



forensic science ireland

**Annual
Report
2019**

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Excellence Through People 1000:2017



Foreword

Before reporting on our progress during 2019 I want to thank all the staff of FSI for their flexibility and support during the current Covid-19 pandemic. As an essential service, FSI staff are maintaining all critical forensic services for the criminal justice system. We have changed work patterns and work practices to help safeguard staff while offering a sustainable service. Several staff volunteered to support Covid-19 laboratory testing at one of the country's laboratory testing facilities at the Department of Agriculture, Food and Marine (DAFM) at Backweston, County Kildare and FSI contributed to this testing in the first phase of the national Covid-19 test plan. It is very encouraging to witness the commitment of FSI staff to support the national response to this pandemic while maintaining a professional and responsive service to our criminal justice system. Many thanks again for your support.

Last year was a very significant year for FSI in many regards. With the support of the Minister of Justice and Equality, Charlie Flanagan T.D., FSI launched its strategic plan for the period 2019 – 2022 at a launch event in April at the Backweston Laboratory Campus. The venue was chosen as this will be the future location of the new FSI laboratory, due for completion in 2022. This strategic plan included 6 broad themes of focus for FSI - the services we develop and deliver; the scientific, technical and innovative capabilities of the organisation; partnerships and integration within the criminal justice system; maintaining a robust quality system; improving our physical work environment and developing our staff in an inclusive, integrated team. I am very pleased to report that we have made very significant progress on all fronts over the course of 2019.

During 2019 we formally integrated two services, Fingerprints and Documents & Handwriting from the Garda National Technical Bureau into FSI. Several Garda members and staff have seconded to FSI to support these services within FSI and we are delighted to have them as part of our organisation. We have supplemented these teams with scientists and additional administrative staff and are working on building additional capacity in these services. It is a pleasure to work with these new teams in FSI and I look forward to growing these services further over the next three years through to 2022.

FSI significantly increased the number of cases reported on over the year – supporting crime investigations including murders and serious assaults, sexual assaults, drugs, possession of firearms and explosives. We increased the number of reported cases by more than 20%, by adding new staff, commissioning new equipment and improving a number of processes. Training was a big focus for us in 2019 and it is very encouraging to have new staff actively contributing to the case load of FSI. This is especially important in the face of significant increases in demand – case submissions increased by an average of 23% over the past 2 years. While we have had a positive year in increasing capacity and reducing backlogs in many areas, a sustained increase in capacity will be required for FSI to achieve the level of service performance that our criminal justice system needs.

2019 was also a successful year for the National DNA Database. The reference index of the database grew by close to 10,000 profiles and close to 1,500 crime stains were added. Significantly, 43 out of every 100 crime scene samples uploaded onto the database will now be linked to a person - this is a tangible measure of how the crime solving capability of the database has grown in time. A report on the operation of the DNA Database in 2019, in compliance with the Criminal Justice (Forensic Evidence and DNA Database System) Act 2014, is also included in this annual report publication.

FSI also started the exchange of DNA profiles through the Prüm Treaty in 2019. This treaty allows for the automated anonymous comparison of profiles among participating countries and enables fast information exchange for intelligence purposes. Ireland exchanged data bilaterally with Austria starting in 2019, identifying matches to suspects with serious offences such as sexual assaults in both countries. This provides valuable intelligence to policing organisations across Europe as they cooperate across international borders.

FSI made great in-roads during the year towards the design and construction of a new fit-for-purpose forensic facility at the Backweston Laboratory Campus in County Kildare. By the end of 2019 the tender and procurement process was completed by the Office of Public Works. At the time of writing this report, contracts have been signed and construction of the new facility had commenced. Although this will be disrupted by the current pandemic, the start of construction gives us confidence on what the future holds for FSI. We very much look forward to the completion of the construction project, transitioning services to Backweston and all that this enables.

FSI was awarded with accreditation to the newest ISO 17025 (2017) standard in 2019, which was extended to include integrated Fingerprints, Documents and Handwriting as well as some enhanced services within FSI.

We have already made substantial progress on the goals stated in our strategic plan, but it's clear to us that there is more to do. We remain committed to working through the current challenges this pandemic brings and to provide the critical services our justice sector needs.



Chris Enright
Director General FSI



Minister Charlie Flanagan Launching FSI's Strategic Plan at Backweston, Co Kildare



Some Staff and Stakeholders at The Strategic Plan Launch, Backweston, Co Kildare



FSI New Building Design (Courtesy of OPW)

Introduction

Forensic Science Ireland is an associated office of the Department of Justice and Equality. We work together to deliver, to best international standards, comprehensive scientific analysis, independent expert opinion, advice and training to support the Irish Criminal Justice system. Originally known as the Forensic Science Laboratory, FSI was established in 1975 to provide a scientific service to the Criminal Justice System by analysing samples submitted from crime scenes and providing expert evidence in criminal trials. In June 2014, President Higgins extended our scope when he signed into law the Criminal Justice (Forensic Evidence and DNA Database System) Act 2014. Under this act, FSI is named as the custodian of that database and our name was changed from Forensic Science Laboratory to Forensic Science Ireland to recognise this broader remit.

In December 2019, the responsibility for the Fingerprints and Documents & Handwriting services transferred from the Garda National Technical Bureau to Forensic Science Ireland. This consolidates most laboratory-based forensic work under Forensic Science Ireland. FSI currently has 183 staff, including seconded Garda members, scientists and analysts trained in forensic testing and reporting techniques, supported by administration professionals.

FSI is currently based in Garda Headquarters in the Phoenix Park but plans to build a new fit-for-purpose building on the scientific campus at Backweston, Celbridge are well developed. Construction work started in March 2020 and we expect the construction phase to be completed by 2022, with full transition to this new facility completed as soon as possible afterwards.

FSI is a founding member of the European Network of Forensic Science Institutes (ENFSI), as well as the Association of Forensic Service Providers (AFSP). These organisations are focused on developing and sharing best international forensic practices and research within its members. Our staff are active on all the relevant ENFSI and AFSP working groups. This international engagement is important in ensuring that expert evidence presented is grounded in the most recent scientific research and best international practice.

FSI is accredited according to ISO17025 (2017) and holds a Gold Excellence through People certification.

Who Are We and What We Do

Our Management Team



Director General
Chris Enright



Director of
Physical Analysis
Dr. Dyan Daly



Director of DNA
Dr. Geraldine O'Donnell



Director of Science &
Development
Dr Martina McBride



Director of
Corporate Services
Dr. Tom Hannigan



Director of
Chemical Analysis
Dr. Yvonne Kavanagh

Our Staff

Forensic Science Ireland is a knowledge-based organisation and the expertise of our staff is its most valuable attribute. Since December 2019, 25 Garda members as well as a number of Garda staff seconded to FSI to support the Fingerprints and Documents & Handwriting services. They bring a wealth of experience and expertise within their fields that is very much appreciated by FSI. Both of these services now have a blend of expert Garda members and scientific staff recruited by FSI within the teams. FSI currently has 183 staff, including the seconded

staff. We have recruited a significant number of new scientific, analytical, ICT and administrative staff over the last year to meet the demands of current and new services in Chemical, DNA and Physical Analysis. We are fortunate to be able to attract high calibre scientific, technical and administrative professionals into FSI. Forensic science analysis and interpretation are always evolving and consequently FSI places a significant emphasis on ongoing education and development. This is vital in ensuring that the Justice System has the benefit of international best practice.

Our Services

FSI contributes to both the investigation of crime and the judiciary process within the Irish Justice System. In broad terms, forensic investigations involve the examination of items recovered from crime scenes and the use of various techniques to investigate links between suspects and victims, and between suspects and scenes. This is underpinned by an objective evaluation of context and scientific facts, frequently leading to the elimination of suspects from investigations. There are few major criminal trials that do not feature some contribution from FSI.

The area of most sustained growth is DNA, which is also the discipline of greatest recent developments. In the DNA area, DNA profiles are generated from submitted items and compared with DNA profiles obtained from suspects to assist the investigation of crimes ranging from burglaries to sexual assaults and murder. Blood Pattern Analysis (BPA) and the examination of damage to clothing is also carried out. Since the establishment of the National DNA Database, the DNA department plays a key role in managing the Database in accordance with the legislation as well as quality and security best practices. This department reports on matches between individual crime stains and suspects as well as cluster matches. This offers on-going intelligence to An Garda Síochána in the investigation of crime. In accordance with the Forensic Evidence and DNA Database, FSI's policies and practices relating to the DNA Database are overseen by an independent DNA Database Oversight Committee. Since 2019, FSI is exchanging DNA profiles with other European countries through the Prüm Treaty. This treaty allows for the automated anonymous comparison of profiles among participating countries and enables fast information exchange for intelligence purposes.

The analysis of materials thought to contravene the Misuse of Drugs Acts constitute the highest number of submissions to FSI and are supported by the Chemical Analysis department. Case submissions vary widely in size, drug mix and complexity. These cases can involve new psychoactive substances that pose particular analytical challenges. The drugs team have influenced legislation through the identification and characterisation of drugs in the market place. In addition to drugs submissions, debris samples from suspicious fires are analysed for accelerants (e.g. petrol), offensive sprays (such as pepper spray) are evaluated and toxicology samples associated with sexual assault cases are analysed and evaluated.

The Physical Analysis area is the most recently formed department in FSI. This department was formed to take advantage of the overlaps between disciplines moving from the Garda National Technical Bureau (GNTB) and disciplines that exist today within FSI. This department includes the Fingerprints and Documents & Handwriting disciplines that integrated into FSI over the course of 2019. It also includes a diverse range of examinations where trace evidence recovered from scenes or suspects (e.g. glass, paint, fibres, firearm residue) is compared to reference samples. Physical or digital tachographs and marks/impressions are also examined e.g. footwear or tyre impressions left at crime scenes or manufacturing marks on plastic bags. Suspect materials are also analysed for explosives within this department.

The majority of cases for analysis at FSI are submitted by An Garda Síochána, but material is also received from Garda Síochána Ombudsman Commission (GSOC), Customs & Excise, and Military Police. Cases are accepted by FSI reception/case intake staff who ensure that items are safely and securely stored or passed directly to a scientist depending on the situation. In either situation, the chain of custody is carefully recorded.

In addition to analysing samples in the laboratory, staff from FSI provide professional advice and training on the appropriate samples to be taken from crime scenes and individuals and, in some circumstances, attend crime scenes. We also operate an out-of-hours service for situations where investigating Gardaí need access to time-critical analysis or when it is necessary to visit crime scenes, or suspected clandestine drug laboratories.

We liaise directly with the Gardaí on investigations where we identify whether there is probative evidential value rather than where scientific findings would not help progress the investigation.

Staff provide expert testimony in criminal trials. There is the potential for this to occur in all cases, but some areas of work are more likely to result in court cases than others. Attendance at court can involve robust defence of scientific findings and/or an outline of routine processes related to continuity or laboratory procedures.

STRATEGIC PILLARS

This annual report is organised under six main headings, corresponding to the strategic themes identified in FSI's strategic plan 2019 – 2022.

1

Service Development and Growth

This section focuses on how we are improving the capacity of services we are delivering today and how we are increasing the breadth of services in support of the justice system in Ireland. This section also includes a report on the DNA Database and Prüm DNA exchange.

2

Science, Technology and Innovation

This section focuses on how the organisation is progressing our application of science and technology, innovating to maximise the impact of forensic science and maintaining our contribution to the international forensic community.

3

Partnership and Integration

This section focuses on how we are strengthening relationships within the criminal justice system and beyond, to maximise FSI's contribution to society.

4

Quality Systems

This section focuses on how we maintain a robust quality-focused forensic science service and operate to the very best international practices.

5

Fit-for-purpose Environment

This section outlines progress in transitioning to a new fit-for-purpose facility at the Backweston scientific campus and how we manage risk in the intervening period.

6

Excellence through People

This section focuses on how we build an inclusive and integrated team within FSI that helps us collectively achieve our mission.



Case Study 1

Following a trial in November 2019, a couple were found guilty of having carried out an act of female genital mutilation (FGM) in 2016 on their then 1 year old daughter.

FSI carried out an examination of the scene and of a toy which the couple alleged had caused the injury. Blood matching the child was found on an area of carpet and no blood was found on the toy. The man and woman were jailed for five and a half years and four years and nine months respectively. This conviction was the first of its kind in the Republic of Ireland.

Case Study 2

Thomas Lynch pled guilty in November 2019 at his trial for attempted poisoning.

Having heard of thallium (a poisonous chemical) on a television program, Mr Lynch procured a vial and spread some of the contents on a colleague's car door handle. This activity was observed and the intended victim was warned, so luckily no harm was caused. The vial was submitted to FSI for analysis and the contents were confirmed to be thallium. Thallium is a heavy metal most commonly used in the production of electronic devices and fibre optics. It was used in crime writer Agatha Christie's book *The Pale Horse* (1961) as an unusual poison – subsequently at least two cases of thallium poisoning have been correctly identified and successfully treated as a result of readers recognising the symptoms from the novel.

Case Study 3

A Galway man was found guilty of sexually assaulting a then 16 year old girl following his 21st birthday party in a bar in Galway in 2015.

During the trial which took place in Galway Circuit Court in 2019, it was heard that he forcibly penetrated the minor with his fingers after pulling off her jeans. There was no informative DNA evidence in this case. The forensic scientist from FSI was able to state that the damage to the injured parties clothing was not due to normal wear and tear and was more likely caused by pulling with force. Kevin Corcoran was subsequently sentenced to 6 years in prison by Judge Rory McCabe.

Case Study 4

Robert Elston was a father of one who was fatally stabbed in May 2018.

During the 2019 trial of Blake Sweeney for the murder of Robert Elston, a forensic scientist from FSI gave evidence of finding blood matching the deceased on a knife that was located in the garden of a neighbouring house. The trial heard that a confrontation happened between the two men following an attempt by the deceased to set fire to a car outside the Sweeney family home. Blake Sweeney was found guilty of the manslaughter of Robert Elston and was sentenced to 7 years in prison.

Case Study 5

In February 2016, a gunman pulled up alongside Vincent Ryan's car and fatally shot him.

Jeffrey Morrow and Paul O'Beirne both pled guilty at their trial to facilitating a serious offence contrary to Section 72 of the Criminal Justice Act, 2006. The court heard that they had provided (and subsequently destroyed) a stolen Volkswagen Golf that the gunman used in the "drive-by" shooting. A forensic scientist from FSI examined a tarpaulin cover that was recovered from Mr O'Beirne's wheelie bin in March 2016 and found dog hairs. The owner of the stolen Volkswagen car used in the shooting had a tarpaulin in his car to prevent hairs from his two pet dogs getting on the upholstery. Subsequent DNA profiling of the dog hairs by an animal testing lab showed a match between the hairs on the tarpaulin (taken from the suspect's bin) and the owner's pet bulldog. Jeffrey Morrow was sentenced to 11 years in prison while Paul O'Beirne received a sentence of 9 years.



Case Study 6

2019 saw the end of the longest criminal trial in Irish history when Pat Quirke was found guilty of the murder of Bobby Ryan.

Bobby Ryan was last seen in June 2011 and remained a missing person until a body was recovered on the farm of Mary Lowry in 2013, in an unused underground tank. FSI were able to identify the body as being that of Bobby Ryan by comparing the DNA profile of his two children to the DNA from a tooth taken from the recovered body.

Case Study 7

DNA profiling was used to help solve eight missing person cases in 2019 in collaboration with the Missing Person Unit of An Garda Síochána.

Four of the identifications, those of Patrick Gallagher (missing since 1999 and whose body was exhumed in Wexford, March 2019), Joe O'Boyle (whose remains were caught in fishing nets off the Isle of Man, March 2019), Mervyn Hardy (remains recovered off Inis Mór in 2001) and Conor Whooley (missing since 1983 and whose remains were located in Wales) were 'Cold Hits'. A 'Cold Hit' is one where there is no indication who the remains are from. Identification occurs when DNA samples submitted by relatives to the National DNA Missing Person Database indicate a family match to the unidentified remains.

The other four body identifications, those of Edgars Leimanis, Milan Kisik, Neil Coleman and Geraldine McGuinness, an English woman whose skeletal remains were found in Wexford were more targeted, where there was some indication from other sources who the person was and this was confirmed by FSI by comparison with DNA samples from relatives.

Case Study 8

An Garda Síochána seized a large amount of drugs throughout 2019. Over 10,000 cases were submitted to the Drugs Teams in FSI during the year.

It is common what FSI finds different drugs to those “advertised” when carrying out analysis of seized drugs. One such seizure during happened in from a house in Navan, Co Meath in March 2019. 18,000 Ecstasy tablets (MDMA), 5 kilograms of Ketamine (a hallucinogen) and 2 kilograms of Cannabis were recovered from the house. Also found in this seizure were over 85,000 fake Xanax tablets. Xanax is a prescribed benzodiazepine medication and is used to treat anxiety disorders. However like all benzodiazepine drugs, when abused it can lead to dependence and addiction. Less than half of the 85,000 “Xanax” tablets contained alprazolam - the expected drug (alprazolam is the drug in licensed Xanax). The other tablets contained a wide variety of other drugs including:

- Amantadine (Used in the treatment of Parkinson’s disease)
- Doxepin (An antidepressant)
- Diclazepam (A benzodiazepine drug not approved for use in humans)
- Promethazine (An antihistamine, used to treat hayfever and morning sickness)
- Cyproheptadine (Also an antihistamine used to treat hayfever)

Case Study 9

A woman in County Clare gave two people (a woman and her son) who were hitching a lift in January 2019.

The man sat in the front seat of the car, while the woman sat in the back seat. After dropping her passengers off, the driver realised her handbag (which had been in the back seat) was missing her purse. An Garda Síochána scenes of crime unit took a DNA swab of the Lucozade bottle the female hitchhiker had left behind in the car. FSI generated a DNA profile from this swab and matched it to Theresa Egan. Ms Egan was subsequently sentenced to four months imprisonment for the theft of the wallet.



A hand holding a pen, poised to write on a document. The background is a dark blue gradient. A large, light blue number '1' is positioned in the bottom right corner. The text 'Service Development and Growth' is centered in the upper half of the image.

Service Development and Growth

1

Service Development and Growth

Service Delivery

An important goal for FSI in 2019 was to increase the capacity of the current services, particularly for DNA and Drugs Analysis, to help address the growing demand for these services and reduce backlogs. Increasing capacity is a crucial step towards our goal of offering faster and predictable turnaround times.

Demand for services in FSI continued to grow in 2019. Table 1 summarises the volumes of submissions over the past 3 years across the forensic disciplines, showing 23% growth overall since 2017.

Service	2017	2018	2019	% Growth (2017 - 2019)
Drugs and Toxicology	8,984	9,577	10,480	17%
Sexual Assaults	510	552	653	28%
DNA Cases	4,918	5,638	6,714	37%
DNA Database (Reference)	14,000	11,045	16,185	16%
Chemistry	788	821	899	14%
Total Cases Reported (excluding reference samples)	15,200	16,588	18,746	23%

Table 1: Case Submissions (Demand)

This growth in demand is driven by underlying crime patterns in Ireland but also reflects the increased potential of forensic science in criminal investigations, particularly with developments in DNA technology and systems, where submissions grew by 37% within 2 years. Submissions have also grown in complexity over the same period. For example, the number of more serious Section 15 or Section 17 drugs cases being submitted (i.e. cases for possession with intent to supply) is increasing at a faster rate, are more complex and typically require analysis of multiple drugs types with different presentations.

To meet this demand, FSI focused on recruiting and training new staff in 2019 so that they could actively contribute to case work as the year progressed. FSI also invested in process improvements and new instrumentation and our efforts yielded very tangible improvements. Our goal was to increase the capacity, measured by the number of cases reported weekly by 20% for Drugs and DNA and we achieved that goal by the end of the year. The number of cases reported by FSI in 2019, relative to 2017 and 2018 is shown in Table 2.

Service	2017	2018	2019	Year-Over-Year Change
Drugs	8,456 Total (3,995 complex, 4,461 Section 3)	7,443 Total (4,571 complex, 2,872 Section 3)	9,319 Total (5,207 complex, 4,112 Section 3)	+25% Total (14% Complex, 43% Section 3)
Toxicology	276	274	348	+27%
DNA Cases (including Sexual Assaults)	4,000	4,500	5,860	+30%
DNA Reference Samples	14,000	11,045	16,185	+47%
Chemistry	623	675	567	-16%
Total Cases Reported (excluding reference samples)	13,355	12,892	16,094	+25%

Table 2: Reported Cases. This table does not include Fingerprints and Documents & Handwriting cases as these services transferred over in December 2019

The overall increase in output from FSI, at 25% is very significant in an environment of growing demand and complexity. The increases in output from Drugs and DNA have helped FSI reduce the backlogs in some areas, but should be seen within the context of broader criminal justice trends. Demand increases for Q1 2020 have shown a further increase of 20% over 2019. Further increases in staffing levels, as well as process innovations, will be necessary in order for FSI to eliminate backlogs and match our capacity to demand. FSI will continue to prioritise cases on the basis of the importance to An Garda Síochána and forensic potential, in accordance with our Service Level Agreement.

The types of drugs analysed during 2019 is illustrated in Figure 1. This remains largely consistent with submissions in 2018 and 2017.

Types of Drug Analysed

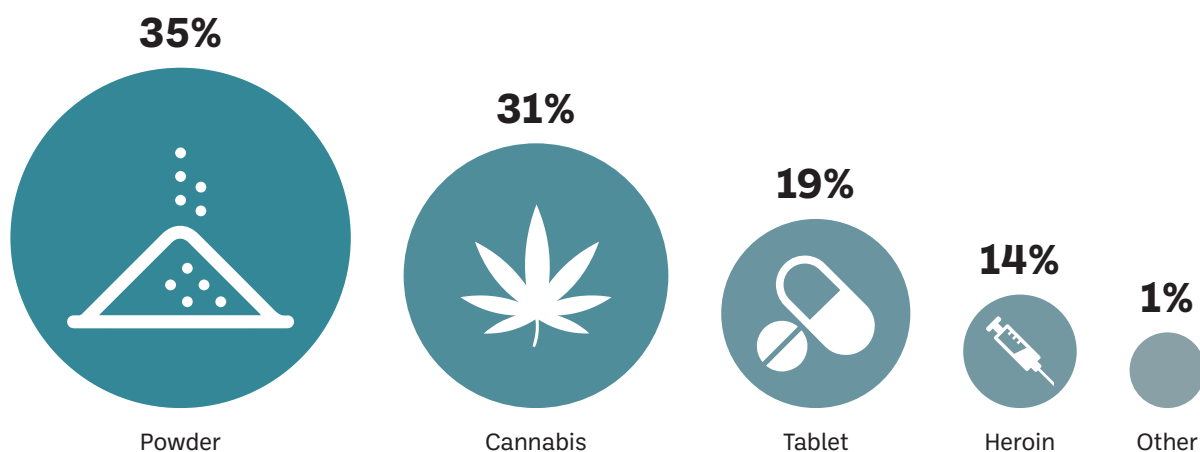


Figure 1

The broad variety of chemistry cases analysed is represented in Figure 2. Each discipline represents a unique speciality and field of expertise. The proportion of explosives/suspect materials, firearm residue and glass cases increased most over the year.

Types of Chemistry Cases Reported in 2019

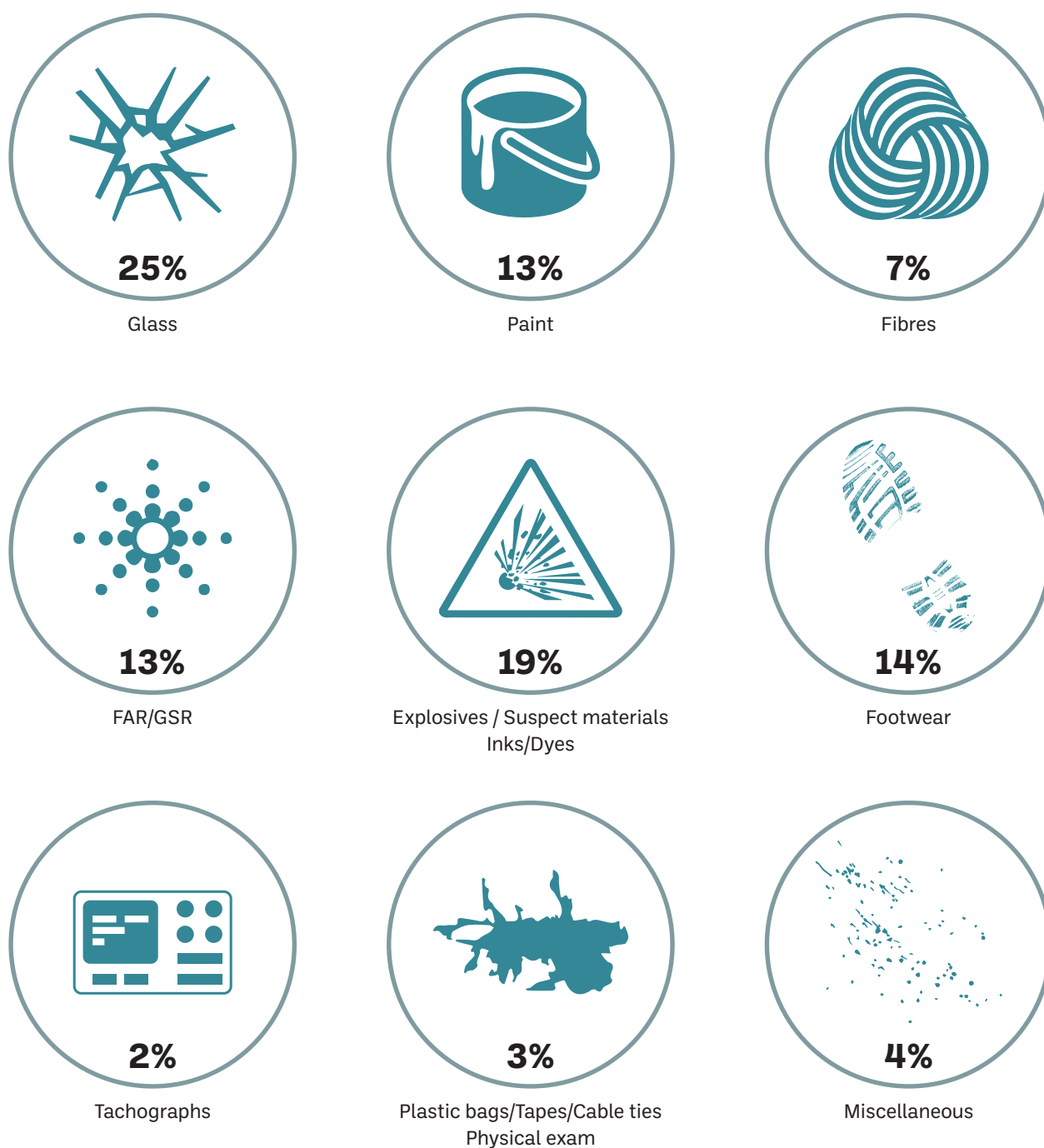
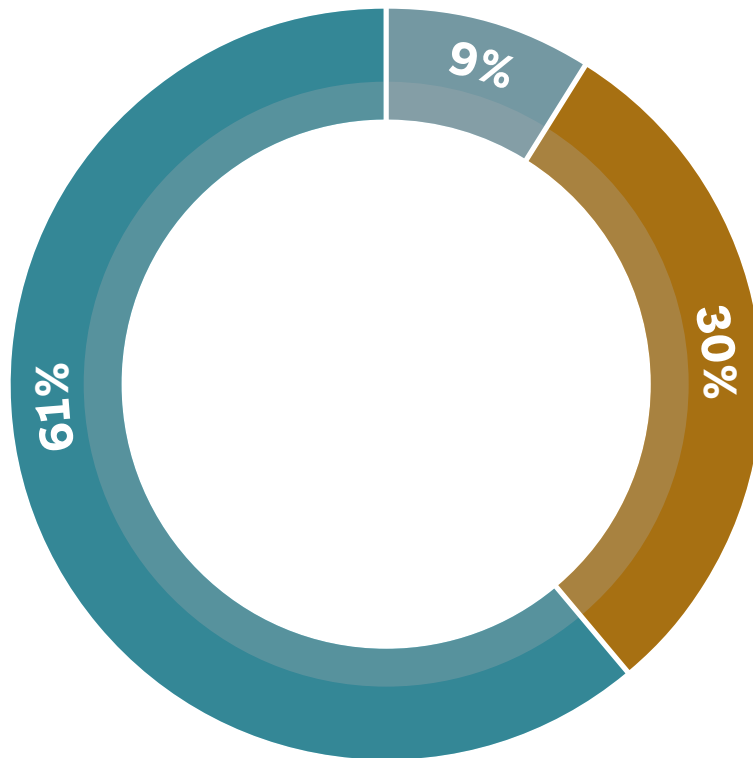


Figure 2

% of Cases Reported by the DNA Section in 2019



- Sexual Assault Cases
- Cases involving injury to people - e.g. murders, gangland killings and assaults
- Volume crime cases - e.g. burglaries and unauthorised takings

Figure 3 represents the types of DNA cases reported from FSI over the course of 2019. While the proportion of cases remains similar to 2018, the volume of cases reported in each was significantly greater than 2018.

The statistics alone cannot represent the contribution and impact that FSI staff are having on the justice system in Ireland. Forensic evidence from FSI was used extensively in Garda investigations and court cases in many murders, serious assaults, sexual assaults, drug seizures and other offences associated with gangland and organised crime throughout 2019.

Figure 3

Contribution to Cold Case and Missing Person investigations

FSI participated in the reinvestigation of seventeen Cold Cases, managed by the Serious Crime Review team of An Garda Síochána, throughout 2019.

DNA profiling was used in the solving of eight missing person cases in 2019 in collaboration with the Missing Person Unit of An Garda Síochána. Four of the identifications, those of Patrick Gallagher missing since 1999 (exhumed in Wexford, March 2019), Joe O'Boyle (whose remains were caught in fishing nets off the Isle of Man, March 2019), Mervyn Hardy (remains recovered off Inis Mór in 2001) and Conor Whooley (missing since 1983 and whose remains were located in Wales) were 'Cold Hits' where there was no prior indication who the remains were from and they were identified by comparison with DNA samples submitted by relatives to the National DNA Missing Person Database.

The other four body identifications, those of Edgars Leimanis, Milan Kisik, Neil Coleman and an English woman whose skeletal remains were found in Wexford were more targeted, where there was some indication from other sources who the person was and this was confirmed by FSI by comparison with DNA samples from relatives.

In recognition of the expanding role of FSI in the area of body identification there was a presentation given at the Irish Society of Coroners meeting in September 2019. FSI also participated in the National Missing Persons Day at Kings' Inns, to gather volunteer DNA samples from family members and presented our successes in the identification of human remains at an International Human Identification Conference hosted by UCC also in December of 2019.

Service Flexibility

The system to facilitate an Out of Hours service continued in 2019. Each scientist carries an on-call phone for a week at a time and a smaller group are available to attend scenes or to carry out necessary urgent laboratory work. In 2019, the service was improved by increasing the size of the panel available for out of hours work from 20 to 34, and by providing that, from now on, two scientists will be called in to the laboratory for out of hours services, for capacity and health and safety reasons. This service was availed of on 37 occasions over the course of 2019 – covering the full gamut of case types. FSI attended five crime scenes to provide specialist knowledge, particularly for murder investigations.

Court Cases

A percentage of the cases examined result in court attendances each year. Frequently these court cases relate to reports issued in earlier years. Staff from FSI attended court as expert witnesses on 108 occasions in 2019 (27% higher than 2018; 74 for DNA in 2018; 21 for Chemistry; 7 for Drugs; 6 for Toxicology), and as witnesses for continuity on 13 other occasions. The types of cases involved are varied as casework itself and range from armed robbery, burglary, explosives and firearms as well as murders, sexual assaults and drugs. In all cases, scientific evidence was presented professionally and objectively and subjected to the rigour of cross-examination.

Visits from Defence Scientists

Scientists employed by the defence visited FSI on 27 occasions in 2019. Some of these visits entailed the re-examination of DNA evidence and re-profiling the samples at the request of the defence. FSI also facilitated visits related to the re-examination of drugs seizures and chemistry cases.

Benchmarking

FSI participated in an extensive benchmarking exercise during 2019 with 8 other institutes. This allowed for a formal comparison of structures, organisational size and capacity, cost, efficiency and turnaround times across some disciplines. While the criminal justice system, and the role of forensic service within that system can vary across Europe, the exercise has provided valuable insights on how FSI can improve its services over the coming years (including further automation, improvements in data systems). This benchmarking work will continue over the coming years and help inform improvement efforts in FSI.

DNA Database

This section is a report on the operation of the DNA Database in 2019, in compliance with the Criminal Justice (Forensic Evidence and DNA Database System) Act 2014.

The DNA Database commenced operation on the 20th November 2015 and its implementation remains one of the most important crime fighting tools introduced within the State in recent times.

Using the database, information is supplied to the Gardaí about links between people and unsolved crimes. These crimes have ranged from burglary/criminal damage to crimes against the person, sexual assaults and suspicious deaths. The power of the database as an investigative tool is that it is providing Gardaí with investigative leads in previously unsolved serious crimes. The database can replace more traditional and time consuming police investigative methods and provide more focus to a criminal investigation. It is now also possible to retain samples from relatives of missing persons to aid in the investigation of unknown remains.

Last year saw an increase in the volume of Database records, as well as an increase in the impact and effectiveness of the system.

DNA Database System by Index

Figure 4 shows the numbers of DNA profiles held in the four indices of the National DNA Database at the end of December 2019

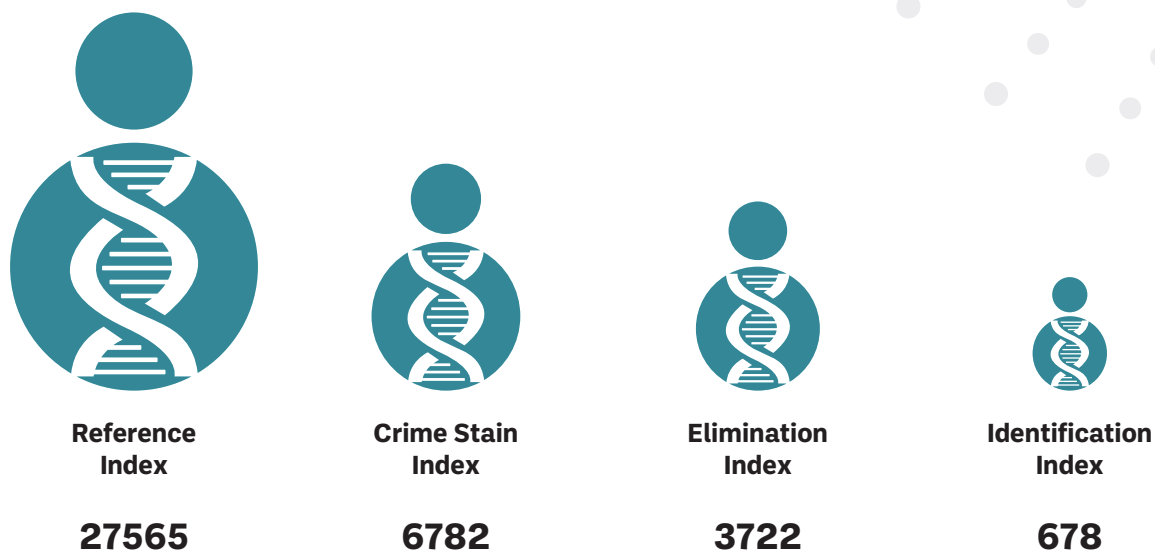
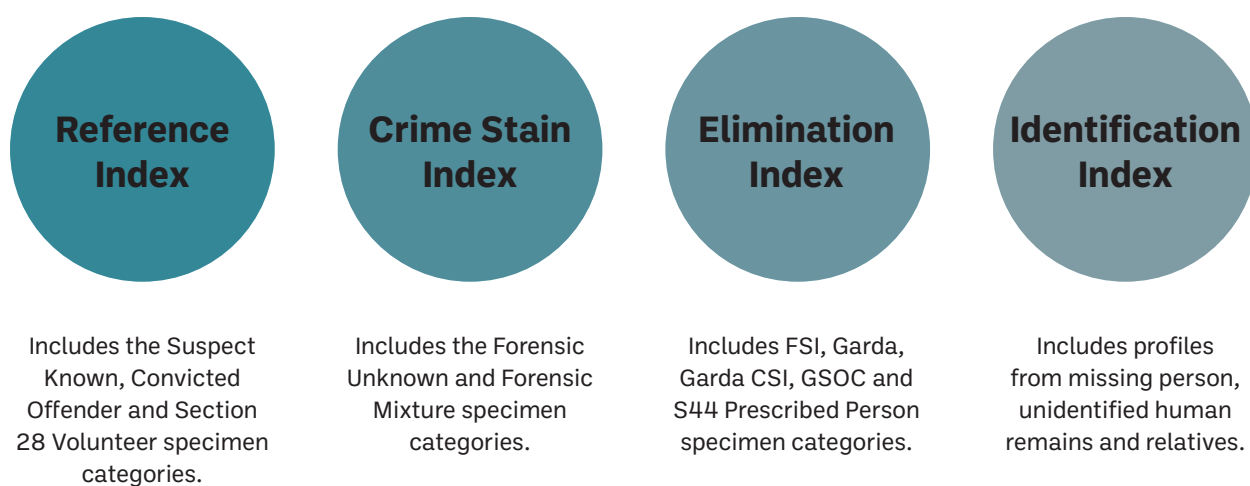


Figure 4

Breakdown of profiles on the DNA database system by Index



Number of persons' profiles on the DNA Database System

Figure 5 shows the number of profiles from persons on the DNA Database from the date of commencement to end of December 2019. This figure takes account of DNA profiles from persons destroyed in compliance with part 10 of the Criminal Justice Act 2014 over this period (as illustrated in figure 8) and shows very significant growth since 2018.

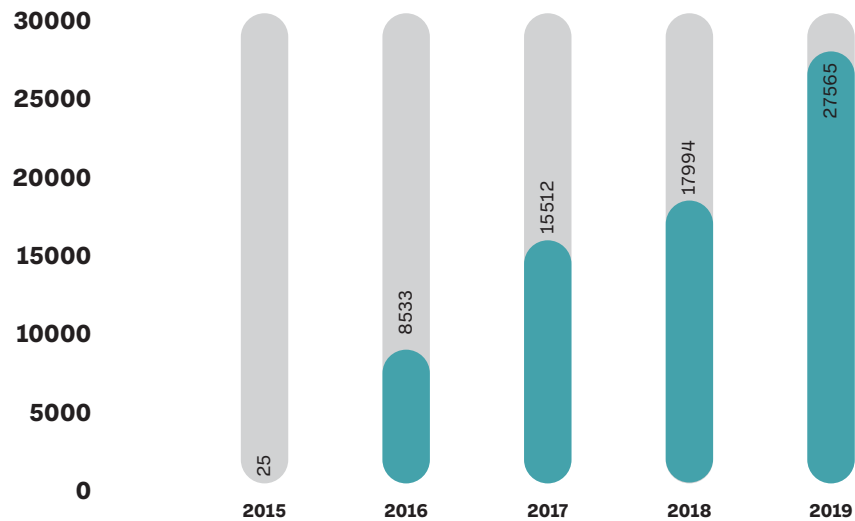


Figure 5: Increase in Profiles on Reference Index

Number of unsolved crime stains added to the DNA Database System

Since the commencement of the Database 6,782 unsolved crime stains were added to the crime stain index (as of the end of December 2019), with 1,456 crime stains added in 2019 alone (Figure 6).

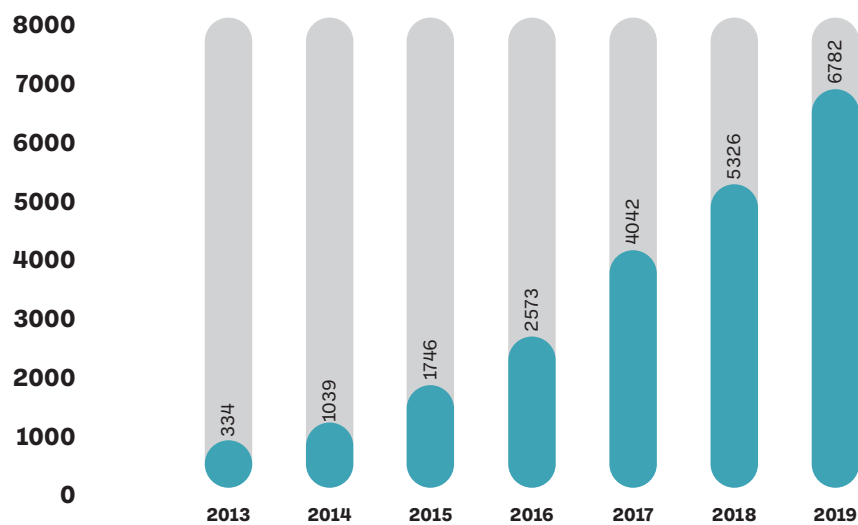


Figure 6: Cumulative number of crime stains uploaded to the Database to the end of 2019

Sample destruction and profiles removal from the DNA Database System

Figure 7 shows the number of samples destroyed since commencement of the DNA database (41,438 samples destroyed up to 31st December 2019, including 13,983 samples destroyed in 2019), while Figure 8 shows the number of profiles removed since commencement of the DNA database (17,700 profiles removed up to 31st December 2019, including 5,411 profiles removed in 2019).

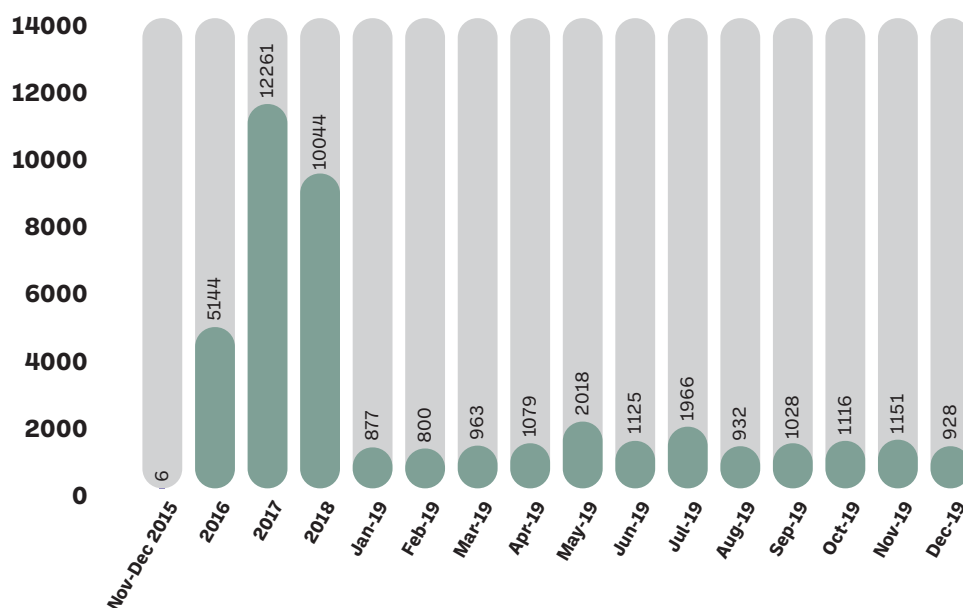


Figure 7: DNA Sample Destruction

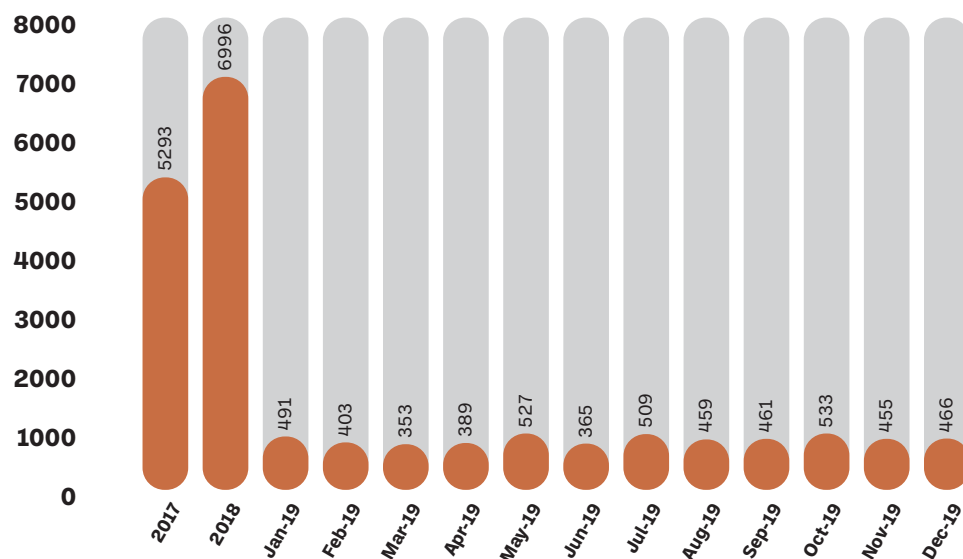


Figure 8: Profile Removal

Investigative links:

Two potential matches can occur when an additional profile is added to the Database – a crime stain can match another crime stain suggesting a link between crimes or the crime stain can match to a person suggesting a link between the person and the crime. Overall, the DNA Database identified 780 hits in 2019, which assisted 1,011 cases. The types of hits are detailed below:

(a) Persons linked to crime stains

There were 724 person-to-stain matches in 2019- 530 of these were person to single case matches providing assistance to 524 investigations while in 194 cases the person was linked to multiple case matches providing assistance to 356 investigations. In total 880 cases have been aided. The details of the cases involving person to stain matches is available on Figure 9. 80% of the person profiles that matched stains originated from samples taken from suspected offenders while 20 % originated from convicted offenders.

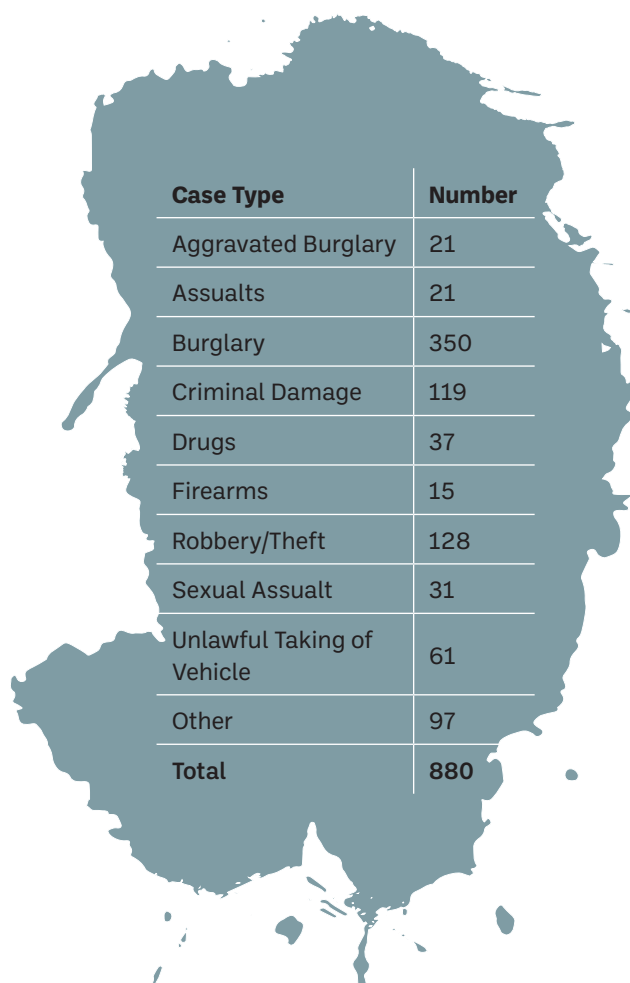


Figure 9: Person to Stain matches [Types of investigations and the number of each involved in 2019]

(b) Crime scene samples linked to other crime scene samples

This type of match occurred 56 times in 2019. In 33 such cases, a case-to-case match was reported while in the other 23 cases, there were clusters of cases associated with each other. Overall, this resulted in 131 investigative links ('hits') between unsolved crime stains - see Figure 10 below

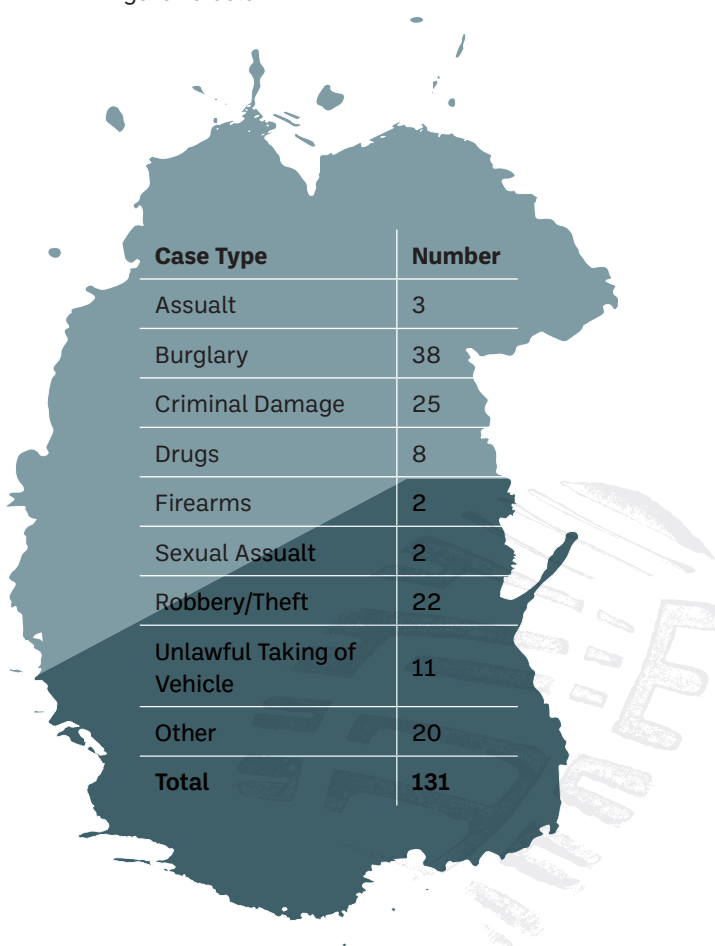
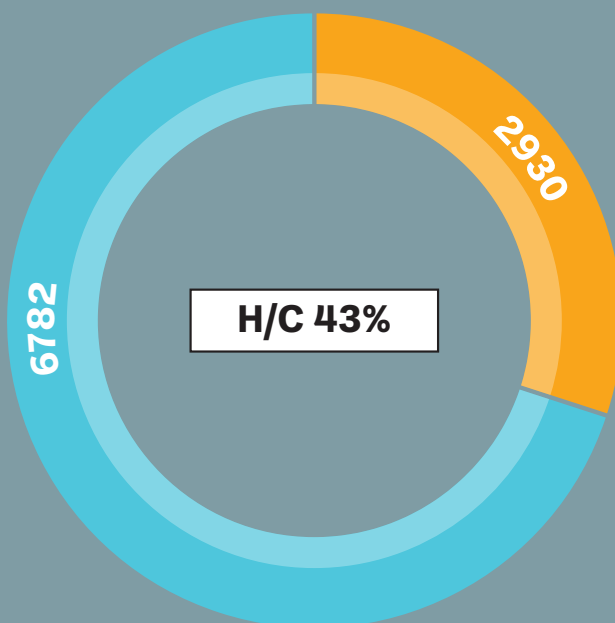
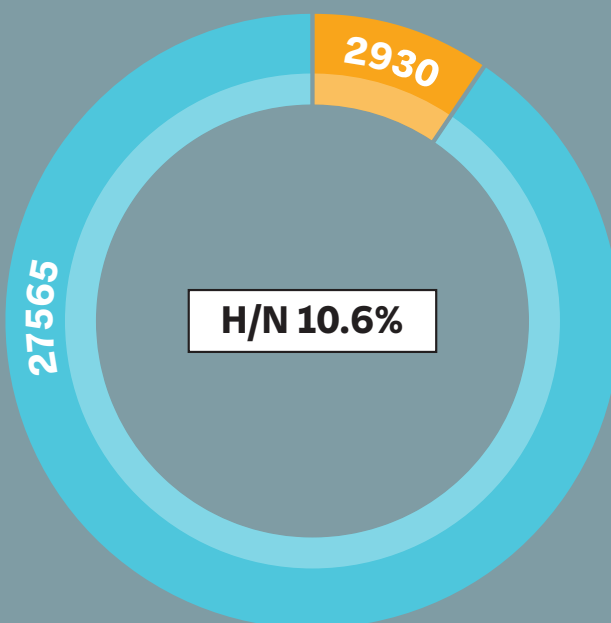


Figure 10: Stain to Stain matches [Types of investigations and the number of each involved in 2019]

Metrics used internationally to assess the effectiveness of databases are available in Figures 11 and 12. These figures were as of the end of December 2019 and they are well within the norms of functioning databases and are indicative that the database is performing well.

- **H = Person to stain matches**
- **N = Number of profiles in reference index**

Figure 11: This figure indicates the appropriateness of the sampling policy (i.e. sampling suspected offenders and convicted offenders).



- **H = Person to stain matches**
- **C = Number of profiles in crime stain index**

Figure 12: This measures the crime solving capacity and is expected to grow as the database grows (i.e. 43 out of every 100 crime scene samples uploaded onto the database will be linked to a person).

On the 2nd October 2019, FSI began live Prüm DNA exchange operations with Austria. Unidentified Crime stains from the Irish database (>3,500) were searched against the Austrian database of 239,000 Reference profiles (Suspects/Convicted Offenders). Austria also searched 40,300 Unidentified Crime stains against 25,350 Reference profiles (Suspects/Convicted Offenders) on the Irish National Database. By the end of the year, 17 crime stains in Ireland were matched to individuals on the Austrian database. These included a profile from 2 sexual assaults, a profile from a cluster of 5 burglaries, a profile from a fraud case and 9 further individual person to stain matches from

burglaries or theft. Similarly, 7 Austrian crime stains have matched reference profiles on the Irish database (1 Convicted Offender, 6 Suspects). This provided invaluable intelligence to the respective policing authorities in their efforts to tackle organised crime.

Finally, some progress was made in 2019 on improvements to the ICT infrastructure and processes. Following a security review, improvements have been made to FSI's ICT platforms and new functionality has been added to the reporting systems. More work is planned in the coming years to allow for a full expansion with all Prüm participants.

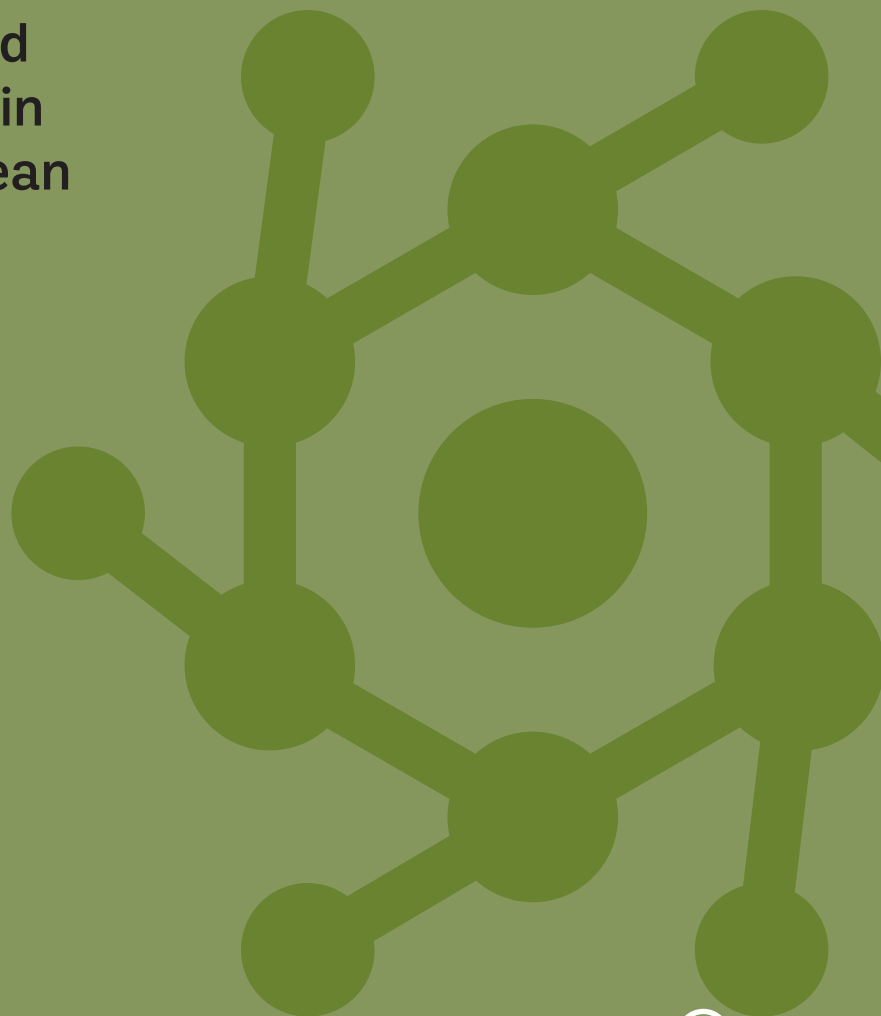


Science, Technology and Innovation

2

Science, Technology and Innovation

FSI has focused on several important projects to improve the efficiency, capability and impact of forensic science over the course of 2019. It has done so while maintaining a strong connection to European forensic institute networks and actively contributing in many areas of European interest.



Several projects were successfully progressed or completed over the course of 2019.

To improve data analysis work-flows the DNA section validated software upgrades for the automated genotyping of DNA profiles and the sequencing instrumentation. It also upgraded the software underpinning the National DNA Database to facilitate the automated transfer of DNA to other jurisdictions under the Prüm process.

A new version of STRmix - the software application that deconvolutes DNA mixtures, was validated and introduced - speeding up the analysis of mixtures by 66%. Process improvements were also implemented in the processing of DNA reference samples, resulting in increased capacity of 40%. Within the chemical analysis area, new capabilities (ATD-GC-MS) have been added to more accurately analyse accelerants in fire debris (for example, in arson investigations). A new FTIR instrument has been commissioned and an evaluation is underway to see how more rapid drugs analysis and quantification can be achieved with this technique. Improved drugs quantification techniques have also been validated and offer valuable intelligence on changes within the drugs market. Our IT systems and the way we process and use data is becoming increasingly important in delivering an efficient forensic science service. Several projects were completed in 2019 that improved the efficiency and integration of our data systems.

An integration project was completed that allowed the automated transfer of data on exhibits from An Garda Síochána into FSI. The Laboratory Information Management System (LIMS) was also configured for the Fingerprints and Documents & Handwriting services. Several complex IT projects in DNA were completed – these involved simplifying our IT platform, upgrades to our DNA Database, our DNA Analysis suite (Genemapper) and the automation of DNA match analysis for national and European DNA exchange. FSI would not have progressed many key initiatives without the active support of our colleagues in the Department of Justice and Equality IT and the Garda IT teams.

FSI submitted two entries for the Civil Service Excellence & Innovation Awards in 2019 (in Chemistry and DNA) and was shortlisted for the World Class Civil Service award for its work in the identification of missing persons.

It is crucially important for FSI to stay abreast of international developments in forensic science so that we ultimately represent the most current and sound scientific thinking in the courts. FSI does so by actively participating in all working and strategic groups of the European Network of Forensic Science Institutes (ENFSI), the Association of Forensic Service Providers (AFSP) in the UK and Ireland, the UK Forensic Regulator and the UK and Ireland Association of Forensic Toxicologists (UKIAFT).

In 2019 FSI hosted an international conference on Fibres at Dublin Castle, with representation from Europe, Asia, the US and Australia. The purpose of the conference was to share best practices, develop converged guidelines on forensic analysis and to plan shared development and validation work across forensic institutes. It was a very successful conference and is an example of how progress can be made through collaboration with scientific professionals in the same field.

During the year, FSI staff organised eighteen literature reviews. These are focused workshops where the most recent publications across the world are reviewed and the implications and applications for FSI are considered. Staff in FSI also contributed to scientific journals in 2019, with some significant publications in the area of background DNA.



FSI staff at the international conference on Fibres at Dublin Castle.

The following papers were authored or co-authored by staff in FSI and published in 2019

Bright et al, 2019. STRmix™ collaborative exercise on DNA mixture interpretation Forensic Sci Int Genet.;40:1-8.

Szkuta et al, 2019, Assessment of the transfer, persistence, prevalence and recovery of DNA traces from clothing: An inter-laboratory study on worn upper garments Forensic Science International: Genetics, 42, pp.56-68.

Murphy, C., Kenna, J., Flanagan, L., Lee Gorman, M., Boland, C. and Ryan, J., 2019. A Study of the Background Levels of Male DNA on Underpants Worn by Females. Journal of Forensic Sciences, 65(2), pp.399-405.

These publications and those of partner forensic organisations relate to how forensic work is directed, analysed, evaluated and presented in court.

In addition to these publications, staff at Forensic science Ireland presented at conferences including the following:

- Ms. Bridget Fleming at the 7th Annual meeting of the European Network of Forensic Science Institutes (ENFSI) Textile and Hair Group on “Fibres Casework in Forensic Science Ireland “
- Dr. Stephen Clifford at the 4th Bone conference, Prague, on “DNA extraction from bone.”
- Dr. David Casey at HRB/European drugs agency, (EMCCDA), on “Trendspotting, Street drugs.”
- Dr Dorothy Ramsbottom at Irish Society of Coroners AGM on “DNA and missing persons”.
- Dr. John O’Shaughnessy at the 13th annual meeting of the ENFSI Expert Working Group on Explosives (FINEX) on “Selected Casework Involving Republican Militants and One Lone Wolf in Ireland.”

The Expert Evaluative Opinion (EEO) approach to forensic science ensures that forensic reports are robust, balanced and transparent. An EEO training programme was developed for new staff in 2019 and delivered to 20 staff throughout the year.





Partnership and Integration

3

Partnership and Integration


FSI exists within a system and this strategic theme focuses on how FSI can participate and contribute at a system level to the Irish justice system.

Although FSI's service plans and expectations with An Garda Síochána are governed by a formal Service Level Agreement, participation in joint working groups, such as in drugs case prioritisation, crime scene training and coordination of DNA sampling has been most effective this year. FSI also had very productive engagement and training with Sexual Assault Treatment Units (SATUs) throughout the year and with some Coroners to develop more cohesive procedures around body identifications.

FSI also engaged directly with the judiciary throughout the year and plans to extend this further over the coming years. This engagement is particularly important as it helps explain the value and limitations of forensic evidence and interpretation but also provides insight on how FSI can improve delivery of expert testimony in courts.

As DNA technology and the National DNA Database continues to evolve, the potential applications to the justice system also grow. FSI engaged with the Department of Children and Youth Affairs throughout the year to see where FSI can assist in an advisory or practical capacity in response to the Mother and Baby Homes investigation. This could include, for example, support for DNA sampling.



A hand wearing a blue nitrile glove is holding a blue pipette, dispensing liquid into a petri dish. In the foreground, there are several glass vials. The background is a blurred laboratory setting. The entire image has a blue color cast.

Quality Systems

4

Quality Systems

It is imperative that FSI maintains a robust quality system so that our customers and the courts have confidence in our services and our findings.

FSI's accreditation to the ISO-17025 standard is a critical aspect of our quality system and a key goal for 2019 was to seek accreditation to the latest ISO-17025 (2017) standard. This new standard includes additional requirements for managing services to the best international standards. In addition, we planned to extend the scope of FSI's ISO accreditation to include Fingerprints and Documents & Handwriting. Finally, we planned to develop and implement training programmes for providing expert opinion in court and Expert Evaluative Opinion (EEO).

FSI was successfully awarded accreditation to the ISO-17025 (2017) standard for all disciplines. Significantly, FSI's Quality System was extended to include the Fingerprints and Documents & Handwriting services. This allowed all Fingerprints and Documents & Handwriting cases to be submitted into FSI's case intake systems and be processed and reported under FSI's management and quality systems. This was a very significant integration achievement and the outcome of many months of integration work and collaboration with quality leads in FSI and GNTB, experts and scientists in FSI and GNTB and several FSI, Departmental and Garda IT staff. It was aided also by a focus on objective Business Analysis, whereby current processes were detailed and new processes defined with this integration in mind.

Furthermore, the scope of accreditation was extended in a number of additional areas:

- Extraction and analysis of DNA from Bones
- Analysis of Black Powder explosives
- Analysis of accelerant residues using new Automated Thermal Desorption (ATD) instrument
- Alcohol Technical Defence in Toxicology analysis

A training programme was developed by senior FSI staff in Expert Evaluative Opinion, based on best practices across Europe. Throughout the year 20 staff received this training and are now using it in the reporting of cases. In addition, 37 staff received training in providing expert opinion in court and 19 people attended an in-house scene of crime course.



Fit-For-Purpose Environment

5

Fit-for-purpose Environment

The goals of this strategic theme are two-fold: transition FSI to a new fit-for-purpose forensic facility at Backweston, County Kildare and manage the risks to staff and services in the interim. We have made very significant progress on both fronts over the course of the year.

The procurement process for a new building at Backweston, County Kildare was completed in 2019 and the main and specialist contractors were selected by the end of the year. This followed a very comprehensive design process under the leadership of the Office of Public Works, detailing laboratory and office space requirements for the new facility. Final business case approval was granted in March of 2020 along with the necessary funding for the project and building works started on the project in March.

The start of construction helps bring much-needed clarity on what the future holds for FSI. The investment in the project in Backweston is a strong endorsement of FSI's purpose and impact within the justice sector as well as its plans to grow capacity and capabilities. The construction phase of the project will last approximately two years and will be followed by a transition phase before all services will be run from the new facility. Project governance has

been established, with participation from FSI, the Department of Justice and Equality and the Office of Public Works. This is a major project for FSI and we look forward to seeing it through completion and realising its benefits to the justice system.

FSI's current facilities remain a significant challenge, especially as we have added staff over the course of the year. Some remedial works were completed, with the support of the Office of Public Works and the Garda Real Estate Team during 2019 to address some of the most critical issues. Offices were reconfigured to accommodate more staff but more will need to be done for any further increase in staffing in core disciplines. A new Health & Safety framework is in place, with many new policies and practices defined. We have invested in risk assessment training, and risk assessments are being developed for all processes. Our focus, until the new building is completed, will be to manage risk to our staff and our services.





Excellence through People



Excellence through People

The goals of this strategic theme are to build an inclusive, integrated team within FSI that focuses on continuously improving our services and to promote an open, collaborative and respectful climate across the organisation.

These goals acknowledge some of the key changes underway within FSI – the integration of new services from the GNTB, a significant amount of recruitment for current and new disciplines (it is noteworthy that at end of 2019 more than 40% of FSI staff are in the organisation less than 2 years) as well as an array of challenging business and operational objectives.

Some very significant progress has been made over the course of the year and some solid foundation work completed to enable further progress in the years ahead. The inclusive development of our strategic plan provided a good platform for staff to engage with planning our commitments and needs in the coming years. This was followed up with Values workshops for all staff during the Summer, where we developed the values and behaviours that underpin our strategic plan.

As with all of our strategic themes, the integration of the Fingerprints and Documents & Handwriting services has been a significant focus. Although this only took effect from December of 2019, a significant amount of planning and training preceded the formal integration of services. Twenty-five members of An Garda Síochána seconded to FSI and 8 scientific staff as well as 10 administrative staff were recruited and assigned to these services. Members and staff of An Garda Síochána have been trained in FSI systems. Equally, scientific staff have been trained and mentored by Garda experts and are actively contributing to case work. This has been supplemented by external training from other centres of excellence – including a residential programme in Fingerprint Mark Enhancement at the University of Portsmouth. The deep expertise and experience of

Garda experts is being complemented with new staff and additional capacity with a view to growing these services over time.

Solid progress was made in 2019 on a learning and development programme for FSI. A training curriculum was developed for new staff and new training solutions developed to help acquire new skills.

FSI has an active staff development group, a social committee and a partnership team focused on developing our staff professionally and creating a friendly work climate and working through changes collectively. FSI also ran a pilot vicarious trauma workshop in 2019 which was valuable for all participants. FSI was audited under the ‘Excellence Through People’ programme in 2019 and maintained its Gold accreditation.

These teams will play a critical role in making further progress in our plans in the coming years.

Corporate Governance

FSI confirms its compliance with the relevant requirements of the Code of Practice for the Governance of State Bodies. In particular, FSI confirms that:

1 The Oversight Agreement for 2019 has been reached with the Department of Justice and Equality and that, as a non-statutory body without a Board, FSI is compliant with the relevant requirements of the Code of Practice for the Governance of State Bodies.

2 FSI is adhering to the relevant aspects of the Public Spending Code.

3 FSI has implemented a risk management system which identifies and reports key risks and the management actions being taken to address and, to the extent possible, to mitigate those risks. A risk register is in place which identifies the key risks facing FSI and these have been identified, evaluated and graded according to their significance. The principal risks identified for FSI in 2019, and associated mitigation strategies are summarised below.

a Service disruption risk based on issues with laboratory spaces and offices. This is being partially mitigated by some remedial M&E works and facilities management. The completion of the new facility at Backweston alleviates this risk.

b Inadequate space for receipt and storage of exhibits, staff accommodation and laboratory work. Some improvements were made in 2019 to accommodate more staff but with some trade-offs. This remains a significant risk and is exacerbated by the current Covid-19 pandemic.

c Contamination risks based on building/facility design are being mitigated through contamination control and workflow processes. The new building design offers a robust mitigation of this risk.

d Demand and capacity are not matched across multiple disciplines within FSI, risking incomplete, erroneous or late reporting of cases for court. This risk is being managed currently through a prioritisation process agreed with An Garda Síochána and reflected in the Service Level Agreement between both organisations. Additional staff were recruited in 2019 but demand trends are increasing ahead of capacity.

Statement of Internal Control

Scope of Responsibility

On behalf of Forensic Science Ireland, I acknowledge responsibility for ensuring that an effective system of internal control is maintained and operated. This responsibility takes account of the requirements of the Code of Practice for the Governance of State Bodies (2016).

Purpose of the System of Internal Control

The system of internal control is designed to manage risk to a tolerable level rather than to eliminate it. The system can therefore only provide reasonable and not absolute assurance that assets are safeguarded, transactions are authorised and properly recorded and that material errors or irregularities are either prevented or detected in a timely way. The system of internal control, which accords with guidance issued by the Department of Public Expenditure and Reform has been in place in Forensic Science Ireland for the year ended 31 December 2019.

Capacity to Handle Risk

Forensic Science Ireland reports on all audit matters to the Audit Committee in the Department of Justice and Equality. Forensic Science Ireland's senior management team acts as the Risk Committee for the body. Senior managers from Forensic Science Ireland completed a risk register in 2019 and shared the findings with the Department of Justice and Equality. The Internal Audit Unit of the Department of Justice and Equality carry out audits on financial and other controls in Forensic Science Ireland. Forensic Science Ireland's senior management team has developed a risk management policy which sets out its risk appetite, the risk management processes in place and details the roles and responsibilities of staff in relation to risk. The policy has been issued to all staff who are expected to work within Forensic Science Ireland's risk management policies, to alert management on emerging risks and control weaknesses and assume responsibility for risks and controls within their own area of work.

Risk and Control Framework

Forensic Science Ireland has implemented a risk management system which identifies and reports key risks and the management actions being taken to address and, to the extent possible, to mitigate those risks. A risk register is in place which identifies the key risks facing Forensic Science Ireland and these have been identified, evaluated and graded according to their significance. The register is reviewed and updated by the senior management team on a quarterly basis. The outcome of these assessments is used to plan and allocate resources to ensure risks are managed to an acceptable level. The risk register details the controls and actions needed to mitigate risks and responsibility for operation of controls assigned to specific staff.

I confirm that a control environment containing the following elements is in place:

- procedures for all key business processes have been documented;
- financial responsibilities have been assigned at management level with corresponding accountability;
- there is an appropriate budgeting system with an annual budget which is kept under review by senior management;
- there are systems aimed at ensuring the security of the information and communication technology systems, The ICT division of the Department of Justice and Equality provide Forensic Science Ireland with ICT services. They have provided an assurance statement outlining the control processes in place in 2018 in respect of the controls in place;
- there are systems in place to safeguard Forensic Science Ireland's assets. Control procedures over grant funding to outside agencies ensure adequate control over approval of grants and monitoring and review of grantees to ensure grant funding has been applied for the purpose intended;
- The National Shared Services Office provide Human Resource and Payroll Shared services. The National Shared Services Office provide an annual assurance over the services provided. They are audited under the ISAE 3402 certification processes.

Statement of Internal Control

Ongoing Monitoring and Review

Formal procedures have been established for monitoring control processes and control deficiencies are communicated to those responsible for taking corrective action and to management, where relevant, in a timely way. I confirm that the following ongoing monitoring systems are in place:

- Key risks and related controls have been identified and processes have been put in place to monitor the operation of those key controls and report any identified deficiencies;
- An annual audit of financial and other controls is carried out by the Department of Justice and Equality's Internal Audit Unit;
- Reporting arrangements have been established at all levels where responsibility for financial management has been assigned; and
- There are regular reviews by senior management of periodic and annual performance and financial reports which indicate performance against budgets/forecasts.

Procurement

I confirm that Forensic Science Ireland has procedures in place to ensure compliance with current procurement rules and guidelines and that during 2019 Forensic Science Ireland complied with those procedures.

Review of Effectiveness

I confirm that Forensic Science Ireland has procedures in place to monitor the effectiveness of its risk management and control procedures.


Forensic Science Ireland's monitoring and review of the effectiveness of the system of internal financial control is informed by the work of the internal and external auditors, the Audit Committee, and the senior management team. The senior management within Forensic Science Ireland is responsible for the development and maintenance of the internal financial control framework. I confirm that Forensic Science Ireland conducted an annual review of the effectiveness of the internal controls for 2019. It should be noted that this extended beyond financial controls and examined ICT controls, management practices and other governance processes.


Internal Control Issues

No weaknesses in internal control were identified in relation to 2019 that require disclosure in the financial statements.

Forensic Science Ireland

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