NATIONAL INSTITUTE OF FORENSIC SCIENCE

FORENSIC SCIENCE INNOVATION STRATEGY

‘THE ADVANCEMENT OF SCIENCE FOR JUSTICE’

Dr K Paul Kirkbride
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1. ABBREVIATIONS

ACPR
Australasian Centre for Policing Research
AGAL
Australian Government Analytical Laboratories
AIC
Australian Institute of Criminology
ANSTO
Australian Nuclear Science and Technology Organisation
APA
Australian Post-Graduate Award
APMC
Australasian Police Ministers Council
ARC
Australian Research Council
BSAG
Biology Specialist Advisory Group
CCDSAG
Chemical Criminalistics and Documents Specialist Advisory Group
CCWA
Chemistry Centre, WA
CIT
Canberra Institute of Technology
DAL
Division of Analytical Laboratories (NSW)
DETYA
Department for Education, Training and Youth Affairs
DISR
Department for Industry, Science, and Resources
EESAG
Electronic Evidence Specialist Advisory Group
FIDSAG
Field and Identification Sciences Specialist Advisory Group
FS, SA
Forensic Science, South Australia
IDSAG
Illicit Drugs Specialist Advisory Group
NCGP
National Competitive Grants Program
NCIS
National Coronial Information System
NDLERF
National Drug Law Enforcement Research Fund
NHMRC
National Health and Medical Research Council

NIFS
National Institute of Forensic Science
NIJ
National Institute of Justice (USA)
PMSEIC
Prime Minister's Science and Engineering Innovation Council
QUT
Queensland University of Technology
SET
Science, Engineering and Technology
SMANZFL
Senior Managers of Australian and New Zealand Forensic Laboratories
TSAG
Toxicology Specialist Advisory Group
UniSA
The University of South Australia
UTS
The University of Technology Sydney
UWA
The University of Western Australia
VFSC
Victoria Forensic Science Centre
VIFM
Victorian Institute of Forensic Medicine
WAPS
West Australian Police Service

2. FOREWORD

Over the last decade of the 20th century there have been a few attempts to improve the rate of innovation in forensic science in Australia. A key development was the creation in 1991 of the National Institute of Forensic Science (NIFS), which has sponsorship and support of research as one of its primary goals. Although a good source of funds initially, NIFS reduced its support for research over time in response to changing priorities. As a result, four attempts were made by the forensic science sector to secure major grants from Commonwealth SET research funding schemes in order to sponsor forensic research programs; all four approaches failed.

In 2000 the NIFS Board of Control identified the need for a coherent, national research strategic plan. This action was followed by the launch of the Research Strategy Project in 2001. The aims of the Project were:

- to inform the NIFS Board of Control of the options available to increase research in forensic science;
- to make recommendations as to the essential elements of a national research strategic plan.

This paper is the immediate outcome of the Project.

The Project was guided by a Steering Committee comprising Mr Alastair Ross and Ms Anna Davey of NIFS, Dr Tony Raymond of the NSW Police, Dr James Robertson of the AFP, and Professor David Curtis of the Australian Academy of Science. At its first meeting the Steering Committee decided that the scope of the Project was to encompass not only traditional research, but also a multitude of other activities that would enhance forensic science. As a consequence the Research Strategy Project evolved into the Innovation Strategy Project, and for the remainder of this paper it is referred to as such.

3. EXECUTIVE SUMMARY

The need for a strong forensic innovation capability in Australia has been recognised by the Prime Minister's Science and Engineering Innovation Council and others. This need has only been further underlined as a result of the terrorist actions of September 11, 2001. This paper identifies how strong and decisive action can be taken now to ensure the criminal justice system has access to the best available science. The reality is that forensic science in Australia barely has the resources to attend to core business. In this environment the sector has no option but to direct resources to casework investigation; budgets for innovation are miniscule, and time spent on innovation activities is discretionary. Any innovation that does take place is largely un-coordinated from a national point of view. Although the Australian Research Council (ARC) has supported some forensic science programs, it is very difficult to fund forensic science innovation in this way. This is because the ARC does not recognize forensic science as a field of research, and many critical forensic innovation programs are not considered scientific research.

The forensic science sector has set in motion an attempt to bring substantial innovation into Australian forensic science; this paper is the first step. The key objectives of this initiative are to:

- assist in the fight against terrorism, major crime and organized crime;
- allow police to tackle volume crime;
- identify and tackle problems associated with licit and illicit drugs.

These objectives will be made real by a variety of innovation programs dealing with the following themes:

- to identify ways of working smarter and quicker in order to reduce current case backlogs;
- to extract the maximum benefit from CrimTrac, and develop other forms of intelligence in order to enhance intelligence-led policing;
- to bring science into the crime scene,
- to enhance the probity of scientific evidence.

In order to move forward the Australian forensic sector must develop a stronger capability for innovation. Two fundamental prerequisites for this outcome are financial support and strategic partnerships:

- There must be an injection of funds over a significant period of time in order to support those innovation programs that will not attract funding from the ARC, and to pay for human resources that can be dedicated to innovation.
- Forensic science is a very specialized field. Therefore, although academic institutions and Government research agencies such as CSIRO and DSTO have much to offer forensic science in the way of skills and technology, and are very keen to become involved in forensic science, the advancement of forensic science cannot be achieved by simply subrogating the task to these research bodies. On the other hand, the forensic sector is distributed across Australia, and it does not have a wealth of experience in innovation.

Arrangements must be made in order to unify the innovation efforts of the forensic sector. Existing strategic partnership with key research providers must be enhanced, and new partnerships must be developed.

This paper suggests a strategy for the development of a national capability for forensic science innovation. The recommended strategy is to establish a decentralized Facility dedicated to innovation. The aim is to develop new technologies, and then transfer them into the forensic sector. A partnership between the forensic sector and a multitude of research providers will under-pin the Facility. The proposed Facility could be thought to resemble a Cooperative Research Centre (CRC). However, if the forensic sector were to build the Facility around a CRC, then serious compromises would be required. Of particular concern is that CRC's have a commercial focus, a limited lifespan, and are relatively limited in their scope. Instead, it is recommended that appropriated Government funds be sought to finance the Facility. As the principle beneficiary of innovation in forensic science is the criminal justice system, it is recommended that the Justice Division of the Federal Attorney General's Department be approached with this request for funding. In the event that the Justice Division cannot support the facility within current budgets, this paper identifies alternative ways in which substantial revenue might be collected in order to finance the initiative.

The development of an effective Facility is a significant endeavour; annual funding of about $4-5M would be required as a minimum.

4. RECOMMENDATIONS

4.1. Recommendation 1

It is recommended that the strategy of highest priority is the establishment of an independent National Innovation Facility supported in the long term by appropriation. The Facility should be engaged in a variety of innovation programs, not just cutting-edge research. An annual minimum operating budget for an effective Facility would be approximately $4-5M.

4.1.1. The National Innovation Facility; finance

Simple, unilateral mechanisms for funding should be approached as a priority. The simplest is to approach the Justice Division of the Federal Attorney General's Department to fully support the Facility in perpetuity, subject to appropriate performance.

In the event that the Justice Division cannot enter into such an agreement committing many millions for many years, an alternative tactic is to approach the Division to grant seed funding for the establishment of the Facility, to collect revenue at the national level on behalf of the Facility, and to contribute top-up funds if and when required. Revenue could be derived from confiscated assets of crime.

If sufficient funds cannot be achieved from this source, multi-lateral revenue collection through State-based instruments such as confiscated assets of crime, or levies on offences and court proceedings (along the lines of the victims of crime levies, or the State of Michigan Forensic Laboratory Funding Act, or the Michigan Justice Training Commission Act) should be pursued. A last resort for funding would be the implementation of levies on national industries that would benefit from innovation in forensic science (eg the insurance and pharmaceutical industries).

If the Justice Division is not willing to provide funding for the establishment of the Facility before the revenue streams stabilize, then the DISR could be approached to provide seed funding for the Facility through its Centre of Excellence program.

If neither DISR nor the Justice Division are willing to commit seed funds, but sufficient revenue can be collected on behalf of the Facility, then the Facility can still be established. However, commencement of activity will be delayed, and the rate of development will be slower.

In the event that revenue collection yields below about $3,000,000, pursuit of the primary strategy is probably not warranted; the secondary strategy should be implemented.

4.1.2. A National Perspective

A decentralized National Innovation Facility is most likely to have strong credibility, relevance, and ownership within the forensic sector, which is mostly State/Territory-based. It maximises the potential for technology transfer, and it makes maximum usage of existing Commonwealth and State Government infrastructure that is distributed around the nation.

4.1.3. Cluster nodes:

In order to establish a critical mass and have sufficient resources for planned programs, the Facility should deploy about 12 program leaders in those regions where strong links between the forensic sector and universities have already developed, and where reasonable development of new linkages might occur.
The following arrangement of resources is proposed:

- Physical Sciences Cluster:

Nodes in NSW/ACT, Victoria, SA, and WA.

- Life Sciences Cluster

Nodes in Queensland, NSW/ACT, Victoria and SA.

- Field, Identification, and Electronic Sciences Cluster

Nodes in Queensland, NSW/ACT, Victoria, and WA.

This is an initial configuration that might change as new alliances become significant or as old ones wane. In SA, WA, and Queensland only 2 out of 3 Clusters are represented. This arrangement attempts to capitalize upon the strengths and potential offered by all regions, while maintaining the number of program leaders at a maximum that can be supported by the budget. It is not suggested in this paper that the boundaries between Clusters are real, the contrary is the case. In SA, WA, and Queensland in particular it is vital that program leaders are able to assist with programs “outside” their Cluster.

4.1.4. The National Innovation Facility; proposal

In order to convince the Justice Division that the Facility is worthy and holds no risks, a detailed proposal must be drafted. The proposal must get the message across that improvements in policing and the criminal justice system will flow from the proposed deliverables (innovation outcomes). To assist with this, the services of a “champion for the cause” could be engaged. It is also vitally important that the proposal leaves the Justice Division with the impression that plans for the Facility are sound. If this impression does not take hold, then the Division might set about developing a plan that is more acceptable. It is therefore that the proposal includes detailed business, innovation, and human resource plans. Appropriate mechanisms and controls must be planned to ensure that innovation outcomes will be achieved. Plans should be drawn up to capitalize upon any intellectual property that might be produced. This paper includes a portfolio of innovation programs (Appendix 1) and a basic estimate of the annual operating budget (Appendix 4) from which a detailed proposal could be developed. It should be pointed out that from a whole of Government perspective the Facility would result in greater leverage being applied to our major federal investments in SET in place at many Universities throughout Australia.

The Federal Government must also be convinced that the Facility would achieve more and cost less through collaboration with the States/Territories than it would if it was to be a established in isolation. It should be stressed that in the decentralized model proposed, the States and Territories would contribute substantial in-kind support. Even though the proposal is not for a CRC, it should as be rigorous as if it were. The CRC selection process has been constructed by technology research experts in order to force proponents to carefully think-through proposals and put in place measures to ensure facilities will be relevant to industry and the nation, accountable, manageable, and capable of achieving proposed innovation outcomes given its proposed resources. If the proposal for the Facility meets that standard then it will withstand scrutiny from any Government research experts.

The drafting of such a proposal should not be taken lightly. It can build upon the suggestions made in this paper as to income streams, innovation management, and innovation programs. It can draw upon the latest proposal for a CRC in forensic sciences, and referees suggestions made in relation to it. In addition, it must build upon the themes emerging from the NIFS project dealing with the value of forensic science in order to indicate how the Facility will yield benefits to the criminal justice system and the nation. Expert assistance will be required in drafting the proposal.

4.1.5. Governance

Program leaders would report to a Director of the Facility, perhaps via a leader of each cluster. As NIFS has a well-established national role in research and development, it is appropriate that the Facility receives governance from NIFS and its Board of Control. Although SMANZFL would have input to governance of the Facility through the NIFS Board of Control, a more direct link also should be established. A Facility Steering Committee comprising a few members of SMANZFL would ensure that innovation programs maintain relevance to the forensic sector and coherence with its strategic plans. The Facility would require its own research panel of advisers that would assess applications for funding, and plan solicitations for innovation programs; this panel should be made up of forensic scientists and academics skilled in research.

4.2. Recommendation 2

That if appropriated funding of greater than $3,000,000 per annum cannot be secured, the forensic sector should abandon plans to establish a National Innovation Facility. Instead the existing NIFS Research and Development Grant scheme should be reformed.

A budget of less than $3,000,000 cannot support a strong innovation fund and a viable cohort of salaried program leaders; the National Innovation Facility as described in Recommendation 1 would therefore not be viable. Although this sum is large enough to be used as industry contribution in the establishment of a CRC, such a course of action is not likely to fulfil the aims of the Strategy. Therefore it is recommended that another approach be taken. The recommendation is to use this income to enhance the current NIFS Research and Development Grant scheme, and make some changes to it that would cause more human resources to be dedicated to innovation nationally. The majority of the income should be earmarked for an Innovation Fund. The Fund can be managed actively and passively, as it is now. However, provisions should made to allow some portion of it to be used as industry contribution (perhaps in combination with contributions from interested forensic agencies) in order to lever support from the Commonwealth under a variety of NCGP and Innovation Access schemes. In this way the NIFS scheme can be used to support post-doctoral fellows, visiting fellows, Linkage programs, even a CRC. Secondments of forensic and university staff to innovation programs should be encouraged and financially supported. The innovation fund should support a number of PhD scholarships (top-up and fully paid) and Honours/MSc scholarships annually. The NIFS Fund should be freed up to support capital equipment lease (or purchase) and long-term placement in overseas agencies and institutions in order to assess technology or develop specialist casework services. As to the remainder of the income, some must be allocated to administration (eg program management, Panels of Advisers activities, secretariat services, etc). A substantial portion should be earmarked to support the activities of an Innovation SAG, as this will be a primary mechanism for technology identification. Travel, to support technology transfer activities, will also be a major expenditure. Compared to the Strategy involving the National Innovation Facility, this one places responsibilities for technology identification, technology transfer, and program planning/coordination onto the forensic sector to a greater extent.

4.3. Recommendation 3

That in the absence of any appropriated funding, the strategy involves an attempt to win a CRC.

The fate of negotiations for appropriated funding will be obvious in 2003. In the event that appropriated funding is not forthcoming, then the only option available to the forensic sector for the creation of a major innovation initiative is to put forward a proposal for a CRC in 2004.

If the forensic sector decides to put forward a CRC proposal, then it should be tightly focussed on those disciplines where cutting edge research is possible in order to satisfy CRC selection criteria relating to technical excellence. It is highly desirable that NIFS and SMANZFL drive the proposal with respect to selection of the field of innovation, so that a strong message as to the strategic importance of the initiative is sent to the selection panel. This tactic will ensure that the proposal is seen as arising in response to a genuine need within the sector. The fields should be chosen with a view to encouraging the participation of universities with strong track records. In order to make the proposition financially attractive to universities only a few should be brought into collaboration. The proposal must contain cash and in-kind support from the sector, but this is not likely to arise uniformly. Given that this strategy will only be pursued if major funds are not forthcoming it is likely that NIFS will only be able to manage a small contribution, if any. Financial support from the sector would most likely be limited to those jurisdictions that can acquire financial backing from their own administrations.

5. INTRODUCTION

5.1. Scope

5.1.1. Innovation

At the first meeting of the Project Steering Committee it became apparent that in order to advance forensic science in Australia the Strategy must stimulate a wide range of activities, not just those commonly associated with research.

For the purposes of this Project these activities have been grouped under the headings "Technology Adoption" (TA), "Technology Extension" (TE), and "Technology Creation" (TC); all three are in scope for the Project.

Technology Adoption

Technology Adoption covers activities such as validation, implementation, and troubleshooting of technology that is published in the forensic literature or purchased "off the shelf". TA is the full implementation of the best technology available today. Although Technology Adoption is the lesser "intellectual" challenge of the three major activities, and therefore the least likely to attract competitive Commonwealth research grants and other funding, it is nevertheless of vital importance in raising the standard of forensic science in Australia. A good example of TA was the replacement of blood grouping technology by DNA profiling in forensic biology. Such an adoption program was not research, it would not attract funds from the ARC, yet its impact has been almost immeasurable to the criminal justice system. Another example of TA is assessment of current technologies. Currently two shoeprint comparison and database software packages are available commercially. It would be a valuable national TA exercise to fully evaluate the products side by side, or by fact-finding missions to laboratories currently employing the technology. Such an exercise would provide valuable validation data that would assist in the implementation of the technology, avoid duplication of effort, and save laboratories from the risk of investment in the wrong technology. Another important TA exercise involves the coordination and management of interlaboratory cooperation programs in order to maximize outcomes through economies of scale and sharing of knowledge. All forensic science disciplines and all agencies would benefit from stimulus to TA.

Technology Extension

Technology Extension covers activities such as the original extension of mature technology from "mainstream" science into forensic science, and the full exploitation of those technologies with an incipient application in forensic science. TE is an investment in the technologies forensic science will be adopting tomorrow. DNA profiling also provides a good example of Technology Extension. At one time only geneticists and molecular biologists were interested in collecting genomic information. A fundamental innovation for forensic science involved the recognition that the technology might have something to offer forensic science. Important as the original extension of DNA profiling into forensic human identification was, additional TE programs that fully exploit the technology are also very important. In addition to blood specimens, DNA profiling now can be carried out on just about any cellular material in virtually any quantity on a variety of substrates such as match sticks and cigarette butts.

Technology Creation

Technology Creation includes two activities; discovery of knowledge, and invention of technology. TC will provide the knowledge we need right now, and the technologies we will be adopting in the near future. In relation to knowledge-based TC, DNA profiling again provides a good example. The final step to full realization of this technique involved two key TC programs, namely the creation of forensic DNA population databases, and offender profile databases. The knowledge contained in these databases is intelligence that helps drive intelligence-led policing, and allows provision of reliable expert evidence. An important feature of forensic science databases in general is that the information they contain is of interest only to the forensic science/law enforcement sector in our region. We cannot buy this information from overseas, and mainstream scientific research does not provide it collaterally for us. Construction of DNA, glass, paint, fibre, drug, and other databases and intelligence information are of vital importance to evidence interpretation or intelligence-led policing, and the forensic/law enforcement sector must drive the creation of this knowledge.

Two good examples of technology-based TC are the invention of the Polilight and the Fireball ballistics comparison system.

5.1.2. Disciplines

In relation to the forensic science disciplines considered by this Project, the Steering Committee decided that the scope includes the fields covered by active SMANZFL SAGs, namely Chemical Criminalistics and Documents, Illicit Drugs, Biology, Electronic Evidence, Field and Identification Sciences, and Toxicology.

For the purposes of this paper these disciplines will be grouped into three Clusters: Physical Sciences (comprising the fields covered by the Toxicology, Illicit Drugs, and Chemical Criminalistics and Documents SAGs), Life Sciences (Biology SAG), and Field, Identification, and Electronic Sciences (the Electronic Evidence, and Field and Identification SAGs).

For the time being, innovation in medical fields such as pathology, odontology, forensic medicine, and forensic psychiatry are not in scope except in those instances where outputs are generated by, for example, the Life Sciences Cluster. The “social sciences” such as criminology are not in scope. The field becoming known as E-crime is not currently covered by any SAG, as a consequence E-crime is not within the scope of this Project. The ACPR is actively involved in this emerging field, and as the field is extremely broad, deep, and technical, NIFS is involved in on-going discussions with the ACPR in order to identify areas of potential collaboration and mutual benefit.

6. AUSTRALASIAN FORENSIC SCIENCE INNOVATION ROADMAP

6.1. Innovation Strengths

This section lists infrastructure that currently supports forensic science innovation. It indicates where potential partnerships could be established to drive additional innovation programs.

6.1.1. Nationally

Although Australia spans a very large geographical area, there is nevertheless a very strong collaborative innovation infrastructure provided by the interaction between NIFS, SMANZFL, and the SAGs. Between them these bodies to some extent attend to all key activities required for innovation, viz. strategic planning, research prioritization and funding, technology identification, and technology transfer (including training programs).

NIFS, SMANZFL, and the SAGs facilitate communication between police and non-police agencies, between States and Territories of Australia, between Australia and New Zealand, and between Australasia and the international forensic community. Compared to many nations, Australia and New Zealand have a relatively simple policing/forensic environment, for example we do not have the many layers present in the American system, nor the many political and linguistic divisions present in the European system. Finally NIFS, SMANZFL, and the SAGs enjoy a high level of respect and trust throughout Australasia, arising from which is a strong national collaborative spirit. **The forensic science sector in Australia is of just the right size and nature to allow a national collaborative Strategy to flourish.**

Both the CrimTrac and NCIS programs are significant national assets that will be major resources for innovation in forensic science. With CrimTrac in place there is the opportunity to "piggy back" other intelligence databases such as shoeprints. There is the opportunity to become even more reactive to intelligence, perhaps even at the crime scene, by correlating "hits" across amalgamated databases. The data present in CrimTrac databases also has great intrinsic value for research, for example in studies relating to population statistics, or an assessment of the reliability of pattern evidence. Likewise the NCIS database will be a valuable resource for toxicological research because it will cover a large number of individual cases and will contain drug-status information relating to a variety of fatalities, not just drug overdoses. As human experiments involving drug impairment or toxicity are virtually impossible, NCIS will be one of the few ways in which basic data covering a significant population might be obtained.

There is potential for linkage with the AIC in relation to investigations dealing with drug abuse. In future, if the scope of the Innovation Facility widens, the AIC might be a valuable partner in assessments of the role and impact of expert evidence. The ACPR is already an important player in forensic science innovation and a potential strong partner. In future very significant linkages could be developed, particularly in the area of interest common to the ACPR and the EESAG, E-crime investigation.

6.1.2. South Australia

There is currently a good, established network comprising FS, SA, Flinders University, UniSA (and its associated Ian Wark Research Institute and the Regional Facility for Surface and Micro-structure analysis), Adelaide University, Deakin University, and CSIRO Division of Land and Water. Collaborative programs currently relate to illicit drugs, illicit drug manufacture, chemical criminalistics, fingerprint enhancement techniques, and forensic biology (DNA analysis).

The South Australia Museum has recently embarked upon an ARC-funded program dealing with DNA profiling of indigenous reptiles for the purpose of combating illicit trafficking in these species.

A so-called Forensic Sciences Cluster has been recently developed by Flinders University. The Cluster is designed to cross over traditional forensic-university and university-university boundaries in order to facilitate multi-disciplinary innovation in forensic sciences. A major goal as far as FS,SA is concerned is the identification of new technologies that can be extended into forensic science.

Flinders University offers two degrees in forensic science; a Bachelor of Technology (Forensic and Analytical Chemistry), and a Graduate Diploma in Forensic Science (DNA Technology). Four members of FS,SA have academic status at Flinders University.

In SA there is the potential for linkage with DSTO, the Centre for Sensor and Signals Information Processing [see www.cssip.edu.au], this organization has become involved in the NIFS Fireball program), and the nanotechnology unit at Flinders University.

6.1.3. New South Wales

Currently there is good collaboration between DAL, the NSW Police, and the UTS. The NSW Police have led Australia in the adoption of significant technologies such as Livescan fingerprinting and the IBIS ballistic system. In some ways the NSW Police are a “test-bed” for technologies new to Australia. AGAL is developing links with the University of NSW through Professor Hibbert in relation to illicit drugs.

Both UTS and the University of Newcastle offer degrees in forensic science, the latter institution offering a Bachelor of Science (Forensic)/Bachelor of Law. The situation relating to UTS is discussed further in Section 6.1.7.

Although many links are not currently in place, the potential for development in NSW is very large in relation to a wide range of forensic disciplines. At the University of NSW, Professor Hibbert is one of Australia’s foremost analytical chemists; involvement of his research group could widen beyond illicit drugs investigations to include chemical criminalistics, chemometrics, and evidence interpretation. Another strength of this University relates to chemical and biological sensors; this is a field of strategic significance to forensic science. The University of NSW also houses the Ray Williams Biomedical mass spectrometry facility; this might be of relevance if human identification techniques become based upon mass spectrometry [see www.med.unsw.edu.au/bmsf/ourlab.htm].

Adam McCluskey, Director of the Forensic Science Unit, University of Newcastle has research interests in synthetic chemistry; links could develop in relation to illicit drug investigations. AGAL's links with the forensic sector could be further extended in relation to toxicology and mass spectrometry (through the Australian Sports Drug Testing Laboratory), chemical metrology and biometrology, and biological testing. CSIRO, through its Telecommunications and Industrial Physics centre [www.tip.csiro.au] offers much in the way of collaboration in the field of sophisticated image, signal, and information processing. Current applications of this technology involve algorithms capable of recognition of complex patterns within video images, such as faces in a crowd or abnormalities in medical scans, and algorithms for video database searching. ANSTO has some extremely sophisticated capabilities with respect to analytical chemistry. It is therefore possible that links could develop with this organization.

6.1.4. Queensland

A good network has developed involving the Queensland Police Laboratory, the Department of Health Forensic Laboratory, QUT, Griffith University, and the Australian Genome Research Facility (AGRF, see www.agrf.org.au) at the University of Queensland. The fields explored so far include image processing, forensic biology (single cell genotyping, mitochondrial DNA, palynology), chemical criminalistics (particularly in relation to soil examination and vibrational spectroscopy), statistics, and odontology.

It would appear that the environment is conducive to further development of the network involving the police and health laboratories as the Queensland Government is actively encouraging innovation and flexibility in Government through its Smart State Initiative. The AGRF is a Commonwealth-funded Major National Research Facility with nodes in Brisbane and Melbourne; further collaboration with the AGRF should be actively pursued. The University of Queensland offers further potential for collaboration in the field of environmental toxicology.

Griffith offers various MSc in Forensic Science programs, including special streams for police personnel, while QUT offers a BSc co-major course in forensic science. One member of the Queensland Police has academic status at QUT.

6.1.5. Victoria

There is a very strong network including the VFSC, the VIFM, La Trobe University, Monash University, Deakin University, RMIT, Melbourne University, and the Victoria University of Technology. The Victorian network leads the nation in innovation relating to forensic DNA examination and toxicology. In addition there are a broad range of activities in the fields of illicit drugs and chemical criminalistics. A strong linkage has developed between the VFSC, FS,SA and Deakin University in order to identify sensitive ways of detecting evidence by the use of chemiluminescence. A unique cooperation has developed between the VFSC and La Trobe in the field of cognitive processes. At the moment major innovations are taking place in handwriting comparison but the field in general has the potential for extension into many forms of "pattern evidence".

There is a strong interest in the field of three-dimensional imaging, where links have been forged with the University of Melbourne and the National Research Institute of Police Science in Japan. The University of Melbourne also has an interest in forensic entomology.

La Trobe University offers a Graduate Diploma in Forensic Science and undergraduate courses in forensic science to its Bachelor students. Deakin offers Bachelor of Forensic Science and Bachelor of Forensic Science (Honours) degree programs, Swinburne offers Certificates and Diplomas in Forensic Science, and Victoria University of Technology also offers a degree program in forensic science.

There is the possibility for future collaboration with the Australian Centre for Research on Separation Science (ACROSS, see www.across.utas.edu.au) through nodes at RMIT and Monash University. Potential fields for collaboration are analytical chemistry and bioseparations. Victoria could offer strong collaboration in relation to the development of test kits for specific genetic sequences. The AGRF has a node in Melbourne, and GeneScan Australia, of La Trobe University, is proposing to develop the first facility in Australia for the mass-production of biological microarrays. Dr John Vine, the Director of Racing Analytical Services, is an acknowledged expert in the application of mass spectrometry to analysis of drugs in racing animals. His expertise could be of great use in collaborative toxicology projects. The Commonwealth Government has awarded the national synchrotron facility to Monash University. Certain chemical criminalistics projects could take place in collaboration with this facility. Finally, DSTO has a facility in Melbourne that offers potential for collaboration.

6.1.6. New Zealand

ESR:Forensic has a very strong network with the University of Auckland. The relationship is probably the most formal and mature of any in Australasia. One staff member (Dr Douglas Elliot) is in a permanent shared position between ESR and the University. In this position Dr Elliot drives the Master of Science, Graduate Diploma, and Certificate of Proficiency programs in forensic science.

ESR's programs are quite diverse covering chemical criminalistics, field and identification sciences, illicit drugs (including cannabis), and forensic biology (human DNA profiling, palynology). The NZ programs dealing with evidence interpretation and statistical inference are extremely strong.

ESR is attempting to establish a funded, "Virtual Forensic Science Research Institute" in collaboration with the University of Auckland, Waikato University, and Victoria University. If established, this Institute would offer possibilities for strong collaboration.

6.1.7. AFP/ACT

There is a very strong innovation network comprising the Australian Federal Police, the University of Technology Sydney, the Australian Government Analytical Laboratory, the Australian National University, the Canberra Institute of Technology (CIT), and the University of Canberra. The strengths of this network relate to heroin profiling, chemical criminalistics, and non-human DNA investigation. This network has achieved the nations' best outcome as measured by success in attracting research grants. Major strengths of the UTS collaboration are its track record in TA programs and its establishment of databases using technology and equipment routinely used by the forensic sector. In this way the UTS-AFP collaboration complements the philosophy of cooperation in SA, where expertise outside those normally found in forensic labs are sought to drive TE programs.

There is the potential for linkage with the Australian Geological Survey Organization, and the ACT Government Analytical Laboratory, which has interests in toxicology and illicit drug analysis. As a result of a business re-structure this laboratory has some instrumental capacity that could be used in collaborative programs. The ANU offers potential linkage through its sophisticated analytical chemistry capabilities, particularly in relation to stable isotope mass spectrometry.

Staff from the AFP have gained academic status at UTS. As well as offering degrees with a forensic science content, the CIT is a major player in police training, offering two Diplomas in Forensic Investigation.

6.1.8. Western Australia

There is collaboration between the CCWA, the Pathology Centre, WAPS, Curtin University of Technology, and UWA, principally in the fields of chemical criminalistics, illicit drugs, and biology (entomology and palynology). Although the situation in WA has emerged only recently, there have nevertheless been some very significant developments. Robyn Napper has been seconded to the Forensic Science Unit, UWA from the UK in order to enhance training programs, and Dr John Watling of Curtin is an Australian representative on a European Union Framework Program called NITECRIME. Edith Cowan University and NIFS together developed the ballistics program called "Fireball".

The WA Government has facilitated the development of a Centre of Excellence in Mass Spectrometry (WACEMS see www.curtin.edu.au/centre/cems). The capability for laser ablation-ICP-ToF-MS and stable isotope MS at WACEMS, together with the LC-ion trap mass spectrometry facility at the CCWA, indicate that WA is a region where innovation in chemical criminalistics and toxicology in relation to mass spectrometry can take place. The Forensic Science Unit, UWA and the Department of Computer Science, UWA are developing programs relating to crime scene investigation; a fruitful linkage could develop in this field.

Curtin and UWA display a good level of collaboration and complementarity in relation to graduate and post-graduate forensic science training. Curtin offers a Bachelor of Science (Honours) Analytical and Forensic Science, while UWA offers a Master and Graduate Diploma in forensic science.

6.1.9. Tasmania

Major links have not developed. There is some potential for linkage with the University of Tasmania node of the Australian Centre for Research on Separation Science (see section covering Victoria). This node includes the research group of Prof Paul Haddad, who along with Professor Brynn Hibbert is one of Australia's top analytical chemists.

6.1.10. Northern Territory

Major links have not yet developed in the Northern Territory. The University of the Northern Territory offers some potential for collaboration in the main science disciplines. A course in fingerprinting is delivered in the NT.

6.2. Areas of Deficiency

6.2.1. Funds

The research fund administered by NIFS is the only one dedicated to the support of innovation in forensic science; this amounts to about $100,000 per annum. Other granting bodies will sponsor forensic science programs, but scientists from outside the forensic sector also compete for funds. In any one year the forensic sector would reap a few hundreds of thousands of dollars from such schemes nationally, and then only after investing a few tens of thousands of dollars cash up front in partnership with local universities.

The current level of funding is not enough to enable significant innovation in forensic science.

6.2.2. Human resources

A lack of funding is not the only impediment to innovation. At the strategic level, participation in SAG and SMANZFL activities is entirely discretionary, with the result that neither body is well organized or very responsive. Furthermore, although the SAGs are empowered to tackle innovation issues, the effort is neither uniform across the Groups nor very fruitful.

At the tactical level, with the exception of ESR, NZ, and the Victoria Forensic Science Centre, forensic agencies around Australasia do not have staff dedicated to innovation. Most forensic practitioners with formal research skills and training therefore become involved in research activities in a purely discretionary manner; in all agencies casework has to come first. As a consequence even innovation programs that do not require funding usually are not pursued due to a lack of time. Many programs that do require funding, and in all likelihood would be successful in attracting funds, in the main are not pursued - the investment of time required to engage collaborators and write the proposal is often just too great. As a consequence the total number of dollars and hours dedicated to forensic science innovation from both a tactical and strategic viewpoint across Australasia is small, with the majority provided by academia.

6.2.3. Critical skills

Few scientists outside the forensic sector have had meaningful, direct experience of forensic casework, court proceedings, or investigation of crime. On the other hand, many forensic scientists are not aware of developments at the technical "cutting edges" of main stream science, nor are many involved in the activities of formal research such as supervision, research planning, or the pursuit of funds**. As a consequence sustainable innovation in forensic science cannot be driven entirely by the forensic sector, nor can it be achieved by "contract" research subrogated to the tertiary education sector or research agencies such as DSTO or CSIRO.** The Innovation Strategy must be built upon collaboration between the forensic sector and the public research sector. Furthermore, if we are to approach Governments in order to attract financial support for our Strategy, it will be expected that we will utilize the existing public innovation infrastructure in which the Government already has heavy investment viz, the nation's universities, CSIRO, and DSTO.

In the main, Honours students, Masters students, and more recently, PhD students are the "hands" that conduct innovation programs. While it is highly desirable that this practice continues, one very important mechanism for innovation that is currently lacking is the involvement of post-doctoral fellows, both from outside the forensic sector and from within it.

6.2.4. Ethics assessment

Innovation programs in forensic science have the potential to impact upon society in a variety of ways. Although mostly positive, some impacts are perceived to be negative, as illustrated by the adverse reaction to the development of the national offender DNA database. The retention of body tissues from cadavers for experimental purposes is another issue that has raised a significant public backlash. In order to retain the confidence of the wider community, and those that we might approach for funding, the Strategy should include mechanisms designed to ensure all innovations are acceptable ethically.

7. OPTIONS FOR THE INNOVATION STRATEGY

7.1. Funding

No matter what form the Innovation Strategy takes, the acquisition of funds will be a critical feature. Around the world innovation in forensic science and policing is funded by various mechanisms such as:

- in Canada, the Canadian Police Research Centre is underpinned financially by the National Research Council (an agency similar to the ARC), RCMP, and research partners to the tune of about $500,000 per annum;
- in England, the Jill Dando Institute of Crime Science is financed by gifts, donations and bequests through the Jill Dando Fund; the target for the fund is £5,000,000. The FSS, a corporatized forensic service provider, funds research and development;
- in the USA the National Institute of Justice sponsors many programs and facilities. For example $40,000,000 has been earmarked for DNA backlog reduction schemes, $35,000,000 has been allocated to a criminalistics laboratory improvement program;
- In Japan the Government funds a facility of about 100 scientists;
- in New Zealand, forensic science research is funded by the ESR, the main forensic service provider and a corporatized agency;
- in Australia, activities of the ACPR and NIFS are funded by Government through contributions from police agencies. Each of these bodies receives about $1,000,000 per annum in order to cover all activities, not just innovation;
- and in Australia, research funding in criminology is controlled by legislation and funded by Government through the Federal Attorney General.

Realistically, a scheme analogous to the Jill Dando Fund is not an option to fund the Innovation Strategy. Neither NIFS, the ACPR, nor the forensic sector is in a financial position to fund it unaided. It might be possible to fund the Innovation Strategy through a commercial operation. If the forensic sector was to engage with the academic sector in a business joint venture then goods, services, and training in the forensic sciences could be provided. However, given the potential size of the market, and the requirement to share profits with the academic sector, the revenue that could be channelled into innovation would be too small to support a practical strategy. Significantly, there are no forensic science innovation bodies that operate on a purely commercial basis.

As is the case elsewhere in the world, Government sponsorship is really the most practical option for the Innovation Strategy.

Two, not necessarily mutually exclusive mechanisms could be employed: winning competitive SET research grants; or direct Government appropriation.

7.1.1. Competitive SET grants-Australia

Given the science and technology focus of the NIFS Strategy, funding through the National Health and Medical Research Council is not appropriate. It is possible, however, that the Strategy could be built wholly or partly upon funding derived from SET grants awarded by the Commonwealth Government.

Backing Australia's Ability

In its innovation statement "Backing Australia's Ability" the Government has announced its intent to drastically increase funding to SET programs through a 2.9 billion-dollar package. Part of this package is earmarked to induce business to invest more heavily in research and development activities that might lead to new products and services. Another part serves to boost university funding for additional salaries and research infrastructure. Of direct relevance to this paper however, the package provides funds through the so-called Innovation Access scheme, doubles the funding to the Australian Research Council (ARC) for its National Competitive Grants Program (NCGP), and boosts funding for AusIndustry initiatives, including the Cooperative Research Centres scheme. Although these schemes are designed primarily to stimulate innovations that might improve Australia's future industrial competitiveness in the global market, funds are made available to programs that seek to enrich the cultural or social wealth of Australia. Forensic science innovation programs (assuming they have sufficient merit) are therefore eligible for funding under the latter criterion.
A brief description of these schemes follows.

CRC Scheme

- The Cooperative Research Centres (CRC) scheme provides big grants to forge lasting, collaborative links between research providers (usually universities) and research users (usually industry). Under this scheme the forensic science sector is an eligible industry. In the context of research grants, funding for CRC's is long term. The usual lifespan of a CRC is 7 years; re-funding for another 7 years can be applied for (and some Centres have been successful in this) but the new CRC must have a new portfolio of research interests. There is an expectation that CRC's engage in high quality research and development, and provide some level of graduate training. Cr.'s usually operate like a small company, but there must be a meaningful participation on behalf of "the industry" with respect to governance, planning, funding, and operation of the CRC. As of July 1, 2001 there were 65 CRC's; it is likely that new rounds of CRC proposals will be considered in 2002, 2004, and 2006. Due to the financial structure of "Backing Australia's Ability" a relatively large number of CRC's will be created in the 2004 round.

- NCGP Scheme
  The Australian Research Council (an agency of DETYA) offers substantial research funding through its National Competitive Grants Programs. Programs can take two forms either Discovery-based or Links-based. Although it would be possible to win Discovery-based grants, forensic programs would have most success attracting funding for Links. In turn, Links-based programs can take three forms, Linkage-Project (these were previously referred to as SPIRT Grants), Linkage-Infrastructure (these were previously known as RIEF Grants), and Linkage-International.

The principal objective of the Linkage-Project scheme is to develop long-term (1-5 years) strategic alliances between tertiary institutions and industry for the pursuit of a specific research program. The Linkage-Infrastructure scheme was introduced to encourage the higher education sector and industry to collaborate in the establishment of major research facilities and equipment. The Linkage-International scheme provides funds to facilitate the international exchange of post-doctoral research fellows. In the past the success rate of NCGP proposals across all fields has been something less than 30%.
An important distinction between the NCGP Linkage-Project and CRC schemes is that funding under the latter can be used to pursue a portfolio of research programs across a field (for example a variety of research programs in forensic science), whereas the former must be used to fund a specific research program within a field (for example a project to develop a new ninhydrin-based fingerprint reagent). Furthermore, under the CRC scheme quite senior researchers can be supported, but under the Linkage-Project scheme only research assistants, post-graduate students, and post-doctoral fellows can be supported.

- Innovation Access Program
  In the "Backing Australia's Ability" statement, $100,000,000 has been provided over 5 years to the Innovation Access Program delivered by AusIndustry. This program replaces a former initiative called the Technology Diffusion Program. Of relevance to the Innovation Initiative is a component of the Innovation Access Program known as the International R&D and Technology Access Activities (IRDTA). Under this scheme funds are made available for travel to access foreign technology, to develop a national innovation culture, to develop national networks for technology identification, and to support international research activities.

The Innovation Strategy cannot be implemented through funding derived solely from the NCGP schemes or Innovation Access programs. However, once implemented, the Strategy could employ such schemes as tactics to obtain extra funding and drive expansion. The Innovation Strategy could be built around a CRC as the sole source of funds, but this approach would involve significant compromise.

<u>A Strategy involving a CRC</u>

In order to progress this in the short-term a proposal must be lodged with Government by about May 2002. Later rounds are likely in 2004 and 2006. The proposal must include a research plan that would describe in some detail the programs to be undertaken during the life of the Centre. The detail should be sufficient to allow referees to assess the proposal and (hopefully) advise the Government that the proposal is worthy of funding. There is some expectation that CRC's will conduct "cutting edge" SET. The proposal must also include a detailed business plan. The Government does not contribute 100% of the funds required for the operation of the CRC. It is required that about 60% of the funding be provided by contributions from the participating Universities and industry partners. The business plan must include a detailed breakdown of cash and in kind contributions from all participants. In reality, the forensic sector will have to provide a substantial cash contribution for the proposal to receive consideration. It is also expected that throughout the life of a CRC the financial contribution by AusIndustry "ramps down" as income to the CRC from commodity sales and service provision "ramps up".

Two attempts to establish a CRC in forensic science have been made in the 1990s; both were unsuccessful. The latter attempt, which involved three universities and two forensic agencies, failed because referees felt the proposal did not have the obvious backing of the forensic sector. Furthermore, the research programs proposed were felt to reflect the idiosyncrasies of the individual researchers more than the innovation needs of the forensic sector. Finally the geographic scope of the proposal was felt to be too narrow, being centred on NSW, WA, and SA. There was, however, the indication by the referees that a CRC in forensic science was warranted, and another application in the future was encouraged. Therefore it is possible that the Innovation Strategy could be built upon a CRC.

For a variety of reasons, however, there might not be an ideal alignment between the scope of the Innovation Strategy and the needs of the forensic sector on one hand, and the promise offered by a CRC and the compromises required for its establishment on the other. For example, in a CRC there is a real expectation that university participants will provide substantial cash support; there is therefore a real expectation on behalf of the universities that the CRC will generate a return substantially in excess of their investment. The scope of disciplines encompassed by the Strategy is very wide. Notwithstanding the comments of referees that the year 2000 CRC proposal was too restricted, an attempt to put forward a CRC proposal encompassing all potential collaborators will result in a body that delivers little return to University investors. Although more university partners means that individual university cash and in kind support is proportionally lower, there comes a point in a modest scheme such as a CRC where the share that any one university might receive is just not worth the effort and expenditure required to attract it. There is the expectation that a CRC will conduct "cutting edge" research. Although such activities are within the scope of the Strategy, pursuits of lesser intellectual challenge but great relevance to the forensic sector are also in scope. Activities such as assessment of the applicability of competing technologies, coordination of national databases and surveys, management/facilitation of TA and TE programs would not be "worthy" of a CRC. Furthermore, the national forensic sector is not capable of sustaining cutting edge research uniformly across the breadth of the profession. Finally a successful CRC requires a substantial cash and in-kind contribution from the forensic sector. The most straightforward mechanism for industry cash support is for participating agencies to contribute about $50,000 per annum. During interviews the majority of laboratory directors indicated that such a level of support could not be provided out of existing budgets. However, there was the feeling that their administrating agencies would probably provide such funding if approached with a good business plan. Alternatively, it might be possible to build the industry cash contribution around various levies and schemes described later. In any event, substantial negotiations regarding cash support must take place within the forensic sector, between the forensic sector and administrating agencies, and between the forensic and educational sectors before a CRC proposal can be arranged.

Due to the pressing time frame the forensic sector cannot put forward a CRC proposal for the 2002 round. Moreover, it would appear that the establishment of a CRC is not the best way to implement the Strategy. Therefore as a priority the forensic sector should concentrate on other ways of implementing the Strategy.

7.1.2. Other competitive grants-Australia

The ACPR provides funds for research, both directly and through the National Drug Law Enforcement Research Fund, which it administers. **As the total of these two funds amounts to less than $2,000,000, the Innovation Strategy cannot be fully implemented through funding from these sources.**

7.1.3. Competitive grants-International

There do not appear to be any international sources that can be used to fund the Innovation Strategy in entirety. However, there are funds that could be used to sponsor international fora, or if the Strategy was to involve export of services and expertise to the Asia-Pacific region, sponsor international collaboration in that region.

The European Union Framework Funding

In order to implement SET R&D policy the EU has developed its so-called Framework Programs. Funding for the Programs amounts to multiple-billions of Euro over a five-year lifespan. The Fifth Framework Program (FP5) commenced in 1998 and submissions to it will cease in 2002; a new round of proposals will commence in 2002 for FP6 which has a budget of 17.5 billion Euro. FP6 has a series of 6 Thematic Programs. Funding can be applied for under the Thematic Programs to support research programs in strategic topics, to support research complementary to the topics, or to provide infrastructure in the topics. One Thematic Program includes funding for projects dealing with "Public Security and Anti-Fraud" [http://www.cordis.lu/rtd2002/fp-legal/budget.htm]. It might be possible to attract funding from FP6 as in the past the EU has been willing to support a forensic science initiative. Under the FP5 Thematic Program "Quality of Life and Management of Living Resources" a collaborative venture was entitled "Natural Isotopes and Trace Elements in Criminalistics and Environmental Forensics" (NITECRIME) was supported; this included participation by an Australian scientist.

In addition to the obvious requirements that any proposals should be meritorious, innovative, and align with the strategic goals of the FP, any collaborative venture must be enacted under the 1994 EC/Australia Science and Technology Cooperation Agreement. The most important requirement of this agreement is that "costs incurred…shall not require the transfer of funds from one party to the other" [Article 7, EC/Australia Science and Technology Cooperation Agreement, 1994]. In essence this means that Australian researchers must procure Australian funds to support research; there are no mechanisms whereby funds can be sourced "off-shore". In order to facilitate collaboration under the FP, the Commonwealth of Australia provides about $1,300,000 for FP collaboration (about $700,000 from the Innovation Access Program, and $600,000 from NHMRC). These funds are to assist collaboration (eg to showcase technology, conduct workshops, sponsor exchanges, and sponsor conference attendance). Similar to other Australian grant schemes the funds are competitive, merit-based, and are contributed on a dollar for dollar basis.

The FP cannot be used to fund the Innovation Strategy in entirety, and given the restrictions placed upon participation, application to the FP cannot be regarded as a key funding activity in the implementation phase of the Innovation Strategy. However, once implemented, participation could be valuable.

Asia-Pacific Economic Cooperation Funding
This funding exists to advance the standard of living in Pacific-rim nations. In addition to commerce, activities such as SET exchange have now been included. One goal at the policy level is to link SET centres nationally then internationally as a means of establishing science infrastructure that will enable advancement of societal and commercial wealth in the Asia-Pacific region.

Australia is not a technological giant within APEC, nor is it the most underdeveloped technologically. Innovation in forensic science might therefore benefit through APEC programs as a result of technology transfer from more developed nations such as the USA. On the other hand, there might well be the possibility of technology transfer from Australia to many developing Asian nations. Such business might be a good source of income.

APEC programs are not appropriate as entire financial support for the National Innovation Facility, and as APEC SET programs are only in the development phase it might well be some years before potential benefits arising from collaboration become clear.

National Institute of Justice Funding (USA)
The NIJ funds forensic science innovation through many schemes. The NIJ might fund projects in Australia, but it cannot be relied upon as a source of income to implement the Strategy.

7.1.4. Appropriated funds

Funding through the Justice Division
The direct beneficiary of innovation in forensic science is the criminal justice system. It is therefore logical that funding for the Strategy originates from the justice sector of Government. A very simple approach is to canvass the Justice Division of the Federal Attorney General's Department for unilateral financial support for implementation of the Strategy. A risk associated with this approach is that in the absence of additional income from Finance, a significant venture such as the Strategy would require a significant level of internal financial restructuring within Attorney General's, perhaps to the detriment of other vital forensic science initiatives such as NIFS. Another potential problem is the threat of the program bogging-down in the manner that the CrimTrac DNA database has. **These risks can be moderated by identifying revenue sources and by putting forward a strong, detailed plan for the Strategy. Therefore, as the first priority, the forensic sector should approach the Justice Division with a request to financially support the implementation of the Strategy.**

In the (likely) event that funding does become an issue for the Justice Division, several schemes could be put forward for sources of revenue at the national level that could be collected by the Division on behalf of the forensic sector. This should ease financial pressure. Sources such as confiscated proceeds of crime and industry levies are discussed in detail below. With an income stream in place the Division might be willing to go ahead and lend its support to the implementation of the Strategy.
This might mean provision of a small start-up fund (eg financial support until revenue starts flowing) or a guarantee of top-up funding should revenue fall.

In order to guard against the Strategy bogging down, the forensic sector must come forward with a strong, detailed proposal to which all members of the sector are signatories. The Justice Division must be convinced that one outcome of the Strategy will be an accountable, manageable entity that is capable of achieving proposed innovation outcomes given its proposed resources. They must also be convinced that benefits to the justice system will flow from innovation outcomes. Even though the proposal is not for a CRC, it should as be rigorous as if it were. The CRC selection process has been constructed by technology research experts in order to force proponents to carefully think-through proposals and put in place measures to ensure facilities will be relevant to industry and the nation, accountable, manageable, and capable of achieving proposed innovation outcomes given its proposed resources. If the proposal meets that standard then it will withstand scrutiny from any Government research experts from Attorney General's or any other Department.

Multi-lateral State, Territory and Federal funding

A multilateral funding model involving State/Territory and federal justice agencies might yield a bigger fund, and buffer the Facility against funding cuts. States and Territories could contribute funding from crime conviction levies and charges as outlined below. However, cross-government negotiations (especially those involving legislation) are difficult to achieve and slow. This model should only be pursued if full unilateral funding through the Federal Justice Division cannot be achieved.

Multi-lateral Federal Funding

Forensic science has science at its core, and one of the spin-offs of the Innovation Strategy is that students will obtain valuable research training. It might therefore be possible to pursue multi-lateral Federal financial arrangements through science, educational, and justice agencies to fund the Strategy. In "Backing Australia's Ability" the Commonwealth announced funding for two world-class Centres of Excellence; one in information and communications technology, and one in biotechnology. Funding of around $170,000,000 has been promised over 5 years by DISR and DETYA to support these Centres. The Government has decided what innovation outcomes are expected of these Centres, has developed guidelines as to how they should be structured, and is now seeking proposals from parties interested in running the Centres. A likely outcome of the solicitation process is that a consortium of universities and businesses with a combined proposal will be successful. With business involvement, and a focus on invention of goods and services, there is the expectation that the Centres will continue operation independently when Government funding ceases after 5 years. Furthermore, during the first five years the Government expects industry to contribute about $30,000,000 to the venture.

Backing Australia's Ability has budgeted for only two Centres of Excellence; currently there are no plans for others. However, it might be possible to convince DISR and DETYA to support the Strategy by the establishment of a Centre of Excellence in forensic science. The proposal will be difficult to carry. A major SET policy put in place by the Chief Scientist is that federal support for programs should be won through competition; the Centres of Excellence are two extremely special exceptions to policy.

DISR and DETYA would have to be convinced that forensic science is a special discipline that allows it to be exempt from the usual requirement for competition against the remainder of the SET sector for funding. Success might follow if the

Justice Division were to get behind the proposal financially and exert influence upon DISR and DETYA. Additional leverage might be gained if the PMSEIC report "Science, Crime Prevention and Law Enforcement" and the issues surrounding the terrorist actions of September 11 are given prominence. Now is the best time to raise a multi-lateral proposal for a forensic science Centre.

The proposal for a Centre of Excellence could request full funding, or it could involve a measure of revenue-raising schemes as discussed in the next section. Assuming a decentralized collaborative model is proposed (also discussed later) a relatively modest grant of about $30,000,000 over 5 years could be requested for full funding. The grant could be used to establish a Directorate, a core of program leaders, a modest level of infrastructure, and a fund to pay for scholarships, fellowships, innovation on-costs, and collaborative ventures. It is important to note that the Government would probably view such a grant as a research grant. If this were the case, then the Centre's funds could not be used to lever additional funds out of other Government schemes such as ARC grants.

The Government would expect the proposal to contain business continuity plans addressing the issue of life for the Facility after the 5-year start up period. The plan could be to request funding in perpetuity to the tune of $6,000,000 per annum, but this is unlikely to be successful and it is a risky option that exposes the Facility to sudden closure due to budgetary cuts back. Alternatively the business continuity plan could involve implementation of some or all of the revenue-raising schemes described in the next section at about the time that Government funding terminates.

There might only be room in existing DISR budgets to partly fund a Centre of Excellence in forensic science. In this case revenue-raising schemes identified previously would have to be implemented from the commencement of the Centre.

7.1.5. Revenue collection

Obviously the most straightforward mechanism for funding the Strategy is full, direct, appropriation from Government. Government funds will be tight over the next few years, therefore the pursuit of only this tactic is risky. It would be helpful to identify revenue that can be collected to fund the Strategy.

Forensic and academic sector contributions

Forensic science agencies could provide revenue. Most laboratory Directors interviewed as part of this project indicated that about $20,000-50,000 could be contributed per annum if a strong business case was presented to their administrating agencies. A figure of $500,000 per annum is therefore a maximum contribution that can be expected from the sector. For schemes other than a CRC, many local universities are not likely to make large cash contributions, as the potential return on their investment is limited.

Confiscated proceeds of crime

Proceeds of crime confiscated by Federal courts could be a source of revenue. About $7.5 millions are collected annually; presumably this income is allocated to current Government activities. However, the Federal Government is in the process of drafting new legislation for confiscation of assets of crime. Reforms are aimed at significantly impacting upon organized crime. Assuming the legislation fairly closely resembles the Proceeds of Crime Bill, there could be a significant increase in the value of proceeds seized [Australian Law Reform Committee Media Release, Wednesday 16 June 1999 "ALRC urges reform to proceeds of crime laws", and "Exposure Draft, Proceeds of Crime Bill 2001" Attorney General's Department]. State and Territory governments also collect proceeds of crime; in some instances (eg WA) tough new laws are already in place. Given the likely "windfall" of revenue presented to Government through confiscated proceeds of crime, now could be a very good time to commence negotiations with a view to diverting some of this revenue to forensic science innovation. It is clear that forensic science only exists because crime exists, therefore there is a certain logical symmetry that proceeds of criminal activity should be used to improve forensic science.

Industry levies

The primary industry sector provides another example of how revenue can be raised. The activities of the Rural Industries Research and Development Corporation are financed through many levies on primary production. Similarly, in relation to primary industry regulation, the costs associated with monitoring produce for chemical residues (conducted by the National Residues Scheme or NRS) are covered by a "user pays" levy. Such monitoring is generally required as part of access agreements for both export and Australian domestic markets. The way in which the NRS went about securing levies for its operations gives indications as to how the forensic sector might achieve similar ends. Instead of approaching businesses directly, the NRS lobbied the Government body that holds the legislation that allows the businesses to operate. Once that body was satisfied that there was a logical connection between the NRS operations and the industry, and that the proposed levy is not onerous, the Attorney General's Department was approached to draft legislation. Instead of establishing independent mechanisms to collect levies, the NRS "piggy-backed" them on existing legislation and levies. In this manner an amendment was made to the *Primary Industries Levies and Charges (National Residue Survey Levies) Regulations 1998* to enable the levies. Levies are collected on behalf of the NRS at the same time as other industry levies and by the same collection staff.

Using the tactics employed by the NRS as a guide, it should be possible to raise revenue for innovation in forensic science through levies applied to industries that will benefit from innovation in forensic science. For example, the insurance industry would benefit from discoveries in toxicology that lead to clearer definition of impairment due to drug or alcohol consumption (and therefore culpability with respect to motor vehicle accidents). Innovation in chemical criminalistics, biology, and crime scene investigation will have a positive impact on domestic and vehicle insurance due to a better clear up of house break-ins, criminal damage, hit and run accidents, and arson. Business insurance will benefit from innovation in documents examination due to better interception of fraud. There is a strong correlation between minor property crime and drug abuse; innovation with respect to drug investigation can be expected to have a positive impact on the insurance sector with respect to domestic liability.

The insurance industry is controlled nationally by the Australian Prudential Regulation Authority (APRA) through the Insurance Act, no 26 of 1973. APRA is a not for profit, government organization funded by direct levy from the industry; it also administers other insurance industry levies. Net total premium revenue (both inside and outside Australia) totalled $20.5 billion for private and public sector entities in 1999-2000. If all insurance premiums rose by just 0.1%, the levy could amount to $20,000,000 per annum! It is important to realize that the monies from the levy would not come from the profits of insurance companies; the Australian public and business would probably pay an additional small amount on our insurance premiums. Compared to the approach where criminal activity could fund the National Innovation Facility through confiscated proceeds, an insurance levy forces almost every individual to support the Facility.

Another industry that might derive some benefit from innovation in forensic science is the pharmaceutical industry. The Therapeutic Goods Administration (a body within the Department of Health and Aged Care) regulates the industry through the *Therapeutic Goods Act 1989.* The Act provides a national framework for the regulation of therapeutic goods in Australia, so as to ensure their quality, safety, efficacy, and timely availability. Most illicit methylamphetamine in Australia is produced locally in illicit laboratories from pharmaceuticals containing pseudoephedrine. Many coronial toxicology cases involve intentional or accidental poisoning due to licit preparations. In court legal drug usage or abuse can be evidence of culpability or mitigating circumstances, depending upon the nature of the offence. Therefore a direct result of innovation in forensic science (particularly in the toxicology and illicit drug fields) would be enhanced public safety with respect to pharmaceuticals. Compared to the insurance industry, however, the pharmaceutical industry is only associated with a fraction of the activities within the scope of the Strategy.

Crime levies

Legislation in the State of Michigan in the USA also indicates how revenue might be raised on behalf of forensic science innovation. In that State, the Forensic Laboratory Funding Act 35 of 1994 was drafted to "…create the state forensic laboratory fund; to authorize local forensic laboratory funds; to provide for assessments against certain criminal defendants; to provide for expenditures from the forensic laboratories funds; to make certain appropriations; and to prescribe the powers and duties of certain departments and agencies and local units of government." (see Appendix 2). In effect, the Act orders all persons convicted of certain offences to pay an "assessment" of $150.00 if a forensic laboratory has conducted a forensic test in the investigation of the case, even if the test results were not presented as evidence. The "assessment", minus a small amount for court administration costs, is credited to the state forensic laboratory fund. The fund is distributed annually to the multitude of registered forensic laboratories in Michigan in order to defray operating costs, the exact amount credited to any particular laboratory proportional to its case load. The system in Michigan employs tactics similar to those used by the NRS in the collection of levies. That is, the collection of "assessments" is piggy backed onto existing court procedure, not through a separate collection mechanism. In Michigan prosecuting attorneys present the court with a special declaration produced by the forensic laboratories if the case before the court included any scientific investigation.

Another statute from Michigan that might serve as a useful model is the Michigan Justice Training Commission Act 302 of 1982, which was drafted to "…create the Michigan justice training commission and the Michigan justice training fund; to provide the powers and duties of certain state agencies; to provide for the distribution and expenditure of funds; and to provide for the promulgation of rules" (see Appendix 3). In effect, this act allows for the collection of a $5 levy applied to traffic violations (with the exception of parking offences). Income from the Act, which amounts to $3-4,000,000 per annum, is credited to a fund administered by the Justice Training Commission. The Commission has the power to award 40% of the fund in competitive training grants. The remaining 60% of the fund is distributed between the 431 (this is not a misprint) eligible law enforcement agencies in Michigan in order to defray reasonable costs incurred in certain law enforcement training.

Crime levies are already in place in Australia. In South Australia, for example, there is a Victim's of Crime levy that amounts to a $7 surcharge on expiated offences, $28 for all other summary offences, and $44 for indictable offences. Offences under the Road Traffic Act account for the bulk of the revenue collected under the Victim's levy. The total value of fines recovered in SA in 2000-2001 was $12,000,000, while the revenue from the victims levy amounts to about $3-4,000,000 annually. Other jurisdictions around Australia have similar levies to raise funds for victims of crimes.

Innovation in forensic science could be funded by income raised through schemes analogous to the Victim's levy, or the levies in place in Michigan. In Australia the bulk of offences that could raise revenue are adjudicated in State/Territory courts, therefore multi-lateral negotiations would most likely be required in order to secure an adequate fund.

7.2. Innovation Management

Assuming appropriated funding can be secured, then two options for managing innovation emerge: a dedicated National Facility with its own innovation personnel could be established; or the current NIFS Research Grant Scheme could be enhanced. As one of the weaknesses in forensic science innovation nationally is the lack of dedicated human resources, the first option would offer the biggest improvement to the current situation. However, a Facility would require a bigger budget in order to cover salary costs, therefore if a certain level of funding cannot be achieved, the option for a Facility would not be available.

7.2.1. A National Innovation Facility

If annual funding of at least $4-5millions can be obtained then the forensic sector can implement a realistic strategy to greatly enhance Australia's capacity for innovation. A National Innovation Facility could be established comprising a substantial number of salaried participants and its own competitive Innovation Fund. Participants should include administrators, full time program leaders, research students, post-doctoral research fellows, and part-time appointees on secondment from the forensic or academic sectors.

Program leadership

Program leaders would be the creative heart and the prime movers of the Facility. It is highly desirable that they have wide and deep knowledge of both technology and forensic science. Their critical innovation outcomes are the identification of new technologies ripe for extension into forensic science, transferral of new technologies into forensic science, program management, attraction of competitive grant funding, and the development of new networks with agencies such as CSIRO. The talents of individual program leaders will have a major impact upon the success of the initiative. Given the size of the population from which appropriately qualified program leaders might be drawn, the creation of the first cohort is one of the major challenges facing implementation of the Facility. A range of flexible employment tactics might be required in order to attract the best candidates from the Australian forensic and academic sectors and from overseas. In addition to permanent full time employment, long term secondments, either part- or full-time, could be offered.

Program assistance

Out of necessity program leaders will require the assistance of personnel who are more directly involved in "hands-on" laboratory work. In most CRC's this "second tier" is comprised of research students and research fellows. This would be a good tactic to adopt even though the Facility might be independently funded.

Research fellowships, particularly at the post-doctoral level, are an extremely important component of the Facility. Such fellowships could be short or long term, and could attract high-profile scientists from mainstream science, from the forensic sector on a secondment basis, and from overseas. The Facility should have the financial means to offer stipends for such fellowships, and also provide funds for participation in Commonwealth competitive schemes to attract fellows.

Research students will make a valuable contribution to the Facility and the sector, even though they will be short-term participants. Their direct research output is of course very valuable, but as they graduate these students will provide a very useful pool of well-trained, innovative "forensic practitioners of the future". Although students would originate from many of the forensic courses on offer around Australia, they could also be drawn from the forensic sector on a secondment basis. In addition to the research outcomes of such a secondment, another tangible outcome would be an up-skilling of the sector if formal recognition of the placement could be arranged. For example, a local University could be convinced to offer formal qualifications such as a Certificate or Graduate Diploma in Forensic Science (Research) for secondments that meet certain academic criteria.

Tactics to attract students

In order to maximize the benefits that students can bring, it is a wise strategy not to let them enter the system by accident or in an ad hoc fashion. Australian education statistics indicate that most students complete their PhD at the institution at which they received their Honours degree. It is therefore vitally important that the Facility implements mechanisms to attract a good number of first-rate, skilled Honours students.

The chemistry departments at Flinders, Curtin, UTS, and Deakin have shown that one way to attract the best Honours students is to offer undergraduate degrees in forensic science. These programs tend to attract and develop the best chemistry students directly from high school. As an investment in the future it is of vital importance that the National Innovation Facility and the forensic sector lends support to these programs, and others that might emerge in disciplines other than chemistry. Industry involvement adds relevance and credibility to courses. Furthermore, as students become involved with forensic scientists barriers are broken down and they feel more comfortable about committing themselves to an Honours degree (and therefore most likely a PhD) within the sector.

Another way to attract the best students to forensic science innovation programs is a carefully planned scholarship program. An aggressive program is to offer a few Honours scholarships each year with a stipend of about $5,000. Such scholarships are not commonplace, therefore they are sought after and highly competitive. For the Facility the likely outcome of investment in Honours scholarships is that a number of the best graduates from around Australasia would be induced to pursue a research path in forensic science for about 4 years (Honours plus PhD).

Additional tactics will be required for the Facility to reach an intake of PhD students commensurate with its innovation programs. Each year the Commonwealth offers a limited number of APA scholarships to the best students Australia-wide to allow them pursue studies towards a PhD; the annual stipend for such scholarships is $17,071 (2001). Students are free to chose the institution at which they study. Obviously prestige alone could be relied upon to induce APA scholars to commit to undertaking PhD studies with the Facility. Although this is a good tactic, it is sub-optimal. It would most likely attract those students who finished somewhere other than at the "top of their class", and those students with a burning desire to pursue forensic science at any cost. The reason is that many educational institutions offer "top-up" scholarships.

In this scheme an institution will offer an additional stipend (usually about $8,000) to winners of APA scholarships in order to lure them to their institution to pursue their PhD. These schemes usually attract the top students in a given cohort. This tactic is win-win for all parties. If the Facility were to adopt this tactic, top students would be attracted. Furthermore, it is cost-effective because a top-up scholarship costs the Facility only $24,000 (over 3 years) whereas if the Facility was to offer its own scholarships at the going APA rate the cost would be $51,213. The student of course benefits by the $24,000 committed by the facility. The Facility should offer as many "top-up scholarships" as possible as a priority tactic, but as the number of APA scholarships offered per year is limited, the number of students acquired through this route will be limited. As a guide, "high quality" CRC's usually can attract about 3 students to top-up scholarship schemes. Therefore the Facility will most likely have to offer its own scholarships at the APA rate in order to achieve the intake required to conduct all its programs.

Facility administration

The program leaders and assistants must be part of a cohesive team with a strong sense of direction. There should be a Director of the Facility to whom program leaders would report, perhaps via a leader of each Cluster. As NIFS has a well-established national role in research and development, it is appropriate that the Facility, via the Director, receives governance from NIFS and its Board of Control. Although SMANZFL would have direct input to governance of the Facility through the NIFS Board of Control, a more direct link should be established. A Facility Steering Committee comprising a few members of SMANZFL would ensure that innovation programs maintain relevance to the forensic sector and coherence with its strategic plans. The Facility would require its own research panel of advisers that would assess applications for funding, and plan solicitations for innovation programs; this panel should be made up of forensic scientists and academics skilled in research. There may well be ethical objections to some innovation programs. In order to retain the confidence of the wider community, and the sector of Government through which financial support originates, the Facility must develop ethical guidelines and an ethics appraisal committee should be established. Although the purpose of the Facility is not commerce, it would be prudent to ensure that the Facility has the capability to capitalize upon any inventions or services that might emerge as a result of innovation. In order to assist with this, the Facility, or NIFS itself, should become a legal entity. As is usual for any research institution, the Facility must draft policies for the administration of intellectual property, IP agreements between the Facility and collaborative partners should be reached, and some administrative assistance in relation to IP management should be arranged.

Innovation Grants Scheme

In addition to funds for salaries, scholarships, and innovation costs (consumables/minor equipment), the Facility should have a significant Innovation Fund set aside so it can offer Innovation Grants on a competitive basis. The Innovation Fund can be managed passively, or by active mechanisms. A passive approach involves an open invitation to researchers to submit research proposals. Under this approach the funding body exerts relatively weak control over the program agenda through its funding guidelines; researchers develop the programs. The ARC, NIFS, NHMRC all provide funds under such passive schemes.

In an active approach the granting body identifies big-issue programs and attaches a budget to them. This is followed by solicitation to researchers to submit proposals for the programs, then the grant is awarded. With this approach the research funding body drives the innovation agenda to some extent. In the USA, the NIJ makes use of this approach in forensic science research funding.

It would be desirable for the Innovation Fund to be administered in a flexible, responsive fashion that would see on-going passive program management supplemented by the announcement of active programs of strategic significance as needs arise.

Innovation grants are vital if the Facility is to expand its geographical and innovation impact. For example, the Fund could be accessed by program leaders as a source of "leverage funds" for participation in a variety of NCRG schemes with new partners such as the AIC or ACPR in fields outside the current scope of the Innovation Strategy. Grants could be awarded to forensic scientists or academics who are not associated with the Facility in order to fund exploratory programs not covered by the Facility. If a substantial area of collaborative, cutting edge research were to be identified or were to emerge from activities of the Facility, then an ambitious option would be use the Fund to provide industry cash support for a CRC.

In order to develop international collaboration, grants could be awarded from the Innovation Fund directly to researchers in NZ for programs that cannot be conducted in Australia, or to large-scale programs covering Australia and NZ. If the planned "Virtual Forensic Science Research Institute" was to develop in NZ, then the possibility exists for programs to be jointly funded by Australian and NZ Facilities. With an established Fund, the Australian Facility will be seen as a credible collaborator in other international partnerships with the NIJ, the FSS, or the European Union Framework Programs, for example. Such international collaborations funded by the Facility would have a good chance of attracting matched funding from the Federal Government. Finally, the Fund could be used to financially support worthwhile proposals arising from individuals not associated with the Facility. This can have two benefits, innovation in fields not within scope of the Facility can be supported, and it will ensure that the Facility does not become the only mechanism for innovation.

A centralized Facility

A National Innovation Facility could be either centralized or decentralized. In a centralized approach the Directorate, the program leaders, and some (if not all) assistants would be housed in one physical location. It follows that real estate and some level of capital equipment must be acquired. This requirement might not be a major financial burden. Equipment can be leased instead of purchased. Furthermore, it might be a very attractive proposition to a number of Universities to house the Facility within their campus. A competitive situation might reduce the financial burden, or even return a surplus. It might be appealing to Government to house a centralized Facility at a CSIRO campus, thereby utilizing existing infrastructure. However, the only links between CSIRO and forensic science currently are in Adelaide, and although CSIRO offers the potential for further collaboration it will not be a major partner.

An alternative centralized structure could have program leaders situated in one location, and second tier staff located around the nation at forensic labs or universities. This structure is similar to that of the AIC. Under these circumstances program leaders would adopt a "hands off" approach to innovation. That is, the leader would become involved in the following activities: identify an innovation program (or be assigned to a program), identify technologies appropriate to the program, develop a program plan to achieve desired outcomes, search for appropriate collaborators, write a grant proposal (or otherwise procure funds), and then periodically assess progress of the program. Leaders would very rarely conduct laboratory work themselves, therefore in this centralized model program leaders would be contribute mostly through their administrative prowess rather than their skill in the laboratory. The "hands off" approach assumes that the forensic and academic sectors can largely conduct the innovation programs independently, subject to periodic review.

Any centralized structure allows for strong management. It should not suffer from critical mass shortage, and it facilitates strong communication and brainstorming between programs and disciplines. However, Queensland, New South Wales, the Australian Capital Territory, Victoria, South Australia, and Western Australia all have useful infrastructure to contribute to a National Facility; no individual State or Territory can offer in isolation the resources offered by all in combination. Furthermore, a centralized facility will be separated geographically from the majority of Australian forensic labs. This might diminish the credibility of the Centre, the sense of national ownership, and the rate of national participation. As forensic activity takes place largely in State- and Territory-based laboratories it is paramount that participation is truly national. A centralized facility might also introduce a significant barrier to active technology transfer (see below) to the forensic sector. Therefore of the two centralized types the AIC model where the program leaders are centralized and the second tier staff are decentralized appears to have the most to offer.

A Decentralized Facility

An alternative model is a decentralized Facility. Such a facility would develop several nodes initially in those locations that already have strong forensic science innovation infrastructure and offer potential for further linkages. For example, a node could be established in Melbourne. There is sufficient current activity in Melbourne and the promise of sufficient new links to warrant the placement of three program leaders (one from each discipline Cluster) from the Facility in that city. Similar nodes, perhaps representing fewer Clusters, could be placed in other cities around Australia.

A decentralized facility should engender a strong feeling of relevance, credibility and ownership amongst the forensic sector and it should enhance active technology transfer (see below). In a decentralized facility program leaders are in an ideal position to "micro-manage" programs and second tier staff to an extent impossible in a centralized facility; this guards against programs "going off the rails". To some extent program leaders could become involved in "hands on" laboratory work in a decentralized structure; the technical skills of the program leader as well as their administrative prowess are therefore utilized. However, the diffuse nature of a decentralized Facility means that communication, brainstorming, and critical mass issues with respect to the program leaders must be addressed, probably through frequent travelling for "face to face" meetings.

It should be pointed out that many successful CRC's and other collaborative research ventures operate with a decentralized structure.

Shared placements

The establishment of a decentralized Facility raises the question of accommodation and equipment acquisition. The logical solution is to place the program leaders in the forensic sector. From this position the program leaders as a group would reach out to establish strong links with the best resources the nation has to offer at local universities, their research institutes, and agencies such as CSIRO, ANSTO, and DSTO. Obviously if arrangements along these lines are to be made, a critical preliminary action is to establish exactly which forensic laboratories and universities are prepared to participate in the scheme under these arrangements. A decentralized Facility requires a very high level of cooperation between the National Innovation Facility, Universities, and forensic agencies. For example, a potential outcome is that some forensic laboratories might be called upon to house two or three full time program leaders for perhaps 75% of their time. Teaching and student supervision might require the program leaders to be housed at universities for the remaining 25%. Alternatively, the Facility might engage part-time program leaders in some jurisdictions. In this scenario the program leaders would devote, say, 50% of their time to forensic casework, the remainder to program management for the Facility. Although the option of part-time program leaders appears to offer nothing but organizational complexity, there are some advantages. Under these circumstances the leaders will retain strong credibility and contacts within the sector; programs stand a much greater chance of being relevant to the industry. Furthermore, part-time program leaders might be a very good solution in those cities such as Darwin or Hobart where the possibilities for full time operation are limited.

Many financial and human resource issues, some of which might be region-specific, could require resolution before a decentralized Facility with jointly appointed personnel could be established. For example, exactly how would part-time or seconded personnel receive payment for their services to the Facility, what authority does a lab director wield over Facility personnel, and which body, the Facility or the host, cover workers compensation issues? **Resolution of these issues need not be impossible; shared placements as described above are already substantially in successful operation in New Zealand (Dr Douglas Elliot is shared between ESR:Forensic and the University of Auckland) and Victoria (Dr Bryan Found is shared between the VFSC and Latrobe University).**

Forensic sector in kind contribution

Any business plan relating to the establishment of the Facility must include an accurate assessment of the magnitude of in kind contribution provided locally. It is important not to under-estimate this contribution as it sends an important message to (Federal) funding bodies that the industry as a whole is financially and morally committed to the initiative. It is also important that the business plan clearly indicates the extent to which the Facility will "lever off" Federal SET infrastructure (universities, CSIRO, DSTO, and ANSTO mainly). This is important information to the Federal Government as it provides concrete evidence of their investments working harder.

Technology transfer

For this report technology transfer refers to the uptake and implementation of technologies new to forensic science in Australasia. Note that this does not limit the discussion to technologies that are new to forensic science, nor to transferral solely to the existing forensic science sector.

Technology transfer (TT) mechanisms can take two forms; active and passive. Passive TT takes the form of publications and conference presentations. As a means of TT, the passive forms can be quite ineffective. If articles or presentations are extremely well written and contain technical details and educational information at the level required by the target audience, then the technology stands a chance of direct implementation. Otherwise all that is achieved is publicity for the technology and the inventor; the end users are left to implement the technology as best they can. As publications and conference presentations are standard performance management measures for mainstream research, there is no doubt that the National Innovation Facility must "publish or perish". However, in addition the Facility must develop strong active technology transfer mechanisms in order to serve the forensic sector.

Active TT involves a more educational, face to face approach; Havelock has reported that this personal approach is of primary importance in TT (Havelock, RG, et al *"Planning for Innovation Through Dissemination of and Utilization of Knowledge"* University of Michigan). Workshops are an effective, active technique. Another is the placement of individuals referred to as "linkers" by George (George, P, et al, 1978 *"The Linker's Contribution to Technology Transfer"* Journal of Technology Transfer, 3(1), 51-61). A linker is one who bridges the gap between technology providers and the technology users. Usually the linker is positioned within the latter group in order to maintain credibility with the user group and overcome what George refers to as that group's "boundary impedance" to TT. **If the National Innovation Facility were to take on a decentralized form as described in the previous section, program leaders situated in forensic agencies could take on the role of linkers very effectively.**

Another means of enhancing TT is to ensure that it becomes an integral part of Innovation Grant assessment criteria. When the ARC receives grant applications, assessment panels judge programs in relation to potential benefits of the research outcomes, and whether the research plan and financial plan are sound. The National Innovation Facility could use similar assessment criteria, but in addition, it could stipulate that applicants also submit a TT plan for assessment. Key features of a TT plan would include provision for national seminars or workshops, compilation of manuals or protocols, and a description of proposed validation.

Other barriers to technology transfer

One significant barrier to full implementation of the best technology nationally is the lack of resources in many of the end user laboratories. In the final analysis, if the laboratories cannot afford the best technologies they will not be implemented. Although measures to address this problem are beyond the scope of this paper, they are within the scope of another NIFS project dealing with the value of forensic science.

In order to realize the potential that the National Innovation Facility promises the values project must be completed. Measures must be put in place to ensure forensic science as a whole, not just innovation, is on a more secure financial and cultural basis.

Service centres of excellence

The National Innovation Facility programs are likely to identify better ways of analysing evidence. Alternatively, it is possible that material not previously thought of as evidence will be shown to have probative value. In any event the forensic sector will be called upon to adopt new technology. In some instances it will not be cost-effective for every laboratory in Australia to gain expertise or equipment relating to a new technology, particularly if the case pressure in a given jurisdiction is low. Under these circumstances an obvious solution is the establishment of service centres of excellence. With a centralized Facility the development of service centres would be difficult, as forensic laboratory infrastructure must be established. Furthermore, a centralized collection of service centres would most likely be met with a hostile backlash from current service providers. With a decentralized Facility, service centres could emerge at those forensic laboratories or universities where the skills and technologies were developed. In the university context these service centres might resemble the UK "crime faculty" model. Distributed ownership and responsibility might be a way of settling what could be a very divisive issue in the forensic sector. Understandably, some existing forensic laboratories are wary of supporting arrangements such as the National Innovation Facility if it an outcome is that their core business moves to a University. This fear, and any that the academic sector might have regarding loss of their business, would be addressed to some extent by a National Innovation Facility code of ethics and business confidentiality agreement.

7.2.2. An Enhanced NIFS Research Grant Scheme

If revenue raised on behalf of the forensic sector only amounts to about $1-3,000,000, then plans for a significant National Innovation Facility would have to be abandoned. At this level of funding an option is to implement the Strategy around a revamped NIFS Research Grant Scheme. A wide variety of innovations covering a wide variety of fields could be supported if the traditional NIFS focus were to be maintained. Therefore, compared to the establishment of a CRC, this approach would more closely align with the scope of the Innovation Strategy, and it would have the added benefit of longevity.

Innovation management

With a budget of more than $1,000,000, the NIFS Research Grants Scheme could have a positive impact upon innovation. A substantial portion of the budget should be allocated to student scholarships, post-doctoral fellowships, and research on-costs. The Scheme should be modified to allow NIFS funds to be used as industry contribution (perhaps in combination with contributions from interested forensic agencies) in order to lever support from the Commonwealth under a variety of NCGP and Innovation Access schemes. In this way NIFS funds could be used to initiate additional post-doctoral fellowships, Linkage programs, or even a CRC. The NIFS fund could foster innovation by provisions for capital equipment lease (or purchase) in order to assess technology or develop specialist casework services.

In relation to technology assessment, the fund could be used to bolster the Michael Duffy Fellowship scheme to allow for long-term placement in overseas agencies and institutions. In addition, the NIFS scheme could be used as it has been in the past, that is, to fund innovation programs proposed by forensic practitioners and academics. Where appropriate, the NIFS scheme could provide funds sufficient to allow practitioners to pursue their proposals themselves on a secondment basis. This is of relevance in those programs that are not suitable for PhD or Honours students, or those programs that are so specialized/classified that universities cannot provide expertise or equipment. Secondments could be viewed as research training for which formal qualifications could be awarded where appropriate.

Technology identification

With the budget given above, there are not the means to support dedicated program leaders, as a consequence technology identification responsibilities will fall back onto the forensic sector to some extent. The NIFS Research Grant Scheme could be used to ease this burden to some extent by sponsoring the activities of a "Research SAG". Unlike the current SAGs, which are populated by representatives of management, the Research SAG should be composed of forensic scientists and academics with a strong track record in forensic science innovation. The SAG would be a forum where innovators within the forensic sector would meet with their colleagues and academics in order to identify technologies that could be adopted or extended into forensic science.

Technology transfer

Given the budget, TT will be heavily reliant upon passive means such as publications and workshops. Those who conduct innovation programs (eg students, practitioners on secondment, academics, etc), will of necessity take upon the role of linker. An important reform of the NIFS scheme is to insist that proposals forwarded for consideration address the issue of TT adequately (See previous section).

Administration

Even though the NIFS fund might be small, administration of it should be accountable, transparent, and ethical. A panel of advisers skilled in research and drawn from academia and the forensic sector should be created to assess innovation proposals. In order to allow for rapid decision-making, this panel could assess proposals every six months. A separate ethics panel should be created, to which controversial proposals would be referred. The accountability chain currently in place for SAGs and NIFS panels should be sufficient to ensure that the Research SAG and the Research Panel of Advisers maintain a drive towards innovation outcomes and industry relevance. NIFS, SMANZFL, the Research SAG, and the Research Panel of Advisers would require the services of a permanent administrative assistant so that a certain level of active control, coordination and planning with respect to activities is maintained.

7.3. Summary of options

7.3.1. Status quo

The forensic sector could adopt an innovation strategy of "do nothing". However, this flies in the face of recommendations made in the PMSEIC paper "Science, crime prevention, and law enforcement", which challenges Australia to "Identify mechanisms to encourage Australian industry and research agencies to participate in the development and production of new, affordable technologies for law enforcement". We do not currently have adequate, dedicated resources or the organizational infrastructure that could allow us to effectively meet the PMSEIC vision. **If the sector does nothing to improve the rate of innovation in forensic science then tomorrow's evidence will rely on today's technology.**

7.3.2. A National Innovation Facility

The forensic sector could establish a major National Innovation Facility that includes these key features:

- personnel dedicated to technology adoption, technology extension, and technology creation;
- a strong focus on technology transfer;
- strong participation in programs by forensic scientists;
- a decentralized network comprising forensic agencies, universities and other Government research providers;
- a competitive Innovation Grants scheme to encourage growth;
- strong governance that includes NIFS and SMANZFL.

Although such a Facility sounds like a CRC, substantial compromises would be required if the Facility were to be funded through the CRC scheme. Instead, the forensic sector should seek appropriated funding through Government. For effective operation the Facility would require about $4-5M per annum.

7.3.3. An enhanced NIFS Research Grants Scheme

If funding of less than $4-5M is obtained then a National Innovation Facility might not be feasible. However, the forensic sector could look to driving innovation by enhancing the NIFS Research Grants Scheme. Key enhancements are:

- gaining leverage on NIFS funds by allowing them to be used as industry contribution in Innovation Access programs and Government National Competitive Research Grant schemes;
- requiring plans for technology transfer to be submitted as part of grant proposals;
- establishing a research SAG to focus on technology identification;
- establishing an on-going research student scholarship program;
- establishing post-doctoral fellowships;
- creating some level of administrative assistance for NIFS including an innovation Panel of Advisers, an Ethics Panel, and a general administrator.

7.3.4. A CRC

Due to a variety of reasons the development of a CRC is not the best way to implement the NIFS Innovation Strategy. Neither the establishment of a National Innovation Facility nor enhancement of the NIFS Research Grants scheme would preclude the forensic sector from pursuing a CRC in the future; such developments might even strengthen the application for a CRC. The logical path to a CRC is for NIFS and SMANZFL to identify a specific, genuine need in forensic science that can be addressed by a significant, technically excellent research program involving a partnership with a few universities. The sector must be prepared for a significant cash investment in the venture, either from its own sources or from the Facility or the NIFS fund.

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Paul Kirkbride
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Introduction

The key deliverables of this Innovation Strategy are to:

- assist in the fight against terrorism, major crime and organized crime;
- allow police to tackle volume crime;
- identify and tackle problems associated with licit and illicit drugs.

These will be made real by a variety of innovation programs dealing with the following themes:

- to identify ways of working smarter and quicker in order to reduce current case backlogs;
- to extract the maximum benefit from CrimTrac and develop other forms intelligence in order to enhance intelligence-led policing;
- to bring science into the crime scene,
- to enhance the probity of scientific evidence.

The following is a collection of ideas for programs within these themes that have emerged from interviews and discussions with representatives of the forensic and academic sectors, from the PMSEIC occasional paper "Science, Crime Prevention and Law Enforcement", from "Using Forensic Science Effectively. A summary for scientific support units" by the FSS and Association of Chief Police Officers, from "Forensic Sciences: Review of Status and Needs" by the US DOJ Office of Law Enforcement Standards, and from proceedings of the Annual National Conference on the Future of DNA sponsored by the US DOJ.

Theme 1, Working smarter and quicker

Biological microchip arrays

These chips are used to indicate the presence of short DNA target sequences or small molecules such as drugs within a biological specimen. The attraction of these devices is that many independent biological recognition receptors can be placed on a single chip, which means that although the devices are really only a screening tool, a very high level of discrimination is nevertheless achievable. The small size and low cost (which is decreasing annually) of chips make them ideal for disposable lab or crime scene test kits. Development of a forensic soil comparison kit based on this technology is already taking place in SA. As there are many laboratories in Australia offering customized manufacture of chips, it is feasible that the Facility could become involved development of microchip technology for laboratory or crime scene screening and "profiling" purposes. However, the Facility would be exposed to fierce competition from large commercial companies in some fields, for example kits to identify biological warfare agents. Identification of "niche" programs or programs solving a particular Australian requirement would offer less risk to the Facility. Assessment of new devices would be an important TA role for the Facility. There are some commercial possibilities in this field.

Microfluidic devices

These devices are the "pumps' that will drive capillary-based separation systems of tomorrow. They are the basis of "lab-on-a-chip" technologies that will probably find application in crime scene investigation kits and in more sophisticated lab-based instruments. DNA profiling, drug and explosive identification, and toxicological analysis could be performed using these devices. These devices promise to be cheaper and quicker than current technology as less "clean-up" or processing of specimens should be required.

The field is high technology and highly competitive, therefore it is probably too risky for the Facility to become involved as a new player in TC activities. However, very useful programs could involve the development of "enabling" technologies in which the forensic sector already has a stake, such a chemiluminescence detection of drugs. Another program would involve modification of devices in order to allow the analysis of specimens from post-mortem or crime scenes. This will be necessary as initial development of labs-on-a-chip will most likely revolve around much "cleaner" clinical applications. Assessment of new devices would be an important TA role for the Facility. There are some commercial possibilities in this field.

Single-cell techniques

A promising collaboration has developed with the AGRF in relation to the recovery of DNA from single sperm cells. This work should be pursued as it might yield technology applicable to the resolution of cell mixtures arising from sexual assault swabs. In the past, connections have been established with the view to developing an instrument that can automatically search multiple microscope slides and log the presence of sperm cells. It might be worthwhile for the Facility to resurrect this program, particularly now that pattern recognition algorithms have been developed to a high state of reliability through research by the CSIRO. There are some commercial possibilities in this field.

Contact DNA

Australia has been a leader in the development of technology for the profiling of contact DNA. This work could be expanded and include a study of the affect surface composition has upon recovery efficiency, and the influence different fibres and solvents have upon recovery from swabs.

Non-human DNA

A few groups in Australia are developing technologies for profiling DNA from plants (cannabis batch comparisons), soil (for soil comparison), and endangered species (to combat trafficking); the Facility should look to enhance these activities. In addition, efforts could be directed towards the adoption of technology suitable for the determination of the origin of non-human crime stains (particularly domestic animals and common fauna) and for the comparison of other types of trace evidence such as pollen. There are some commercial possibilities in this field, particularly specialist services.

Audio and image evidence

Current programs dealing with video, still image, and audio enhancement could be enhanced by the Facility. In addition, new programs built on collaboration with the CSIRO Telecommunications and Industrial Physics (TIP), RMIT, and the CSSIP could result in sophisticated algorithms for the detection of and enhancement of complex images in complex data, even video recordings. In addition to Field, Identification, and Electronic Sciences, this technology could be used in biology (automated logging of sperm in sexual assault exhibits), radiology and other medical imaging, and micro-CT scans.

Latent fingerprints

Australia has a good track record in the development of new reagents for latent fingerprint enhancement. The Facility should look to enhancing this situation by encouraging links with surface, physical, and synthetic chemistry research groups. There are some commercial possibilities in this field.

Human location

There is an infrequent but important need to locate interred remains, either within a defined region (such as a domestic crime scene) or over a vast region (such as the Balangalo State Forest). The Facility could become involved in an investigation of new types of ground penetrating radar and software algorithms that can be used to enhance contrast between the gravesite and unrelated earth. Due to the cost of technology, and particularly the allied costs associated with airborne technology delivery, it is unlikely that any forensic agency would be capable of service provision. As a consequence an important part of this innovation program would involve the development of a national response capability.

Devices incorporating nanotechnology

It is quite likely that instruments incorporating multiplexed nanotechnology devices could be developed as wide-ranging screening tools. For example, one instrument might be sensitive towards all gaseous hazards present at illicit drugs or explosives laboratories. Another instrument might respond to a wide range of drugs in a saliva sample. However, the competition in this field will be intense, and unless a niche interest can be identified, or an interest where the Facility might have an edge due to strong partnerships, the risk of becoming involved in this field might be too great. Assessment of new devices would be an important TA role for the Facility.

LC-MS

Many forensic laboratories are installing LC-MS or LC-MS-MS facilities to streamline toxicological investigations. The Facility could become involved in the coordination of toxicological TA programs, and TE programs in relation to chemical criminalistics and illicit drug innovations. The Facility could coordinate the development of on-line mass spectral libraries.

Entomology

The strong entomology programs at UWA and Melbourne University could be supported by the Facility. There are some commercial possibilities in this field, particularly in relation to specialist services.

Theme 2, Intelligence

CrimTrac

Much can be gained by levering off the CrimTrac database, extending its scope, and planning for succession when "technology creep" catches up. The National Innovation Facility would be a logical body for these, particularly at CrimTrac reaches the end of it's funding cycle. Databasing of shoeprint images and the coordination of technology nationally for the collection of shoeprints could take place. In the field of DNA profiling, a project of significant ramification might be management of database succession should the forensic sector opt to move from Profiler Plus as the preferred technology. CrimTrac databases will be massive. In addition to solving crime, the data could be of use in research projects, for example, how big must a partial print be before a reliable match can be made? A potential program dealing with casework management relates to the identification of measures that will enhance the correlation of hits between fingerprint and DNA databases, and the rate of follow up of identifications made through CrimTrac.

The Illicit drug trade

Australia is in a good position to make a positive impact in the fight against illicit drug trafficking. Current programs dealing with tactical intelligence (identification of synthetic pathways and by-products, new technologies for batch comparisons, tracer studies) and strategic intelligence (provenance profiling, batch comparisons) should be enhanced. Programs to enhance coordination and management of intelligence at the national level should be initiated.

Anti-terrorism programs

The Commonwealth Government has been galvanized by events relating to the terrorist activity around September 11. Defence and security agencies will have a major role to play in relation to public safety, surveillance, and incident investigation. In a major incident, the AFP and perhaps State/Territory forensic labs will become involved when investigations progress beyond the scope of defence and security agencies, such as tracking down criminals and providing evidence by means of fingerprints, DNA, and chemical trace evidence. Forensic agencies will also be involved in the myriad of copy-cat and hoax incidents, and events that are not immediately recognized as terrorism and therefore not attended to by defence and security agencies. The Facility could assist in developing forensic science intelligence that would complement that held by security and defence agencies. Obviously CrimTrac is of critical importance, but trace evidence intelligence relating to explosives and chemical warfare agents could also be developed.

The Facility could also become involved in national anti-terrorism measures by coordinating and developing the forensic sector's response to intelligence gathering campaigns that are already under way (eg Operation Drava).

DNA phenotyping

Research programs exploring phenotyping for criminal investigation purposes have commenced in Australia. Given the activity in the forensic aspects of this field outside Australia, and the great activity outside forensic science all over the world, the Facility should be prepared to become involved in appropriate innovation programs. Although direct competition with major players in the field might be too risky, TA programs, intelligence management, assessments of reliability, development of local databases, and the identification of uniquely Australian characteristics might be appropriate activities.

Theme 3, Science at the crime scene

Portable instruments and technologies

There is evidence to suggest that the rapid identification of a criminal greatly assists clear-up of crime; the ultimate would be to make an identification at the crime scene. At some crime scenes, such as bombings or clandestine drug labs, it might not be obvious exactly which items should be seized or sampled for further examination; obviously it is desirable not to collect many irrelevant exhibits. Evidence from some crime scenes is too dangerous to transport to the laboratory; CBR exhibits, improvised explosives, and some illicit drug lab evidence fits into these categories. Crime scene dilemmas such as these are an emerging trend world-wide. In response instruments are being developed that can be used at the crime scene. It should be possible to screen evidence, identify deposits of explosives residues, quickly obtain results then destroy hazardous evidence, or indicate useful items for sampling at the scene. It might be possible to produce a DNA profile at the scene and search it against CrimTrac. It would be risky for the National Innovation Facility to invest heavily in TC related to this field; large transnational companies would easily out-compete the Facility. However, programs should be commenced dealing with the identification of suitable portable scientific test equipment for use in Australia as it becomes available. An investigation of the scope, limitations, and management of these tools nationally is also required.

Communications

In relation to remote crime scenes if expert assistance is required it might take some hours to arrive. Thought should be given to evaluation of telecommunication technologies that can widen the scope for real time interrogation of CrimTrac databases, or can provide a "virtual expert" 24hr a day, 7 days per week to a crime scene anywhere in Australia.

NCIS

The NCIS is a valuable resource for toxicological research. It will contain a wealth of information pertaining to the involvement of drugs in fatalities. Human experiments in this field are not possible therefore it is one of the few ways in which these basic data might be obtained. As the database has a national perspective statistics derived from it will have far more significance than any State or Territory database. The Facility could become involved in significant programs combining NCIS data with those from other national/international survey programs. It should be emphasised during the lobbying process that the Facility would lever off the NCIS.

Theme 4 Enhancing probity of scientific evidence

Chemical trace evidence

One impact of DNA profiling has been that courts are now more sophisticated in their expectations regarding trace biological evidence. It is likely, and reasonable, that higher expectations will be placed upon the probative value of chemical trace evidence, perhaps even expectation of a quantitative estimate of the significance of the evidence.

Technologies with very high discriminating power that are applicable to the analysis of chemical trace evidence, inks, and toners must be identified and extended into forensic chemistry. One possibility is to use highly sensitive microprobe techniques to yield trace element and/or isotope profiles from trace evidence. Australia already has research groups working on extension of such technologies into forensic applications; this effort should be enhanced so these techniques can be fully exploited. Trace element profiles can be regarded as a chemical “fingerprint”. Much work must be carried out to establish just how unique, or otherwise, these “fingerprints” are. As chemical trace evidence can take on so many forms, attention should be directed towards programs that can identify ways of estimating the reliability of evidence in a generic sense. Currently the significance of evidence is determined through the use of databases. Databases are also very useful for intelligence-led policing. It is therefor important to enhance the current rate of database compilation as well.

“Pattern” evidence

Comparisons of patterns (fingerprints, toolmarks, ballistics, handwriting, trace element profiles, chromatograms, dental and facial patterns) is extremely important to forensic science, yet the validity and significance of pattern matching and the human role in it are not well understood. Investigations relating to handwriting and facial image comparisons have commenced in Australia. These programs could be expanded into other fields, and the roles and possibilities for human- and machine-based matching could be investigated. The importance of this program has been highlighted recently by the landmark “Daubert” decision handed down by District Judge Louis H. Pollak in *United States v. Plaza.*

Evidence-based opinions

Sophisticated databases, preferably combined on-line with computerized algorithms, will allow forensic scientists to develop opinions based soundly on the best available knowledge. This is somewhat similar to the approach taken by clinicians in "evidence-based" medicine. ESR has developed this technology for interpretation of glass evidence. In Australia and NZ uncoordinated studies of "random man", evidence transfer and persistence/sheddability, and evidence targets in relation to glass and other trace evidence are taking place. These are vitally important projects to establish the rules or knowledge with which algorithms can operate. Similarly, there are some efforts to establish population databases in some evidence types. The Facility could plan and coordinate knowledge-gathering efforts, and become involved in the development of algorithms.

Drug impairment

A critical issue in court can be the impairment an individual might have suffered as a consequence of drug use. Although a blunt tool, surveys of accident victims and random drivers are one way of gathering data. A major requirement for such surveys is that many individuals must be surveyed to get a reliable picture. The National Innovation Facility, preferably in collaboration with NZ or other countries with a similar drug demographic to Australia, would be a good body to initiate surveys of this magnitude.

Pharmacogenetics

There is strong evidence to indicate that drugs exert different influences upon different individuals. This has significant implications in relation to interpretation of toxicological data associated with fatalities or when questions of impairment arise. The Facility could coordinate and conduct national studies (which would have good statistical relevance) based on Coronial investigations and toxicological surveys. Studies of illicit drugs will be of particular relevance, as these substances will not be investigated by the pharmaceutical industry.

Chemical and biological metrology

The Facility should consider becoming involved in cutting edge TC in relation to metrology. However, as has been demonstrated by the impact of the requirement for the forensic sector to estimate measurement uncertainty, coordination and planning of responses to changes in international metrological best practice are significant programs that could be taken on.

THE FORENSIC LABORATORY FUNDING ACT

Act 35 of 1994

AN ACT to create the state forensic laboratory fund; to authorize local forensic laboratory funds; to provide for assessments against certain criminal defendants; to provide for expenditures from the forensic laboratories funds; to make certain appropriations; and to prescribe the powers and duties of certain departments and agencies and local units of government.
History: 1994, Act 35, Eff. June 6, 1994 ;--Am. 1998, Act 98, Imd. Eff. May 15, 1998 .

The People of the State of Michigan enact:

12.201 Short title.
Sec. 1. This act shall be known and may be cited as “the forensic laboratory funding act”.
History: 1994, Act 35, Eff. June 6, 1994 .

12.202 Definitions.
Sec. 2. As used in this act: (a) “CSC offense” means a violation or attempted violation of section 520b, 520c, 520d, 520e, or 520g of the Michigan penal code, 1931 PA 328, MCL 750.520b, 750.520c, 750.520d, 750.520e, and 750.520g.
(b) “Forensic laboratory” means a laboratory maintained by the department of state police or a municipality that meets all of the following criteria: (i) Has at least 1 regularly employed forensic scientist who conducts analyses of controlled substances or androgenic anabolic steroids for criminal justice agencies in criminal matters, and provides testimony with respect to those analyses.
(ii) Is registered as an analytical laboratory with the drug enforcement administration of the United States department of justice for possessing all scheduled controlled substances.
(iii) Has at least 1 regularly employed forensic scientist who conducts forensic tests other than those described in subparagraph (i) and provides testimony with respect to those forensic tests.
(c) “Forensic test” means a drug analysis, toxicology analysis, or other forensic analysis or examination in areas including, but not limited to, latent prints, microchemistry, serology, firearms, toolmarks, or questioned documents. Forensic test does not include an analysis of the alcohol content of an individual's breath.
(d) “Municipality” means a county, township, city, or village.
History: 1994, Act 35, Eff. June 6, 1994 ;--Am. 1998, Act 98, Imd. Eff. May 15, 1998 .

12.203 State forensic laboratory fund; creation as separate fund; money and earnings credited to fund.
Sec. 3. The state forensic laboratory fund is created as a separate fund in the state treasury. The state treasurer shall credit to the fund all amounts received under sections 6 and 9. Money in the fund credited to the department of state police pursuant to section 7 that is not appropriated in a fiscal year shall be credited to the fund to the credit of the department of state police and shall not revert to the general fund. Earnings from the fund shall be credited to the fund.
History: 1994, Act 35, Eff. June 6, 1994 .

12.204 Forensic laboratory fund; establishment within office of municipal treasurer.
Sec. 4. A municipality that maintains a forensic laboratory may establish a forensic laboratory fund within the office of the treasurer of the municipality.
History: 1994, Act 35, Eff. June 6, 1994 .

12.205 Conduct of forensic test; advising prosecuting attorney; notice to court.
Sec. 5. (1) The investigating officer of each criminal case being adjudicated shall advise the prosecuting attorney if a forensic laboratory has conducted a forensic test in the case.
(2) The prosecuting attorney shall examine the case and notify the court that a forensic laboratory has conducted a forensic test in the investigation of the case before the court.
History: 1994, Act 35, Eff. June 6, 1994 .

12.206 Assessments.
Sec. 6. (1) The court shall order each person convicted of 1 or more crimes in the case to pay an assessment of $150.00 if 1 or more of the following apply: (a) The court is notified pursuant to section 5 that a forensic laboratory has conducted a forensic test in the investigation of the case.
(b) The person is convicted of a CSC offense.
(2) The assessment required under subsection (1) is in addition to any fine, costs, or other assessments imposed by the court. An assessment required under subsection (1) shall be ordered upon the record, and shall be listed separately in the judgment of sentence or order of probation.
(3) After reviewing a verified petition by the defendant against whom an assessment is imposed, the court may suspend payment of all or part of the assessment if it determines the defendant is unable to pay the assessment.
(4) The court, prosecuting attorney, and originating investigating law enforcement agency may each retain 5% of all assessments or portions of assessments collected for costs incurred pursuant to this section and shall transmit that money to their respective funding units. On the last day of each month, the clerk of the court shall transmit the remainder of assessments or portions of assessments collected under this section to the department of treasury for deposit in the state forensic laboratory fund created in section 3.
History: 1994, Act 35, Eff. June 6, 1994 ;--Am. 1998, Act 98, Imd. Eff. May 15, 1998 .

12.207 Expenses incurred by municipality; application for reimbursement; reports; number of investigations; distribution and proceeds to municipality; determination of amount; appropriation and use of money.
Sec. 7. (1) A municipality that maintains a forensic laboratory and that incurred expenses for a forensic test by that laboratory may apply for reimbursement of those expenses on a form provided by the department of treasury.
(2) A municipality applying under subsection (1) shall report to the department of treasury the number of criminal investigations in the preceding year for which the municipality's forensic laboratory performed 1 or more forensic tests. The department of state police shall report to the department of treasury in the manner prescribed by that department the number of criminal investigations in the preceding year for which the department of state police performed 1 or more forensic tests, whether the investigation was conducted by the department of state police or by the law enforcement agency of a municipality. The department of state police shall also report the number of DNA identification profilings performed pursuant to the DNA identification profiling system act, Act No. 250 of the Public Acts of 1990, being sections 28.171 to 28.178 of the Michigan Compiled Laws.
(3) The number of investigations reported pursuant to subsection (2) shall exclude any investigation reported in a previous year.

(4) The department of treasury shall distribute proceeds of the state forensic laboratory fund annually to a municipality applying under this section in an amount determined by multiplying the total amount received in the fund for that period by a fraction, the numerator of which is the total of investigations reported pursuant to subsection (2) by that municipality for that period and the denominator of which is the total of investigations and DNA identification profilings reported pursuant to subsection (2) for that period. The balance of the total amount received in the fund for that period after distributions to municipalities shall be credited to the department of state police.
(5) The legislature shall appropriate money in the state forensic laboratory fund credited to the department of state police to that department exclusively for forensic science services. The use of money appropriated pursuant to this section may include, but is not limited to, any of the following: (a) Costs incurred in providing forensic tests in connection with criminal investigations conducted within this state.
(b) Purchasing or maintaining equipment used in performing forensic tests.
(c) Providing for the continuing education, training, and professional development of regularly employed laboratory personnel.
(d) Payment of expenses for implementing and performing procedures for DNA identification profiling under the DNA identification profiling system act, Act No. 250 of the Public Acts of 1990.
(6) Money appropriated from the state forensic laboratory fund to the division of the department of state police concerned with forensic sciences shall be in addition to any allocations made pursuant to existing law and is intended to enhance appropriations from the general fund and not to replace or supplant those appropriations.
(7) Funds credited to the department of state police pursuant to this act for the fiscal year ending September 30, 1994 are appropriated to the department of state police for the purposes described in subsection (5).
History: 1994, Act 35, Eff. June 6, 1994 .

12.208 Forensic laboratory maintained by municipality; appropriation and use of money.
Sec. 8. (1) A municipality shall appropriate fees deposited in a forensic laboratory fund established pursuant to section 4 to the forensic laboratory maintained by the municipality.
(2) Money appropriated pursuant to this section shall be for the exclusive use of the forensic laboratory maintained by the municipality for the same purposes described in section 7(5)(a) to (c) and shall be in addition to any allocations made pursuant to existing law.
History: 1994, Act 35, Eff. June 6, 1994 .

12.209 Acceptance of gifts and grants.
Sec. 9. The department of state police may accept for deposit in the state forensic laboratory fund by the state treasurer gifts and grants of money from individuals, federal or state governmental agencies, corporations, partnerships, associations, foundations, organizations, societies, or other legal entities.
History: 1994, Act 35, Eff. June 6, 1994 .

12.210 Report.
Sec. 10. The department of state police or the department of treasury, as applicable, shall report annually to the governor and to the house and senate appropriations committees the amount received and appropriated in the fiscal year pursuant to this act, the amount expended pursuant to appropriations, and the balance in the state forensic laboratory fund.
History: 1994, Act 35, Eff. June 6, 1994 .

12.211 Effective date; applicability of assessment.
Sec. 11. This act shall take effect upon the expiration of 90 days after the date of its enactment. The assessment required by this act shall apply to criminal prosecutions for offenses committed on or after the effective date of this act.
History: 1994, Act 35, Eff. June 6, 1994 .

12.212 Repealed. 1998, Act 98, Imd. Eff. May 15, 1998.
Compiler's Note: The repealed section pertained to repeal of the act.

MICHIGAN JUSTICE TRAINING COMMISSION
Act 302 of 1982

An act to create the Michigan justice training commission and the Michigan justice training fund; to provide the powers and duties of certain state agencies; to provide for the distribution and expenditure of funds; and to provide for the promulgation of rules.
History: 1982, Act 302, Imd. Eff. Oct. 12, 1982 ;--Am. 1989, Act 158, Imd. Eff. July 28, 1989 ;--Am. 1992, Act 104, Imd. Eff. June 25, 1992 .

The People of the State of Michigan enact:

18.421 Definitions. [M.S.A. 3.519(101)]
Sec. 1. As used in this act: (a) "Alcoholic liquor" means that term as defined in section 2 of the Michigan liquor control act, Act No. 8 of the Public Acts of the Extra Session of 1933, being section 436.2 of the Michigan Compiled Laws.
(b) "Eligible entity" means a city, village, township, county, junior college, community college, state supported college or university, or the department of state police.
(c) "Fund" means the Michigan justice training fund created in section 5.
(d) "In-service criminal justice training" means a criminal justice educational program presented by an agency or entity eligible to receive funds pursuant to this act or by a contractual service provider hired by the agency or entity eligible to receive funds pursuant to this act, including a course or package of instruction provided to an eligible trainee for the payment of a fee or tuition, or education or training presented through the use of audio-visual materials, which program, education, or training is designed and intended to enhance the direct delivery of criminal justice services by eligible employees of the agency or entity.
(e) "MLEOTC certified police officer" means an individual certified as a police officer under the Michigan law enforcement officers training council act of 1965, Act No. 203 of the Public Acts of 1965, being sections 28.601 to 28.616 of the Michigan Compiled Laws.
(f) "Professional association" means a national, state, or local police union, or an association or fraternal organization of police officers, correctional officers, or prosecuting attorneys.
(g) "State or local agency" means any of the following: (i) An agency, department, division, bureau, board, commission, council, or authority of the state or of a city, village, township, or county.
(ii) A state supported college or university.
(iii) A community college or junior college.
(iv) Any agency or entity of the judicial branch of government of this state.
History: 1982, Act 302, Imd. Eff. Oct. 12, 1982 ;--Am. 1989, Act 158, Imd. Eff. July 28, 1989 .
Compiler's Note: For transfer of authority, powers, duties, functions, and responsibilities of the Michigan Justice Training Commission and the Michigan Justice Training Fund from the Department of Management and Budget to the Department of State Police, see E.R.O. No. 1993-5 , compiled at § 18.431 of the Michigan Compiled Laws.

18.422 Michigan justice training commission; creation; membership; election and term of chairperson; reimbursable expenses; conducting business at public meeting; notice; functions requiring affirmative votes of 5 members. [M.S.A. 3.519(102)]
Sec. 2. (1) The Michigan justice training commission is created within the department of management and budget. The commission shall consist of the following members: (a) The director of the department of state police or his or her representative.

(b) The president of the prosecuting attorneys' association of Michigan or his or her representative.
(c) The president of the Michigan sheriffs' association or his or her representative.
(d) The president of the Michigan association of chiefs of police or his or her representative.
(e) One person appointed by the governor who is employed by a police agency employing at least 20% of the police officers in this state.
(f) The president of the Michigan state police troopers association or his or her representative.
(g) One person appointed by the governor who has been elected by police officers other than police officers in administrative or managerial positions, representing the interests of police officers other than police officers in administrative or managerial positions.
(h) The president of the criminal defense attorneys of Michigan or his or her representative.
(2) The commission shall elect a chairperson annually from among the members of the commission. A person shall not serve more than 2 consecutive years as chairperson.
(3) The members of the commission shall be reimbursed for actual expenses, including travel expenses, from the fund. Members of the commission shall not be reimbursed for expenditures for alcoholic liquor, or for meal expenditures in excess of the per diem meal expenditures authorized for members of the state civil service.
(4) The business which the commission may perform shall be conducted at a public meeting of the commission held in compliance with the open meetings act, Act No. 267 of the Public Acts of 1976, as amended, being sections 15.261 to 15.275 of the Michigan Compiled Laws. Public notice of the time, date, and place of the meeting shall be given in the manner required by Act No. 267 of the Public Acts of 1976, as amended.
(5) The commission shall not perform any function authorized under section 3 without the affirmative votes of 5 members of the commission.
History: 1982, Act 302, Imd. Eff. Oct. 12, 1982 ;--Am. 1989, Act 158, Imd. Eff. July 28, 1989 .

18.423 Duties of commission; assistance. [M.S.A. 3.519(103)]
Sec. 3. The commission shall do all of the following, with the assistance of the department of management and budget: (a) Annually distribute 60% of the fund to eligible entities not including the money in the fund pursuant to section 5(2). An eligible entity receiving a distribution under this subdivision shall expend the distribution only for the in-service criminal justice training of its police officers. An eligible entity that uses money received under this subdivision shall maintain detailed records of the actual costs associated with the preparation for, the administration of, and the actual conducting of the training program. Use of money received under this subdivision for the payment of unreasonable or duplicative costs, as determined by the commission, shall result in the forfeiture of the money received by the eligible entity under this subdivision. Money distributed to an eligible entity which is not expended in the fiscal year of the distribution shall only be expended by the eligible entity for the in-service criminal justice training of its police officers in future fiscal years. An eligible entity receiving a distribution pursuant to this subdivision shall use the entire distribution for the in-service criminal justice training of its police officers within 2 years after receiving the distribution. If the eligible entity fails or refuses to use the entire distribution for the in-service criminal justice training of its police officers within 2 years after receiving the distribution, the eligible entity shall not be eligible to receive additional distributions pursuant to this subdivision until the prior distribution is used for the in-service criminal justice training of its police officers.

A distribution made under this subdivision shall serve as a supplement to, and not as a replacement for, the funds budgeted on October 12, 1982, by an eligible entity for the in-service criminal justice training of its police officers. The distribution shall be made in 2 semiannual installments on dates determined by the commission and shall be expended only for the direct costs of the in-service criminal justice training of police officers. The funds shall be distributed on a per capita basis to eligible entities based upon the number of full-time equated sworn MLEOTC certified police officers employed. Each eligible entity shall receive a minimum distribution of $500.00. For purposes of this subdivision, the number of full-time equated sworn MLEOTC certified police officers shall be determined by dividing the total number of paid work hours actually worked by sworn MLEOTC certified police officers in the eligible entity's fiscal year by 2,080 hours, rounded down to the nearest whole number. For each year, the percentage of police officers who provide direct police service receiving training under this act shall be equal to or greater than the percentage of police officers who are in full-time administrative positions receiving training under this act.

(b) Annually distribute through a competitive grant process the balance of the fund after making the distributions required in subdivisions (a) and (d) and the expenditures required under section 2(3). In distributing money from the fund, the commission shall consider the quality and cost effectiveness of the training programs of applicants for funds and the criminal justice needs of this state. Money shall not be distributed under this subdivision to a professional association. In distributing money from the fund, the commission shall attempt to provide equity in funding for training programs for prosecutors and assigned criminal defense counsel. A state or local agency that uses money received under this subdivision shall maintain detailed records of the actual costs associated with the preparation for, the administration of, and the actual conducting of the training program. Use of money received under this subdivision for the payment of unreasonable or duplicative costs, as determined by the auditor general or the commission, shall result in the forfeiture of the money received by the state or local agency under this subdivision. Grants under this subdivision shall be distributed only to the following: (i) State or local agencies for the purpose of providing in-service criminal justice training programs to employees of those state or local agencies. A distribution made under this subparagraph shall serve as a supplement to, and not as a replacement for, the funds budgeted on October 12, 1982, by a state or local agency for in-service criminal justice training.

(ii) State or local agencies providing criminal justice training to the employees or the contractual service providers of other state or local agencies. A distribution made under this subparagraph shall be used to enhance and increase, but not supplant, the amount of local, federal, and other state funds that, in the absence of money from the Michigan justice training fund, are available for criminal justice training. As used in this subparagraph, “criminal justice training” means training which is designed and intended to enhance the direct delivery of criminal justice services by employees of state or local agencies; which is not required minimum basic training for police officers or initial training for other employees; and which is any of the following: (A) A criminal justice educational program presented by the state or local agency or by a contractual training provider hired by the agency.

(B) A criminal justice course or package of instruction provided to an eligible trainee for the payment of a fee or tuition.

(C) Self-education presented through the use of audio-visual materials.

(c) Promulgate rules pursuant to the administrative procedures act of 1969, Act No. 306 of the Public Acts of 1969, as amended, being sections 24.201 to 24.328 of the Michigan Compiled Laws, which prescribe the procedures by which the commission shall distribute money from the fund.
(d) Annually distribute an amount from the fund to the department of management and budget to cover the reasonable expenses of providing staff services to the commission, and to cover the expense of maintaining a register of available criminal justice training programs in this state.
History: 1982, Act 302, Imd. Eff. Oct. 12, 1982 ;--Am. 1983, Act 184, Imd. Eff. Oct. 25, 1983 ;--Am. 1989, Act 158, Imd. Eff. July 28, 1989 .
Admin Rule: R 18.451 et seq. of the Michigan Administrative Code.

18.424 Prohibited expenditures; approval of out-of-state training program. [M.S.A. 3.519(104)]
Sec. 4. (1) Distributions of money under this act shall not be expended for any of the following:
(a) Criminal justice training conducted by a training provider not based in this state unless the training event has first been approved by the commission.
(b) Criminal justice training not located in this state, unless the training event has first been approved by the commission.
(c) Criminal justice training in another country.
(d) Meal expenditures in excess of the per diem meal expenditures authorized for civil service employees.
(e) Purchasing alcoholic liquor.
(f) Travel costs to participate in criminal justice training, unless the criminal justice training program is for the sole purpose of training or offers not less than 6 hours of qualifying training within any 24-hour period.
(g) The publication of a newsletter.
(2) The commission shall not approve any out-of-state training program unless the eligible entity requesting approval of the training program has exhausted all reasonable efforts to locate a similar training program in this state, and the commission is satisfied that a similar training program is not available in this state.
History: 1982, Act 302, Imd. Eff. Oct. 12, 1982 ;--Am. 1989, Act 158, Imd. Eff. July 28, 1989 .

18.424a Printed materials; statement. [M.S.A. 3.519(104a)]
Sec. 4a. Any material printed from funds distributed under this act shall contain a statement that Michigan justice training funds were used to print that material.
History: Add. 1989, Act 158, Imd. Eff. July 28, 1989 .

18.425 Michigan justice training fund; creation; disposition of certain money and investment earnings. [M.S.A. 3.519(105)]
Sec. 5. (1) The Michigan justice training fund is created in the state treasury.
(2) Money in the fund which is not distributed in a fiscal year and which was to be distributed under section 3(b) shall remain in the fund for distribution in future fiscal years only for the purposes described in section 3(b).
(3) Investment earnings from the Michigan justice training fund assets shall be deposited in the Michigan justice training fund.
History: 1982, Act 302, Imd. Eff. Oct. 12, 1982 ;--Am. 1989, Act 158, Imd. Eff. July 28, 1989 .

18.426 Annual reports. [M.S.A. 3.519(106)]

Sec. 6. Each eligible entity and state or local agency receiving a distribution under this act shall report annually to the commission on the results of its training programs. Each training program financed in whole or in part by a distribution from the Michigan justice training fund shall be separately identified. The commission shall report annually to the appropriating committees of the legislature on the results of the expenditure of the amount distributed.

History: 1982, Act 302, Imd. Eff. Oct. 12, 1982 ;--Am. 1989, Act 158, Imd. Eff. July 28, 1989 .

18.427 Repealed. 1984, Act 364, Eff. Mar. 29, 1985. [M.S.A. 3.519(107)]

Compiler's Note: The repealed section provided for the repeal of Act 302 of 1982.

18.428 Conditional effective date. [M.S.A. 3.519(108)]

Sec. 8. This act shall not take effect unless House Bill No. 5520 of the 81st Legislature is enacted into law.

History: 1982, Act 302, Imd. Eff. Oct. 12, 1982 .

Compiler's Note: House Bill No. 5520, referred to in this section, was approved by the Governor on October 12, 1982, and became P.A. 1982, No. 301, Imd. Eff. Oct. 12, 1982.

18.429 Audit of books, records, and accounts. [M.S.A. 3.519(109)]

Sec. 9. The books, records, and accounts of the Michigan justice training commission shall be audited by the auditor general every 2 years.

History: Add. 1989, Act 158, Imd. Eff. July 28, 1989 .

18.430 Repealed. 1992, Act 104, Imd. Eff. June 25, 1992. [M.S.A. 3.519(110)]

Compiler's Note: The repealed section pertained to the repeal of the act effective July 29, 1993.

APPENDIX 4, Estimate of National Innovation Facility annual budget *I*

The estimate below gives a general picture of the order of magnitude of funding required to establish a workable National Innovation Facility. It is based on the following assumptions:

- that the Facility would be established in the form described in Recommendation 1;
- that participating forensic agencies and universities will provide in-kind support in the form of accommodation and project assistance (mainly supervisory assistance);
- that there is an equal spread of program leaders, students, and assistants across the clusters.

SALARIES	**Director**		1 @ 130,000*	130,000
	Secretary/personal assistant (part time)		1@ 40,000	40,000
	Prog leaders	4/cluster	12 @ 91,000**	1,092,000
	Post-doc f/ships	1/cluster	3 @ 60,000	180,000
	Industry secondments	1/cluster	3 @ 70,000	210,000
	PhD top up scholarships	1/cluster	3 @ 8,000	24,000
	PhD full scholarships		21 @ 25,000	525,000
	Honours scholarships	1/cluster	3 @ 5,000	15,000

RESEARCH ON-COSTS	**Prog leaders**	12 @ 10,000	120,000
	PhD students	24 @ 10,000	240,000
	Honours students	24 @ 5,000	120,000
	Post-Doc fellows	3 @ 10,000	30,000
	Industry secondments	3 @ 10,000	30,000

EQUIPMENT	**Purchase/lease**	50,000
(technical, office)	**Purchase of instrument time**	50,000

INNOVATION FUND		1,000,000

ADMINISTRATIVE SERVICES	**IP/marketing/legal/consultants**	30,000
	Travel/accommodation/conference expenses	40,000
	Secretariat (including library/ISP fees, desktop publishing, etc)	50,000

TOTAL	**3976000**

*Calculated from professor salary +30% on costs
** Calculated from senior lecturer salary, mid range, + 30% on costs