

COMBINED NATIS, CVD AND E-FORCE PILOT PROJECT

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ABSTRACT

The basis for traffic management is determined by the National Road Traffic Act and related legislation; supplemented by various policies, strategies, manuals and other supporting documentation. Traffic legislation not only addresses vehicle standards and driver behaviour on our roads - such as speeding, wearing of seatbelts, etc - but also prescribes, in detail, the exact process and procedures to be followed when, for example, a vehicle testing station or driving licence testing centre is assessed for registration and grading. The Act also prescribes the roles, responsibilities and duties of a number of role players in the road traffic environment – traffic officers, examiners of vehicles, etc.

No road traffic management system can operate optimally without the full support of an accurate, reliable and comprehensive road traffic information system. Access to information on, amongst others, drivers, vehicles, infrastructure and resources is needed on a continuous, timeous and real-time basis by many role players within the system to plan and perform their daily tasks, as well as to measure performance and outcomes.

The ultimate aim, vision and mission of road traffic management is to promote compliance with legislative requirements, to improve road safety and to reduce fraud and corruption. Traffic management comprises many components that need to be integrated in a harmonised order to obtain the desired results.

This paper briefly describes the systems, technologies and procedures in road traffic management that have been established, or that are in the process of development, by the Department of Transport, to address the above issues. These are mainly aimed at assisting and improving the efficiency of officials and officers in some of the functional areas of road traffic management and law enforcement in particular, with the ultimate goal to improve law compliance and reduce road traffic crashes.

1. INTRODUCTION

In order to combat the daily carnage in terms of traffic accidents on our roads we need to effectively combat the occurrence of traffic offences and lower the level of lawlessness. We need a paradigm change. The Road to Safety Strategy: 2001-2005 encompasses a variety of programmes and projects to do just that. Targets have been set in carefully separated stages to take realistic account of the constraints still facing us in the current phase of fundamental restructuring of road traffic safety management.

Four key thematic areas have been defined as areas of action:

- Enforcement and law compliance
- Operator, vehicle and driver fitness
- Infrastructure, management and information systems; and
- Communication, public education and participation.

Two of the four key thematic areas defined in the Road to Safety involve traffic law enforcement and which are directly related to the daily task of each and every traffic officer. Of all the role players involved in the improvement of road safety, traffic law enforcement could possibly be regarded as the most visible functional area, and which is subjected to general public and road user opinion on a daily basis.

The White Paper on National Transport Policy states:

“Traffic Policing (law enforcement) is a priority of traffic management, due to a severe breakdown in discipline on the roads, which in turn leads to unsafe conditions, damage to the road infrastructure, etc. The lack of discipline can only be rectified through strong proactive and reactive control actions. The effectiveness of the traffic control function must be improved substantially.”

The restraints holding us back are well known and include, amongst others : insufficient personnel levels; scarce financial resources; equipment needs; insufficient use of information; a lack of planning, scheduling and undertaking of enforcement; as well as challenges within the judicial system.

To overcome these restraints new procedures, technologies, equipment and systems are being developed. It is envisaged that some of these will be in place before the end of 2004 and will bring about a radical change in law enforcement and will assist traffic officers in working smarter and more effectively. Improved use will be made of accident, offence and other traffic information to plan and schedule law enforcement actions. Officers will also have continuous access to information on drivers, vehicles and owners stored on the National Traffic Information System (NaTIS), as well as other electronic support such as charge-sheets, traffic fines, etc from the roadside. In the past we have been relying too much on the human factor in our efforts to manage and control road traffic. Although we will never be able to replace the human element, the time has come to make use of technologies that are available.

2. THE NATIONAL TRAFFIC INFORMATION SYSTEM (NaTIS)

The National Traffic Information System, (NaTIS), is the information backbone that supports legislation and a great variety of daily functions and transactions related to road traffic at all levels of Government. Government Departments such as the South African Police Service (SAPS), the South African Revenue Service (SARS), the National Intelligence Agency (NIA), private sector financing and banking institutions, as well as other role players, such as Business Against Crime (BAC), also rely on NaTIS for certain information requirements.

NaTIS not only facilitates the administration of road traffic legislation, it also contains comprehensive, accurate and timeous data, information and statistics on most aspects relating to road traffic management, including the strategic decision making process in this regard. The enormous potential of NaTIS is not yet fully utilised, and additional, more effective functions and procedures need to be developed and implemented to harness this source in support of increased law compliance.

The development of NaTIS was initiated in the early 1990's to support the previous Road Traffic Act, Act 29 of 1989, which was implemented on 1 June 1990 and more recently the National Road Traffic Act, Act 93 of 1996. Most of the aspects contained in legislation are provided for in NaTIS.

NaTIS provides *inter alia* the following aspects:

- Vehicle registration and licencing and roadworthiness of vehicles;
- Registration of Operators;
- Driver and professional driver registration and licencing;

- Registration of authorised officers, examiners of vehicles and driving licences;
- Registration of vehicle and driver testing facilities;
- Recording of road accident information; and
- Recording of road traffic offences.

NaTIS is an on-line computer system allowing, for example, a registering authority to key-in, verify and process the particulars in respect of a vehicle registration transaction whilst the applicant is still present, instead of concluding the transaction by hand and mailing the documentation to a central location for capturing of the data.

By the end of 2003 NaTIS had been deployed at 850 sites across the country. Approximately 2500 users use the system on a daily basis and more than 70 million transactions and queries are performed annually on the system. More than six different interfaces have been deployed which are used by more than 80 authorities across the country.

NaTIS has been designed to assist in curbing various forms of fraud and motor vehicle related crime.

At present, provision has been made for the following:

- Maintaining a comprehensive record of transactions in respect of each holder of a driving licence in South Africa;
- Recording of all convictions in respect of road traffic offences for a person, and
- Identification of habitual offenders by means of a points demerit system and the subsequent suspension or cancellation of driving licences.

The system has been amended to ensure the successful conclusion of outstanding offences (offences where the offender failed to appear in court) by refusing the issuing of a clearance certificate to the owner of a motor vehicle who has outstanding offences recorded against him/her. Furthermore, any other transactions relating to the owner and the vehicle will be refused until the offender has settled all his/her outstanding traffic fines with the authority that initiated the prosecution. The regulations have already been amended and are effective from 1 June 2003, allowing the refusal to issue a vehicle licence disc, should the owner have outstanding offences.

Although the Administrative Adjudication of Road Traffic Offences (AARTO) Act has not yet been put into operation, the Department is developing the implementation of the first phase of the National Contravention Register (NCR) on the NaTIS.

NaTIS has been designed to curb motor vehicle theft and hi-jacking by establishing a closed system, restricting the market for stolen motor vehicles, as well as preventing and curbing various forms of corrupt practices. For example, The SAPS has, through their link to NaTIS, ensured the reduction of motor vehicle crime and hi-jackings. The SARS managed to trace tax evaders and recovered more than half a billion Rand in 2003. And the NIA also managed to crack a few crime syndicates through their link with NaTIS.

3. THE DEVELOPMENT OF e-NaTIS

The e-NaTIS system is currently being developed to replace the current NaTIS system that has been in operation since 1991. The e-NaTIS system will replace the current architecture of NaTIS with a centralised solution consisting of a centralised Data Centre (DC) as well as a Disaster Recovery (DR) site. The DR site will become operational in the case of a major system disaster. All data is duplicated at the disaster recovery site on a real time basis. The Data Centre will be connected to all 850 sites through an efficient virtual private network giving access to more than 2,500 NaTIS users concurrently. The focus of the e-NaTIS system is to provide state-of-the-art technology with

maximum interpretability between related systems.

The e-NaTIS application is being developed in a Java shell for internal users, and browser technology will be made available for external users. e-NaTIS will be fully operational by the middle of 2005.

4. SECURE AND AUTHENTIC DRIVER AND VEHICLE DOCUMENTATION

The new credit card format driving licence was introduced on 1 March 1998. The driving licence card is a document of high integrity with a number of security features. These security features ensure that it is extremely difficult to produce a counterfeit card. Even if a person has the ability to successfully produce a counterfeit, the high cost would not be worthwhile in view of the fact that a driving licence card is valid for only five years.

One of the most important characteristics of the card is the two-dimensional bar code that appears on the back. All the information that can be seen on the card, including the driver's photograph is encrypted in this bar code. The bar code can be deciphered using appropriate equipment; where-by the information contained in the bar code can be compared to the actual particulars on the card.

Motor vehicle registration certificates and licence discs must also become secure documentation to prevent the illegal registration and use of un-roadworthy and un-licenced vehicles on our roads. The Department improved the properties of most NaTIS "face value" documents by the printing of a two-dimensional bar code on these documents.

The first phase of implementation, which includes the printing of the two-dimensional bar code on the motor vehicle licence disc, was completed in May 2001. These bar codes can also be scanned to validate the authenticity of these documents. In the second phase the current licence-form, which has been in use for more than 10 years, will be replaced by a new re-designed form from the second half of this year.

5. CARD VERIFICATION DEVICE (CVD)

The original credit card format driving licence contract also required the supply of scanning devices to scan the bar codes on driving licences. However, the development of these devices was fortunately delayed for a few years until a sufficient number of driving licences were converted to warrant the deployment thereof. *Fortunately*, because the rapid development in technology now allows for a much more sophisticated, versatile and useful tool than was originally envisaged.

The scanning device, which was developed and tested during 2003, is actually a powerful handheld computer called the Card Verification Device (CVD). The CVD is not only the first device of its kind in South Africa, but research indicates that no similar device is yet in operation anywhere else in the world. The CVD is unique in the fact that it can be used to scan two-dimensional barcodes and display the information on the device itself, communicate with information databases through the cellular network, read fingerprint biometrics and perform fingerprint verification, as well as determine its position through Global Positioning System (GPS) coordinates (latitude and longitude) by making use of satellites. The CVD (Fig.1) could be regarded as a wireless terminal of the NaTIS system.

CVD - Portable Traffic Law Enforcement Terminal

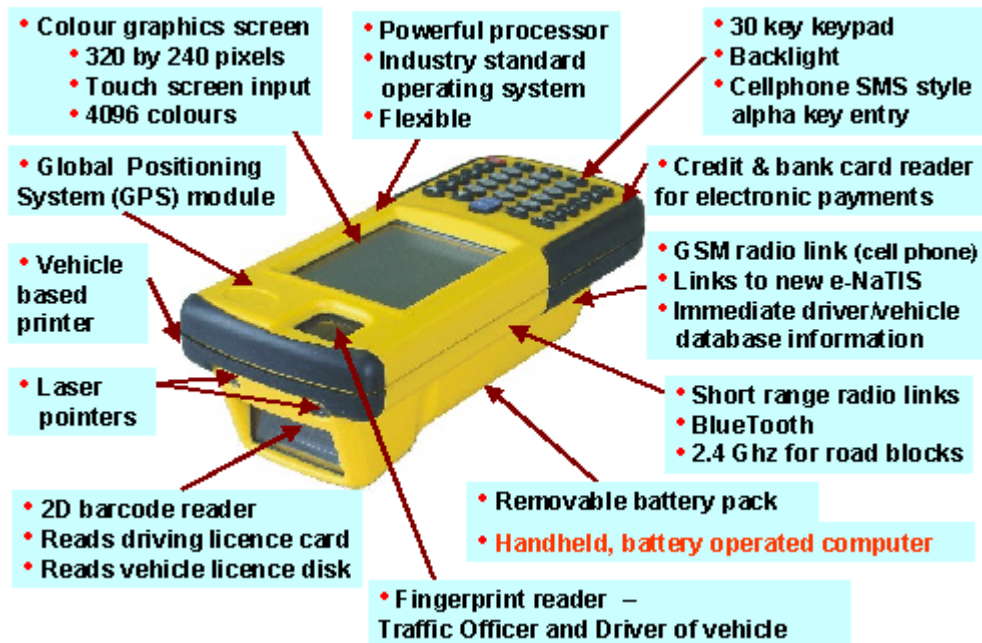


Figure 1. Functionalities of the Card Verification Device (CVD).

Proven Public Key Infrastructure (PKI) is used to scan driving licences and vehicle registration discs at the roadside to determine the authenticity of these documents.

The scanned information on drivers and vehicles is also transmitted to NaTIS which automatically replies with verification and additional information, such as:

- validity and authenticity of a driving licence or Professional Driving Permit (PrDP);
- outstanding traffic fines and warrants of arrest against the driver;
- penalty points accumulated (once AARTO is operational);
- validity and authenticity of the registration and licence of a motor vehicle;
- correctness of the roadworthiness status of a motor vehicle; and
- whether the vehicle is marked as a stolen.

The verification takes place from the roadside by means of cellular communication and, should unlawful action be detected or suspected, action can be taken immediately. Should it be required, information on where, when and by whom drivers or vehicles were previously stopped and checked, will also be available on the system.

At several roadblocks during the past December/January festive season where the CVD's were deployed, some drivers were identified operating with duplicate or fraudulently produced documents and driving stolen vehicles.

Each and every transaction done with the CVD automatically transfers information for storage on e-NaTIS on, amongst others, the following:

- The number of the particular CVD used, the name of the authority to who it was issued, as well as the detail of the traffic officer performing the transaction; and
- The location, date and time of the transaction, and
- The driver and vehicle offences detected.

The system will link this information with the information on each individual driver and vehicle that was stopped and checked.

The information data base will have to be further developed to allow for either the transfer of information from, or the linking to, other contravention systems to enable the establishment of a comprehensive traffic offence data base. Other systems referred to include, for example: speed law enforcement by camera, red light running cameras, etc.

6. E-FORCE

The CVD provides enormous potential and, realising that using the equipment for scanning and information retrieval purposes only would be a waste of powerful resources, it was decided that some additional abilities should be developed so as to utilize the CVD to the fullest extent possible in the short term.

The extended capabilities, still under development, will provide traffic officers with the ability to transfer and record driver and vehicle offences directly onto e-NaTIS. In turn e-NaTIS will link each contravention with the applicable charge-sheet detail and relevant traffic fines and transfer this information back to the traffic officer at the roadside. A standard, electronic charge-sheet, with comprehensive reference to the various sections and clauses in traffic and other legislation, as well as a traffic fines module, will be developed in due course for this purpose.

With a portable printer being available, the information will be transmitted from the CVD to the printer and the charge sheet printed, signed and handed to the driver at the roadside. Should a printer not be available, the charge-sheet will be completed by hand from the information displayed on the CVD. Whichever process is followed, there will be no further need to capture the information, as it will be already automatically recorded on e-NaTIS, (Table 1).

Table 1. Typical Information Collected and Transferred to NaTIS by the CVD.

CVD SERIAL NO	CVDID	PROVINCE	LOCATION	AUTHORITY
CVD00085	01f6a5f507000096	Gauteng	S26°18.8339' E027°38.8143'	Johannesburg
DATETIME	ALCOHOLOK	BRAKESOK	DRIVERLICENCED	LIGHTSOK
25/11/2003 10:41	1	0	1	1
STEERINGOK	TYRESOK	VEHICLELICENCED	IDDOCN	IDDOCTYPE
1	0	1	5402205417085	02
BUSORSURNAME	INITIALS	DRIEXPIRYD	PRDPEXPIRYD	DRILICNR
KHOBOKA	KM	2004-08-19	2004-03-12	406600002998
ENDORSTYPECD	LICN	DRIVEN	ENGINEDISP	
	HMX193GP	Self-propelled	1770	
ENGINEN	GVM	MAINCLOUR	MAKE	MODELNAME
2Y0348665	2738	Purple	Nissan	E20
MVCAT	MVDESC	MVDTOWN		
Heavy passenger mv (12 or more persons)	Mini bus (10 to 15 persons)	Westonaria		
MVLICEXPIRYD	MVREGN	MVREGTD	ROADUSEIND	RWSTAT
2004-02-29	PVW790A	2003-03-05	Y	Roadworthy
RWTSTSTATD	SAPCLRD	SAPCLRSTAT	SAPMARK	TARE
2003-01-16	2000-11-07	Cleared	None	1453
VINORCHASSIS	MVREGTTYPE	PREVLICN	REGAUTHOFREGTN	
R01851	Registered	LKC595T	Randfontein	

There are many traffic authorities that are currently enforcing only certain sections of the NRTA, but fail to enforce the total NRTA for various reasons, mainly due to the detailed comprehensiveness thereof. The use of the CVD in this regard will provide automatic access to the full set of applicable legislation at the roadside.

From the information generated by the CVD, it will be possible to generate regular computerised performance management reports, for example:

- The real duration and number of person-hours spent on law enforcement actions at each location; and
- The number of driving licences and vehicles, per type of vehicle (trucks, buses, motorcars) checked by individual officers per time period.

These reports, together with additional information, should be continuously used by supervisors and traffic managers for monitoring and control purposes to:

- Determine performance criteria for law enforcement generally per authority, region or Province, as well as for individual officers;
- More effectively detect fraud and corruption committed at the roadside;
- Determine the effect and the duration of law enforcement on the level of lawlessness in particular areas, on specific routes or certain types of offences;
- Plan, schedule and set targets for law enforcement actions;
- More effectively utilise scarce resources; and
- Prepare more accurate budgets and resource needs requisitions.

From November 2003 and during the festive season, the Department of Transport, with the co-operation and assistance of the Gauteng Provincial Administration, and later also KwaZulu-Natal, introduced e-Force as a pilot project. The project entailed using 30 CVD's in Gauteng at Provincial and Local level, to perform only limited roadworthy checks on vehicles stopped at roadblocks. During the roadside check, key roadworthiness elements were recorded on the CVD, together with driver and vehicle information which was retrieved from NaTIS. This information, together with the latitude and longitude of the location where the vehicle was examined, was uploaded on a temporary CVD content server for evaluation purposes. The collected data could also be displayed spatially on a Graphical Information System (GIS).

Examples of the information that could be displayed spatially at various scales on a GIS are shown in Figures 2 and 3 below.

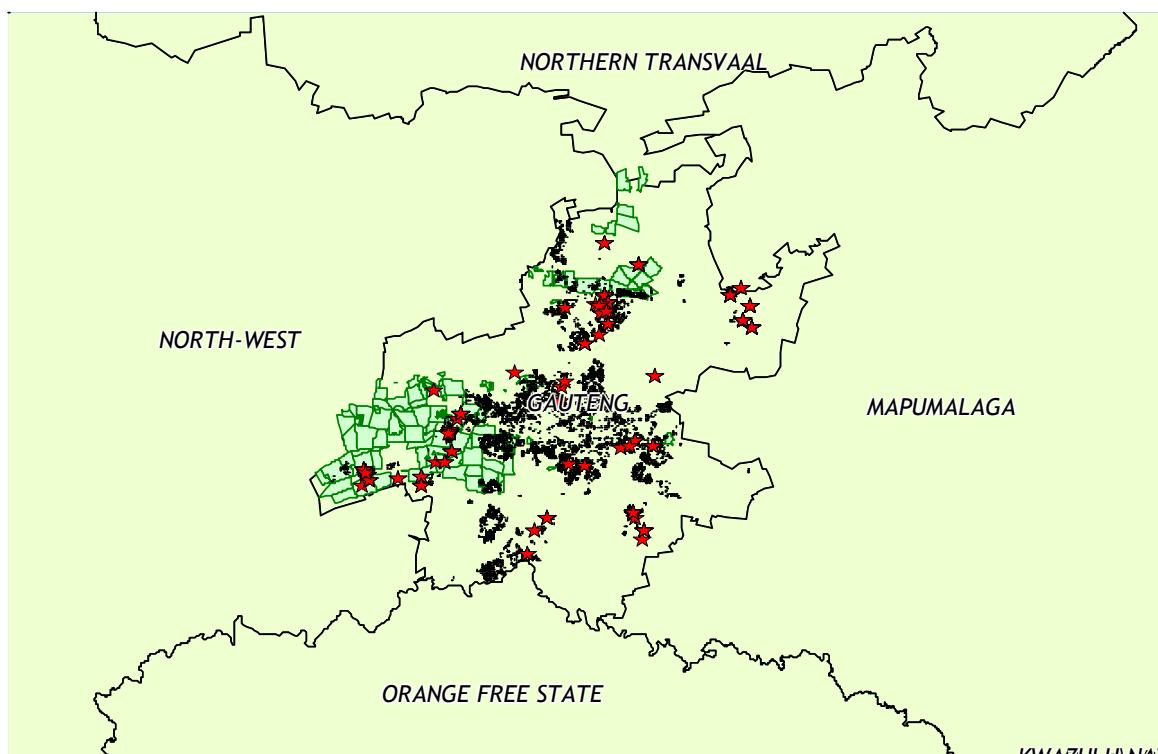


Figure 2. CVD Information display at Provincial level.

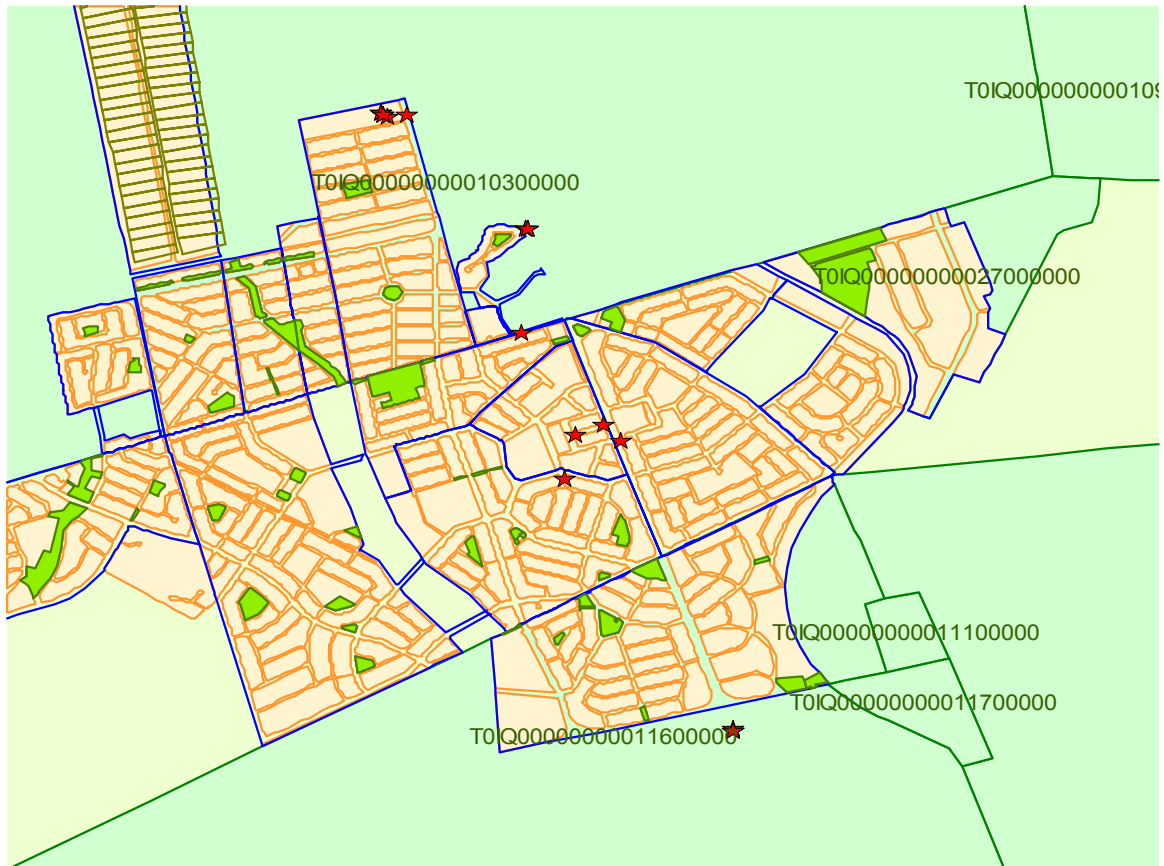


Figure 3. CVD Information display at street level.

A user manual was developed and users of the CVD were trained during a one-day session on how to use the equipment and access information on NaTIS. A Call Centre was established to assist with problems that were experienced. A speed delivery service was also put in place to replace faulty equipment as soon as possible. Several hardware and software problems are still being experienced. These are, however, addressed to ensure that the equipment, software and continuous on-line access will operate flawlessly in due course.

Early indications are that the e-Force pilot project was highly successful and that data that is collected is highly valuable and useful, not only for traffic law enforcement management and control purposes, but also for overall traffic management purposes in general. It is envisaged to further develop and expand e-Force as a priority project during the second half of 2004 into a comprehensive and fully integrated law enforcement “tool”, making use of modern technology such as the CVD.

Other uses of the CVD, such as enforcement of the National Land Transport Transition Act and the completion of electronic accident report forms on site, will be considered in future.

7. CONCLUSION

Although initiatives such as the promulgation of legislation, the appointment of the various inspectorates, the establishment and operation of NaTIS, the use of secure documents and the registration of officers, examiners and facilities go a long way in the battle against crime, it is not enough. It is our duty to provide the necessary additional tools, technology, procedures and support to effectively fight this battle.

It is ultimately the way in which all officials involved use the tools, technology and mechanisms at their disposal, that determines their effectiveness in enforcing road traffic legislation. These officials, who work long hours under difficult circumstances, often risk their lives to make our roads safer – for which we must thank them. The integrity and dedication of these officials are amongst the most important factors in our struggle against road crime.

Another important aspect to focus on is to ensure that officials and officers working in the road traffic environment are properly and regularly audited in order to detect tendencies to ignore transgressions of the NRTA and curb the acceptance of bribes.

e-Force is an initiative which is aimed at the accelerated development, deployment and use of Intelligent Transport and Safety Systems, that uses information and communication technologies in intelligent solutions, in order to improve law compliance and reduce the number of accidents on South Africa's roads, as well as to curb fraud and corruption in the traffic environment more effectively.

It is trusted that the current efforts and investment in new technologies will result in the much-needed positive benefits for road safety through a reduction in lawlessness in the near future.

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