

Safety & Security at the CSIR: Growing the Impact

BJE Taute
CSIR DPSS, PO Box 395, Pretoria, 0001
Email: htaute@csir.co.za

Abstract

This paper reviews Safety and Security in the CSIR since the initiative was started towards the end of 1996. Motivated by the reality of high levels of crime and violence, the CSIR vision is to be a national centre of competence for integrative thinking, knowledge generation, skills development and innovation in safety and security – with impact on South Africa's safety, growth and quality of life.

While supporting efforts to improve security, the ultimate vision is to contribute to the achievement of a safe South Africa – thus focusing on both reactive and proactive interventions.

Innovation successes include the local crime prevention toolkit, cyber forensics, technology partnerships, crime prevention models, cash-in-transit innovations and strategies for a safe South Africa.

The CSIR is ready for the next level of national impact – as explained in a number of proposals and current initiatives based on the notion of much better national coordination of research and interventions in safety and security.

1. The CSIR's role

During 1996 it became clear that South Africa had a significant crime and violence problem that affected government, business and society at large, including each one of us as individuals. The CSIR started to explore ways that it could support government, business and society in their efforts to reduce and combat crime.

At the time the CSIR already had a significant science and technology base and a solid strategic partnership to support the South African National Defence Force. It soon became clear that the domain of crime prevention and combating was much wider and more multi-disciplinary with a much wider stakeholder base than defence, but likewise the CSIR had access to a wide range of relevant science and technology (S&T) – both inside the CSIR and in the wider South African and international science and technology community.

It also became clear that no similar, coordinated, S&T innovation and support capacity for crime prevention and combating existed in South Africa. Current research and innovation are largely fragmented and directed at localised problem solving.

Over time, the concept of “crime prevention and combating” was replaced by “safety & security” (S&S) as a more inclusive, proactive and positive concept. Indeed, enhanced *safety and security* is included in the current “apex priorities” of the South African government.

The initial question was: What technology solutions can the CSIR provide, based on our expertise? This was quickly replaced by a realisation that safety and security solutions are not technology “driven,” but rather mission driven – based on a thorough and systemic understanding of risk areas, finding innovative solutions using relevant science and technology, and then transferring skills and solutions to the user communities.

While stated in various ways over time, the persistent vision of the role of the CSIR in S&S is:

To be a national Centre of Competence for integrative thinking, knowledge generation, skills development and innovation in Safety and Security, with impact on South Africa's safety, growth and quality of life.

This vision is in line with the CSIR's Mandate to have a national impact by improving quality of life through innovations in science and technology. In short – to “shape a better future through science.”

The CSIR cannot do this alone. This vision strongly embraces, in fact depends on, the concept of a National System of Innovation whereby innovative solutions will best be developed through wide collaboration and partnerships in the academic, science, business and user communities.

This paper explores the historic role of the CSIR and the prevailing need for a much better coordinated, national effort to enhance our safety and security through science based innovations.

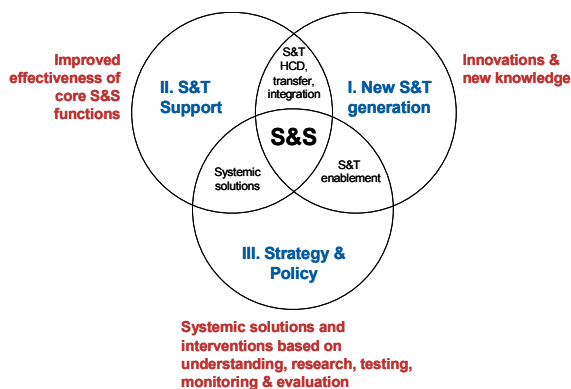


Figure 1: Impact Areas for Safety & Security

2. Impact on Safety & Security

In order to define impact, one has to first define what innovation means in this context, ie:

- ◆ a thorough, scientific understanding of crime and violence phenomena and risk areas,
- ◆ finding creative solutions, including systemic solutions and interventions, through research & development and application of appropriate science, engineering and technology skills, and
- ◆ transferring these technologies & solutions to user communities in government, business and society.

Impact on S&S can be defined as the creation of value to the user and stakeholder community responsible for the crime prevention, crime combating, safety and security. There are potentially three overlapping domains for impact (see Figure 1):

- I. New Science and Technology - This is done through innovations and new knowledge in relevant safety and security science and technology disciplines.
- II. Science and Technology Support – Primarily to the stakeholder departments in government by providing S&T support towards fulfilling their core S&S functions and enhanced performance.
- III. Strategy and Policy Research – taking a holistic look at S&S and developing systemic solutions and interventions, with appropriate strategic focus areas and implementation plans, as well as monitoring and evaluation of progress.

Impact in these domains is illustrated by examples in the rest of the paper.

3. The Current Reality

Police crime statistics have indicated about two million reported crimes per year for the last ten years, of which a significant percentage is violent crimes. Even so, it is generally accepted that crime is significantly under-reported.

South Africa is not getting safer: fear and experience of crime and especially violent crime is on the increase and negatively impacts the achievement of developmental goals. This is fueled by a complex set of issues including alcohol, drugs, guns, unemployment, migration, regional instability, political instability, lack of social capital and cohesion, inequality, local and trans-national organised crime, globalisation and some aspects of international terrorism. It affects us all and has a negative impact on critical areas such as skills retention, investor confidence, job creation and tourism.

The Criminal Justice System (CJS) is currently neither effective nor able to deal with the volumes of crime, with resulting low levels of confidence in the CJS. In many cases, the criminals have the upper hand in innovation – easily changing tactics, environment and targets. While any society needs a well-functioning CJS, the demands on the overloaded CJS must be decreased through effective crime prevention and safety interventions.

Internationally, S&S agencies are grappling with shifting roles in addressing crime and violence; policing strategies alone are inadequate to the provision of sustainable safety and security.

International trends also indicate that the boundaries between military threats, organised crime and international terrorism are becoming increasingly fuzzy and borderless – as demonstrated by the 9/11 events in the USA and the subsequent escalation of military responses.

Similarly, threats in the cyber domain can range from mischievous computer viruses, to enrichment through “identity theft,” to targeted commercial and even national cyber attacks (an example is the 2007 attack on the “essential electronic infrastructure of the Republic of Estonia”[1]). These kinds of threats require an especially high technology response capability.

A lot of safety and security research is being done in South Africa, but not directed and coordinated by clear national priorities (as is the case for defence where there are structures to coordinate and fund R&D). CJS related government departments tend to use the different sciences thematically and within their own needs only. Police, intelligence, border control, transport and other agencies with safety & security responsibilities are often primarily focusing on their short term technology purchasing requirements (for operational use) rather than long term technology development requirements. There is no national capability that serves government and society with integrative, science based safety & security strategies and practical, sustainable solutions.

4. Crime and Insecurity vs Safety & Security

Criminology theory [2] states that predatory crime occurs when a likely offender and a suitable target (vulnerable victim) comes together in time and space (enabling environment) without a capable guardian present.

While the problem statement and risk assessment starts with actual crime, violence and insecurity, it is not sufficient to only react to these challenges – for example by increased policing. Sustainable solutions must also include proactive measures to achieve a vision of safety where the risk has been reduced or prevented. Consequently, the solution space includes reducing the number of likely offenders, making likely victims less vulnerable and creating a safer environment that would include innovative new roles for police, business, society and other stakeholders.

A universal vision of safety includes freedom from fear and freedom of movement; a nurturing society with opportunities, equality and inclusive communities; and some elements of security. Achieving this vision requires agreement on a practical, achievable vision, defining indicators of success, and targeted strategies and interventions based on ongoing research and scientific understanding.

Security is characterised by reaction to threats, responding to crime, protection through separation and exclusion, guarding, policing, defending, and the Criminal Justice process as a deterrent to crime. Improved security requires effectiveness in the CJS as well as other departments with law enforcement and security functions, such as Intelligence, Border Control,

Transport, and also effective measures by business and civil society. Effective security is often enabled by technology capabilities including appropriate technology, skilled users and efficient processes.

5. Stakeholder and Partner Domains

The diverse stakeholders and partners in the S&S domain include the following groupings:

- CJS government departments responsible for law enforcement, S&S operations, intelligence, crime investigation, prosecution, conviction, sentencing, incarceration, correction, diversion, probation, victim empowerment, rehabilitation and social re-integration.
- Government departments responsible for traffic control, border control, financial control, information & communications infrastructure and security, safety at local and provincial government levels, safety in education, science and technology, foreign relations, mental and physical health and safety.
- Academia and science councils (primarily CSIR, MRC, HSRC, ARC) with related focus areas.
- Civil society including non-government organisations, community-based organisations, faith-based organisations and the public.
- Business, as represented by various business and consumer associations, security product suppliers and the private security industry.
- International crime prevention, safety & security organisations, including the International Centre for the Prevention of Crime, the European Union Framework Programme 7 – Security Research Theme, and various bilateral agreements that enable cooperation and joint research between countries and organisations.

6. A Brief History

The following gives a brief history of S&S in the CSIR:

6.1 1997: The Crime Prevention Initiative

The CSIR Crime Prevention Initiative was kick-started by some significant events, including:

- The National Crime Prevention Strategy (1996) which defined a national strategy

based on the pillars of crime prevention, effective criminal justice processes, reducing transnational crime and reducing crime through public values and education. This was supplemented by a White Paper on Safety and Security. While these included ground-breaking thinking, they did not result in coordinated national implementation as was envisioned.

- Two calls for Crime Prevention innovation proposals by the Department of Science and Technology. This provided the CSIR with funding for inter alia consortium based research on: Vehicle crime prevention, technology assessment, crime mapping, safety at modal interchanges, DNA forensics, intelligent firearm, and crime prevention through environmental design. While these projects stimulated focused, long-term research, and some resulted in new capabilities within government (eg crime mapping at police stations) the funding mechanism enabled opportunistic rather than strategically directed focus areas.
- The parliamentary decision to create a National Inter-Departmental Structure for Border Control. They were closely supported by the CSIR through a variety of secondments and technology focused initiatives.
- The creation of Business Against Crime (BAC) provided partnership opportunities to address both business requirements and the needs of government departments through coordinated activities.

A CSIR Crime Prevention Forum coordinated work across the divisions Transportek, Environmentek, Boutek, Mattek, Foodtek, Defencetek and Icomtek.

The security solution for cash-in-transit vehicles, to prevent access to cash, and thus deter criminals in case of a robbery, was an early success that involved the full innovation cycle up to commercial deployment. It also led to further cash management innovations.

6.2 1999: The CSIR Crime Prevention Centre

The CSIR Crime Prevention Centre (CPC) provided a more permanent, corporate structure with additional funding and human resources.

- The “Presidential Imperative Programme for Crime Prevention” stimulated CSIR coordination, including a response to the National Advisory Council on Innovation

regarding South Africa's readiness for 9/11-type threats, and coordination of crime prevention work with the University of Pretoria and other science councils in the COHORT (Committee of Heads of Organisations of Research and Technology). However, without funding to drive collaborative research, these efforts did not yield significant new initiatives.

- The multi-year Crime Prevention Research Resources Centre funding from DST created a framework for research collaboration with government and the science, research and practitioner communities, and stimulated the creation of the CSIR's social crime prevention capability, leading to crime prevention research and impact on local level safety planning and strategies.
- The CSIR's Parliamentary Grant funding was applied to technology support for criminal justice system and related departments, in areas such as border control, social crime prevention, vehicle crime, child justice, environmental design, volunteer child network, information management, victim support, technology strategy for the SAPS, forensic science and technology foresight.
- Crime prevention and technology support contracts were awarded to the CPC by various government agencies, including the SAPS, the NPA and the Gauteng Department of Safety & Liaison. A notable contract was to assist South Africa's bid for the 2006 Soccer World Cup with the writing of the “security chapter.”

6.3 2005: Defence, Peace, Safety & Security

The “Beyond 60” restructuring process in the CSIR redefined operating units and centres, and joined the Crime Prevention Centre with Defencetek to form a Safety & Security Competency Area within CSIR Defence, Peace, Safety & Security with a mission:

- To contribute to a better understanding of & innovative and effective S&T solutions to crime, violence and conflict;
- To be the ‘in-house’ S&T capability of key state departments and agencies in safety & security.

This is currently still implemented through two Research Groups:

- **The Crime Prevention Research Group**

The crime prevention research group includes the National Crime Prevention Research Resources Centre and is uniquely positioned to combine academic, theoretical and practical approaches to crime prevention.

In an effort to establish more complete and valuable information to impact crime and violence-related policies, programmes and practices in SA, the group works from a multi-disciplinary platform on the subject of crime and violence prevention and facilitates the building of bridges and partnerships between the research community, non-governmental organisations and policy makers. Collaboration with the International Centre for the Prevention of Crime resulted in Board Membership.

This component further aims to increase understanding and mobilise action for the reduction and prevention of crime and violence in SA through practical participatory processes and the empowerment of individuals and communities across the country.

Capabilities include participatory leadership, creative facilitation, research and organisation development; working in law enforcement environments, education, schools, multi-departmental partnerships and youth; project planning, specification and funding applications; mentorship, capacity building and training.

● The Safety & Security Technology Research Group

This group provides technology support and innovative solutions on a partnership basis to government departments and industry responsible for S&S related aspects such as intelligence, law enforcement, justice, correctional services, border control and transport. This is achieved through breadth and depth in understanding of safety and security technologies and the roles of key stakeholders.

Technology partnership starts with the development of a technology strategy (Figure 2) - the glue that ensures that the right skills, right equipment and efficient processes, aligned with departmental objectives, create enhanced organisational performance. The technology strategy reviews current technologies and their effectiveness, develops requirements for future technologies and a gap analysis from which prioritised technology projects are defined.

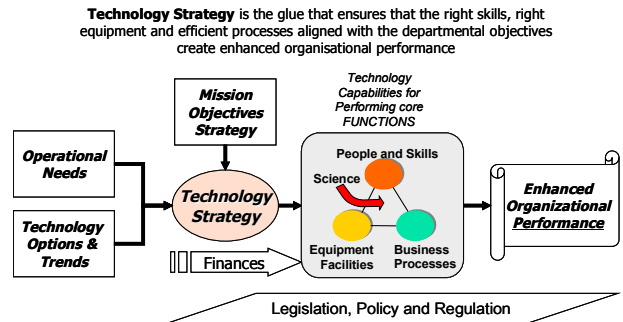


Figure 2: Technology Strategy

This is followed by research into technology trends and operational requirements, innovative problem solving and new knowledge generation. Where appropriate, new solutions are developed and tested through a systems engineering process. As a non-commercial partner, this research group then assists with acquisition and tender processes which need to be enabled by availability of finances and the appropriate legislative, regulatory and policy frameworks.

Through close interaction with departmental operations, the research group provides support to improve operations, develop skills and transfer technology to achieved the desired improvement in organisational performance.

A specialised capability in cyber security and forensics supports law enforcement with an understanding of cyber security requirements, the training of “cyber first responders” that gather digital evidence at crime scenes, the analysis of evidence and research into new cyber crime and security threats and challenges.

Other CSIR units with safety and security activities include:

- DPSS Landwards Sciences – peace support technologies, drug/explosive detection, blood stain analysis, bomb disposal, border line support.
- DPSS Technology for Special Operations: covert surveillance and tracking, mobility, technologies for special operations and firearms.
- DPSS Radar & Electronic Warfare – wide area surveillance for security purposes.
- DPSS Optronics Sensor Systems – CCTV, specialised surveillance cameras, mapping.
- Command, Control and Information Warfare – interoperability, communications, information warfare, modeling and simulation, systems engineering.

- Built Environment - crime prevention through environmental design, post-conflict reconstruction, peace support, intelligent transportation systems, operations research and modeling, geographic crime mapping.
- Satellite Application Centre – multi-spectral satellite imagery and image analysis.
- Meraka Institute – information and communication security, cryptography, software development, human language technology.
- Materials Science and Manufacturing (MSM) – cash-in-transit innovations.
- Sports Technology Centre – video and audio analysis and software tools.
- Modeling and Digital Science – autonomous systems, mathematical modeling, biometrics and tracking.

7. Demonstrators of Impact

Impact in terms of the domains in Figure 1 include the following areas, some of which are expanded in more detail:

- I. **New S&T generation** – mobile forensics, evidence mining, crime prevention models, cash-in-transit innovations, contributed to CCTV Industry Standard, geographic mapping, crime prevention through environmental design, electronic license disk technology proof of concept research.
- II. **S&T Support** – SAPS and DCS technology strategy, NPA investigation technology procurement support, cyber forensic first responder training, Dept of Justice Zero-based budgeting project, national border management coordination centre development.
- III. **Strategy & Policy** – local crime prevention toolkit, strategy for a Safe South Africa, inputs to national integrated border management strategy.

The following are a few of the noteworthy demonstrators of impact on the S&S domain:

7.1 Cash-in-transit innovations

This initiative started with a request from business for improved cash-in-transit (CIT) vehicles to promote safety to the drivers and to prevent the cash from being stolen. A number of feasible solutions were identified through wide CSIR and public involvement, and the final

solution was eventually developed and successfully transferred to industry by CSIR MSM.

This was followed up by cross-pavement CIT solutions (a trolley) and later on DPSS developed a CIT vehicle with enhanced ballistic protection, lower centre of gravity and broader wheel base, which was also successfully transferred to industry and which is currently in production.

7.2 The Local Crime Prevention Toolkit

The Local Crime Prevention Toolkit (LCPT) is a process tool for local crime prevention partnerships that facilitates a safety audit, benchmarking, strategy development and implementation including community mobilization, monitoring and evaluation, and local capacity building.

The LCPT has been delivered to and implemented at local governments in the Free State, KZN, WC and MP, and training has been given to Local Government and the SAPS. The tool is currently being enhanced through the development of an Information and Communication Technology Tool which will be tested through comparative studies in various municipalities.

7.3 Technology partnerships

Technology partnerships with organisations provide support to improve the effectiveness of the organisation's core functions in safety and security through improvement of its technology capabilities (people, technologies and processes). This is done through developing a technology strategy, conducting research and development in strategy directed areas, providing technology procurement support and providing technology deployment/implementation support.

In the SA Police Service a technology strategy has led to the creation of a new technology management unit, and new forensic and operational tools were developed; In the National Prosecuting Authority this has supported a wide range of technology acquisition and development projects for investigation and computer forensics; In the Department of Correctional Services this has led to a Technology Strategy and support to a security audit and technology procurement; In border control the Border Control Operational Coordinating Committee is supported with the systems engineering of a National Border Management Coordination Centre; with Business

Against Crime this has supported the development of a CCTV White Paper and is supporting a variety of partnership projects to combat violent organised crime as prioritized by the Government/Business Step Change initiative.

7.4 Crime Prevention Models

Crime prevention models provide increased understanding of crime and violence. Some of these have been used in SAQA unit standards and have received international recognition. A few examples include:

- The “Three Spheres Crime Prevention Convergence Model” that addresses the occurrence and prevention of crime.
- The synthesized “Cycle of Crime and Violence” model, and “Breaking the Cycle of Crime and Violence” are used by Action for a Safe South Africa.

7.5 Cyber Forensics

Cyber crime is crime within or by means of the electronic communications media. This has become wide spread and a threat to individuals, business, finance, government and nations. Cyber forensics seeks to obtain electronic crime scene evidence that will stand up in court.

Work in this domain included the development of a cyber forensics methodology, training prosecutors and investigators for responding to e-crime scenes, performing operational cyber forensics work and research on new areas such as mobile forensics, evidence mining and live forensics. The training course is being transferred to a commercial company for accreditation and future training.

7.6 Strategy for a safe South Africa

This initiative set out to analyse what a safe South Africa would look like. In the process it used morphological (cause and effect) modeling of the understanding of current role players such as the criminal justice system departments of their roles and impact on safety. Finally, it identified key themes for creating a safer South Africa – by addressing the impact of corruption, guns, alcohol and others. This project has contributed to the current Action for a Safe South Africa initiative together with key role players in science councils, NGOs, academia and government.

8. Where's the Science?

“Safety and security” is not confined to a single domain of science and technology. A mission driven, collaborative approach to S&S innovations needs to enhance the quality of applied research and facilitate the integration of different disciplines in science, technology, social systems and engineering with operational knowledge of S&S practitioners.

- I. **New S&T generation** – underpinning S&T capabilities such as criminology, research methodology, electronic engineering, computer science, optics, information and communication technologies, geographic mapping, security systems and sensors, innovation, intellectual property management,
- II. **S&T Support** – applied science and technologies such as forensics, analysis, technology management and forecasting, technology evaluation and testing, systems engineering, victimology,
- III. **Strategy & Policy** – systems analysis S&T such as modelling and simulation, decision support, operations research, management and administration.

In some cases, like cyber forensics, it is possible to focus on and build the underlying capabilities because the domain is sufficiently defined and constantly evolving.

In other cases, such as general security technology support to the Department Correctional Services, the capability is better defined as “technology management” since the application domain can range from CCTV to perimeter fences to biometrics and many more, where the “technology support” role is to understand the user requirement and also to know where to get hold of experts that can advise on the many components technologies.

9. Moving forward, increasing impact

After 11 years in Safety and Security, the CSIR has developed significant corporate memory and domain expertise, and is ready for the “next level.”

A recurring theme during all these years has been the lack of national coordination and

strategically directed research and implementation in Safety & Security, such as is getting in place with the current Defence Evaluation and Research Institute that seeks to integrate, enhance and strategically align all the defence related research, development, test and evaluation entities in South Africa. The lack of national coordination in safety and security is despite the fact that crime and violence present a much bigger national threat to South Africa than the foreseeable military threat.

The following noteworthy initiatives highlight the desired and envisioned way forward:

9.1 Innovation Centre for a Safe South Africa (ICSSA):

The CSIR is currently seeking substantial funding for ICSSA with the strategic objective to be a national Centre of Competence for integrative thinking, knowledge generation, skills development and innovation in Safety and Security, with impact on South Africa's safety, growth and quality of life.

Research and innovation will be strengthened and maximised through the National System of Innovation: research networks and collaboration with universities, science councils, government, private sector and NGOs. International networks will enhance skills development, benchmarking and knowledge generation.

The following key focus areas (missions) were identified, based on interactions with the stakeholder community:

- Systems modelling for national Safety and Security cause and effect; Incorporating the Criminal Justice System and beyond as well as the effects of technology and society; Future scenario development
- Contribution to the development of a National Plan for a Safe South Africa through focused workgroups.
- ICT crime research – mobile devices, e-commerce, live forensics, threat analysis and response
- Data mining for corruption detection, non-intrusive investigation, prevention
- Robbery and theft systems analysis and solutions: with application to settlements, houses, business, vehicles, cash. Developing

technology to “soften/disable” criminals and criminal activity

- Gun detection and neutralisation
- Technology analysis – crime, crime combating & crime prevention uses, foresight for innovative prevention.

9.2 Information Security Centre of Competence (ISCOC):

ISCOC, with the hub at the CSIR Meraka, has been allocated funding by the Department of Science and Technology from 2008 till 2011.

ISCOC is motivated by the increased need public sector, industry and individual Information and Communication Security, South Africa's vulnerability to potential large scale cyber attacks and the need for increased innovation that leads to technology transfer and global competitiveness.

The main purpose of ISCOC is collaborative development of technological competencies and R&D leading to commercialisation/transfer of R&D outcomes in Information Security (IS).

The following are the key strategic objectives:

- To establish a recognisable hub for coordinated information security research and development (R&D)
- To contribute to building a new generation of information security specialists
- To link and strengthen remaining pockets of IS excellence
- To establish research-industry partnerships, transfer of research results to industry and entrepreneurial activity;
- To provide mechanisms for stakeholders to articulate needs and influence research and human capital development agendas; and
- To establish a collaborative initiative for incident response and national cyber security risk mitigation.

Three Market Opportunities define the current understanding:

- National Cyber Security – including national awareness, investigative capacity and threat mitigation for critical infrastructures.

- Secure eGovernment – supporting trust in e-service delivery and e-commerce, and
- Information Security industrial products and services – with the aim to develop new R&D capabilities and licensable technology with global potential.

The first substantial progress is being made in the area of establishing a national Computer Security Incident Response Team capability in cooperation with European partners.

9.3 Action for a Safe South Africa (AFSSA):

Action for a safe South Africa (AFSSA) [3] is a collaborative effort of IDASA, the Council for Scientific and Industrial Research (CSIR), Institute for Security Studies (ISS), Resources Applied to Prevent Child Abuse and Neglect (RAPCAN), the Centre for the Study of Violence and Reconciliation (CSVR), the International Marketing Council for SA (IMC), Gordon Institute of Business Science (GIBS), Da Vinci Institute for Technology Management, Soul City, Mr Roelf Meyer (the project leader), Fevertree Consulting, Inzalo Communications and various individual citizens, including representatives of Luthuli House (www.safesouthafrica.org.za).

- The AFSSA initiative chooses the route of significant reduction of demand on the criminal justice system,
- recognises the need for a practical, achievable vision of a safe South Africa,
- aims to enable every South African to contribute to making South Africa safe through sustained actions that prevent crime, and
- had a successful Convention in August 2008 where the following work groups focused on different aspects of prevention and intervention to reduce criminality, vulnerability and address the environment that allows opportunity for crime in a perpetual cycle of crime, violence and distrust:
 - ◆ Healthy Mothers; Resilient Children, National Parenting Initiative

- ◆ Peace in the Home – fathering and partnering for peace
- ◆ 7-24: Opportunity of Youth – The Youth Zones, “Fix It”
- ◆ Recovery & Resilience – Unlocking our compassion
- ◆ Multiplying the Power of One – A role for everyone
- ◆ A Sober South Africa – alcohol health promotion foundation, Sober Mzansi
- ◆ Unsafe in Anyone's hands – no need for guns
- ◆ Second Chance – law reform and support of offenders for a second chance.

9.4 Participation in international S&S research:

- AU and NEPAD – the CSIR, through DST, is building relationships with African research organisations and the NEPAD Secretariat to identify relevant S&S partnership projects.
- European Union (EU) Framework Programme 7 Security Research Theme – as National Contact Point for Security Research, supporting the European-South Africa Science and Technology Advancement Programme (ESASTAP) of DST, the CSIR is exploring EU cooperation and building South African and European networks for collaborative, mission driven research projects.

10. Conclusions

The CSIR has made significant progress and demonstrated impact in Safety & Security.

However, the current reality of crime and violence points to a national need to step up innovation and interventions, and the CSIR is ready for the next level of impact that requires much bigger and more coordinated national efforts and science and technology support.

11. References

- [1] DAVIS J, 2008. Web War One, Reader's Digest, August 2008, pp 58 - 65.
- [2] CLARKE, RV and ECK, J, 2003. *Become a Problem Solving Crime Analyst in 55 Small*

Steps: London, Jill Dando Institute of Crime Science.

[3] August 2008. Action for a Safe South Africa Convention, Background Document.

12. Endnote

The author wishes to thank Ms Barbara Holtmann, Crime Prevention Research Group Leader, for authoring various concepts that were taken over from a variety of internal CSIR documents as well as documentation related to the Action for a Safe South Africa.

CLOSE