

National DNA Database Ethics Group

Notes of the 37th meeting held on 22 February 2017 at

Home Office, 2, Marsham Street, Westminster, London, SW1P 4DF

1.0 Welcome and Introductions

- 1.1. The Chair welcomed all to the 37th meeting of the National DNA Database Ethics Group (EG). Apologies had been received from Adil Akram, David Latchman, Carol Moore, June Guinness and Paul Wiles.
- 1.2. The Chair welcomed: Shazia Khan, Metropolitan Police Service (telecom) for item number 8, Rod McLean Crime, Police & Fire Group, Home Office; Kirsty Faulkner, National DNA Database Delivery Unit and Gemma Gyles, Office of Biometrics Commissioner.
- 1.3. The chair requested that members declare any conflicts of interest concerning matters to be discussed. None were reported.

2.0 Note of the Previous Meeting and Matters Arising

- 2.1 The note of the previous meeting had been approved via correspondence and published on the EG website.
- 2.2 Matters arising were discussed:

Action 2: Chair to hold discussions with the Forensic Science Regulator (FSR) and Biometrics Commissioner (BC) to clarify their roles on the EG and to ensure appropriate interchange. The chair had met with the BC and an update was provided under item 7. A date had been fixed in March for the chair to meet with the FSR.

Action 5: Secretariat to pursue whether the chair of the EG could have a seat on the National Police Chief's Council Science and Innovation Board. The Secretariat had contacted the police force lead and was waiting for a reply.

3.0 Review of the Ethics Group Ethical Principles

- 3.1 The EG were provided with a first draft of a set of high level principles which could be applied to the consideration of ethical issues in relation to biometrics and forensics which had been developed by an EG working group. The EG heard that an eclectic approach had been taken for the development of these principles including selecting information from a variety of disciplines and philosophies. The working group had undertaken an extensive review of literature and had extracted principles which were relevant to Biometrics and Forensics. The working group came to the view that whilst broad principles would be able to set the scene, they alone would not be sufficient to provide the necessary guidance. Therefore a set of open questions would be developed which would facilitate considerations without

restricting them. The EG were invited to comment on the approach which had been taken, the principles which had been developed and to offer suggestions as to appropriate questions to accompany the principles.

- 3.2 Clarification was sought as to the purpose of these principles and whether they would have a role in the oversight of research proposals. It was explained that the principles would both provide a common first step to frame members' initial considerations and provide transparency of this process; on that basis they would form part of the EG's accountability framework. Therefore the principles needed to be broad, encompassing and inclusive.
- 3.2 The point was raised that science was being practiced within organisations with varying degrees of quality, rigour and reproducibility with the aims of the research sometimes being based on increasing the funding to an organisation or to generate publicity, rather than developing robust scientific techniques. It was suggested that the principles should state that biometric and forensic procedures should be based on robust evidence, that the science behind the processes should be reproducible and the research should be open and published. It was agreed that the following principle should be included under 'governing principles' – 'procedures should be based on robust evidence'.
- 3.3 It was queried whether a principle should be included about safeguards to minimise error with remedial steps to be taken should errors occur, as well as systems for recording and reporting errors. It was suggested that the term 'error' might be too specific and instead limitations would include both error and difficulties identified in a process. It was agreed that this issue could be addressed by providing qualification to the principle 'openness and transparency' under the heading 'implementation of the governing principles'. The principle would be changed to reflect the committee's comment.
- 3.4 The EG considered whether a principle on public perceptions should be included which would equate to a requirement for the public to have trust in the procedures which were implemented. Ensuring public trust was considered difficult to control and it was highlighted that it would not be possible to legislate to ensure public trust. However, it would be possible to include an expectation of trustworthiness amongst institutions and to expect a pattern of behaviour which merited trust. It was agreed that in the preamble to the principles the following should be included 'We consider that observing these principles should enhance trust in biometric and forensic services'.
- 3.5 It was noted that consent was not currently included in the principles and whilst it was not relevant to all DNA procedures, it was important that where required to be given, it was respected and obtained freely. The following would be included in the principles 'The need to provide adequate information, and where appropriate, to obtain consent from whomever data or samples are sought'.
- 3.6 Consideration was given to whether the principles should include the requirement for procedures to be implemented and organisations to be compliant with procedures or whether having procedures in place was sufficient to protect the public. The EG came to the view that this would be too specific for inclusion in the

principles as an assumption can be made that quality checks which ensure compliance should be inherent within procedures.

- 3.7 Clarification was sought in relation to the principle 'Intrusion into private lives should be minimised' under the section 'Considerations Specific to the Collection and Processing of Data'. It was highlighted that in certain types of DNA testing, for example familial testing, there is the potential to intrude into people's lives when those individuals are not within the purview of the forensic system. However, it was clarified that this principle specifically related to the use of data and the collection and storage of that data.
- 3.8 Subject to the changes which had been agreed, the EG approved the document on ethical principles and agreed for the working group to proceed with the development of the questions to accompany the principles. The questions would need to provide a structure for considering ethical issues in an open manner and for it to be clear that these would not be the only questions which would require consideration. It was recommended that once the principles and questions were finalised they should be piloted by researchers within the Home Office.

Action 1: Ethical principles working group to amend the principles document and develop the questions to accompany the principles.

Action 2: When complete, the ethical principles should be piloted on researchers within the Home Office.

4.0 Review of the leaflet 'DNA profiles and the National DNA database (NDNAD)'

- 4.1 Members were provided with a redrafted information leaflet titled 'DNA Profiles and the National DNA Database' which would be given to individuals when providing DNA samples for inclusion of their DNA profiles on the NDNAD. The committee heard that the purpose of re-drafting the leaflet was to make it accessible to a wider target audience and to ensure that it aligned with information that was already available on the internet. Part one of the leaflet would be applicable to all individuals providing a DNA sample and provided background information on DNA and the database. There were subsequent separate sections which contained frequently asked questions for those individuals who had been arrested and for individuals who were voluntarily providing a DNA sample. Members were invited to comment on the leaflet.
- 4.2 Members suggested that the terms 'biological material' and 'contains instructions for life' would be too difficult to understand for some recipients of the leaflet. It was suggested that the question 'What are the reasons why I will be asked to volunteer my sample' should be made the first question in the list of questions for voluntary donors.
- 4.3 It was queried whether this leaflet would only be applicable in England and Wales and if so, the leaflet should reference legislation in England and Wales. It was clarified that this was the case, and the leaflet would be updated accordingly. The final version of the leaflet would be presented to the NDNAD Strategy Board,

whereby Scotland and Northern Ireland would have the option to adopt it for their own purposes.

- 4.4 Overall members thought that the leaflet provided a clear and understandable account of a technical area. The EG were invited to submit further comments to the chair of the working group for consideration prior to the ratification of the leaflet by the working group.

Action 3: EG members to submit comments on the leaflet 'DNA profiles and the National DNA Database' to the Chair of the working group for consideration prior to ratification of the leaflet by the working group.

5.0 Ethics Group work plan and forward look

- 5.1 The EG were presented with a paper which included a work plan for 2017 and a suggested approach to Forward Look activities. Members were invited to review the work plan and approve the prioritisation of work and discuss the approach to undertaking Forward Look activities.
- 5.2 Consideration was given to the work plan which included priorities which had been set by the Home Office sponsor and work which the EG had already agreed to take forward. It was explained that the mechanism for the prioritisation of work would be helpful when negotiating future work streams with stakeholders.
- 5.3 It was queried whether the work plan was overly ambitious considering the voluntarily nature of EG members. However, it was highlighted that a number of the EG projects would finish in the near future which would provide the EG with the capacity to start new work streams. In addition, the intention was to increase the membership of the EG during the forthcoming recruitment campaign and this would increase capacity of the EG.
- 5.4 It had been suggested that work should begin in April on 'Bringing Forensics Closer to the Crime Scene' and 'Retention of DNA after 100 years'. In relation to the latter, it was noted that this would have operational knock on effects for the police in relation to deleting information. It was also noted that the Information Commissioner had expressed concerns about retention of DNA for relatively minor convictions. Furthermore, given what is known about the sociology of crime, consideration needed to be given to whether the retention times were proportionate. There was support for starting these two pieces of work in April.
- 5.5 The EG discussed which other pieces of work they considered to be a priority and due to the imminent publication of the Custody Images review, it was suggested that this work should also commence in April, subject to the publication of the Custody Images review by the Home Office.
- 5.6 The Chair suggested that the Secretariat should begin preliminary work on these topics and produce a first draft of a paper on each for the June EG meeting. In addition, volunteers were sought to work with the Secretariat to develop the papers and members were nominated for each piece of work.

Action 4: Secretariat to begin work developing papers on projects; Bringing Forensics Closer to the Crime Scene', Retention of DNA after 100 years' and 'Custody Images'.

- 5.7 Members were also invited to comment on the proposed approach for the EG to undertake a Forward Look of activities which include Biometrics and Forensics. It was suggested that a subgroup of the EG should be set up to review and filter potential projects which might require ethical considerations in the future. It was further suggested that the EG Forward Look work should dovetail with the Home Office Transforming Forensics Programme and it was agreed that Kirsty Faulkner would develop a document on the programme for the next EG meeting, which would highlight the areas covered by the programme and allow the EG to identify potential ethical considerations.

Action 5: Kirsty Faulkner to develop a document on the Transforming Forensics Programme for the June EG meeting.

- 5.8 The view was put forward that the EG should attempt to capture political and social developments and determine how they might impact on Forensics and Biometrics. For example, the departure of the UK from the EU would create additional borders which would have an impact on biometrics and changes in police forces would raise new issues for the Criminal Justice System (CJS).
- 5.9 The EG heard that the HO had set up a Strategic Data Board to consider data policy and processing issues. Considerations were on-going as to the role ethics should play in decision making. The HO would provide further information on this at the next meeting and seek EG input.

Action 6: Rod McLean to provide the EG with details of the Strategic Data Board at the June EG meeting.

6.0 Ethical dimensions of Next Generation Sequencing (NGS) – sign off

- 6.1 The EG was invited to ratify and agree to the publication of the document 'Ethical Dimensions of the application of Next Generation Sequencing technologies to criminal investigations'.
- 6.2 It was recommended that the column 'what is the potential public benefit' should be changed to 'what are the potential public benefits' to account for the diversity of the public. It was suggested that reference to relatives in the document should be changed to 'biological relatives'. Finally, it was suggested that it should be made clear that issues raised for other sequencing technologies would also apply to whole genome sequencing and whole exon sequencing.
- 6.3 Subject to these changes the document was signed off by the EG and it was agreed that it would be published on the EG website and shared with the National DNA Database and Fingerprint Strategy Board.

Action 7: Secretariat to make amendments to the document ‘Ethical Dimensions of the application of Next Generation Sequencing technologies to criminal investigation’ and to publish it on the EG website and share it with the NDNAD and Fingerprint Strategy Board.

7.0 Chair’s update

7.1 The Chair provided an update from a recent meeting between himself and the Biometrics Commissioner (BC). The EG heard that:

- the BC would be investigating the use made of National Security Determinations (NSDs) in order to gain an understanding of their effectiveness and any potential ethical issues;
- the BC has oversight of DNA, fingerprints and shoe marks but not oversight of custody images;
- it was possible to envisage that arguments could be made for all biometrics to have the same governance and retention framework;
- in relation to the transparency of matching algorithms which were used in biometrics which would have the capability to develop and learn from the data which they hold, which makes it difficult to understand the meta rules which they were adopting;
- there were concerns that young people who have their DNA taken might not be informed that they had the right to request for their DNA to be destroyed;
- there was a requirement to determine how best complex forensic evidence could be presented in courts so that it could be understood by a jury;
- there was a requirement for a cost benefit analysis of DNA evidence and statistics and the proportion of those cases involving DNA which led to a criminal justice action.

7.1 The EG discussed the last point in more detail and heard that a report had stated that 62% of crime stain DNA matched someone on the NDNAD. Whilst this reinforces the effectiveness of the NDNAD, and the trend for repeat offending, it was emphasised that this statistic was only representative of cases which are DNA-rich at the scene of crime and had been given sufficient priority by the police. This figure also related to samples and not cases and so was skewed by multiple samples in a single cases matching on the NDNAD. A more useful statistic would be the value added of the NDNAD i.e. the number of cases that had been solved per annum that wouldn’t have been solved without the NDNAD.

7.3 The EG discussed a recent issue of a Forensic Science Provider (FSP) falsifying quality data to justify the reliability of the data they report. The EG suggested that consideration should be given to whether the FSP had complied with their own quality assurance processes and what the trigger for the discovery had been. This issue was relevant to the previous discussion on the Ethical Principles and organisations operating in trust-worthy manner.

7.4 The Forensic Science Regulator’s (FSR) annual report had been published in January 2017 and the following highlights relevant to the EG were noted:

- the standards were not an unachievable gold plated ideal; they were minimum standards expected of any reliable FSP;
- forensic science which was commissioned must support the overall aim of the CJS and not solely the aims of the commissioning party;
- forensic science should be supported by ongoing research to increase quality and capacity;
- the operation and implementation of streamlined forensic reporting (SFR), including the resolution of how DNA mixtures would be reported using the SFR;
- publication of a standard on the collection of forensic evidence at sexual assault referral centres;
- support for the expansion and implementation of the central elimination DNA database
- publication of guidance on the clarity of wording, interpretation and validation of software for the interpretation of complex DNA mixtures;
- support for the adoption of the Fingerprint Comparison Standard;
- support bids to funding bodies for relevant, high quality research.

8.0 Evaluation of the Met police Y-STR pilot

- 8.1 The EG were provided with an update from the Metropolitan police on their Y-STR pilot. The pilot had started in December 2015 and had originally been planned to last six months, however the timeline had been extended beyond six months. The Metropolitan police were in the process of writing up an evaluation of the pilot which would be submitted to the NDNAD and Fingerprint Strategy Board shortly. It would include work which had been undertaken by the Association of Forensic Science Providers to increase the number of UK samples on the European Y-STR Haplotype Reference Database (YHRD). The paper would also be shared with the EG.
- 8.2 Preliminary analysis of results had found that the Y-STR database established during the pilot to be a useful intelligence tool. Y-STR profiles had been obtained when it had not been possible to obtain standard DNA profiles and it had been possible to link cases together.
- 8.3 The EG were in favour of a centrally governed Y-STR database rather than pockets of Y-STR data being held by separate local police forces. The EG heard that in September the NDNAD and Fingerprint Strategy Board would be considering future searching approaches which would include the potential to search Y-STR profiles on a national level. It was highlighted that a public consultation would be required if the Home Office were to recommend the national storage of Y-STRs.
- 8.4 The EG suggested that the Metropolitan police's report on their Y-STR pilot should include an evaluation of the success of the project, including how success had been measured, such as the expectations at the start of the project and the impact that Y-STR profiling could have on criminal investigations.

9.0 Review of the documents ‘Proposal to Conduct R&D using DNA samples, profiles and or NDNAD data’ and the ‘DNA Research Ethics Information Form’

- 9.1 The EG had been provided with two forms. The first was a National DNA Database Delivery Unit (NDU) form which was completed by researchers when submitting requests to access DNA samples, profiles and/or data held on the NDNAD. The second form was developed by the EG and required researchers to compile ethical information in relation to their research. Both forms had been used relatively infrequently. The EG were invited to consider whether both these forms were necessary, whether a combined form could be created and to provide further suggestions.
- 9.2 It was agreed that due to the development of the Ethical Principles by the EG the EG’s form was no longer required however the updated NDU form should include signposting to the EG’s Ethical Principles. It was suggested that the NDU form should be modified so that ethical issues were not separated out from other issues, as was currently the case. Additionally, the NDU form should include a link to the data management plan rather than listing all the legal, security and ethical issues. It was agreed that the NDU form should be updated so that it covered the entire remit of the NDAND Strategy Board.
- 9.3 The EG recommended that proposals which were received for research to be conducted on the NDNAD should be reviewed by a committee with the appropriate expertise. The EG agreed that university research ethics groups might not always have the necessary knowledge of the DNA database which would be required to undertake these ethical reviews. Therefore, it was agreed that a sub-group of the EG should be established which would undertake ethical reviews of research proposals, this would be in-line with the current research policy for the NDNAD.

Action 8: Secretariat to set up a sub-group to be responsible for undertaking ethical reviews of research proposals.

10.0 National DNA Database Delivery Unit - update

- 10.1 An update was provided on the work of the NDNAD and Fingerprint Strategy Board. Developments were underway for reporting and transparency of fingerprints. The governance rules were being updated and would be presented at the next Strategy Board meeting. The Strategy Board would also receive an overview of the Metropolitan Police’s project on Prüm and the international sharing of DNA and fingerprints. The Strategy Board would also be discussing the Data Assurance Strategy for DNA and fingerprints and giving consideration to what works effectively in both these areas. Later in the year, the Strategy Board would be giving consideration to safeguarding responsibilities of the database and the protection of vulnerable people. This Strategy Board paper would be shared with the EG.

Action 9: Kirsty Faulkner to share the NDNAD and Fingerprint Strategy Board paper on safeguarding and protection of vulnerable people with the Ethics Group when prepared.

11.0 Forensic Science Regulator - update

- 11.1 The EG were provided with a written update from the Forensic Science Regulator. Members were invited to submit any comments to the Secretariat.

12.0 Biometric Commissioner update

- 12.1 The EG heard that the Biometrics Commissioner (BC) was finalising his annual report and it was expected that a draft would be circulated to stakeholders at the end of February. The aim was to publish the annual report in March.
- 12.2 The BC was intending to establish a new audit framework for police forces in relation to compliance with PoFA. The new framework would target police forces with a risk based approach and proposals for the framework would be developed over the next year. The requirements that police forces would need to meet would be made available and police forces would be measured against these requirements. The EG queried how the BC would handle non-compliance with PoFA by police forces. It was noted that the BC would write to the Home Office about such non-compliances and the Home Office would be required to publish this information.

13.0 AOB

- 13.1 The date of the next meeting would be 7 June 2017

Annex A

Attendees

Chris Hughes	Chair
Alan Clamp	Member
Nina Hallowell	Member
Kit Harling	Member
Isabel Nisbet	Member
Barbara Prainsack	Member
Jennifer Temkin	Member

Apologies

Adil Akram	Member
June Guinness	Forensic Science Regulation Unit, Home Office
David Latchman	Member
Carole Moore	Member
Paul Wiles	Biometrics Commissioner

In attendance

Emma Burton-Graham	EG Secretary, Home Office
Kirsty Faulkner	National DNA Database Delivery Unit
Gemma Gyles	Biometrics Commissioner's Office
Rod McLean	Crime, Police and Fire Group, Home Office
Linsey Urquhart	Home Office Science Secretariat
Jo Wallace	Head of the Science Secretariat, Home Office

Annex B:**GLOSSARY OF TERMS**

Biometric Information	Information about an individual's physical characteristics such as fingerprints or eye colour, which are distinctive and measureable.
Biometrics Commissioner	Independently appointed post to provide oversight of the regime established by the Protection of Freedoms Act to govern the retention and use by the police in England and Wales of DNA samples, DNA profiles and fingerprints. The post has a UK-wide oversight function as regards their retention and use by the police on national security grounds.
Central Elimination DNA Database (CED)	A centrally held database of DNA profiles taken from individuals who are involved in a role where there is an increased risk that they may inadvertently contaminate a sample taken from a crime scene with their own DNA, such as manufacturing or laboratory staff, crime scene officers and police personnel.
College of Policing	The professional body for policing which operates in the public interest to find the best ways to deliver policing and support for the police service.
Counter Terrorism (CT) DNA Database	A DNA database operated by the Metropolitan Police Service which contains the DNA profiles obtained through searches, crime scenes and arrests in relation to counter terrorism.
Crime Scene Stain	Biological material recovered from the scene of a crime from which DNA may be able to be extracted.
Criminal Justice Sample	A sample of DNA obtained compulsorily from people arrested by the police for a recordable offence under the provisions of the Police and Criminal Evidence Act 1984.
Crown Prosecution Service (CPS)	Established in 1986, it prosecutes criminal cases investigated by the police in England and Wales. It advises police, reviews cases submitted by the police and prepares and presents papers for cases in court.
Custody Images Review (CIR)	Review by the Home Office to consider proportionality of the use and retention of images on a national database.
Dactyloscopy	The method of ridge analysis in human skin (typically fingers and palms). <i>[See also Fingerprints]</i>
Data Linkage	A process which brings together two or more sets of data from different databases, organisations or countries to enhance the information that can be obtained from the data (e.g. by combining different datasets, new patterns may become apparent).
Deoxyribonucleic Acid (DNA)	The chemical in the cells of an organism that carries that organism's heritable material used in the development, functioning and reproduction of all known living

	organisms. DNA is a nucleic acid and consists of two strands coiled around each other to form a DNA double helix. Each DNA strand is composed of smaller units called nucleotides and the sequence of these nucleotides encodes biological information.
DNA Profile	A numerical representation of the characteristics of certain sections of (typically non-coding) DNA obtained following the analysis of a DNA sample which can be uploaded to a database and compared with other DNA profiles.
DNA 17 Profile	A profile produced using the latest system of DNA profiling technology which examines 16 sections of DNA, plus a gender marker to produce a numerical DNA profile that can be loaded onto the National DNA Database. The methodology used creates greater discrimination between profiles than the previous SGM + methodology and reduces the probability of chance matches between individuals.
Elimination DNA sample	A DNA sample taken from an individual and used to create a DNA profile in order for that individual to be eliminated as the source of a sample found at a crime scene. <i>[see also Central Elimination DNA Database]</i>
Epigenetics	This is the study of (partly heritable) changes in gene expression due to external or environmental factors that affect how genes are read, rather than changes in the underlying DNA sequence.
Facial Recognition System	A computer application capable of identifying or verifying a person from a digital image or a video source by comparing selected facial features from the image with those on a facial database.
Familial Searching	Involves searching the database for DNA profiles that do not match fully to a comparison profile, but where an unusually high number of loci match. This could indicate a biological relationship such as parent, child, sibling, cousin, uncle etc.
Fingerprints	The impression left by the epidermal ridges in a human finger. The print consists of a mixture of sweat and skin cells. <i>[See also Dactyloscopy]</i>
Forensic Science Regulator (FSR)	Ensures that the provision of forensic services across the criminal justice system is subject to an appropriate regime of scientific quality standards. The FSR works with the Home Office.
International Standards Organisation (ISO)	Is an independent, non-governmental international organisation. It brings together experts to share knowledge and develop international standards that are voluntary, consensus-based and market relevant.

Low copy number (LCN)	A modified version of DNA profiling that is performed when the amount of DNA recovered from a biological sample is very limited. The number of PCR cycles is increased compared to standard SGM plus, which enhances the sensitivity of the technique and improves the likelihood of detecting DNA.
Random Match Probability	The probability that a DNA profile matches a randomly drawn person from the general population. If the random match probability is high, then any suspected link between the DNA and a person needs to be treated with caution.
Metagenomics	Is the study of the diversity of species in a microbial sample which has been recovered from the environment. It allows the study of all genes in all organisms which are present in a given complex sample.
Mixed DNA Profile	A profile where DNA from more than one individual is present. A mixed DNA profile is evident when more than two copies of DNA are observed at a region. <i>[See also DNA profile]</i>
National Crime Agency	Leads the UK law enforcement's fight to cut serious and organised crime. It has national and international reach and the mandate to work in partnership with other law enforcement organisations to tackle serious and organised criminals.
National DNA Database (NDNAD)	Established in 1995, it is an electronic, centralised database holding the DNA profiles taken from both individuals and crime scenes. The database can be searched to provide police with a match linking an individual to a crime scene and <i>vice versa</i> .
National DNA Database Delivery Unit (NDU)	A department within the Home Office responsible for overseeing the running of the National DNA Database.
National DNA Database Strategy Board (NDNAD SB)	A board comprising representatives from NPCC the Home Office, the DNA Ethics Group and the Forensic Science Regulator as well as representatives from other bodies that provides governance and oversight for the operation of the NDNAD.
National Police Chiefs Council (NPCC)	The NPCC bring together the 43 operationally independent and locally accountable chief constables and their chief officer teams to coordinate national operational policing. They work closely with the College of Policing.
Next Generation Sequencing (NGS) or Massive Parallel Sequencing (MPS)	Terms used to describe a number of high throughput approaches to DNA sequencing that allow the sequencing of DNA much more rapidly and cheaper than previously.

ParaDNA® Instrument	An instrument that can be used at a crime scene and is able to produce a DNA profile from a sample within 75 minutes. ParaDNA® profiles include 5 STRs and a gender test and therefore the discrimination power provided from these profiles are much less than obtained from full SGM+ and DNA17 profiles. [See also <i>Rapid DNA Technology</i>]
Partial DNA Profile	This is the term used to describe a profile when results have been obtained at some but not all of the sections of DNA which were analysed. Partial profiles are often obtained from samples recovered from crime scenes as the DNA may have been subject to conditions which have degraded it, which means that not all regions of DNA of interest are intact.
Phenotype	The physical manifestation of an individual's genotype combined with the effects of exposure to environmental factors (e.g. the hair colour, facial features, or personality traits of a person)
Phenotypic profiling	The use of DNA analysis in order to obtain information about externally visible traits, and/or the likely ethnic background, of a person. The information cannot be obtained from traditional STR profiles but requires a special type of analysis.
Protection of Freedoms Act (PoFA)	An Act of Parliament of the UK which was introduced by the Home Secretary in 2011 and sponsored by the Home Office. In May 2012 the Bill completed its passage through Parliament and received Royal Assent.
Prüm Agreement/ Convention	A convention signed in May 2005 by Austria, Belgium, France, Germany, Luxemburg, the Netherlands and Spain and is open to all members of Europe and enables the signatories to be able to exchange data regarding DNA, fingerprints and vehicle registrations of persons suspected to be co-operating in terrorism, cross-border crime and illegal migration.
Rapid DNA Technology	Technology which has the ability to produce a DNA profile much faster than can be done using conventional technology and is also portable.
S and Marper	This refers to a case where S joined with Marper to bring a case to the European Court of Human Rights after their applications to the English courts had failed. They objected to the retention by the police of their DNA samples, profiles and fingerprints as they had not been convicted of any offence. The police were entitled to retain them under the law then in force. S and Marper relied principally on Section 8 of the European Convention of Human Rights which protects the right to privacy. The Court found in their favour. It held that the margin of appreciation had been exceeded and their right to privacy had been infringed. This decision led eventually to the passing of the Protection of Freedoms

	Act 2012 which changed the law on the retention of samples, profiles and fingerprints. This in turn led to the removal of millions of profiles from the National DNA Database.
Second generation multiplex (SGM, SGM+)	A system of DNA profiling which was used in the UK until July 2014 which examines 10 sections of DNA plus a gender marker to produce a numerical DNA profile that can be loaded onto the National DNA Database. At each of the 10 areas an individual has two copies of DNA, one inherited from each of their parents.
Short Tandem Repeat (STR)	Sections of DNA dispersed within coding and non-coding regions of the human genome that contain hundreds of repeats of a short sequence of DNA (2-6 nucleotides). Different people have different numbers of repeats and when a number of regions are analysed, the chance of two people having the same number of repeats at all loci is small. This is the underlying principle of DNA profiling.
Single Nucleotide Polymorphism (also referred to as SNPs – pronounced “snips”)	This is a variation at the level of single nucleotide bases that occurs at a specific position in a sequence of DNA.
United Kingdom Accreditation Service (UKAS)	Is the national accreditation body for the UK and is recognised by government to assess against internationally agreed standards, organisations that provide certification, testing, inspection and calibration services.
Y-STR profile	See <i>STR profile</i> but restricted to regions found only on the Y-chromosome (which is only present in males).