Forensic Science Northern Ireland (FSNI) – Written evidence (FRS0006)

Questions

1. Is forensic science contributing to the delivery of justice in the UK?

1.1 Yes. It contributes significantly to the process, from crime scene to court. It also has a role in intelligence and deterrence, as well as after disposal – in probation and prisons, deterring recidivism and monitoring drug abuse. However, there is no quantitative measurement carried out by users and stakeholders of the value contributed, monetary or non-monetary.

2. What are the current strengths and weaknesses of forensic science in support of justice?

2.1 **Strengths**: Its sensitive, discriminating advanced technologies (e.g. DNA, Chemical Analysis) used impartially within quality assured organisations with a scientific ethos.

2.2 Networking via the Association of Forensic Science Providers (AFSP) and European Network of Forensic Science Institutes (ENFSI), whose specialist working groups develop best practice.

2.3 The Forensic Science Regulator (although still without statutory powers).

2.4 Main **weaknesses** stem from strategic choices made following closure of the FSS, which assumed that the understandable drive for “value for money” (VfM) should best be achieved through a reduction in expenditure rather than through optimising added value.

2.5 In E&W, forensic science is treated as a policing responsibility, with insufficient weight attributed to the rest of the CJS, e.g. role of CPS, Judiciary and MOJ is less than in N.I./Scotland.

2.6 The market strategy in E&W encouraged in-housing of forensic activities into police forces and drove down both prices and the contestable market size. As a result, there is today little incentive for providers to remain, even less invest. Ironically, the debacle at RTS has largely neutralised any savings from the commodity-based procurement strategies.

2.7 The perception of Quality Accreditation in in-housed police forensics in some regions, as a rubber stamp (to be deferred if possible) rather than essential for objective, self-critical science. In contrast, the attitude to Quality of the main providers, both commercial and public sector (within AFSP) is one of strong commitment. This is paradoxical, given inherently greater risk of cognitive bias (Role and Confirmatory Bias) in a science organisation under direct police control.

2.8 One cause may be the different “world view” of scientists (determined by international norms of science *per se*) versus the distinct worlds of Policing and the Law. Failure to understand the non-negotiable scientific fundamentals can create risks to both justice and policy.
Understanding and use of Forensic Science in the Criminal Justice System

3. What is the scientific evidence base for the use of forensic techniques in the investigation and prosecution of crimes? Are there any gaps in that evidence base?

3.1 The evidence base differs between analytical processes addressing “Source” questions of “what and how much?” – e.g. the identification/quantification of DNA, Body Fluids, Drugs, Explosives, Fibres, Firearms residues, etc., versus the interpretive “Activity” questions, such as “when, where and how did this evidence come to be?”

3.2 Source questions can usually be answered with a high degree of confidence, based on validated techniques and instruments used by competent staff.

3.3 Activity questions are influenced by difficulties in precisely defining variables in each case. This should not prevent scientists giving expert opinion, in the absence of precise data, on relative likelihoods of the evidence arising, given the competing propositions of Defence V Prosecution.

3.4 Science in general uses levels of uncertainty in multiple variables to derive overall levels of uncertainty. The court often expects (wrongly) that scientific evidence will deliver “certainty” and if it cannot do so, presumes it has failed. This is a false assumption, as science is about probabilities, not certainty and the court uses the yardstick of “beyond reasonable doubt”.

3.5 Another weakness – not in the science but in the CJS’s understanding of it – is the “CSI Effect” where jurors and others have false perceptions – fed by TV shows involving forensics - which can influence their assessment of forensic evidence in court.

3.6 An inherent weakness is that forensic evidence is dealt with within an adversarial legal system, whereas it is by nature better suited to an inquisitorial system. The Prosecution ought (scientifically) to treat forensic evidence holistically, i.e. an aggregated interpretation, i.e. examining the joint probability of separate evidence types all arising, given the Prosecution’s Proposition versus the joint probability given the Defence proposition. This requires holistic scientific advice to the Court, as well as expert opinion on each individual specialism.

3.7 In contrast, the Defence try to disaggregate evidence into individual strands and establish sufficient doubt in each in order to undermine the entire Prosecution case. Whilst legally astute, this approach ignores the probabilistic nature of science and can lead to scientifically questionable verdicts, e.g. in relation to perceived contamination of trace evidence.

4. How can the Criminal Justice System be equipped with robust, accurate and transparent forensic science? What channels of communication are needed between scientists, lawyers and the judiciary?

4.1 It should be straightforward, re Source evidence, to assure the court of its integrity, validity and accuracy. This requires a well-managed and accredited Quality Management System within an organisational scientific ethos of impartiality and demonstrable operational
independence.

4.2 It is also important that evidence gathered and analysed is sufficiently complete and that potentially exculpatory evidence is fully recovered, analysed and disclosed. This applies most obviously - but by no means exclusively - to digital evidence.

4.3 The Activity evidence requires - to be robust - adequate case contextual information and relevant scientific research on issues such as innocent transfer of trace evidence. It is impossible to give precise figures for the likelihood of innocent transfer, given the unquantifiable variables and bespoke nature of every case. However, this does not mean that the Expert cannot give a robust opinion on the relative likelihoods of the evidence arising under the circumstances postulated by the Prosecution versus the Defence.

4.4 Questions from Counsel to Expert Witnesses such as “Is it possible that...?” are often unscientific and misleading, especially if the Expert has no opportunity to frame their opinion in terms of relative probabilities, rather than the inappropriately binary Possible/Impossible.

5. What is the level of understanding of forensic science within the Criminal Justice System amongst lawyers, judges and juries? How can it be improved?

5.1 Variable. Few Law graduates have studied science beyond GCSE and most have an incomplete understanding of science per se, in common with wider UK society. See also above re CSI effect.

5.2 Through joint training/awareness workshops with Counsel, SIO’s CPS, etc. plus visits to forensic laboratories. A forensic module should be included in University Law courses.

5.3 Through requesting a scientific generic response (e.g. from AFSP and Academia?) to rulings where the forensic community has concerns that the science was significantly misinterpreted or misused.

5.4 Appeal Court and/or Supreme Court sittings could also, where relevant, call upon senior scientific experts for generic advice on points of scientific confusion or contention.

5.5 Accredited providers (public or private sector) should be viewed, not primarily as mere contracted suppliers of test results, but as objective, skilled expert servants of the court.

5.6 The marketplace dynamics in E&W position commercial providers in junior roles of commodity suppliers to paying customers. This goes against the Court rulings and Regulator’s guidance that an Expert Witness’ sole duty is to the Court and not to those instructing or paying them. The independence and objectivity of forensic provision must be upheld from the outset of each case.

6. Is the current training available for practitioners, lawyers and the judiciary appropriate?

6.1 Doubtful. See above. In N. Ireland we have had workshops with PPS (including the DPP), senior Counsel, PSNI SIO’s and FSNI scientists. We have also had well received tours of the FSNI laboratory by the Judiciary, as well as final year Law Students and the CCRC.
Standards and regulation

7. Is the current market for forensic services in England and Wales sustainable? Are changes needed to ensure forensic science provision is maintained at the level required? What are the risks of a market approach, for example what happens if a provider goes out of business? And what is the impact on quality?

7.1 The market as currently constituted is not sustainable. Since the closure of FSS, external police spend on forensics (except digital) has halved (due to in-housing and price pressure). Providers’ profit margins have as a result dropped precipitously or evaporated.

7.2 Forensics is not a true market. The police are (price-sensitive) commissioning customers at the start of the process but the final arbiters of quality and value are the (cost blind) Courts (with CPS intermediary). The front end determines market policy, without regard to the value to the CJS as a whole. These risks were highlighted by observers at the time of the closure of the FSS.

7.3 A “true” market has several suppliers competing for market share from multiple customers from which they select those to seek to do business with. Such markets benefit buyers and sellers in a win-win situation. If one supplier dominates, it is a Monopoly and market forces cease to work properly - to the detriment of the buyers.

7.4 Conversely, when suppliers are competing for essentially the sole customer in their geographical region, it is a “Monopsony”, in which the market fails and prices are driven down excessively. The risk of losing the customer becomes an existential issue for the supplier. This is exacerbated by short-term procurement contracts, which inhibit suppliers’ capital and resource investment and weaken staff morale, as the future is precarious. Forensics has an inherently long lead-in time for capital and staff and is particularly vulnerable to short-termism.

7.5 Because of the regional Monopsonies in the current “market”, of the three largest commercial providers, one has recently been rescued from administration, and the other two have been divested by their corporate parents. This reflects the threat to sustainability of the market.

7.6 It is unwise to invest in staff, capital or R&D, within a shrinking, commoditised market, especially where paying customers do not measure the added value of the suppliers’ inputs into their own business but opt instead for “more, faster, cheaper” as a substitute for a strategy.

7.7 Whilst there may be an incentive in a price sensitive market for suppliers to “cut corners”, this has not been evident amongst the AFSP members, who have fought to preserve quality in the interests of justice. In one procurement, the unfeasibly low bid price of a (non-AFSP) provider was flagged up to the police procurement team as a potential risk to quality.

7.8 Expert Witnesses are sometimes (wrongly) seen by police and other CJS stakeholders as Prosecution witnesses. Whilst called to give evidence by the Prosecution, they have no vested interest in the verdict, and no incentive to deliver a particular finding. They work closely with police during the investigation, but must always bear in mind their sole duty in any subsequent trial to provide objective and
competent scientific advice to the Court. The potential dangers of an inappropriate relationship, commercial or otherwise, between police and forensic provider must be guarded against within the design of the marketplace and its funding/procurement strategy.

8. Is the system of accreditation working successfully to ensure standardised results and the highest quality analysis and interpretation of significance of evidence?

8.1 It works well in the accredited providers, public and private sector, due to their commitment to the principles of quality assurance in forensics. The reluctance of some police in-house laboratories and digital forensics services to attain accreditation may stem from a misunderstanding of the role of quality in the provision of objective science, perhaps because they see themselves as part of the policing, rather than scientific community.

8.2 There is also reluctance from some small, as yet unaccredited providers, for whom the “hassle” of accreditation (as well as the fees) seems disproportionate to their expected revenues.

8.3 Quality is not guaranteed by accreditation, which is merely one indicator of the quality ethos central to all good science. Without accreditation or an appropriately robust Quality Management System, how can the courts rely on the forensic science produced, either by a mainstream provider or by a Defence Expert? It is also in the best interests of the police that their providers of scientific services are committed to the highest quality standards.

9. What role should the Forensic Science Regulator have? If the Forensic Science Regulator is to have statutory powers, what should these be?

9.1 The Regulator plays a useful role in setting standards and addressing generic issues. He/She should have statutory powers in E&W, with devolved administrations voluntarily following guidance or mandated through secondary legislation. The powers should be as already outlined in the current draft legislation in the Private Member’s Bill and should include the market’s impact on quality.

10. What lessons can be learned from the use of forensic science in Scotland and Northern Ireland? What can be learned from the use of forensic science overseas?

10.1 In N.I. approx. 60% of forensics is through FSNI, an Agency of the NI DOJ, with the rest through the PSNI’s Scientific Support and Cybercrime Units. An SLA sets the payment FSNI receives from PSNI - ca 85% of FSNI revenue. The Criminal Justice Inspectorate of N.I. (CJINI) in 2014 recommended forensic provision should emulate the “Scottish Model” where all forensics is conducted by one unified, independent public body.

10.2 The independence of forensic science is particularly relevant in the N.I. historical and political context, given its support to the Police Ombudsman, State Pathologist, Legacy Inquests and the planned Historical Investigations Unit. It is in the police’s interests, and the
public’s, that forensic science is demonstrably objective and independent. Ireland is currently implementing a similar model to Scotland, with Forensic Science Ireland currently absorbing the forensic services of the Irish police (AGS), following public concerns over manipulation of drink driving cases.

10.3 In response to the CJINI recommendation, a Forensic Services Strategy for NI (the NIFSS) was drawn up by DOJ in 2016. See: https://www.justice-ni.gov.uk/sites/default/files/publications/justice/forensic-services-strategy-2016.pdf

10.4 Governance structures are in place, with a Leadership Board (FSLB) chaired by a High Court Judge. FSLB includes representatives from relevant CJO’s, and is funded by DOJ.

10.5 The next tier of governance – the Forensic Services Operational Group (FSOG) is currently overseeing three main projects:
- **Forensic Gateway**, looking at how best to coordinate the selection and submission of exhibits for forensic analysis through joint working methods of PSNI, PPS and FSNI.
- **Process Mapping** – using process reengineering tools to map the end-to-end crime scene to court flowline (where it involves forensics) and identify/quantify root causes of delay.
- **Value for Money** – in conjunction with Ulster University faculties of Economics and of Criminology, to assess the benefits, monetary and non-monetary, of forensic science to the CJS, e.g. its role in: improving speed and efficiency of investigations, detection & clear-up rates; encouraging early guilty pleas; reducing case preparation workload and the number of remand/bail hearings, trials, retrials and appeals; reducing legal aid requirements; deterring first offenders and recidivism; increasing public confidence; improving victim/family satisfaction; reducing overall time from detection to disposal; delivering societal/economic benefits of deterrence and crime reduction.

10.6 A 3rd tier of NIFSS governance, the Joint Innovation Delivery Group (JIDG), coordinates service development and innovation, in line with the agreed Innovation and R&D strategy.

10.7 Forensics is expanding in most parts of the world. The UK is unusual in seeking to reduce spend.


11.1 No. It does not address the CJS-wide aspects of forensic science and views it primarily as a commodity supply issue for policing rather than one of safeguarding scientific principles in the interests of all stakeholders and of justice. Meetings of the AFSP attest to the difficult conditions for commercial suppliers and their lack of traction in creating a genuine partnership with customers/stakeholders.

11.2 The attractiveness of the market for commercial investment was not addressed, resulting in stressed trading conditions compounded by a demand for inefficiently fast turnaround times. The reluctance of some police forces to embrace scientific quality as an essential component of forensic science should have been a warning signal of the
inappropriateness of a fully police-led strategy.

**Forensic Science research landscape**

12. *How should further research funding for forensic science be justified? What should be the focus of such research? What is the role of UK Research and Innovation, especially considering the interdisciplinary nature of much forensic science?*

12.1 In science, Innovation and R&D are essential, yet in forensics there has been little incentive for such activity, whilst casework pressures resulting from limited resources have inhibited the dedication of time by scientists to innovation.

12.2 Innovation should be focussed under several key themes:-
   - faster, better science at the scene to optimise speed and effectiveness of investigations – e.g. through more rapid suspect identification/elimination using mobile technologies.
   - more effective and efficient forensic laboratory processes for exhibit screening and analysis
   - supporting interpretation and robustness of forensic evidence – e.g. through collaborative studies on variables such as trace evidence transfer and persistence.

12.3 In scientific/technical markets, innovation is driven by two factors, the “push” of technology enabling potential new applications versus the “pull” of customer need, addressing the strategic benefits the customer wishes to see in their own “business”.

12.4 Technology Push draws upon developments in the much larger - but related – markets outside forensics, e.g. chemical analysis, photonics, artificial intelligence, etc. It is rare for a new technology to emerge from the small specialism of forensics. Instead the technology is adapted to the forensic arena through Application Development.

12.5 Customer Pull requires customers with strategic understanding of the opportunities for adding value to their own business processes through the use of science and technology. There is limited evidence that the police have operated in this mode, which requires a partnership with suppliers.

12.6 Innovation and research in forensic science (a wide range of applied sciences) cannot be done by academia or by police alone, but requires a partnership with the active involvement of forensic providers and technology partners within a mutually beneficial governance model.

13. *Where are the gaps in research and understanding of forensic science? How and by whom should the research questions be articulated to fill these gaps?*

13.1 See also 12 above. A working group consisting of representatives of NPPC, AFSP, CPS, FSR and Academia should be established under the Transforming Forensics governance structure.

14. *How can a culture of innovation in forensic science be developed and sustained?*

14.1 See also 12 above.
14.2 This requires financial incentives, dedicated funding and protection of Intellectual Property Rights so innovations can be shared under licence (to avoid regional disparity of justice).

14.3 For research on evidential robustness, such as innocent transfer/contamination of trace evidence - which does not generate new IPR or technologies but underpins expert opinion evidence ‐ funding should support the work of AFSP’s Body Fluid Forum, Academia or other relevant bidders.

15. Are there current or anticipated skills gaps? Who should have responsibility for and/or have oversight of training?

15.1 The number of experts competent in the various forensic specialisms has reduced due to the forced reduction in market size and transfer/loss of staff as contracts have changed hands.

15.2 Training of forensic scientists to Reporting Officer (Expert Witness) level requires:
- Academic qualifications, not in Forensic Science, but in core sciences, such as chemistry, biology, biochemistry, physics, mechanical engineering, electrical engineering or similar
- 2-3 years training in the employing organisation to reach full expert status for the courts.
- Specialist Competences maintained under the Quality Management System of the employer to ISO17025 and Regulatory Guidance of the FSR; assessed during UKAS inspection visits.
- Specialist Working Groups of AFSP, ENFSI, UKIAFT, FSR, etc. plus seminars and training programmes to share best practice, nationally and internationally.
- The time lag between recruitment and reaching full competence (in whatever forensic specialism) means short term financing and contracts are damaging to the skills base and inhibit flexibility of capacity balancing versus fluctuating demand.
- Training should not be taken out of the responsibility of providers (and their associations) or given to academia or policing to control (although they can of course play a role).

Digital Forensics

16. Are there gaps in the current evidence base for digital evidence detection, recovery, integrity, storage and interpretation?

16.1 Given that different recovery methods, software, etc. can yield different amounts of data from the same device, it follows that completeness of recovery - including potentially incriminating or exculpatory evidence - is key in investigations, decisions to prosecute and in disclosure.

16.2 The integrity of data is also critical, i.e. assurance that it has not been inappropriately edited, deleted or digitally manipulated.

16.3 Completeness and integrity both require work to be done under an ethos of quality accreditation, with validated methods, hardware and software and competent staff, within an organisation (or sub-
organisation) with an appropriate level of operational independence.

16.4 As Artificial Intelligence becomes increasingly applied to sifting enormous amounts of data, even from devices such as smart phones, etc. it will be essential that AI systems are themselves validated.

17. Is enough being done to prepare for the increasing role that digital forensics will have in the future? Does the Criminal Justice System have the capacity to deal with the increased evidence load that digital forensics generates?

17.1 There is a risk (already materialised) that as digital evidence burgeons, other forensic specialisms are seen as less important, and less technically advanced. Neither is true. Digital and non-digital forensic evidence - in combination - can be key to investigations and prosecutions, e.g., when it is necessary to recover data from a smartphone along with DNA, fingerprints and/or fibres for the purposes of establishing who actually used the phone.

17.2 Such “joint” or “sequential” recovery of evidence cannot be done by police cyberunits or specialist digital-only forensic providers, but instead requires the full panoply of forensic facilities, competences and procedures needed for the trace evidence components (DNA, etc.).

17.3 As regards the exponentially growing amount of digital data on “smart” devices, and the Cloud, full data recovery (including deleted data, partially overwritten files, etc.), analysis and interpretation will be increasingly beyond the human resources available in both speed and capacity. Artificial Intelligence will be needed which in turn needs to be validated if it is not to exert its own biases into recovery, integrity, selection and interpretation of data.

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