1-1-2010

The Science, The Technology, The Law

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DOI: 10.4225/75/57b2931840cdb
8th Australian Digital Forensics Conference, Edith Cowan University, Perth Western Australia, November 30th 2010

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Abstract
Forensic science must satisfy two needs; that of the scientific community and that of the legal profession. It is hoped that the legal and scientific outcomes should be based on one and the same thing. Science, Technology and Law depend upon the establishment of a reliable basis of fact. But in the Court it is the law that finally decides what is fact, what is opinion and what the truth should be. This paper looks at the role of the Forensic Practitioner's requirement for understanding the science, the technology and the law. It endeavours to explain the reasons, using cases, as to why Forensic Practitioners need to know the methodology, technicalities and jurisprudence in relation to their expertise.

Keywords
Forensic Practitioner, Science, Technology, Law.

INTRODUCTION

Chief Justice French said the more technically or scientifically complex the issue for determination, the greater the challenge for the courts whether in patent law or other fields. There are some areas, particularly those involving computer science and complex software that may test the limits of the capacity of the courts to answer the composite questions of science and law to which they give rise (French 2009).

This above statement is also true for the general public and the Forensic Practitioner. We are living in a world that is using complexity to resolve complexity. We expect advancement, we expect solutions and we expect it to be right.

As Forensic Practitioners there is an expectation that we are experts in our field, we have qualifications, we have accreditation, we have practical experience and we have the under pining knowledge of how our speciality works, is used and accepted.

This paper will look at the why Forensic Practitioners need to know "their" Science, "their" Technology and "their" Law, in relation to their speciality (eg: a Surveying, Medical, Crash Investigation, Digital and Bio-metrics).

THE SCIENCE

Science moves inexorably forward and hypotheses or methodologies once considered sacrosanct are modified or discarded. The judicial system with its search for the closest approximation to the "truth," must accommodate this ever-changing scientific landscape (Edwards, 2010).

What the Forensic Practitioner practised, used or what was acceptable in the past may have changed and therefore is required to keep abreast of new advancements, to understand the changes and reflect these in their workings, findings and decisions.

Historically, scientific evidence, broadly defined, had to be generally accepted as reliable in the field in which it belongs, before courts would admit opinion testimony based on a particular technique or discipline. This was based upon the 1923 decision *Frye v. United States 293 D 1013 (DC Cir 1923)* and as such a "general acceptance" test was established by the testimony of experts in the particular field.

In 1993, *Daubert v Merrell Dow Pharmaceuticals Inc, 113 S Ct 2786,* the US Supreme Court held that the *Fry* test had been superseded by *Daubert* and established as requirements for the admissibility of expert evidence that:

1. The expert must be qualified.
2. The methodology employed by the expert must be reliable.
3. The testimony must assist the trier of fact.

These requirements were reflected in an amended version of US Federal Rules 702. The reliability criterion by a consideration by trial courts of:

1. Whether the theory or technique had been tested.
2. Whether it had been subjected to peer review.
3. The rates of error in the technique and any standards controlling the technique's operation.
4. Whether there is general acceptance of the theory or technique in the scientific community.

Justice Wood from the Supreme Court of New South Wales wrote that it is unresolved whether the appropriate test for the admissibility of expert evidence [Forensic Practitioners] should be the *Frye* test, depending upon whether the theory or technique upon which the opinion is based is generally accepted within scientific circles; or the *Daubert* test under which scientific validity or reliability depends on matters such as falsifiability, known or potential error rate, peer review, publication and so on (Wood 2002).

What we do know is that the role of a Forensic Practitioner is to assist the courts in understanding the facts presented in a trial and providing an opinion (if required).

In 2003, former President of the American Academy of Forensic Sciences, Kenneth Melson, stated that more research was needed in the techniques and science already in use and the science employed and relied upon by judges and juries must be valid. It does not matter how well forensic scientists abide by testing protocols or how reliable the techniques are, if the underlying science does not actually reveal what the expert says it does. Method validation studies and new research must be ongoing even in the areas of traditional forensic science disciplines (Melson, 2003).

Our Justice system and our client's demand that the science we use is the "good science", that is the science that has been (or can be) proven, can be reproduced, peer reviewed and communicated to the courts. We can no longer expect the courts or public to accept the science we practice merely because we say it is good. In order to maintain the integrity of the science, we must continue to prove that it is correct and applicable as we cannot overlook the fact that some scientific evidence has been presented (and accepted) at trials where people were convicted and but later (by retrial/review) exonerated.

As Forensic Practitioners we must be able to understand the science we use (in our respective profession) and how it works and present our work and opinions in a scientific manner to the courts but also be able to communicate that information in way that is understandable and acceptable.

For example: Mr Albert Godfery a Registered Professional Engineer and long-time State Traffic Safety Official and favourite expert witness, testifying in a vehicular homicide case based on a questionable application of critical speed formula (Bohan 2009).

The Court: Mr Godfrey, let's go back to some high school physics here just to complete the record. What is the scientific basis for the critical speed formula?

Mr Godfrey: Newton's Laws.

The Court: Which is?

Mr Godfrey: Well there are three of them, three different Laws

The Court: Put them on the record, please.

Mr Godfrey: You're pressing me, your Honor, here in my advanced senility.

The Court: I just want to complete the record.

Mr Godfrey: There's three Newton's Laws. For every force there is an opposing force.

The Court: An object in motion stays in motion?

Mr Godfery: An object in motion tends to stay in motion. If it's in a circular motion, it will tend to move to the outside. **NOT!**

The Court: And these are the basis of the mathematics of the formula?

Mr Godfery: These are the basics of the mathematics of the formula, yes, sir.

And just for the record, Newton's 3 Laws are:

1. Every object in a state of uniform motion tends to remain in that state of motion unless an external force is applied to it.
2. Acceleration is produced when a force acts on a mass. The greater the mass, the greater the amount of forced needed.
3. For every action there is an equal and opposite reaction.

From the above either Mr Godfrey was so confident, that as an expert witness [Forensic Practitioner] the court would automatically accept what he said or he just forgot. What the court (and his peers) saw was his lack of understanding and knowledge in the science he used as a Forensic Practitioner.

In another example: R v Tang, Tang was convicted of one count of robbery when armed with an offensive weapon. The robbery occurred in a convenience store on 14 March 2003 and was videotaped by a surveillance device. The tape showed three offenders but was not of sufficient quality to enable clear identification of the offenders. Tang came to the attention of the police eight months after the robbery and was linked to the offence through fingerprints found on some of the stolen goods. The Crown case turned to a significant degree on opinion evidence from Dr Meiya Sutisno, who identified points of resemblance between the surveillance images of the third offender and photographs of the Tang, based on facial mapping and body mapping techniques. Dr Sutisno expressed three kinds of opinion: first, that the two bodies of photographs depicted the same person; secondly, that there was a level of support to this conclusion by application of a six point scale; and, thirdly, that certain characteristics were "unique identifiers" (Tang 2006).

In the original trial the presiding District Court Judge Finnane accepted the Forensic Practitioners evidence and Tang was convicted by Jury but on appeal to the Supreme Court, Tang's appeal was concerned with the admissibility of the Forensic Practitioners evidence. In the transcript of the judgement Spigelman CJ stated that Dr Sutisno did not identify the terms of the strict protocol that she purported to have applied, nor did she set out the basis on which the protocol was developed. Indeed, she said that this information was confidential, because of what she described as a process of patenting my innovations. Accordingly, she had not published any of these innovations. The critical matter is that she did not identify her protocol or explain its basis.

It was unanimous decision of the 3 appeal judges, Chief Justice Spigelman, Justice Simpson and Justice Adams that the appeal be granted and a retrial was ordered.

Gary Edmond (Edmond 2008) summed it in the follow way: that the Court was willing to allow her to testify about similarities between the two sets of photographs in a future trial and she would be allowed to give expert opinion evidence about similarities, but would be prevented from actually identifying the accused as she had done, during the first trial. According to Spigelman CJ, any weaknesses or limitations with Dr Sutisno's techniques and opinions were for cross-examination and it would be for a future jury to determine the reliability and weight of her evidence.

A second trial was conducted which resulted in a hung jury so a third trial was conducted and on Wednesday 27 August 2007, Tang was found guilty. It should be noted that the facial mapping evidence of the Forensic Practitioner (Dr Sutisno) was not used.

The above demonstrates that the courts are expecting the Forensic Practitioner to present their findings in a scientific manner based on scientific rigor. We must have a good understanding of the science(s) we use, have the ability to describe and communicate that science in general terms for the layperson and if required specific/technical for the "expert" discussions (Court challenges).

A second area within the science is that we must also be capable of accepting changes and or criticism which can be confronting especially if it is your science that has been/is being challenged. Although science is considered stable, science is still being tested as Kenneth Melson states should happen, (Melson 2003), and some are found wanting either via its peers, due to advancements in technology and science itself.

For example Phrenology (reading bumps and fissures) was defined as the science devoted to the identification of basic brain functions and their manifestations in cranial features. While we may think of it as harmless quackery practiced upon the gullible at fairs, phrenology was a confident science, promising clear and certain knowledge concerning the mental attributes and behaviours of human beings. There were conferences and symposia. There were professional associations (Moenssens, 1999).

For Example: In 1834, Major Mitchell, a nine-year-old boy from Durham, Maine, was tried for the beating and mutilation of another boy. Mitchell was convicted and sentenced to nine years at hard labor in the prison at Thomaston, Maine.

The acceptance of phrenological testimony, was objected to by the Attorney General, "... opposing the introduction of such testimony upon two grounds—1st, that it had never been heard of before; and 2ndly that neither he, nor the jury, nor perhaps the court would be prepared for understanding the subject. It was responded to that that chemistry was also a comparatively new science, yet courts permitted testimony in that area and Secondly it was not necessary for the court, the attorney general or the jury to be acquainted with phrenology, because Mighles was an expert whose opinions, founded on acquaintance with the subject, by reading and observation, were to be judged of by the jury, as any other matters of fact (Weiss 2007). (Note: The judge in *Mitchell* instructed the jury to disregard any considerations of a phrenological nature. Instead, he charged them with determining whether, at the time of the incident, the boy could distinguish right from wrong).

Mitchell survived his ordeal and resurfaced in Durham, Maine, in 1870, where he was married and worked as a farm laborer.

This case is an excellent example of change in science as it is understood that this is the first use of psychiatric testimony by way of phrenology in an American court room, which has led to the current practice of Psychiatry and Psychology in both areas of general and forensic.

A more current example of changing science is that of DNA which is used as a significant evidential tool (if available).

In the early 1900s, scientists identified 4 different blood types in humans – A, AB, B, and O – based on the presence of certain proteins called antigens in the blood. This blood typing system, called the ABO system, provided doctors with crucial information about their patients and in the 1920s, scientists recognised that blood types were genetically inherited. A blood typing chart was developed to show the relationship between parents and their children. In the 1930s, scientists discovered other proteins in the blood that could be used for identifying humans. The Rh, Kell, and Duffy blood group systems, like the ABO system.

In 1953 James Watson and Francis Crick publish landmark paper identifying the structure of DNA and later in 1980 American geneticists discovered a region of DNA that does not hold any genetic information and which is extremely variable between individuals. The research and new DNA science continued with Alec Jeffreys in 1984 discovering a method of identifying individuals from DNA - Restriction Fragment Length Polymorphism (RFLP). He dubbed it 'DNA Fingerprinting'. RFLP allows scientists to cut out the unique sections of the DNA, which is extracted from blood samples

1985 Police in the UK used this new forensic science called DNA profiling. The research continued when in 1986 Kary Mullis discovered Polymerase Chain Reaction (PCR) a method of replicating particular regions of a DNA molecule. PCR is a technique through which samples of DNA fragments are copied and replicated many times until billions of copies are made. Because of the power of PCR, very small samples of DNA from any part of the body can be used in a DNA test. Additionally, the process is quick.

The use of DNA has changed over the years and with the new science of DNA becoming available (as well as technology) some older cases that relied heavily on DNA as evidence are now being reassessed and some people once convicted (based on DNA of that time) are found to be innocent.

The science is being tested by other scientists, challenged by researchers and the law and it is the Forensic Practitioner who needs to keep abreast of what is happening. The case you used your scientific knowledge to determine an opinion may have changed and when doing a new case or due to the length of the legal process (the same case) your workings, finding and opinion may change due to new science, and this must be reflected in your work and findings.

THE TECHNOLOGY

Technology is changing rapidly, it is said that technology changes every 6 months and as practitioners we need to be aware of such changes especially if that change is associated and used by the discipline that you are associated with.

One of the earliest Australian cases dealing with computers took place in the District Court of Western Australia in 1980. It concerned the purchase, in 1976, for the price of $12,085, of a Burroughs L6316 minicomputer, equipped with one magnetic tape cassette station. For that price, the plaintiff obtained a machine which the judge described as capable of performing basic bookkeeping functions, with the aid of a number of standard package programs in the form of punched yellow tapes. The plaintiff's central complaint was that the machine would not do what he thought it should and what he alleged he had been told it would (Hayne, 1999).

How technology has changed, what would $12,000 buy now, even if you took no account of 23 years of inflation? What would the machine be capable of doing? How quickly would it do it?

At some stage in a practitioners career, it is very possible, especially in current times and the courts being "evidenced based and adversarial" that you will be challenged in the court regarding your work or you will be required to present your evidence again (due to retrials and appeals) and when that happens, potentially the science /technology you used then may have changed.

This is demonstrated in the following: In 1993 Mr Clark Eastaday was jailed along with brothers Dean and Len Ireland after it was discovered their mining tenements near Karpa Springs, 300 kilometres north-east of Perth, were grossly over-valued. The men sold their holdings to mining companies Noranda and Perilya for $6 million after samples suggested significant gold deposits in the area. Later drilling found no commercial gold reserves.

An appeal was conducted almost 10 years later at the Supreme Court of WA Court of Criminal Appeal on 9-17 December 2002 (*Easterday vs The Queen [2003] WASCA*) the appeal was granted with the order of no retrial.

During the retrial a number of practitioners were recalled to provide testimony at the appeal, but it was a Mr McGowan that used new technology to assist him in presenting his statement and technical explanation to the court. Mr McGowan used video overlayed with animation and graphics to demonstrate to the court his theory. He demonstrated the technical issues related to showing how a drill rig operated while drilling, how the air escapes through the earth and how particles of gold could enter the drill rig and subsequently be dispersed in the ground at various drilling depths and at distances away from the initial deployment position.

Justice Scott said: Mr McGowan went to a great deal of trouble and conducted experiments to determine how the salting could have taken place. In the end, he concluded that the most likely way was via gold contamination of the grease used to join the drilling rods. Not only did Mr McGowan explain how that occurred, but he also made a demonstration film showing how the drilling rods were connected to each other and how grease was used in relation to each drill rod when it was connected. Mr McGowan made it clear that only a small amount of gold would be needed to contaminate the drill rod grease so as to produce the spectacular readings from the Phase 2 and Phase 3 drilling.

The above case used new technology in the form of now affordable desktop computers and software in the form of computer processing, RAM, computer graphics, video, voice-over and 2 & 3 Dimensional graphic and putting all of this information on a video tape so it could be played in the court. The new technology software was now able to run on "house hold" computers and the cost of software was significantly less and made easier for "non users" which made the expertise readily available. How do I know this, because it was my team (messr: A Bruz and M Annear) who developed the "demonstration film".

In another Western Australian case: Andrew Mallard (was convicted of murder but later on appeal to the High Court of Australia a new trial was requested (not required as Mallard was later pardoned). The incident (murder) happened on 23 May 1994, Trail 2 Nov 1995, convicted 15 Nov 1995, 11 Sept 1996 Appeal dismissed, 8 July 2002 petition for clemency, 3 Dec 2003 Appeal dismissed and on 15 November 2005 allowed the appeal (refer :*Mallard v The Queen [2005] HCA 68, 15 November 2005, P77/2004).*

As we can see there is 11 years since the incident and the collection, validation, testing and storage of all that evidence, and now the High Court of Australia orders a retrial.

What technology has changed? What technology was used to collect, store validate, measure the evidence? And the question is, are the Forensic Practitioners who presented at the original trial (from both sides) able to remember the technology they used? or had it changed?

Technology is changing fast and everyone is having difficulty understanding it and the new applications and operating systems may not run the old software that the "original" evidence is stored in/on, used on or retrieved from.

Judge Richard Posner declared that the continued rapid advance in science is going to make life difficult for judges, (and the courts) this was because of the breakneck technological changes that are thrusting many difficult technical and scientific issues on judges, for which very few of them are prepared because of the excessive rhetorical emphasis of legal education and the weak scientific background of most law students (Posner 2006).

Because the technologies themselves have now gone beyond the understanding of ordinary citizens, even highly educated ones, it is essential that society should be able to look to experts in the technology to help in defining, and responding to, the implications for society of the technological advances (Kirby, 2007).

One of the major areas of technology change is that of data storage. In 1969 the floppy disk was introduced and it stored around 80kB, then in 1980 Seagate technology introduces a 5.25 inch hard drive and by 1999 the Hard Disk Drive (HDD) was doubling its storage capability every 9 months. The advancement continued not only in storage space but the device itself, for example the HDD is a mechanical device and as such faced problems with failures (lost data) due to the disk spinning and the reading arm (mechanical) falling on the disk and destroying data or the drive totally. Through to current technology of Solid State Drives (500 Gb) with no moving parts.

As Forensic Practitioners we must understand that digital evidence can be very fragile, and inherently has several challenges unlike evidence encountered during traditional investigations:

1. Memory resident programs can be lost when the system is shutdown
2. Digital evidence can be manipulated during the collection, analysis and presentation of the evidence
3. Digital evidence can be altered without trace
4. Digital evidence stored computer systems can be accessed several times
5. It is sometimes difficult to attribute a computer activity to an individual, because the digital evidence is circumstantial

The evidence should be protected from virus infection, mechanical and electromechanical influences. The forensic investigator must be able to demonstrate that the evidence was not altered in any way before or during its collection or subsequently (Ami-Narh 2007).

A large majority of practitioners store information on computer hard drives either local, external or on large central storage systems. How is it stored? Do we need to know how it is stored? and how it affects the evidence? Who has access to it? The use of various applications for verifying results or evaluating evidence, are we required as practitioners to know the algorithm that is behind the software application we get our correct result? or due to the methodologies we use is it all good (and verified). How do we store images? does the format we use change the image and can we say yes that is the same image with all its meta-data? – so many questions so many possibilities.

Some of these questions cannot be answered by this author as I have not found any evidence on "the need to know" or "if any challenges have occurred" but with the courts being adversarial in nature, maybe there is a person who may just ask … "how was that digital image stored – and how did you retrieve it - are you sure that that image is in its original state?

Due to technical advancement some practitioners need to be across a number of years of technology changes, for example in the Police Service a major crime is not closed until it is solved (an outcome) so all that evidence is stored – digitally, in boxes and other filing methods. The number of cold cases reviewed: how many stored information on floppy drives and computers using windows 3.1? How many readers of this paper still have floppy disk and even worse 5 ½" or 9" disk?

Readers of this paper should now start thinking what information I have got stored, on what and can I get it back without compromising the integrity of the "original" data.

As practitioners we need to know our current technology and be prepared for the "olde" technologies if required (eg; cold cases, cases with new evidence) as we do not want to be the weak-link in the court proceedings, but if the new technology provides new information or challenges the Forensic Practitioners original opinion then this is a good outcome.

THE LAW

In 1935, there were only 340 Acts of the Commonwealth Parliament. They were printed in four volumes covering less than 3,000 pages. Today there are more than 1,300 such Acts. The official reprint of the *Social Security Act* 1991 (Cth) alone occupies more than 2,700 pages. The *Income Tax Assessments Acts* are even longer. Today the official reprints of the Assessment Act of 1936 and the "Plain English" partial rewrite of 1937, which have to be read together, occupy more than 3,700 pages.

What is known is that the law has become much more complicated, and the pace of legislative change, which has seen the size of the annual volume of Acts of the Parliament of the Commonwealth increase from 488 pages in 1901 to 7521 pages in 1997, will not diminish. Indeed it may be thought that if the activities conducted by government (and this includes the States) continues, more and more legislation will be seen to be necessary.

Some laws are changed to keep in harmony with advancing technology. For example, the *Criminal Code* (WA) originally contained references to provisions requiring that confessions and admissions to police by suspects in police custody should be recorded on "video tape" The change of recording technology from tape to digital formats necessitated amendments of such laws to substitute the requirement for "audio-visual" recording (Kirby 2009).

Forensic Practitioners must have sound knowledge of legal issues that they deal with. These include the privacy protection rights of employees and other individuals; knowledge about what constitutes a legal search, laws about obtaining evidence and securing, the chain of custody and electronic communications that can be legally intercepted or examined and how to present evidence in the jurisdiction they are attending.

Forensic Practitioners must keep abreast of or at least be aware of reforms to "expert evidence" as changes have been introduced in three ways in Australia:

1. by practice directions issued by the courts to control the use of expert evidence and to ensure that experts understand their obligations to the court;
2. rules of court establishing new procedures and guidelines for the reception of expert,
3. judicial decisions refining the principles governing expert evidence, usually insisting on the application of more stringent criteria for the admissibility of such evidence.

An example of this is provided by the Federal Court's *Practice Direction: Guidelines for Expert Witnesses in Proceedings in the Federal Court*. First issued in 1998, the current *Practice Direction issued* on 6 June 2007 makes it clear that the expert has an overriding duty to assist the Court on matters within his or her field of expertise; that the expert is not an advocate for a party; and that the expert's duty to the Court overrides that owed to the party using the expert's services. The *Practice Direction* specifies in some detail, the formal requirements with which the expert's written report must comply. The requirements include a full and clear statement of all assumptions of fact, reasons for each opinion expressed and a record of the instructions given to the expert and of the documents or other materials the expert has been asked to consider (Sackville 2008).

The courts and Common Law will uphold the fundamental rights of people against unreasonable search and seizure. The Forensic Practitioner must ensure that the authority for search and seizure of forensic evidence was obtained prior to the investigation, for example, a computer forensic practitioner must be aware that a search warrant must be clear about the searching of network and file servers, and backup media. Also, it must be clearly stated if hardware, software, and peripherals of crime scene can be removed to another location to conduct the search (Ami-Narh 2007).

The Forensic Practitioner must have knowledge of how to present and deal with evidence as well as how the courts deal and consider your evidence, in Western Australia there is the Evidence Act 1906. It must be stated that the Forensic Practitioner would be assisted in this area by the legal team they are associated with thus ensuring all protocols and procedures are understood and adhered to.

Some new sciences and technology has yet to go before the courts and if it has, it may not been challenged (due to the lack of understanding).

For example: the use of Laser Scanning technology or High Definition Scanning (HDS). The capturing of millions of points to create, what is called a "point cloud" that depicts a 3 Dimensional (3D) model of the scene. Where the operator can move around the 3D model zoom in and take accurate measurements. The model can also be used to generate an animation of the scene, e.g. a crime scene can demonstrate the probable movement of a perpetrator through a house.

How will the courts deal with this new "surveying" tool. The admission of computer generated images/data into some courts is difficult as it is considered as potentially depicting the "accused" in a bad way? Animations have been used to demonstrate technical issues (*Easterday vs The Queen [2003] WASCA)* and to show the court various settings that may not be accessible/available (*Rodney William King & Ors v The Queen & Ors*) but to show a "virtual crime scene" where all of the evidence is in its original position (and for a murder scene – the body). Time will tell.

The question is, who *must* decide. The answer is: the court must do so (Allen 2003). The lawyers will invoke the forensic practitioner to answer a question and they will answer in the best way they can with the knowledge they have and the technology they used in determining the answer. No matter how skillful or not the practitioner is the court will *decide* who is correct and what can and cannot be admitted.

In the case of a the State of *WA v Marteniz* (Martinez 2006) before Justice EM Heenan. The accused were charged over the death of Phillip Walsham from the overhead footbridge at the Stirling train/bus interchange in the early hours of 28 February 1998. Please note; death in Feb 1998 - Still going through the Courts (what changes have occurred since)?

Justice Heenan was making comment on whether the Experts evidence could be admitted and he points out a lot of flaws as to the Experts evidence, opinion, theories and assumptions e.g.:

1. Dr Gibson's report is that there was no attempt made to standardise the results. There was no error analysis. All of the measurements actually relied upon, whether of height or of velocity or of weight, are fixed or precise measurements with no allowance, plus or minus, for error and they produce precise results, again with no variation for error. That does not impress even a lay observer as being particularly scientific but nevertheless that is the process.
2. Dr Gibson's calculations as to time for the fall and distance covered are expressed in terms of absolute accuracy with no allowance for error plus or minus. This is most unlikely given the subjective nature of much of the data and renders questionable conclusions based on a difference between 3.7 metres and five metres over the short span of this fall.
3. It seems to me that the process by which he sets out to convert, from the initial horizontal velocity involved in the falling body to the force applied by the men or man on the top of the bridge is very questionable.

However, Justice Heenan is satisfied that Dr Gibson does have training, experience and expertise in the field of physics, mechanics and trauma analysis and has presented his report/findings in a manner that is acceptable to the court and allows the evidence presented to be challenged and questioned.

It is incumbent on anyone who holds himself or herself out as willing to give evidence as an expert [Forensic Practitioner], or who is asked to prepare expert reports in connection with litigation, to understand the changes that have taken place. This implies, of course, familiarity and compliance with the duties of experts spelled out in legislation, rules of court and practice directions. But it also implies an understanding of why the changes have come about and what the courts and those concerned with judicial administration are trying to achieve. Only then will experts [Forensic Practitioner] be able to discharge the more onerous functions legitimately expected of them (Sackville 2008).

CONCLUSION

Science research as well as technical advancement is providing the Forensic Practitioner with better tools to work with to undertake work using the best science but it also means that the Forensic Practitioner is required to have a greater understanding of their particular area of expertise. The changes in the law demands that Forensic

Practitioners assist the courts in understanding certain events and we are not there for the service of the people who fund us gone are the days where once the Forensic Practitioner could say “trust me I am a practitioner”.

The volume and complexity of legislation passed by legislatures in this country (and, for that matter, in other comparable countries) and the volume and complexity of common law developed in this country has increased markedly. I have heard it suggested that the Ten Commandments are only 295 words long and cover the whole field of life, but in the Crime Acts of the various States the legislators took more than 90,000 words to cover only part of the field.

The Forensic Practitioner plays a decisive role in only a minority of cases that come before the criminal courts; however, if forensic science is required, it can have a crucial bearing on the outcome of the trial. Of concern to the courts is that a sound judgement is reached that is based upon ‘the facts’? To reach this conclusion it may be that technical or scientific information is required. But this fact finding system is subject to the law where an adversarial system exists. The prosecution and defence councils will use their own Forensic Practitioners (experts) to influence the case. The neutral standing of the expert will be tested by answering questions that will judiciously allow only the facts that suit one side or another. The defence and prosecution are there to win their case. Behind this scenario the search for the ‘truth’ and the ‘facts’ may be obscured (FSU, nd).

The Forensic Practitioner must therefore satisfy two needs; (1) the scientific community and (2) the legal profession. The Forensic Practitioner must demonstrate good understanding of the science, technology and law they use whether it be old (but still accepted) or new and revised. Their underpinning knowledge is paramount to the case, client and court.

Science, Technology and Law depend upon the establishment of a reliable basis of fact, because at the end of a trial, at the end of an appeal, a Judge will be compelled to reduce a complex slice of human experience with all its subtlety, to what is, in essence, a one line answer: "A wins; B loses."

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