technique to gauge trends in the usage of forensics.

SARIMA uses past seasonal values as predictors for the future values of the process. If there is a significant deviation between the observed and fitted trends, the evaluators can attribute it to a change in the use of forensics in all charges. The graph surfaces some interesting points. First, the usage of forensic evidence has been increasing since as a far back at 2005. The year 2009 is a major turning point for forensics. However, changes in 2009 are probably due to events and decisions taken in previous years, including the publication of the CJS review and adoption of the Seven Point Plan. Thus, policy making processes had an influence on the forensic services, even before the IIFS was allocated and spent. In some respects, this might be an example of the Hawthorne effect. Behavioural and process changes have occurred because the forensic environment was being observed and monitored through the CJS review process. Therefore, between January 2008 and April 2009, improvements in the use of forensics are mostly the result of efficiency gains within the Division: Forensic Services.

There is a clear structural break in the time series after 2009. It seems as if there is variability is the percentage of charges with forensics, and the actual and predicted values tend to coverage after July 2012. There are three possible reasons for the improvement in forensic utilisation on all charges. First, the policy review and making processes places significant pressure on the Division: Forensic Services by highlighting areas that were not working and setting out the expected results. Second, better management of forensic capacity has helped to plan the delivery of forensic services and reduced the seasonal variability. Finally, the IIFS has made a considerable difference to forensic capabilities in the country. Between April 2009 and January 2015, the percentage of with forensics usage on all charges increases from 4% to 6%. In forensic-heavy crime types such as murder, the improvement is much more significant, rising 32% to 50% over the period.

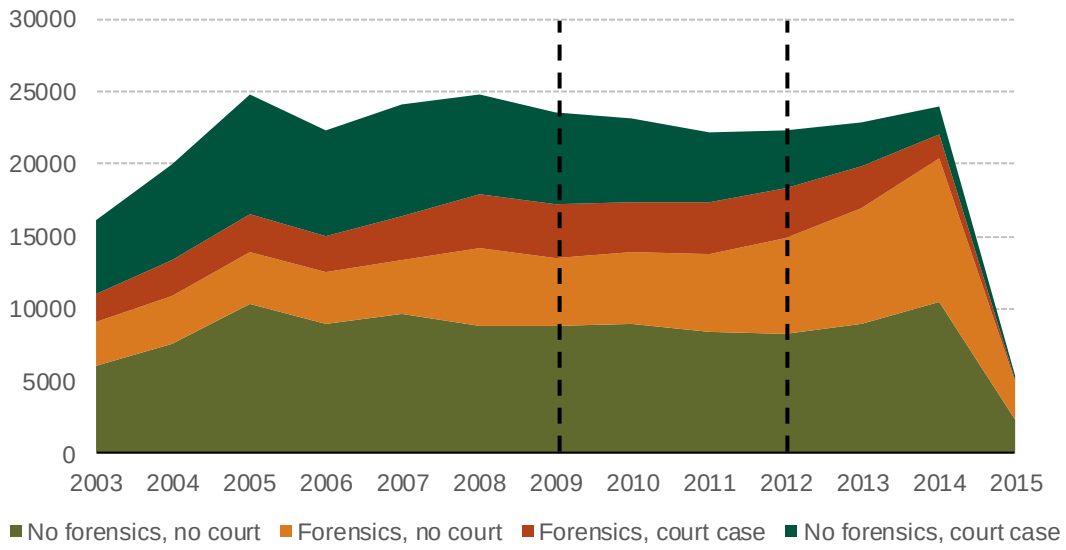
7.2.2 Benefits to the CJS cluster

The two most forensics-heavy crime types in our sample are rape and murder. In the 2014 calendar year, 49% of murders and 74% of rapes saw some forensic analysis taking place, as opposed to the next highest of the eleven categories examined, sexual assault, where only 14% of reported crimes experienced had associated forensic analysis. Improvements in the forensic system are thus most likely to impact on justice system outcomes in murder and rape.

The two graphs below show the total number of reported cases of rape and murder over the period, in absolute terms. As can be seen, the graphs dip in 2003, and then again at the end of the period. Theses dips can largely be attributed to the fact that the data available for 2003 excludes the first two months of the year, and 2015 only goes up to March. However, each graph also distinguishes between cases which have been processed by the court system, and those which have not. For more recent cases, a significant proportion is still under investigation, and thus the proportion where a verdict has already been reached (or the case has been withdrawn) is lower than in earlier years. Thus the shorter period in 2003 is less problematic to account for than the lower case resolution rate in 2014 and 2015 in particular, and certain types of analysis will have to exclude these more recent years.

In both graphs, for example, the proportion of cases which have seen some forensic analysis, but have not been to court yet, has increased in recent years. This trend, however, should not be over-interpreted, as many of these cases are still in the pipeline. While the median shoplifting case in the years from 2003 to 2013 took only 14 to 32 days to resolve from date reported, the median murder case in the same period took between 400 and 638 days to resolve. A tabular summary of these results is shown in **Error! Reference source not found.**.

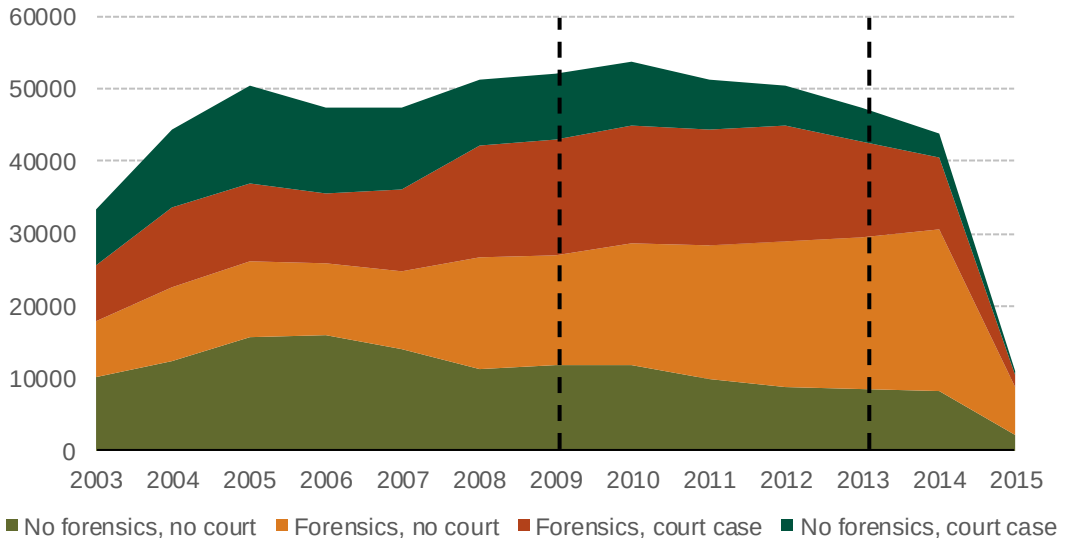
Figure 54: Murder cases reported, absolute terms



Source: CAS and FSL systems, own calculations

Because of the length of time typically taken to resolve murder and rape cases (a little over two years and around 18 months respectively), the last 3 years of data in the case of murder, and two years of data in the case of rape, must be regarded as unreliable (and it should be borne in mind that unresolved cases may still play a role in case outcomes in the last years of the sample analysed). The period up to 2009 is the period before implementation of the IIFS. The question is thus whether there is any evidence of a change in trends in the 2003-09 period, as compared to the 2009-12 period (in the case of murder), and 2009-13 period (for rape).

Figure 55: Rape cases reported, absolute terms



Source: CAS and FSL systems, own calculations

The tables below are based on the data used to generate Figure 54 and Figure 55 above, with the cases that went to court further split out by outcome (guilty, not guilty or withdrawn). For each year, the proportion of cases in each category is shown. From the point of view of improving justice system outcomes, the most relevant columns in each table are those which track the proportion of guilty outcomes.

For murder cases (Table 25), an increase in forensic activity is immediately apparent. There has been an increase in all categories where forensic activity takes place, including forensics, no court; forensics, guilty; and forensics, not guilty, shaded in green within the table. While the increase in cases with forensics that generate guilty verdicts is encouraging, it should be recognised that there has also been a decrease in the number of cases with no forensics where guilty verdicts are reached.

There are a two possible reasons for this declining trend:

- Prosecutors are taking fewer cases with no forensic evidence to the courts. Between 2003 and 2013, the number of murder cases with no forensics taken to court fell from 5115 to 3081.[81] Similarly, the number of rape cases with no forensics taken to court fell from 7551 to 4695 over the same period. Therefore, it seems that prosecutors are relying more on forensic evidence to get a guilty verdict.[82]
- There is a risk that some "easier" cases, which used to be resolved without the use of forensics, are now still being resolved, but with the added expense of possibly unnecessary forensics involved.[83] This might reflect one of the unintended consequences of the IIFS; forensic evidence has become a substitute for detective work. It may be that fewer cases are solved without forensics because SAPS does not have enough detectives to cope with the number of cases. The shortage of detectives within SAPS was a recurring issue raised throughout interviews with the detective services.

[81] The 2014 and 2015 years are excluded as there may still be cases that are not enrolled on the court roll.
[82] Sustained pressure by civil society between 2004 and 2007 contributed to average of 11 888 cases with no forensic taken to court. This is more twice the number of rape cases with no forensics taken to court in 2014. If this trend is not monitored and action taken, eventually, a situation may arise only rape cases where physical evidence is present will be taken to court, denying all other rape victims justice.
[83] Another possibility is that the court system has become increasingly dependent on forensic evidence, so that cases without forensics have a lower chance of securing a conviction, and to some extent, this finding is supported by feedback from prosecutors.

Table 25: Murder case outcomes

Description	Year	No forensics, no court	Forensics, no court	Forensics, Guilty	Forensics, Not guilty	Forensics, Withdrawn	No forensics, Guilty	No Forensics, Not guilty	No Forensics, Withdrawn
Before IIFS	**2003**	37.8%	18.1%	5.5%	2.5%	4.4%	13.5%	7.7%	10.4%
	2004	37.8%	16.5%	5.6%	2.2%	4.9%	13.5%	7.6%	11.9%
	2005	41.7%	14.7%	4.2%	2.1%	4.0%	13.6%	7.2%	12.5%
	2006	40.3%	16.2%	4.7%	1.9%	4.3%	13.1%	7.5%	12.1%
	2007	40.0%	15.2%	5.3%	2.9%	4.5%	13.0%	7.4%	11.7%
	2008	35.5%	21.3%	6.5%	3.4%	5.4%	11.9%	6.2%	9.8%
	2003-2008	***38.9%***	***17.0%***	***5.3%***	***2.5%***	***4.6%***	***13.1%***	***7.3%***	***11.4%***
During IIFS	**2009**	37.4%	20.0%	6.8%	3.2%	5.5%	12.0%	6.0%	9.2%
	2010	38.3%	21.6%	7.1%	3.0%	4.9%	11.1%	5.3%	8.8%
	2011	37.7%	24.5%	7.9%	3.2%	4.8%	9.9%	4.8%	7.2%
	2012	37.0%	29.7%	8.0%	3.1%	4.4%	8.0%	3.5%	6.4%
	2009-2012	***37.6%***	***23.9%***	***7.4%***	***3.1%***	***4.9%***	***10.2%***	***4.9%***	***7.9%***
	2013	39.1%	34.5%	7.0%	2.3%	3.6%	6.6%	2.5%	4.4%
	2014	43.4%	41.6%	4.0%	1.2%	1.9%	3.9%	1.2%	2.6%
	2015	44.5%	49.0%	1.8%	0.3%	0.8%	2.0%	0.5%	1.2%

Source: CAS and FSL systems, own calculations
Note: Columns shaded in green highlight the use of forensics in murder cases and their justice outcomes, rows shaded in grey reflect the averages for the period, while rows with dark blue lettering reflect incomplete datasets. In these years, some cases might not have made it onto the court roll.

Although rape case trends show substantial evidence of an increase in forensic activity, the number of cases with forensics that do end up in court nearly tripled increasing from 7484 to 22585 between 2003 and 2014. Over the same period, the proportion of all cases with that resulted in a guilty verdict fell from 20% to 16% over the period. Equally concerning is the increase in the number of cases with forensics where charges are withdrawn. High levels of withdrawn cases reflect the inherent difficulties in prosecuting rape crime. A trial often boils down to the word of the complainant against the defendant, unless there clear corroborating physical evidence (such as physical assault). Even with forensic evidence, the burden of proof in a rape case is high for prosecutors, who must prove that the victim did not consent. These two factors: the high level of cases with forensics that do not go to court, the large number of cases that are withdrawn, paint a bleak picture of the justice outcomes in rape crime.

Table 26: Rape case outcomes

	No forensics, no court	Forensics, no court	Forensics, Guilty	Forensics, Not guilty	Forensics, Withdrawn	No forensics, Guilty	No Forensics, Not guilty	No Forensics, Withdrawn
2003	30.9%	22.5%	4.9%	4.9%	14.0%	3.9%	4.6%	14.3%
2004	27.8%	23.3%	4.7%	4.7%	15.4%	3.7%	4.1%	16.3%
2005	31.0%	20.8%	4.2%	3.9%	13.2%	4.4%	4.1%	18.5%
2006	33.6%	21.1%	4.0%	3.3%	12.8%	4.2%	3.7%	17.2%
2007	29.8%	22.6%	4.7%	3.7%	15.3%	3.8%	3.2%	16.9%
2008	22.0%	30.3%	6.2%	4.6%	19.5%	2.5%	2.3%	12.6%
2003-2008	***29.2%***	***23.4%***	***4.8%***	***4.2%***	***15.0%***	***3.7%***	***3.7%***	***16.0%***
2009	22.6%	29.6%	6.1%	4.2%	20.2%	2.4%	2.3%	12.7%
2010	22.1%	31.2%	6.3%	3.8%	20.5%	2.4%	2.0%	11.8%
2011	19.4%	36.0%	6.4%	3.6%	21.0%	2.0%	1.6%	9.9%
2012	17.1%	40.0%	6.3%	3.4%	22.3%	1.6%	1.1%	8.2%
2013	17.7%	44.5%	5.4%	2.5%	20.1%	1.4%	0.9%	7.6%
2009-2013	***19.8%***	***36.2%***	***6.1%***	***3.5%***	***20.8%***	***1.9%***	***1.6%***	***10.1%***
2014	18.4%	51.6%	3.5%	1.5%	17.4%	0.9%	0.4%	6.2%
2015	20.4%	59.1%	1.4%	0.4%	13.1%	0.6%	0.1%	5.0%

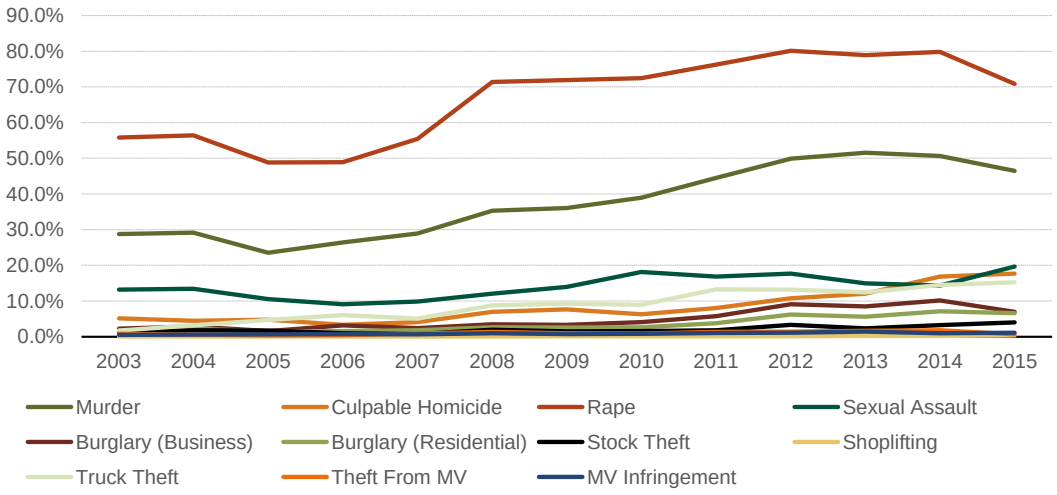
Source: CAS and FSL systems, own calculations
Note: Columns shaded in green highlight the use of forensics in rape cases and their justice outcomes, rows shaded in grey reflect the averages for the period, while rows with dark blue lettering reflect incomplete datasets. In these years, some cases might not have made it onto the court roll.

Looking at the contribution of forensics to guilty verdicts, an interesting pattern emerges. Between 2008 and 2015, the proportion of cases involving forensics that achieved a guilty verdict was significantly higher in the preceding period, as depicted in Figure 56. Therefore, the analysis suggests that there has been a substantial improvement in the contribution of forensics to guilty verdicts in forensic-heavy cases. Specifically, the proportion of guilty verdicts associated with forensics in murder cases increases from 28.8% in 2003 to 46.5% in 2015, and from 5.2% to 17.6% for rape crime. If forensic services had not improved over the ten-year period, the evaluators posit that conviction rates would have been much lower.

There has also been some improvement in conviction rates amongst forensic-light cases. Conviction rates amongst burglaries (both residential and business) have increased, albeit from a low base. Interesting, there has been a relatively rapid growth in the contribution of forensics to guilty verdicts in truck theft and culpable homicide and a lesser extent residential burglaries since 2010. This trend might signal that the use of forensics in these crime types has intensified.

In other forensic-light cases such as theft from motor vehicles and motor vehicle infringements, conviction rates remain extremely low, which raises questions about the benefit of attending and collecting evidence from these types of crime scenes.

Figure 56: Proportion of guilty verdicts associated with forensics as a % of all guilty verdicts



Source: DNA Economics' calculations

Lastly, the pattern of increased proportions of withdrawn cases is substantial enough to merit concern. In all eleven crime types, the percentage of offences which experienced some forensic analysis and were then withdrawn increased, which may reflect simply the growing use of forensics in all crime types. It may also be indicative of the fact that prosecutors are selective about the cases they take to court and are likely to withdraw cases where there is a much lower likelihood of winning. Interviewed officials also suggest that cases involving children are withdrawn when they are diverted out of the CJS in line with the prescripts of the Children's Act (No. 38 of 2015). However, as diversions are not recorded in the CAS or CRIM data, the evaluators cannot measure the proportion of withdrawn cases can be ascribed to diversions.

7.2.3 Possible additional research priorities

The analysis presented above provides a preliminary indication of the impact of the IIFS on criminal justice system outcomes. The extent of analysis possible was limited by some factors, the most pressing of which is the short period available. IIFS expenditures only began in 2009, which limited the number of years of results which could be interpreted. The long lead times in the criminal justice system further reduced the number of years of good data available, and problems with stripping unresolved cases out of the database mean that the key data outcome, the proportion of guilty verdicts, is systematically biased downwards in the most recent years of the sample.

More conclusive results could be generated by repeating this analysis in a few years' time. However, more should also be done to improve the quality of the database, to allow open cases to be more effectively stripped from the sample. Specifically, the CAS system is failing to accurately record the time and manner in which cases are closed, which makes it impossible to consistently identify cases which have been concluded without going to court. Improving the accuracy of this database field would be an valuable initiative from the point of view of ongoing monitoring and evaluation processes, not only as regards forensics impact but as regards the performance of the police system as a whole.

As has been noted previously, in particular, research has found that forensics is only one of several factors contributing to the likelihood of successful prosecution and incarceration of offenders. For example, the time taken to respond to the scene of a crime, and the time elapsed between the occurrence and the reporting of a crime, are often crucial to the likelihood of successful case resolution. Such studies which have been conducted, both in South Africa and abroad, have tended to focus on a small sample of crime types, and a small geographical area (see for example Jewkes et al, 2009, which examines attempted and completed rape cases in a sample of Gauteng police stations in 2003). This allows the research team to focus extensive efforts on cleaning and reorganising complex datasets to fully flesh out the many causative factors affecting case outcomes.

Going forward, it may be useful to undertake research of this more focused nature in order to analyse which factors are most likely to affect case outcomes, and determine the role played by forensic investments in this process.

8 CONCLUSIONS

8.1 Relevance

The relevance criterion consists of two distinct components. The first component measures the extent to which the **objectives of the programme** align with the country's policy priorities or national development plans. The second component of relevance examines whether the **design of the intervention** was relevant and appropriate to the problem and realities faced by the country.

To check for alignment between the IIFS and national priorities, it is important to revisit the context in which the country found itself before the IIFS. By 2004, crime levels in South Africa had peaked, and the CJS faced the insurmountable task of reversing these trends. With high crime rates and rising levels of organised crime, the SAPS needed the ability to detect and investigate crimes. At the time, although SAPS had a forensic services programmes, DNA analysis was only done at the request of the detective or prosecutor. The results of fingerprint comparisons too so long that they often failed to make a difference to the outcome of investigations. Investigators relied mainly on witness testimony and other forms of evidence to make a case. Around the same time, the use of DNA in forensic investigations was gathering pace internationally. Developed countries made concerted efforts to invest in forensic capacity. In the US, forensic laboratories were decentralised from state to the county level to expand the reach of forensic services.

In 2006, the CJS review found severe shortcomings and shortages in capacity within the forensic services programme. As part of the Seven-Point Plan, a recommendation was made to develop forensic capacity and capabilities. From a funding perspective, forensic services were given priority because of its position within the CJS value-chain at the coal-face of crime detection and investigation efforts.

The IIFS was designed to accelerate investment in the upstream parts of the CJS value chain. Evidence collection, crime scene management, forensic analysis and timely criminal records provide the evidence and information required to detect and investigate the offences. Forensic evidence benefits each level of the CJS.

For detectives, forensic evidence along with good investigative practices provide valuable leads for investigators. Prosecutors take forensic evidence into account when deciding on whether to charge a suspect or not. Forensic evidence can also exonerate the innocent, saving the time and effort of detectives, prosecutors and the courts. In the courts, the forensic evidence provides scientific evidence to support the theory of the crime and allows judges to make decisions on the merits of the case. Therefore, given the importance of forensic evidence in the CJS, this **evaluation finds that the IIFS was relevant to, and aligned with the national priorities.**

Turning to the design of the IIFS, the **intervention's logic reasonably clear at the outset of the programme.** However, because the activity plans developed by the SAPS did not link the forensic processes and activities to the outcomes intended by the Seven-Point Plan, the theory of change was not complete. In other words, the activity plans do not locate the position of forensic services in

the CJS and specify its contribution to justice outcomes. It appears that planning for the IIFS was mainly left to SAPS, with little input from other role-players in the CJS.

The problem arises because of how the Seven-Point Plan has been implemented and coordinated. There is a disconnect between the system-level planning located within the Office for the Criminal Justice System Review (OCJSR) and the IIFS plans developed by SAPS. Originally, the intention was that the OCJSR and departments would work together to align their programs, find solutions and coordinate their actions across the CJS. While a review of the OCJSR is beyond the scope of this evaluation, it appears that the OCJSR has its own capacity constraints, which may have impeded the institution's ability to coordinate the implementation of the Seven-Point Plan.

The Division: Forensic Services has developed annual activity plans to guide the spending against the IIFS. On the upside, these plans have ensured that activities and processes take place as and when planned. However, there are three downsides commonly associated with this type of activity-based planning. First, activity encourages a mechanistic approach to planning that is focused on what the division should do instead of what they aim to achieve. Second, activity planning detracts from a medium to longer-term focus. For the Division: Forensic Services, the emphasis should be on developing medium to long-term plans that illustrate how they contribute to the CJS. Finally, activity plans encourage the use of numerical targets and the use of input and process indicators. Output and outcome targets are used less frequently within SAPS. Currently, the emphasis is on tracking inputs and processes within the Division with little attention given to the measurement of outputs and outcomes.

One of the shortcomings of the Seven-Point Plan was that it did not set outcome targets for the CJS. Thus, as one of the objectives of the IIFS was to increase the availability of high quality and timely forensic evidence for detectives and prosecutors, a simple measure of this objective is the proportion of cases with forensics where the prosecutors bring charges. However, as none of these outcome measures are tracked over time, it is difficult for SAPS to determine whether the IIFS has brought about meaningful changes in the CJS.

The Division's current approach to planning focuses on chasing numerical targets instead of results that benefit the wider CJS. This singular focus can be detrimental to the broader CJS. Emerging research reveals that that certain types of targets can encourage perverse behaviours in law enforcement (Office of the Chief Superintendent, 2015). For example, turnaround time targets can incentivise forensic analysts to declare inconclusive or negative findings to close an entry. Therefore, turnaround times should be used in conjunction with other monitoring mechanisms such as quality reviews. It is important to mention that the Division: Forensic Services has already begun to implement some of these changes. For example, the IIFS funding has established the beginnings of a quality management function.

While there are certain weaknesses in the design of the IIFS, various positive aspects warrant further mention. The IIFS has responded to the changing patterns of crime. In response to the increasing number of ATM bombings, the IIFS was used to purchase equipment and build capacity in the explosives unit. Similarly, it contributed to building much-needed capacity to analyse DNA in response to the promulgation of the Criminal Law (Forensic Procedures) Amendment Act, Act 37 of

2013 (commonly referred to as the "DNA Act"). In many areas, the IIFS has allowed the Division: Forensic Services the flexibility to make decisions based on their needs. As a result, the Division has established new disciplines within the forensic services programme and deepened capacity in others.

8.2 Effectiveness

KEQ1: To what extent are the intended benefits of the incremental annual investment into the SAPS Forensic Services achieved?

The benefits of the IIFS arise at three levels within the CJS. The first level covers the direct advantages of the IIFS to the Division: Forensic Services. The extent to which the IIFS achieves the second and third round of benefits depends partly on the effectiveness of the initial investment. Second round benefits include all changes brought about by the IIFS beyond the Division: Forensic Services but still within SAPS, such as the benefits of forensic evidence to criminal investigations. The final level of benefits refers to the advantages of the IIFS beyond SAPS to the broader CJS.

The evaluation found that the IIFS has **made inroads in addressing many of the challenges described by the CJS review**. With the additional funding, the Division: Forensic Services has recruited more personnel, purchased equipment, modernised their systems and financed the operations of the Division. As a consequence of these investments, turnaround times have improved, and backlogs have declined. It appears therefore that the **IIFS has expanded the reach and capacity of forensic services**, as intended by the Seven-Point Plan.

Although the efficiency of forensic services has improved, evidence on the extent of which quality has improved is mixed. The Division: Forensic Services has established quality assurance processes to enhance the quality of forensic services. However, the quality of findings and results produced by analysts is not monitored through normed indicators. For example, it is unclear that proportion of chemical analyses yield a positive, negative and inconclusive result. Moreover, FSL Admin system records the results of the forensic analysis inconsistently, making it difficult to make sense of the data. Monitoring the quality of forensic analysis and evidence is of particular importance when using indicators such a turnaround time as a primary measure of laboratory efficiency. Numerical indicators such as turnaround times can create perverse incentives, and additional indicators are needed to counteract these effects. Nonetheless, it is important to recognise that the majority of prosecutors surveyed report that the quality of forensic evidence has improved compared to six years ago before the IIFS. They also note that these **improvements have had a direct impact on their ability to obtain convictions**.

Beyond the Division: Forensic Services, the benefits of the IIFS to the broader SAPS are limited by the capacity of detectives to investigate cases. The police services face a severe shortage of detectives. Whereas forensic evidence is supposed to provide the leads in investigations and information upon which to make an arrest, there are simply not enough detectives to run down these leads. Furthermore, even leads generated to the forensic database are often not used by detectives. In some ways, the CJS has adapted in response to this shortage in detection capacity. Nowadays,

specialist task teams which were established to fight priority crime follow-up on leads from the Division: Forensic Services. Prosecutors are more willing to take cases with forensic evidence.

To summarise, the IIFS has **fundamentally changed the use of forensic evidence in the CJS,** and increased the proportion of guilty verdicts where forensic evidence is present. These trends imply that courts place some weight on forensic evidence when making judgements on the merits of the case. It also means that cases that would have otherwise fallen by the wayside because of a lack of detection capacity are being taken to court. By expanding the availability and use of forensic evidence in the CJS, the IIFS has begun to make a major contribution to justice outcomes in the country.

KEQ2: Overall, how cost effective is the incremental annual investment into the SAPS Forensic Services?

Cost-effectiveness is defined as "achieving the maximum level of output for a stated level of inputs or costs (Productivity Commission, 2013). Unit costs are rough measures of cost-effectiveness. In respect of forensic services, the evaluators define unit costs as the amount of resources it takes to analyse one entry. Declining unit costs show improvements in efficiency, or in other words, more entries are analysed for a given level of funding. Conversely, rising unit costs should demonstrate that investments in institutional capacity such as expenditure growth outstrip increases in entries submitted for analysis.

In 2009/10, the Division: Forensic Services spent an average of R 6 480 on analysing each case entry it received. By 2014/15, the average expenditure per entry had risen to R12 515, growing at an annual average growth rate of 13.2%. As such the **unit cost of case analysis rises faster than inflation over the evaluation period**. If the evaluators exclude expenditure on technology from the calculation, the average cost per entry analysed grows to R10 129, at an annual average of 11.2%. There is not enough detail in the expenditure and administrative to pinpoint the causes of this higher-than-inflation growth. It is possible that the rapid increase in operational costs is because of weaknesses in procurement practices combined with the small pool of suppliers, who have some market power. The increased cost relating to technological advancement and increased complexity of forensic analysis that improved discrimination power and sensitivity to detect minute amount of forensic trace exhibit material may also increase the cost per case.

One of the unintended consequences of the IIFS was that it made a pool of money available to the division, without setting clear criteria for the use of the funding. Coupled with the lack of a clear and detailed implementation plan, this has fostered a situation where the focus was on spending the CJS funding, and not necessarily always driving the best value for money from purchases or supporting best forensic practices. Nevertheless, there is some emerging evidence that to show that the investment in automation has achieved efficiency gains. Within the biology section, expenditure on consumables per case entry dropped from R721.40 in 2010/11 to R 686.54 in 2014/15.

8.3 Efficiency

KEQ3: What is working, what is not working regarding the incremental investment into the SAPS Forensic Services? Specifically, what are the operational constraints and challenges during implementation of the intervention (such IT, HR, procurement, etc.?)

Over the course of this evaluation, the project team found a high level of commitment within the Division: Forensic Services to achieving their targets. However, three operational constraints influence their ability to meet their objectives.

Planning and monitoring

This evaluation report discusses at length the problems with the current planning. Activity planning encourages a mechanical approach to implementation instead of genuine attempts to solve problems. Numerical targets such as turnaround times encourage "target chasing" at the expense of other priorities. This is not to say that the Division should not have activity plans and turnaround time targets, but rather balanced approach is needed that focuses on activities as well as outcomes. Another important lesson for the division is that monitoring activities are not simply about monitoring targets. Monitoring is an organisational exercise that seeks to promote improvement. For example, the Division should be monitoring the number of crime scene examiners and forensic analysts who testify in court and whether their testimony contributes to a conviction. This type of monitoring provides useful information to the Division on the types of supported needed for examiners and analysts to become expert witnesses.

Supply chain management

Supply chain management practices are the source of many delays within the Division and impact adversely on the delivery of forensic services. The procurement officials of the Division: Forensic Services are struggling to cope with the increased demand to procure forensic items which contributes to the delays. Weak coordination between the Division's procurement officials and the Office of the Chief Financial Officer are frequently cited in interviews as having negative impacts on the work of the Division. When its comes to procuring technology and systems, lengthy delays on the part of SITA have set back the implementation of particular systems.

Information and technology

SAPS operates a multiple and disparate information systems. As many of these systems are not integrated, it is hard to track the effects of forensics throughout the system. Inadequate levels of integration across systems entrench a narrow view of performance and success within SAPS, as each division works towards its specific objectives and targets. Consequently, SAPS has limited information on whether detectives are using the forensic evidence and leads and the extent to which forensic evidence is being utilised across the CJS.

Human resources and financial management

In relation to the IIFS, the different types of expenditure were monitored by separate divisions. While the Division: Forensic Services managed the spending on goods and services, TMS oversee technology expenditure, and the Office of the Chief Financial Officer handled compensation of employees. Because of this division of responsibilities, the Division did not have a holistic view of how much was spent in totality on forensic services.

8.4 Sustainability

Sustainability examines the extent to which the benefits will continue to accrue to the Division, SAPS, and the CJS. Three factors promote the sustainability of the IIFS:

- The Division: Forensic Services has done well in establishing **systems to monitor** the execution of their activity plans. It monitors these business plans on a quarterly basis and takes corrective action when targets are not achieved. The combination of better monitoring and quicker remedial measures has led to a marked improvement completion of the activities and achievement of divisional targets. Thus, existing business plans and monitoring systems provide an excellent springboard for the development of a results-based implementation plan.
- There has been a definite improvement in the **management of forensic services**, and if this is maintained it will contribute to better performance over time. Before 2008, there were major drops in the production of forensic evidence around November and December every year. Since then, the division has managed its workload to minimise fluctuations over the holiday periods. By doing this, the Division can operate at capacity throughout the year and supply timely forensic evidence and reports to detectives, prosecutors and courts.
- The **investment in equipment in equipment and technology** will continue to yield substantial benefits in coming years.

Factors that hinder sustainability

Various factors adversely affect the sustainability of the IIFS:

- Forensic services do not work in isolation, and its success depends on how well other parts of the CJS function. The **lack of coordination** around the interventions that fall under the Seven-Point Plan undermines the effectiveness of the IIFS.
- Within SAPS, the critical shortages in the number of detectives means that forensic evidence is used less effectively and fewer arrests are made on the basis of such evidence.
- There are also concerns about the **high levels of charges withdrawn** by prosecutors on cases with forensic evidence. Given the cost of producing forensic evidence, withdrawals, unless they relate to children and are in line with the prescripts of the Children's Act (No. 38 of 2015), undermine the overall effectiveness of forensic services.
- **Low levels of morale** amongst crime scene examiners affect their productivity and are likely to raise the turnover of the Division. Contributing to this low level of morale is the loss of experienced members within CR&CSM and perceptions of nepotism in promotions and appointments.
- About 16% of the amount earmarked for compensation of employees was spent on overtime. Although the spending on overtime allowed the Division to reduce the backlogged case entries, overtime expenditure is a short-term fix for a pervasive shortage of forensic analysts and crime scene examiners. This practice cannot be sustained over the long-term.
- Finally, **inadequate and ill-suited physical infrastructure** will limit the ability of SAPS to cope with the increasing demand for forensic analysis.

8.5 Emerging impact

Although, this criterion was not included in the evaluation framework, the analysis revealed a number of positive trends in justice outcomes. There has been a marked increase in the percentage of charges that use forensic evidence between 2008/09 and 2014/15. This finding suggests that prosecutors are increasingly relying on forensic evidence when bringing charges against offenders. There is also some evidence to show that prosecutors prefer to bring charges based on cases where forensic evidence is present as this increases the likelihood of a conviction.

The two most forensics-heavy crime types in the sample of crimes are rape and murder. In the 2014 calendar year, 49% of murders and 74% of rapes saw some forensic analysis taking place, as opposed to the next highest of the eleven categories examined, sexual assault, where only 14% of reported crimes experienced had associated forensic analysis.

For murder cases, the analysis shows that there has been an immediate increase in forensic activity since 2009/10. This increase is across all categories of cases where forensic activity takes place including: (i) forensics, no court; (ii) forensics, guilty; (iii)) and forensics, not guilty (see Figure 11 and Figure 12). The increase in cases with forensics that generate guilty verdicts is encouraging. It shows that by increasing the use of forensic evidence in the case, the IIFS has contributed to increased convictions.

That said, there has also been a decrease in the number of cases with no forensics where guilty verdicts are reached. As a result, (and possibly because of some unresolved cases are still in the more recent years of data), the average total number of guilty verdicts has decreased slightly, from 18.4% in 2003-2008 to 17.7% in 2009-2012. There are two possible reasons for this decline in guilty verdicts:

- Prosecutors are taking fewer cases with no forensic evidence to the court. Between 2003 and 2013, the number of murder cases with no forensics taken to court fell from 5115 to 3081. Similarly, the number of rape cases with no forensics taken to court dropped from 7551 to 4695 over the same period. Therefore, it seems that prosecutors are relying more on forensic evidence to get a guilty verdict.
- There is a risk that some “easier” cases, which used to be resolved without the use of forensics, are now still being resolved, but with the added expense of possibly unnecessary forensics involved. This trend might reflect one of the unintended consequences of the IIFS; forensic evidence has become a substitute for detective work. It may be that fewer cases are solved without forensics because SAPS does not have enough detectives to cope with the number of cases.

9 RECOMMENDATIONS

KEQ 4: How can the effectiveness of the incremental investment in SAPS Forensic Services be improved and what are the implications for the design of the intervention?

The current planning cycle covers a one year period. Planning is done for the year with some targets set over the medium term in the SAPS’ annual performance plan. Given the crucial role of the

forensics services in the CJS, the IIFS should ideally be linked to a medium to long term strategy. This strategy should outline the steps taken by SAPS to sustainable build forensic capacity in the country and leverage the gains already made through the IIFS. All additional funding made available through the IIFS should be linked to this **medium to long-term plan with clear milestones for the Division** and other key role-players in the CJS. The table below contains recommendations on ways to improve the implementation of the IIFS and the forensic programme, more broadly.

Recommendation	#	Detailed recommendations
R.1 The SAPS and DOJ&CD must coordinate their planning and strengthen their monitoring systems to realise the benefits of the IIFS.	R1.1	SAPS in consultation with the DOJ&CD must prepare a **five-year National Forensic Strategy** that sets out clear objectives, outlines the role of forensic services in the CJS, and determines milestones for the development of forensic sciences in the country.
	R1.2	The Division: Forensic Sciences must use theory of change and logical framework developed for this evaluation to develop a **results-based implementation plan**. The plan must include the following: ○ **Input indicators** measure the economy and value for money achieved by the IIFS (e.g. unit cost per entry analysed) ○ **Activity indicators** track the efficiency of operations (e.g. turnaround times) ○ **Output indicators** measure the quantity and quality of forensic analysis (e.g. percentage of cases that result in a positive, negative, or inconclusive result) ○ **Outcome indicators** quantify utilisation of forensic services across the CJS (e.g. the percentage of forensic cases that lead to a guilty outcome)
	R1.3	The Division: Forensic Services must develop a **monitoring plan** that identifies: ○ The source of information for these indicators ○ The data collection and validation protocols, including a set of rules around how the data is cleaned and analysed (in respect of CR&CSM and FSL admin data) ○ Frequency of data collection
	R1.4	The Division: Forensic Services must agree to a **set of targets** for the next three years. The Division should not change the target or the method of measurement over this period or until the target is achieved consistently, whichever happens first.
	R1.5	SAPS must establish the **statistical capacity** to use the data collected by the Division: Forensic Services and Division: TMS to track and monitor the influence of forensic services on court outcomes.
R.2 The SAPS must improve its financial management processes and supply chain management practices to deliver better value for money.	R2.1	The SAPS should maintain a **consolidated expenditure report** that shows how the IIFS is spent on compensation, good, services, and technology.
	R2.2	The Division: Forensic Services, in collaboration with the Chief Procurement Officer, should **diagnose the current weaknesses in their procurement system**, and identify potential improvements. Specific issues to be addressed as part of this exercise include the: ○ Challenges in purchasing equipment and technology for forensic services. ○ Appropriateness of rotating suppliers in respect of equipment and consumables that need to be pre-tested and validated. ○ Criteria used to measure value for money. ○ Substantially above-inflation increases in the prices of goods and services. ○ Allegations of procurement irregularities and the system deficits that give rise to them.
	R2.3	The Division: Forensic Services must ensure that **value for money** during procurement. Specifically, the Division must establish value for money criteria that applies to purchasing decisions in the forensic environment.
	R2.4	The Division: Forensic Services must update their **human resources plan** with estimates of the number of, and competency of staff needed to implement the "Fingerprint Act," "DNA Act," and handle the increased workload arising from the changing nature and levels of crime in the country.
	R2.5	The Division: Forensic Services and the Division: TMS must prepare **a maintenance plan** that estimates how much funding will be required to maintain the equipment and technology procured as part of the IIFS, placing particular emphasis on those items that do not have an existing maintenance agreement.

R.3	**The SAPS should consider providing additional funding to sustain these gains and cope with the increasing demand for forensic services.**	R3.1	SAPS' senior management should review the staff plan of the division and **allocate additional positions** to the Division, with a particular priority given to crime scene examiners and forensic analysts.
		R3.2	The Department of Public Works, in conjunction with SAPS, should assess the **risk annually as required by the "DNA Act"** and submit an improvement plan with recommendations on how to address the physical infrastructure needs of the Division: Forensic Services in order to meet accreditation requirements.
R.4	**The SAPS and the SITA must work together to integrate information technology systems necessary for the forensic services programme to operate efficiently.**	R4.1	SAPS, in conjunction with SITA and the Department of Home Affairs, must set timelines to **expedite the integration of AFIS and HANIS**. The Division: TMS must monitor and report regularly on these deadlines.
		R4.2	The Division: TMS must collect, use and **integrate data from the CAS, CRIM, and FSL admin systems to monitor the utilisation** of forensic evidence and its contribution to case outcomes.
		R4.3	The Division: TMS establish **systems for data integrity and disaster recovery** that are aligned to best practices in line with the DNA Act
R.5	**The SAPS must take steps to build skills, competencies and capacity amongst forensic personnel and enhance staff welfare**	R5.1	The Division: Forensic Services must **monitor the overtime** worked by forensic analysts and examiners. Where overtime increases to harmful and unsustainable levels, the Division must review their resource allocation and establish a system to manage their staff's workloads.
		R5.2	The CR&CSM component must determine the feasibility of obtaining **accreditation for its training programmes**. To the extent possible, The CR&CSM component, together with the Division: Human Resources Management should develop an accredited programme for crime scene examiners that is recognised and registered with the South African Qualifications Authority.
		R5.3	The CR&CSM component must develop a **continuous professional development programme** so that crime scene examiners can access refresher courses. A training needs assessment should inform any such training programme. The programme must include a mentorship component so that recent hires can receive guidance from senior crime scene examiners.
		R5.4	The Division: Forensic Services, in collaboration with Division: Human Resource Management must undertake a **staff satisfaction survey** and identify actions to remedy the low levels of morale in CR&CSM.
R.6	**The SAPS must train VISPOL and detective services in securing a crime scene and safeguarding forensic evidence. VISPOL must monitor the implementation of crime scene procedures and related national instructions**	R6.1	The Human Resources Division in SAPS must develop and rollout training to improve the **forensic awareness of VISPOL**.
		R6.2	VISPOL must establish monitoring systems to ensure that first responders **comply with the National Instruction for Crime Scene Management** (NI 1 of 2015). Deviations from compliance with the instruction must be analysed and where necessary, VISPOL should take corrective action.
		R6.3	SAPS must address the **critical shortages in detectives**, which constrain the use of forensic evidence in crime investigations.
R.7	**The NPA and SAPS must interrogate the high levels of withdrawn charges in cases where forensics is present and develop plans to reverse this trend, where appropriate**	R7.1	The NPA and SAPS should interrogate the **high levels of withdrawn charges** in forensic cases, and determine if any improvement actions can be taken to reduce the number of cases with forensics that are withdrawn.

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APPENDIX 1 REVISED LOGICAL FRAMEWORK

Narrative

To achieve the impact of a "South Africa where all people are and feel safe", there were, at the onset of the CJS Revamp programme, a number of alternatives open to the CJS. Government, however, opted to invest in forensic capacity. As the provider of forensic services in the CJS, the SAPS set out the following objectives for itself:

1. Ensure a forensic human resource capacity, responsive to the needs of the CJS
2. Advance the development of personnel in forensics
3. Provide support to the criminal investigation & judicial process through the detection, collection and use of quality forensic evidence
4. Ensure the provision of reliable and timely forensic processing, analysis & examinations to support the fairness and effectiveness of the CJS
5. Establish an enabling mechanism for improved business performance and the accreditation of the forensic service laboratories (including the implementation of applicable legislation)
6. Create forensic awareness
7. Expand and decentralize the Forensic Service and Criminal Record and Crime Scene Management capacity
8. Facilitate the modernization of systems

While it is not clear to DNA Economics to what degree these priorities were defined at the outset of the IIFS and/or are amended over time, they are serve as a point of department for the development of a theory of change and logical framework. A fundamental component of the logical framework is the inclusion of the performance indicators which measure and monitor the success of an intervention. The logical framework sets out the inputs and activities that translate into outputs, outcomes and eventually impacts. It also identifies external factors that impact on the implementation of the programme. For example, an important external factor in this evaluation is the level of forensic awareness amongst the public. Does the citizen know and understand what do you at a crime scene to ensure that the evidence is not destroyed and remains untainted?

When analysed, the logical framework reveals some useful insights into the IIFS. First, and for the most part, the logical framework covers all the result areas identified in the theory of change. The extent to which these actions were carried out has planned, and led to the intended outputs are tested during the implementation evaluation. Second, performance measurement within the forensic division of SAPS is largely activity based with most indicators focused on activities. The evaluators found that only a few performance indicators that measure intermediate outputs. The focus on activity measurement is not in itself wrong. Forensic analysis is a process driven function, but more attention needs to be given to the outputs and outcomes associated with the investment in the IIFS.

The international review confirms this thinking. It suggests that for policy makers to understand the effectiveness of forensics in the CJS, the ability to link forensic evidence to case outcomes is important.[84] Current systems within the SAPS monitor the performance of the CR&CSM and FSL on an exhibit rather than a case level. While, the evaluators recognise that forensic evidence is not the only determinant of case outcomes, it can play an important role in securing justice outcomes.

However, the role of forensic analysis in case outcomes can only be established if there are systems in place to measure forensic performance in relation to its contribution to the performance of the CJS as a whole. The logical framework presented below updates the one prepared at the beginning of the project. It outlines a number of indicators that SAPS should use to track and monitor the performance of forensic services. While the logical framework contains a **comprehensive set of indicators**, it might not be **practical for SAPS** to use all of them from the outset. Rather, the evaluators recommend that SAPS identifies a set of core set of indicators that tracks inputs to impacts. As their information systems develop, other indicators can be added to the mix of measures.

	Summary	Indicator(s)	Currently measured	Source of data	Means of verification	Assumptions
IMPACT	Lower levels of crime	National crime rate	Yes	SAPS Annual Report, Crime Statistics	Audits of Performance Against Objectives	Poverty levels, unemployment rates, economic climate and social conditions
		Change in the crimes against women, children, and other vulnerable groups reported	Yes	SAPS Annual Report, Crime Statistics	Audits of Performance Against Objectives	
		Homicide rate (per 100 000 population)	Yes	SAPS Annual Report, Crime Statistics, UNODC Homicide Report	Audits of Performance Against Objectives	

[84] National Research Council (2009) *Strengthening Forensic Science in the United States: A Path Forward.* Report prepared for the US Department of Justice.

	Summary	Indicator(s)	Currently measured	Source of data	Means of verification	Assumptions
	Lower levels of perceived crime	% of people feeling safe walking alone in their area during the day	Yes	Victims of Crime Survey	Gallup Poll	
		% of people feeling safe walking alone in their area during the night	Yes	Victims of Crime Survey	Gallup Poll	
		% of households believing that the level of violent crime has gone down	Yes	Victims of Crime Survey	Gallup Poll	
LONG TERM OUTCOMES	Increased conviction rates	Change in conviction rates by type of crime	Yes	SAPS Annual Report, Crime Statistics	Audits of Performance Against Objectives	Functioning and effectiveness of the prosecution and courts
			No	Macro level time series analyses on the effect of the level of punishment on crime rates*	Impact evaluations	
	Crime deterrence	Perceptions of household's satisfied with the way courts deal with perpetrators of crime	Yes	Victims of Crime Survey	Gallup Poll	Legislation governing the level and severity of punishment Overall effectiveness of policing, prosecution and correctional services
		Recidivism rates	No	DCS annual report	CRIM	
	Forensic evidence and updated criminal records lead to better sentencing	Average sentence terms for priority crimes	Yes	DOJ*CD and SAPS Annual Reports	CRIM and CAS	

	Summary	Indicator(s)	Currently measured	Source of data	Means of verification	Assumptions
	Forensic evidence effectively contributes to conviction	Proportion of trial cases using forensic evidence where a conviction is secured (reported by type of crime)	No	Case outcomes reported by DOJ&CD	CRIM	The degree to which court officials and prosecutors understand, value and interrogate forensic evidence
INTERMEDIATE OUTCOMES	Correct bail decisions	Percentage of bail hearings where updated criminal report is made available	No	NPA monitoring reports		
		Criminal records made available within specified timeframes	Yes	CRC&CSM reports		
	Forensic evidence is sufficiently robust to withstand legal scrutiny in trial-ready cases	Proportion of trial ready cases where forensic analysts provide expert evidence	No	FSL monitoring reports		
	A plea bargain is agreed to	Proportion of cases with forensic evidence where a plea bargain is agreed	No	CRIM		
		Proportion of cases with forensic evidence where a child is diverted in line with the Children Act (2005)	No	CRIM/CAS		
	Charges are brought based on forensic and other evidence	Average time taken to complete a complete a trial ready case docket (by type of crime)	No	Case outcomes reported by DOJ&CD	Audits of Performance Against Objectives	
	Forensic evidence contributes to detection	Change in detection rates by type of crime (e.g. serious crime)	Yes	SAPS Annual Report	Audits of Performance Against Objectives	

	Summary	Indicator(s)	Currently measured	Source of data	Means of verification	Assumptions
	Forensic analysis is used by detectives during their investigation	Proportion of cases, where evidence is submitted for forensic analysis	No	FSL Admin System	System audits	
	DNA database searches produce investigative leads	% of database leads provided to detectives that lead to arrest	No	FSL monitoring reports	CAS	
		% of match reports dispatched within 24 hours	No	FSL monitoring reports	CAS	
		Number of DNA exhibits expunged per annum	Yes	CJS Performance reports		
FINAL OUTPUTS	High quality forensic evidence is produced within required timeframes	The percentage of case exhibits (entries) processed by Forensic Services within target number of days (by division)	Yes	FSL Admin System	System audits	Public awareness of forensic sciences and understanding of crime scenes.
		Proportion of entries to entries finalised	Yes	SAPS Annual Report		
		The number of backlogged cases / exhibits relative to the end of the previous year	Yes	FSL Admin System	System audits	
		Proportion of cases by discipline with a positive, negative or inconclusive result	No	FSL Admin		
		Number of forensic DNA and Ballistic investigative leads reported per annum relative to target	Uncertain	FSL Admin System Gold database and Environmental Database	System audits	
		Acceptance rate of S212 by courts as indicators	Yes	FSL Admin System		

	Summary	Indicator(s)	Currently measured	Source of data	Means of verification	Assumptions
	DNA profiles are matched	Number of DNA profile matches per annum	Yes	FSL Admin System		
	Timely availability and processing of up to date previous conviction reports	Percentage of original previous conviction reports for formally charged individuals generated within target number of days.	Yes	SAPS Annual Report	Audits of Performance Against Objectives	
	Timely and accurate finger and latent print analysis	Annual change in the following indicators: - Requests for crime-related fingerprints for possible identification and/or confirmation - Electronic Palm prints per annum - AFIS Fingerprint Identifications per annum - Manual Fingerprint Identifications per annum - Manual Palm prints per annum - Exhibits processed by Fingerprint Laboratory per annum - Cases processed by Fingerprint Laboratory per annum - Number of positive cases processed by Fingerprint Laboratory per annum - Number of shoe-print Investigations per annum - Number of positive Shoe-print Investigations per annum	Yes	SAPS Annual Report	Audits of Performance Against Objectives	
INTERMEDIATE	CR&CMSs and crime scene	Workload per Crime Scene Examiner	No	Staff figures Crime scene attendance (From 2010 - LCRC)	CR&CSM monitoring reports	

	Summary	Indicator(s)	Currently measured	Source of data	Means of verification	Assumptions
	evidence and exhibit collection is robust	Average scene attendance per CSE	No	CR&CSM monitoring reports		
		Fingerprint identifications per 1000 crime scenes examined	No	CR&CSM monitoring reports		
		DNA identifications per 1000 crimes scenes	No	FSL monitoring reports		
		Other forensic evidence per 1000 crime scenes	No	CR&CSM monitoring reports		
	Forensic laboratories are well equipped and have sufficient staff	No of forensic examiners per discipline Number of forensic examiners trained Overtime measured. Increase in court appearance	Yes	HR reports	Powerstats	
		Number of expert testimony appearances by Forensic Examiner (S212) 'Number of expert testimony appearances by Forensic Examiner (LCRC) Number of S212 reports issued per case Workload per FTE Forensic Examiner across the disciplines Ratio of operational forensic staff to forensic examiners	No	FSL monitoring reports HR reports	Powerstats FSL admin	
	Behavioural analysis contributes to investigation	Victim count per case (indicator) Hours spent per type of case	No			
	Crime scenes are secured by first responders	Proportion of crime scenes confirmed secured by first responders	No			
	Reliable reference (buccal) and other forensic samples are taken	Change number of buccal and reference (no differentiation before 2010) received	Uncertain			

	Summary	Indicator(s)	Currently measured	Source of data	Means of verification	Assumptions
ACTIVITIES	Expand and build capacity within FSL	Expenditure on capital equipment per laboratory	No	CJS Performance reports		
		Number of FSLs refurbished and renovated		CJS Performance reports		
		Percentage variation from approved equipment budget	Yes	Supply Chain Management reports, Expenditure Reports, POLFIN	Annual Financial Audit	
	Recruit, train and retain FSL staff	Number of forensic scientists recruited per annum (by level)	Yes	HR reports		The availability of a pool of qualified and suitable candidates to fill the positions within the FSL and CRC
		Expenditure on compensation of employments	Yes	BAS HR Reports	Annual Financial Audit	
		Expenditure on overtime as a proportion of total expenditure on compensation of employees		BAS HR Reports		
	Establish and maintain DNA database	Number of Forensic DNA profiles added to the DNA database relative to target	Yes	CJS Performance reports		
		Percentage of forensic DNA profiles and exhibits submitted to the FSL	Yes	CJS Performance reports		
	Establish and maintain quality management systems	Quality management component established within section	No	SANAS and SAPS Annual Report	SANAS reports, CJS Performance reports	
		Number of test methods which are accredited with SANAS	Yes	Quality Management reports		
		Planned versus total test methods accredited	Yes	CJS Performance Reports		

	Summary	Indicator(s)	Currently measured	Source of data	Means of verification	Assumptions
	Implement appropriate ICT systems to support forensic analysis	Expenditure on ICT systems relative to budget per annum	Yes	Supply Chain Management reports, Expenditure Reports, POLFIN	Annual Financial Audit	SITA has the skills and capacity to deliver system solutions promptly
		Number of systems procured and / or implemented per annum	Yes	CJS Performance reports		
		Percentage of ICT project milestones achieved	Yes	CJS Performance reports		
		System availability and performance (by type of system)	No			
		Expenditure on integration of fingerprint databases relative to target	Yes	CJS Performance reports		
		Expenditure on development of DNA database relative to target	Yes	CJS Performance reports		
	Capacitate and expand (including decentralise) CR&CSM	Average expenditure per CSE by incremental investment programme	No	CJS Performance reports		
		Number of new LCRCs and Crime Scene Labs established and operational	Yes	CJS Performance reports		
		Number of new LCRCs and Crime Scene Labs established and operational	Yes	CJS Performance reports		
		Number of service points established	Yes	CJS Performance reports		
		Ratio of LCRCs to police stations	Yes	CJS Performance reports		
		Ratio of Crime Scene Labs to police stations	Yes	CJS Performance reports		
		LCRC per 100 000 population	Yes	CJS Performance Reports		
		Number of CSEs per vehicle	Yes	Supply Chain Management reports, Expenditure Reports, POLFIN		
	Provide CSEs with the appropriate	Change in number of fingerprints accessible to SAPS relative to the end of the previous year	Yes	CJS Performance reports	Annual Financial Audit	The competence and

	Summary	Indicator(s)	Currently measured	Source of data	Means of verification	Assumptions
	equipment and consumables	Percentage variation from approved equipment budget	Yes	Supply Chain Management reports, Expenditure Reports, POLFIN	Annual Financial Audit	performance of external service and product providers
		Number of training workshops conducted Number of forensic analyst completing training relative to target per annum	Yes	Annual report, CJS Performance reports	Annual Financial Audit	
	Recruit and train CR&CSM	Number of CSEs trained per annum	Yes	HR reports		
		Attrition rates amongst CSEs	No	HR reports		
		Number of staff trained on prescriptions of Fingerprint Act Number of staff trained on prescriptions of DNA Act	Yes	HR reports		
	Train first responders (VISPOL) in CSM and raise forensic awareness	Number of VISPOL personnel trained by division per annum (e.g. proportion trained in taking buccal samples)	Yes	CJS Performance reports		
		Expenditure on forensic awareness campaign relative to budget target	Yes	CJS Performance reports		
	Train detectives in CSM and raise forensic awareness	Number of detectives trained by division per annum(e.g. proportion of detectives trained in taking buccal samples)	Yes	CJS Performance reports		

APPENDIX 2 INTERNATIONAL EVIDENCE ON FORENSICS USE

Aggravated/serious assault

Based on the available international evidence, aggravated or serious assault cases see physical evidence collected only moderately frequently. For example, one study found that "only 30% of assault incidents had physical evidence collected at the crime scenes," of which the most common form was firearms and other weapons, followed by natural/synthetic materials, with biological materials collected in only 4% of incidents.[85] As in many other forms of crime, much lower levels of collected evidence is examined than is collected (12% examined versus 30% collected).[86]

Evidence as regards the impact of forensic exhibits on criminal justice outcomes in assault cases is mixed. For example, while one study concludes that "the effect of evidence on the clearance and prosecution of aggravated assault cases is less pronounced and, in many situations, not significantly different from cases where scientific evidence is not used,"[87] another finds that:

- "contrasts between rates of arrest with and without physical evidence are statistically significant ($t = 4.91$, $p < .001$)
- About 42% of cases with physical evidence were referred to the district attorney as compared to 33% of cases without physical evidence ($t = 2.75$, $p < .001$)
- A total of 39% of cases with physical evidence were charged as compared to 27% without physical evidence ($t = 3.52$, $p < .001$)
- Approximately 27% of cases with physical evidence resulted in a conviction compared to 18% for cases without such evidence ($t = 2.91$, $p < .01$."[88]

Yet another study suggests that the effect of DNA profiling on recidivism rates in offenders convicted for violent assault can be substantial, as "profiled offenders continue to commit new offenses, but are caught much more often than those not in the database: They are 23.4% more likely to be convicted of another crime within three years than their unprofiled counterparts."[89]

Net-net, however, because forensic evidence is not collected in the majority of assault cases, it does not have an opportunity to affect criminal justice outcomes in those cases. this is in stark contrast to the next crime category considered, namely homicide.

Homicide

[85] (Baskin & Sommers, 2012, p. 192)

[86] (Baskin & Sommers, 2012, p. 192)

[87] (Peterson, J; Mihajilovic, S; Gililand, M;, 1984, p. xvii)

[88] (Baskin & Sommers, 2012, p. 192)

[89] (Baskin & Sommers, 2012, p. 192)

Homicide cases exhibit some of the highest rates of collection and examination of forensic evidence of all crime types, partly because the serious nature of the offence prompts the criminal justice system to focus large amounts of resources on it, and partly because the nature of the crime results in the production of a large amount of physical evidence (not least of which is the body of the victim). One study found that "an extremely high percentage of homicides (97%) had physical evidence collected from the crime scenes . . . No other crime in this study compares with homicide in the quantity and diversity of physical evidence collected."[90]

Forensics evidence is only one of the factors influencing the criminal justice outcome of a homicide case, and interacts with those other factors in complex ways. A study of 215 factors influencing the rate of clearance of homicide cases identified 15 key factors in terms of police practice and case characteristics, as follows:

> *"In terms of police practices, the probability of clearance increased significantly when the first officer on the scene quickly notified the homicide unit, the medical examiners, and the crime lab and attempted to locate witnesses. The length of time it took detectives to arrive at the scene also was a key factor. Cases in which the detective arrived within 30 minutes were more likely to be cleared. Faster response times are considered critical because they reduce the potential for the loss or contamination of evidentiary material, and there is a greater likelihood that individuals involved in the homicide may still be present at the crime scene. The findings also indicated that the number of detectives assigned to a case is particularly important: assigning a minimum of three to four detectives appeared to increase the likelihood of clearing it. The findings also suggested the growing importance of computer checks of various types, particularly checks on guns, suspects, and victims. Cases in which computer checks— using the local Criminal Justice Information System—were conducted on the victim, suspect, witnesses, and guns were more likely to be cleared."*[91]

> *"With regard to case characteristics, the Homicide Clearance study found that a case was more likely to be closed when witnesses were at the crime scene and provided valuable information, including the circumstances of death, the motivation for the homicide, identification of the suspect, identification of the victim, and location of the suspect. The crime was more likely to be closed when a neighborhood canvass provided valuable information, when friends and neighbors of the victim were interviewed, and when confidential informants provided valuable information or came forward on their own. When police used surveillance in a case, the case was more likely to be solved."*[92]

As can be seen, while there are links here to the role of forensic evidence, most notably as regards the impact of police response times on the quality of forensic evidence, forensics itself does not seem to be the primary determinant of most case outcomes.

[90] (Peterson, Sommers, Baskin, & Johnson, 2010, p. 74)

[91] (Peterson, Sommers, Baskin, & Johnson, 2010, p. 86)

[92] (Peterson, Sommers, Baskin, & Johnson, 2010, p. 88)

To complicate the analysis, hard-to-solve cases may attract more investment in forensic activities, precisely because an absence of other leads makes investigators concentrate on what they do have to hand, which is often principally the crime scene. One researcher commented that:

> *"Basically, more physical evidence categories are collected in personal crimes when the least information about the identity or whereabouts of the suspect is available. The fewest categories of evidence are gathered when a suspect is in custody. This pattern of collecting less physical evidence when a suspect is in custody is understandable because such cases practically always have a witness to corroborate the suspect's involvement. This reduces the need for physical evidence to link a suspect with the crime. Technicians make an extra effort when suspects are not in custody or identified in some fashion."*[93]

Similar evidence is found in a study looking at the link between collection of DNA evidence and clearance rates in homicide cases. This study found much lower clearance rates for cases with DNA evidence, and concluded that this "strongly suggests that these cases were fundamentally different and more difficult to solve."[94]

However, other studies seem to find that collection of any kind of forensic evidence is associated with better case outcomes in homicide investigations. In 1984, Peterson et al found that "conviction rates, in two of the jurisdictions studied, are significantly higher in homicide cases where physical evidence linking the offender with the crime is developed,"[95] and Peterson et al in 2010 found that "the percentage of homicide offenses with physical evidence, that lead to convictions (35.3%), was about four times higher than those cases without physical evidence (8.3%)."[96] The most common type of forensic evidence collected is firearms/weapons evidence, followed by biological evidence and fingerprints.[97]

Sexual offences

The role that forensic evidence plays in sexual offence cases is complicated by the nature of the legal issues that such cases raise. Specifically, unless the victim is a minor and the perpetrator is an adult, physical evidence that proves that sexual contact has taken place is not sufficient to secure a conviction. To substantiate a claim of sexual assault, that contact must also have been non-consensual. For this reason, evidence of physical trauma to the victim is often of particular use to achieving convictions (and in fact to helping police and prosecutors decide to pursue a case). Studies have thus found that, while forensic evidence does improve case outcomes "the strongest predictors of case charging, …. were victim reports (odds ratio = 17. 10) and victim medical treatment (odds

[93] (Peterson, J; Mihajilovic, S; Gililand, M;, 1984, p. 101)

[94] (Wilson, Weisburd, & McClure, 2011, p. 21)

[95] (Peterson, J; Mihajilovic, S; Gililand, M;, 1984, p. xvii)

[96] (Peterson, Sommers, Baskin, & Johnson, 2010, p. 80)

[97] (Peterson, Sommers, Baskin, & Johnson, 2010, p. 80)

ratio = 21.62),"[98] while "in adult cases a conviction was very much more likely if injuries were documented."[99] It should be noted that evidence of physical trauma is often collected by medical personnel rather than forensics personnel, and may fall into the classification of tangible rather than forensic evidence.

The non-forensic factors that affect case outcomes largely relate to the social status and credibility of the victim. A 2007 study, for example, found that the following factors negatively affected case outcomes:

- "victim age and socio-economic status—with older, poorer women less likely to be associated with a positive legal outcome;
- character and reputation—such as sexual promiscuity, being a sex worker, having a psychiatric history, having a drug abuse problem or criminal record;
- doing something that could be perceived as having "provoked" the attack through "risktaking behaviours"—such as hitchhiking or drug/alcohol use;
- failing to resist either verbally or physically; and
- not reporting the sexual assault promptly to police."[100]

Evidence seems to be collected in a fairly high percentage of sexual assault cases. Internationally, one 2010 study found that some sort of physical evidence was collected in 63.8% of rapes, for example, with the most common form of evidence collected being biological materials, followed by natural and synthetic materials.[101] In a 2011 study by different authors, forensic evidence was collected in almost 60% of cases, with the same pattern of biological and natural and synthetic materials being the predominant types of samples collected.[102] The presence of physical evidence also seems to help reduce the funnelling effect in rape cases, with cases with physical evidence resulting in more arrests, referrals, placement of charges[103] and convictions.[104]

The manner in which forensic evidence is used in sexual assault cases is highly variable. Even where sexual assault kits are frequently collected, they are often unlikely to have been examined before decisions are made to pursue a case, and thus it is difficult to draw conclusions on exactly how they influence case outcomes. One study suggested that "the initial association between forensic

[98] (Peterson, Sommers, Baskin, & Johnson, 2010, p. 98)

[99] (Jewkes, et al., 2009, p. 7)

[100] Du Mont and White (2007) quoted in (Baskin & Sommers, 2012, p. 192)

[101] (Peterson, Sommers, Baskin, & Johnson, 2010, p. 90)

[102] (Sommers & Baskin, 2011, p. 322)

[103] (Peterson, Sommers, Baskin, & Johnson, 2010, pp. 93-94)

[104] (Peterson, J; Mihajilovic, S; Gililand, M;, 1984, p. xvii)

evidence and conviction was more a reflection of prosecutors' rejection of cases that seemed "ambiguous" because of the circumstances of the assault (e.g., victim-offender relationship or offender tactics) rather than a reflection of forensic evidence per se."[105]

The manner in which DNA evidence is collected and examined in particular seems to frequently be suboptimal. Rape kits are often not submitted for forensic examination, and "a common explanation for not submitting evidence for screening in sexual assault cases is that "no suspect had been identified.""[106] The implication is that DNA evidence is more often being used to confirm the identity of known suspects, rather than to find unknown offenders.[107] Some of the potential of DNA databases, for example to identify patterns of serial sexual offenses by the same individual which may strengthen an otherwise isolated 'acquaintance' sexual assault case, is thus probably yet to be realised.[108] This is reflected in a 2010 study of 602 sexual assault cases in the United States. Of the 602 cases, nine had DNA profiles that were put on the CODIS DNA database, of which only four resulted in a positive identification. The database thus helped to identify a suspect in only 0.7% of cases.[109]

Despite these concerns, it does seem that forensic evidence plays a role in improving justice system outcomes in sexual assault cases, by improving the proportion of cases resulting in arrests, charges being laid and conviction levels.[110]

South African experience: forensics and sexual assault

Published research on the link between forensic evidence and sexual assault criminal justice system outcomes in South Africa specifically was undertaken by Jewkes et al in 2009,[111] and forms a valuable resource for this analysis. On the available evidence, it is striking to observe the similarities between the South African forensic experience and the international experience, although the criminal justice system outcomes appear to be significantly worse in South Africa.

The study looked at the results obtained in 2 068 attempted and completed rape cases reported in a sample of Gauteng police stations in 2003, which comprised 17% of the 11 926 cases reported in

[105] (Quadara, Fileborn, & Parkinson, 2013., p. 9)

[106] Lovrich et al., 2004, p. 3; see also Patterson & Campbell, 2012; Pratt et al., 2006; Strom & Hickman, 2010 in (Fallik & Wells, 2015, p. 601)

[107] Lovrich et al., 2004, p. 3; see also Patterson & Campbell, 2012; Pratt et al., 2006; Strom & Hickman, 2010 in (Fallik & Wells, 2015, p. 601)

[108] (Peterson, Sommers, Baskin, & Johnson, 2010, p. 105)

[109] (Peterson, Sommers, Baskin, & Johnson, 2010, p. 93)

[110] (Jewkes, Christofides, Vetten, Jina, Sigsworth, & Loots, 2009)

[111] (Jewkes, et al., 2009)

the province in that year. All cases selected had already been closed. Of the cases selected, only 1 547 had medico-legal examination forms[112] completed and still available. Table 27 below shows the funnelling process for these cases, split out into child and adult victims. As shown, roughly half of suspects were arrested, a trial commenced in 14% of cases, and 4.8% of cases resulted in conviction. While 80.5% of cases had a completed forensic kit, only 60.2% of those kits were sent for forensic examination, and only 1.4% of cases had a report on DNA evidence.

Table 27: Attrition of rape cases in the criminal justice system and attrition in handling and processing of forensic evidence, 2009 sample

Attrition	Adults		Children		p-Value
	n	%	n	%	
Overall attrition of cases					
Opening case	951	100	596	100	—
Suspect arrested or asked to appear in court	430	45.2	341	57.2	0.0001
Charged in court	365	38.4	284	47.7	0.0015
Trial commenced	101	10.6	108	18.1	0.0006
Found guilty of sexual offence	31	3.3	44	7.4	0.0001
Sentenced to imprisonment	30	3.2	24	4	0.36
Attrition in handling and processing forensic evidence					
J88 completed and available	951	100	596	100	—
Forensic kit completed	868	91.3	377	63.3	0
Forensic kits sent to lab	659	69.3	273	45.8	0
Suspect's blood obtained	84	8.9	54	9.3	0.81
Report from forensic lab on DNA	10	1.1	12	2	0.28

Source: (Jewkes, et al., 2009, p. 3)

The frequency with which forensics is used in South African and the United States rape cases appears to be very similar, by cross examination with the two US studies in the brief literature survey. As shown in **Table 28: Attrition in use of forensics in South African and US rape cases** below, once the Jewkes study is rebased to include all incidents, which makes it more comparable with the two US cases,[113] rates of completion of forensics kits are very similar (around 60%), and South Africa seems to send slightly more forensic kits to the lab, and receive slightly more DNA results, than the US. However, as seen in some of the international analysis summarised in Section 4.1.1, Jewkes et

[112] In South Africa, the relevant form is a J88, and it is completed by the doctor or other medical staff who examine the victim of any form of interpersonal violence.

[113] Some caution still needs to be taken as regards exactly how comparable these studies are. Although best efforts have been made to rebase the South African numbers to improve comparability, there may still be differences in the extent to which attrition has already occurred by the time a case is recorded as an incident for the purpose of the study concerned.

al. conclude that the potential of DNA evidence is not yet fully realised in South African sexual assault investigations.[114]

Table 28: Attrition in use of forensics in South African and US rape cases

	South Africa (Gauteng)		Los Angeles County and Indianapolis		Los Angeles County, Indianapolis, Indiana State Police	
	(Jewkes et al. 2009)		(Sommers & Baskin 2011)		(Peterson et al. 2010)	
	Number	% of total	Number	% of total	Number	% of total
Total incidents	2 068	100.0%	381	100.0%	602	100.0%
Forensic kit completed	1 245	60.2%	227	59.6%	384	63.8%
Forensic kits sent to lab	932	45.1%	159	41.7%	194	32.2%
Report from forensic lab on DNA	22	1.1%	-	-	2	0.3%

Source: As indicated, row 2

Much larger differences are seen between the US and South African criminal justice system outcomes, as reflected in the table below. The key difference is in conviction rates. While only 3.6% of opened cases in South Africa resulted in a conviction, in the two US studies the conviction rate was comfortably above 10%. If the amount of forensics effort being expended in South African sexual assault cases is in fact as similar to the US as Table 29 suggests, then there is considerably less output being achieved for forensic spending in South Africa than the US.

Table 29: Attrition in justice proceedings in South African and US rape cases

	South Africa		Los Angeles County and Indianapolis		Los Angeles County, Indianapolis, Indiana State Police	
	(Jewkes et al. 2009)		(Sommers & Baskin 2011)		(Peterson et al. 2010)	
	Number	% of total	Number	% of total	Number	% of total
Opening case	1 547	100.0%	381	100.0%	602	100.0%
Suspect arrested or asked to appear in court	771	37.3%	226	59.3%	271	45.0%
Charged in court	649	31.4%	60	15.7%	81	13.5%
Found guilty of sexual offence	75	3.6%	49	12.9%	67	11.1%

Source: As indicated, row 2

Property crimes: burglary, robbery and similar volume crimes

[114] (Jewkes, et al., 2009, p. 7)

The definition of property crime used in international forensics literature differs slightly from paper to paper, and thus it is most useful to discuss all property crimes in one category. Volume crimes are typically defined as a form of property crime, for example:

> *"Volume crime, for the purpose of this research, was defined as four offences: burglaries of dwelling houses, burglaries in buildings 'other than a dwelling', thefts from motor vehicles and thefts of motor vehicles."*[115]

Property crimes often do not produce much evidence, either forensic or otherwise, not least because they are often crimes of stealth. For example, one study found that in 95% of burglary cases no witness report is available to police.[116] In many cases, therefore, the police have few if any leads, and arrest and conviction rates are accordingly low – in the same study mentioned above, 8% of burglaries resulted in arrests and only 3% in convictions.[117]

Physical and forensic evidence is not collected in the bulk of property crime scenes. In the literature examined, the rate appeared to be in the region of 20-25% of cases, with the bulk of evidence being latent prints or substrates on which prints might be found.[118,119] Biological evidence from which DNA profiles might be developed is rarely collected – in one study, only 1% of burglaries saw collection of biological evidence.[120]

There appears to be some evidence that collection of forensic evidence is more likely if a suspect is already in custody. As per Peterson et al (1984) "*given the low probability of solving property offenses when a suspect is neither in custody nor identified at the beginning of the investigation, technicians may have learned through experience that there is little payoff in collecting many categories of evidence in such cases. When a suspect is in custody, though, the technician is presented with an opportunity to corroborate that suspect's involvement through physical evidence."*[121] This is probably a logical and cost-effective response to the need to efficiently ration forensic services in the property crime arena, where the sheer volume of cases may otherwise be overwhelming. As per Tilley and Townsley (2009) on volume crimes:

> *"The sheer number of cases involved means that the case-by-case approach adopted in major crime investigation is not practicable. The speculative and thorough searches for possible physical evidence*

[115] (Burrows, Hopkins, Hubbard, Robinson, Speed, & Tilley, 2005, p. 2)

[116] (Peterson, Sommers, Baskin, & Johnson, 2010, p. 60)

[117] (Peterson, Sommers, Baskin, & Johnson, 2010, p. 60)

[118] (Peterson, Sommers, Baskin, & Johnson, 2010, p. 60)

[119] (Baskin & Sommers, 2012, p. 198)

[120] (Peterson, Sommers, Baskin, & Johnson, 2010, p. 60)

[121] (Peterson, J; Mihajilovic, S; Gililand, M;, 1984, pp. 101-102)

> *and analyses of items recovered, which can be undertaken where needed in major crime investigation, are not possible with the resources available. There are nowhere near enough senior forensic practitioners to allocate one to each case or sufficient crime scene examiners for every crime scene to be attended by one of them. Moreover, it is not conceivable that those resources will become available in the foreseeable future. The issue for volume crime investigation is, therefore, that of maximising the benefits from the limited resources available."*[122]

However, where physical evidence of some type is collected, it often plays a significant role in case outcomes. One examination of burglary cases suggested that "*42% of arrests for cases with evidence can be attributed to examination of, or leads provided by, the evidence*."[123] Similarly, in robbery cases the collection of physical evidence (not all of which may comprise forensic evidence) seems to improve the likelihood of arrests, case referrals, charging and conviction rates.[124] For robberies and burglaries, one study suggests that "*forensic evidence has its greatest effect in cases which, traditionally, have the lowest solution rates--cases with suspects neither in custody nor identified at the preliminary investigation stage. Moreover, significantly more persons arrested for the crimes of burglary and robbery are convicted in cases with analyzed forensic evidence.*"[125]

Similarly, while DNA evidence is not collected in many property crimes, where it is collected it appears to make a substantial impact on case outcomes. Various studies have found that DNA testing in volume crimes "*more than tripled the odds of identifying a suspect and making an arrest, and more than doubled the odds of a case being accepted for prosecution*."[126] In the United States, the Denver DA in particular has undertaken research specifically to tease out the impact of DNA testing on property crime outcomes. They have found that, while only approximately 7% of burglary cases produced DNA evidence, the prosecution rate on those cases was 32.5%, versus only 5.9% for cases without such evidence.[127]

While the collection and examination of DNA evidence is found to add substantially to case costs, the Denver DA research moreover suggests that it is cost effective when the effects of crime deterrence are taken into account. They found that in 2006, the use of DNA profiling probably helped them to identify and convict 40 prolific burglars, responsible for around 242 crimes annually each, with each crime resulting in an average loss of $2 468 ($23.9 million in total). [128] Another study found that DNA testing cost in the range of $815 to $2,481, with the additional costs of DNA testing per additional conviction in the range of $2,000 to $13,000.[129] These figures suggest that although DNA

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[122] (Tilley & Townsley, 2009)

[123] (Peterson, Sommers, Baskin, & Johnson, 2010, p. 65)

[124] (Peterson, Sommers, Baskin, & Johnson, 2010, p. 112)

[125] (Peterson, J; Mihajilovic, S; Gililand, M;, 1984, p. xvi)

[126] Roman et al. (2008), quoted in (Wilson, Weisburd, & McClure, 2011, p. 22)

[127] (Tilley & Townsley, 2009)

[128] (Ashikhmin, Berdine, Morrissey, & LaBerge, 2008, p. 7)

[129] (Wilson, Weisburd, & McClure, 2011, p. 23)

testing is likely to play a role in only a small minority of property crimes, the extra cost of doing so is likely to be justified by the resulting reduction in crime rates.

APPENDIX 3 SELECTED RESEARCH INSTRUMENTS

A 3.1 introduction

In 2009, National Treasury approved additional funding (the "incremental investment") for the SAPS Forensic Services as part of the implementation of the so-called "Seven Point Plan" for the improvement of the Criminal Justice System (CJS). Given the importance of high quality crime scene evidence collection and forensic analysis to the effectiveness of the wider CJS, it is critical to understand what the results and effects of this incremental investment has been, and to investigate ways in which forensic services can be further improved going forward.

As a result, DNA Economics has been commissioned to conduct this deeper assessment of the expenditure associated with the incremental investment into forensic services and the effects thereof on SAPS and the wider CJS cluster. We have specifically been asked, by DPME, to seek your involvement in this study. The study aims to assess how the incremental investment funds were both intended to spent and actually spent, how effective this spending has been and what factors might have inhibited the spending from having a greater effect. The information you provide will assist us in answering these questions and ensuring that the effectiveness of future expenditure on forensic services is maximised.

This study will be carried out in five main stages:

1. **Inception stage**: The project commenced with an inception meeting between the core members of the evaluation team, DPME, SAPS and the NPA. The meeting provided the basis for a solid foundation and mutual understanding of the plan and delivery of this evaluation.
2. **Documentary, legislative and international review**: The project team conducted an in-depth systematic review of relevant programme documentation supplied by SAPS, external literature on the CJS revamp programme's work and performance, as well as reviewing recent legislative changes in the forensic area and how forensic services are delivered in key international comparison countries.
3. **Evaluation framework, instruments and fieldwork**: As the first step in this stage, the team developed a logical framework and a theory of change for the incremental investment, as well defining the evaluation framework and the research instruments that will inform the rest of the evaluation. The next part of this project stage is then to conduct semi-structured interviews with and collect documentation from identified key parties in the forensics division as well as other stakeholders involved in or affected by the incremental investment in forensics.
4. **Expenditure Tracking**: This stage uses collected information to provide a detailed understanding of the cost elements, expenditure drivers, and expenditure of the incremental investment programme.
5. **Cost benefit analysis**: Compares the total costs of the programme to the measurable benefits resulting from it. More specifically, it uses the the data and information captured during the preceding stages to estimate the societal welfare impact of the incremental investment.

6. **Reporting and recommendations**: During this stage, the draft reports will be circulated to important stakeholders for comment, before the findings and recommendations of the evaluation are discussed and finalised.

.

A 3.2 Discussion Guides

The tables below provide indicative interview guides that will be used in the interviews that are to be conducted in the next stage of the project. Given the large number of interviews that are to be conducted and the many different types of respondents that will be interviewed, the guides will be customised to specific respondents.

Interview Guide: Forensic Science Laboratories

Section 1:	Introduction	Notes
1	**Name**	
2	Section	
3	Position/Role within SAPS	
4	Time in current position/role within SAPS	*Length of time*
5	Previous position	
Section 2:	**Personnel and training**	
6	Has your section employed more personnel/employees since the inception of the incremental investment? If so,	*Yes/No*
6a	- What categories of employees (e.g. forensics/ administration) have been employed?	
6b	- Has any increase been sufficient to meet increased demand for your services?	*Yes/No*
6c	- How has the additional resources enable the unit/section/division to reduce the backlog and / or improve turn-around times?	
7	What challenges do you experience in finding and retaining the right candidates? Specifically,	
7a	- What factors prohibit posts from being filled more effectively and efficiently?	
7b	- What factors prevent / reduce the retention of skilled analysts?	
8	To what degree is the training provided to forensic analysts effective and sufficient to ensure competent and effective analysts?	*Scale of 1 to 10, where 10 is most effective*
9	Are there continual training courses/workshops/conferences that they are compelled to attend?	*Yes/No*
Section 3:	**Equipment, consumables and systems**	
10	How have each of the main items of expenditure in your section (list to be provided to each interviewee) affected your ability to deliver high quality forensic analysis (if at all)	
10a	For each of these items, comment on the extent to which they meet the needs and requirements of your division?	

10b	Do you feel that there are other resources that could have been purchased instead which could have improved the performance of the unit/division? Please specify.	*Yes/No*
Section 4:	**Performance**	
11	What is the exact definition of the performance measures (including definition of "exhibit / entry", "routine" vs "non-routine" exhibits and "backlog") in your section / discipline (e.g. ballistics / biology etc.) of the FSL and how have these definitions changed over time?	
12	Are there any other performance measure of the unit? Please specify.	*Yes/No*
13	How is your performance measured in terms of your performance agreement?	
14	What factors are responsible for the increase in exhibits over time within the FSL in your section?	
15	What other factors determine the variations in performance between the different years under consideration?	
16	What are the different ways in which you measure the performance of your section? What documentary evidence is available to measure changes over time in these measures?	
17	How do improvements in your area contribute to better outcomes in the wider CJS?	
18	How has the expenditure under the Incremental Investment contributed to the performance of your section / discipline (e.g. ballistics / biology etc.)?	
19	What factors have prohibited the investment from being more effective? Select all that apply.	
19a	- Physical infrastructure	*Yes/No*
19b	- Delays in acquisitions	*Yes/No*
19c	- Difficulties in retaining staff	*Yes/No*
19d	- Purchased equipment / systems not being fit for purpose	*Yes/No*
19e	-Purchased equipment / systems not being implemented effectively	*Yes/No*
19f	- Other (specify)	*Yes/No*
20	What are the main remaining challenges faced by your section / discipline in delivering high quality timely forensic analysis?	
Section 5:	**Legislation**	
21	In what ways has the passing of the Fingerprint and / or DNA Act changed the responsibilities and workload of your section?	
22	What training has been conducted to ensure that analysts are adequately informed to comply with the requirements of new legislation?	

Interview Guide: Criminal Record and Crime Scene Management (CR&CSM)

Section 1:	Introduction	Notes
1	**Name**	
2	Section	
3	Position/Role within SAPS	
4	Time in current position/role within SAPS	*Length of time*
5	Previous position	
Section 2:	**Personnel and training**	
6	Does the CR&CSM currently have sufficient human resource capacity?	*Yes/No*
7	Has your human resource capacity improved since the outset of the incremental investment? If so,	*Yes/No*
7a	- What categories of employees (e.g. crime scene experts/ administration) have been employed?	
7b	- Has any increase been sufficient to meet increased demand for your services?	*Yes/No*
7c	- Has the additional capacity significantly improved your ability to meet performance targets?	*Yes/No*
8	What challenges do you experience in finding and retaining the right candidates? Specifically,	
8a	- What factors prohibit posts from being filled more effectively and efficiently?	
8b	- What factors prevent / reduce the retention of skilled crime scene experts and other CR&CSM staff?	
9	To what degree is the training provided to CR&CSM staff effective and sufficient to ensure competent and effective CR&CSM?	*Scale of 1 to 10, where 10 is most effective*
10	Are there continual training courses/workshops/conferences that they are compelled to attend?	*Yes/No*
Section 3:	**Equipment, consumables and systems**	
11	How have each of the main items of expenditure (list to be provided to each interviewee) affected the CRC's ability to perform its duties accurately, effectively and efficiently (if at all), both nationally and locally?	
11a	For each of these items, comment on the extent to which they meet the needs and requirements of your section	
11b	Do you feel that there are other resources that could have been purchased instead which could have improved the performance of the unit/division? Please specify.	*Yes/No*
Section 4:	**Performance**	
11	What factors are responsible for the change in workload over time within the CR&CSM?	
12	What are the different ways in which you measure the performance of the CRCs at local / provincial level? What documentary evidence is available to measure changes over time in these measures?	
13	To what degree has the expenditure under the incremental investment improved:	

13a	- Capacity of the CRC?	*Scale of 1 to 10, where 10 is highest level of improvement*
13b	- Competency of the CRC?	*Scale of 1 to 10, where 10 is highest level of improvement*
13c	- Efficiency of the CRC?	*Scale of 1 to 10, where 10 is highest level of improvement*
14	What factors have prohibited the investment from being more effective? Select all that apply.	
14a	- Physical infrastructure	*Yes/No*
14b	- Delays in acquisitions	*Yes/No*
14c	- Difficulties in retaining staff	*Yes/No*
14d	- Purchased equipment / systems not being fit for purpose	*Yes/No*
14e	- Purchased equipment / systems not being implemented effectively	*Yes/No*
14f	- Other (specify)	*Yes/No*
15	What are the main remaining challenges faced by your section / discipline in delivering high quality timely forensic analysis?	
16	Are there any other performance measure of the unit (other than those listed in the annaul report)? Please specify.	
17	How is your performance measured in terms of your performance agreement?	
Section 5:	**Legislation**	
18	In what ways has the passing of the Fingerprint and / or DNA Act changed the responsibilities and workload of your section?	
18a	What has been done to ensure that these responsibilities can be executed as required?	
19	Has SAPS successfully developed the capacity to link to the relevant external databases that may be accessed according to the Fingerprint Act?	*Yes/No*
19a	What additional systems and / or hardware was required to achieve this?	
20	What training has been conducted to ensure that your section's staff are adequately informed to comply with the requirements of new legislation?	

Interview Guide: Quality Management

Section 1:	**Introduction**	**Notes**
1	**Name**	
2	Section	
3	Position/Role within SAPS	
4	Time in current position/role within SAPS	*Length of time*
5	Previous position	

Section 2:	Quality Management	
6	What initiatives have been undertaken to improve the quality of forensic evidence collection and analysis?	
6a	To what extent have these improvements been funded through the incremental investment?	*Scale of 1 to 10, where 10 is entirely through the incremental investment*
7	What indicators of quality are collected and recorded in the FSL, and what monitoring of these indicators is done? How has this measurement and monitoring changed over time?	
8	What are the plans in terms of accreditation of labs?	
9	What factors complicate attempts to accredit forensic labs? What is being done to address these issues?	
10	What are the key benefits that would result from a greater level of accreditation?	
Section 3:	**Legislation**	
11	Please describe your involvement in the creation and drafting of the DNA Act?	
12	In what ways is the amended legislation expected to contribute to improved conviction and exoneration rates?	
13	To what degree are the requirements of the legislation practically achievable by SAPS and other stakeholders?	*Scale of 1 to 10, where 10 is entirely achievable*
13a	Are funds available to meet these requirements?	*Yes/No*
14	In your opinion, are there any remaining shortcomings of the legislation that could limit the effectiveness of DNA evidence?	*Yes/No*
15	What indicators are collected and monitored to measure the effect of DNA legislation?	
15a	Based on these indicators (and other evidence) have you observed any improvements resulting from amended legislation up to date?	*Yes/No*
16	How has the capacity and effectiveness of the DNA Database improved over time? What plans are in place to ensure future improvement?	

Interview Guide: National Prosecuting Authority and Department of Justice

Section 1:	Position	Notes
1	What is your current position and role?	
2	How long have you been in this position?	
3	What was your previous position / role?	
Section 2:	**Involvement with SAPS and CJS Review**	

4	Please describe the nature and range of interactions of your department with SAPS in general and forensic services, in particular.	
5	Please describe how the outputs of the forensic services division affects your department	
6	In particular, which aspects of your performance is affected by forensic evidence and analysis?	
7	Have you observed an improvements in the outputs of the forensic services division since the start of the incremental investment (2009/10)?	
8	In what practical ways do there improvements (if any) manifest themselves? In other words, which forensic outputs that you observe have improved?	
9	To what extent have these improvements benefited the quality, effectiveness or efficiency of your department?	
10	Does the quality of forensic analysis produced stand up to the scrutiny of the courts? Has the extent to which this happens increased over time?	
11	Is forensic evidence and analysis playing a greater role in the prosecution of crime? If not, what is preventing this from happening?	
12	Has forensics contributed to a reduction in the backlog of cases or an increase in prosecutions or acquittals?	
13	What indicators do you collect that could help measure the effect of changes in the forensic services environment?	
Section 3	**Legislation**	
14	To what extent has the passing of the Fingerprint and / or DNA Acts improved your ability to obtain more accurate convictions and a greater number of convictions?	
15	Have any such potential benefits been realised in practice?	

Interview Guide: Visible Policing and Detective Services

Section 1:	**Position**	**Notes**
1	What is your current position and role?	
2	How long have you been in this position?	
3	What was your previous position / role?	
Section 2:	**Crime Scene Interactions with Forensic Services (to be answered by both VISPOL and Detectives)**	
4	Please describe the nature and range of interactions of your department with forensic services personnel (incl. CR&CSM and FSL).	
5	Please describe the criteria that determine when forensic crime scene experts are called to the scene of a crime and how they support the crime scene investigation process.	
6	In your opinion, has the quality and amount of support that you receive from crime scene experts increased in recent years?	
6a	Has the time spent at crime scenes by forensic crime scene experts, on average, increased in recent years?	

6b	What factors inhibit the quality and quantity of forensic evidence collected at the scene of crimes?	
6c	Have the response times of forensic crime scene examiners improved in recent times?	
Section 3:	**Investigative Interactions with Forensic Services (to be answered only by Detectives)**	
7	Does forensic analysis play a greater role in investigation and arrests than it did in the past?	
7a	If yes, what are the main drivers of this increased role?	
7b	Have you observed quality improvements in the forensic analysis supplied to you?	
7c	Has the turn-around time of forensic analysis improved over time in your experience? Please expand	
8	Has forensic analysis contributed to a greater number of arrests in recent years?	
9	Has the reduction in the forensic backlog and improved efficiency of forensic analysis (if and where it exists), reduced the time it takes to complete an investigation?	
10	What factors inhibit forensic evidence and analysis from playing a greater role in arrests and convictions?	
Section 4	**Effect of newly amended legislation**	
11	In what ways has the passing of the Fingerprint and / or DNA Acts increased the workload of your section (VISPOL / Detectives) during the investigation of the crime scene?	
12	Is there sufficient capacity within your section to meet the requirements of amended legislation?	
13	To what extent has the passing of the Fingerprint and / or DNA Acts improved your ability to obtain arrests and resolve investigations?	
Section 5	**Training and Forensic Awareness**	
14	What training and information has been received by VISPOL / Detectives to increase their understanding of how forensic evidence should be secured, collected, recorded and interpreted?	
15	Do you feel that VISPOL / Detectives have a greater degree of forensic awareness and knowledge than before?	
16	Are there ways in which forensic awareness could be further enhanced? i.e. in what particular areas is forensic awareness amongst VISPOL / Detectives staff still lacking?	