Welcome. We will start the seminar shortly
Housekeeping

- Teams Live – no hand raising function
- Post questions during session using Q&A function
- Questions will be addressed sequentially
- If you have any problems email:
  - tom.mclarenwebb@advisory.kbrwyle.co.uk
  - Rob.SIMMONDS@devonandcornwall.pnn.police.uk
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1. Welcome

T/ACC Mark Callaghan, Deputy Programme Director, Transforming Forensics
2. Keynote #1

Dr Gillian Tully CBE, Forensic Science Regulator
Cell Site Analysis: Quality Issues

Dr Gillian Tully

Online Seminar
14 October 2020
Outline of Session

Problems to learn from
- Technical / Wording
- Differing court judgments

Guidance and standards to help
- Cellsite Appendix
- Validation approach
- Cognitive bias guidance
- Legal guidance

Next Steps
PROBLEMS TO LEARN FROM
Cell siting is consistent with mobile 079XXXXXXXXX having been nearby Specific Road / Adjacent Close including at, or in the vicinity of, Address of Interest at the times of calls between 21:30 hrs and 21:45 hrs.
Language

■ **Consistent with**

■ **R v. Puaca [2005] EWCA Crim. 300121**

- “Whereas ‘inconsistency’ is often probative, the fact of consistency is quite often of no probative value at all.” Without clarification ‘consistent with’ can easily be misinterpreted by a lay person as meaning ‘is’, because the context or limitations of the finding are unknown. If the data would be expected in a number of considered or expected scenarios, clearly being consistent with one of them is not discriminating or useful.”
Language

On the language of framing conclusions:

“...none of them should ask the question “Is the evidence consistent with this man?” unless, of course, they are asking simply whether he is excluded.”

The Right Hon Lord Hughes of Ombersley
Justice of The Supreme Court
Language, precision and bias

- “vicinity” must be quantitatively defined and not used in a way that might imply a level of precision that is not supportable by the findings

Most likely at the location of interest

..at or in the vicinity of

...most likely at or in the vicinity of
Language, precision and bias

Phone “being at this address”

Phone “has now left this address”

Suspect X “is still in the vicinity of [site]”

Suspect Y “is no longer in the vicinity of Z’s home”
"Cell sitting evidence can be powerful evidence. But it is not capable of locating a phone with pinpoint accuracy and it has other limitations. Those limitations are familiar to all who conduct and try criminal cases in which such evidence is commonly adduced. The limitations are not however necessarily familiar to the members of a jury."

"in the absence of agreement between prosecution and defence, evidence that a cell site was located in a particular place is not evidence that it served the nearby location in which Calland was observed, still less that it provided the best coverage of that location and would therefore be likely to have transmitted the relevant call."
Boundaries of expertise

*R v Calland [2017] EWCA Crim 2308*

“The judge, in our view rightly, foresaw the danger that if the case were presented as the prosecution would wish it to be, the jury would be drawn into making a speculative assumption for which there was no evidential foundation.”

“when questions of this nature arise it is vital to focus upon the actual issues in the case and on the extent to which particular features of the prosecution case are challenged. We certainly do not say that expert evidence will be needed in every case in which the prosecution wish to rely on cell siting evidence.”
Boundaries of expertise

- **R v Turner [2020] EWCA Crim 1241**
  - Could a ‘factual’ analysis of data show that a phone had travelled between two villages, separated by 7km?
    - “That was, in substance, neither expert evidence nor evidence of coverage.”
  - “I just show the mast on my maps in relation to the home address. So it’s up to yourselves to kind of draw that conclusion”

- Only if the cell at the start of the sequence of calls only served in one village (and nowhere else) and likewise the last cell in the sequence only served in the second village?

- Can lay jurors be expected to understand that a cell might be based on a close mast but pointed away from the address and as a result not serve there, or a cell based on a different mast might dominate service at the address to the exclusion of other cells?
Boundaries of expertise

- **What are the key issues in the case?**
  - Active case management: all parties have duty to assist

- **Is inference/opinion required in order to assist with those key issues?**
  - Appropriate case strategy

- **Does every report sufficiently clearly show:**
  - The limitations of what has been done?
  - Any margins of uncertainty?
  - The extent to which an inference has been reached from the findings, or the extent to which an inference is required to address the key issues?
GUIDANCE AND STANDARDS TO HELP
Codes of Practice and Conduct Appendix: Cell Site Analysis

- Request and/or normalise call data records
- Present/Report
- Radio frequency (RF) propagation survey
- Cell site analysis
  - acquisition of communications data
  - processing
  - presentation of an expert report.

www.gov.uk/government/publications/cell-site-analysis
Codes of Practice and Conduct Appendix: Cell Site Analysis

Independence, impartiality & integrity

- All providers are required to demonstrate that they meet these requirements which shall include:
  - While cell site analysis may be used to propose investigative avenues (i.e. to help form a hypothesis). If a hypothesis is formed, cell site evidence should only be used to test whether that hypothesis is supported by the evidence; it should never be used to test whether the hypothesis supports the allegations or scenarios being put forward in the case independently of the evidence.
  - Terminology used in reports shall be clearly defined and imply no bias, phrases such as “in the vicinity of” may only be used if qualified, phrases such a ‘consistent with’ should not be used in reports unless it is clear what else this result would be consistent with.
Setting forensic strategy:

- The procedure shall include the following.
  - Case circumstances;
  - The data available (Call Data Records, cell information etc.);
  - The limitations of that data.
  - The suspect’s personal situation (e.g. place of work, home address);
  - Known or suspected attribution of phones (and how attributed);
  - Survey requirements:
    - Location survey (including potential requirements for elevation, e.g. high floors in tower blocks).
    - Area survey, to distinguish whether service between two or more locations can be differentiated.
    - Cell Mapping, to measure the service area of a given cell.

The customer must be made aware of limitations.
Validation is about providing objective evidence that the method is fit-for-purpose.

Currently a pilot validation exercise running using GTD.
Reports to investigators or to courts produced from cell site analysis and radio frequency propagation surveys may be:

- Factual, produced by technical staff acting as witnesses; or
- Evaluative, including an interpretation and/or opinion by staff competent to provide expert evidence.

Providers shall ensure that all staff who provide factual evidence based on scientific methodology are additionally able to demonstrate, if required the following:

- Whether there is a body of specialised literature relating to the field;
- That the principles, techniques and assumptions they have relied on are valid; and
- The impact that the uncertainty of measurement associated with the application of a given method could have on any conclusion.
Cognitive bias

- Subconscious, not deliberate malpractice
- Can’t avoid risk just by trying hard
  - Process design, e.g.
    - Controlling task-irrelevant data flow
    - Blind checks
Legal obligations on experts

  - Crim PR
  - Crim PD
  - Case law
Forensic Science Regulator

Guidance

Expert Report Guidance
FSR-G-200
Issue 4

In development...

- Before doing anything, conduct a pre-assessment
- After analysis, evaluate of the observations given each of two mutually exclusive propositions
- So what is the probability of observing these call data records and these survey results:
  - IF the prosecution proposition (Hp) is true?
  - IF the defence proposition (Hd) is true?
- LR is simply the ratio of these probabilities
Evaluating the probability of obtaining your set of results under $H_p$ and $H_d$ helps to achieve balance and satisfies logic.

Validation ensures robustness.

Requirements in the appendix to ensure transparency.
Illegitimately transposing the conditional

- People have a tendency to assume that a conditional probability and its inverse are similar:
  - The probability of a sheep having 4 legs is very high
  - Because this animal has 4 legs, it has a very high probability of being a sheep
Illegitimately transposing the conditional

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Illegitimately transposing the conditional

- People have a tendency to assume that a conditional probability and its inverse are similar:
  - The probability of a sheep having 4 legs is very high
  - Because this animal has 4 legs, it has a very high probability of being a sheep

- The probability of your observations given a particular proposition is NOT the same as the probability of that proposition.

- To swap them is called illegitimately transposing the conditional, e.g. “it is likely that the phone was in area X”

We should always be sure to be talking about the probability of our observations (findings/results) IF the proposition is true: e.g. the findings are more likely if the phone was in area X than if it was not.
NEXT STEPS
Pilot accreditation

- Pilot using Cell Site Appendix to the Codes
- We have supplied ground truth data to assist with validation
- The outcomes will inform any changes needed to the appendix and confirm if ISO 17025 is an appropriate standard for assuring the quality of cell site analysis work

At that stage, a decision will be taken about the standard and a date by which it should be achieved. This will be reflected in the Codes.

Accreditation is only the external assessment to demonstrate that an organisation is compliant with the standard and is in control of its own quality.
Quality Standards

Really think about the requirements – never just tick boxes

Don’t work around procedures, change them if they don’t work

Don’t leave it to the last minute: good guidance already in place
Questions/Comments in the panel session

With thanks to:

The Forensic Science Regulation Unit,
in particular, Simon Iveson
3. Keynote #2

Matt Tart, Principal Expert, CCL Forensics
Cell Site Analysis: Roles and Interpretation

Matthew Tart
Principal Expert
Process – Technical Procedure Driven

“I did this…”

Purpose directly defined by customer request

Define and Perform Technical Processes

CIR Normalisation

Perform Surveys

Cross reference CDRs and Survey Results

Produce Map and Table Exhibits

Court Presentation (if required)

Report and/or statement based on Maps and Exhibits

“This means…”

Expert Witness Role

If an expert is appointed

Analyst Role:

Technical processes
Interpretation - 1
Explaining a technical Term – e.g. Normalising Call Data Records

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[in the period of the offence the phone] “used cell 300374 1069 in the Aston area of Birmingham”
“Cell ID 1069 is a serving cell at [the scene]”
Interpretation - 3
Interpreting the data to provide possible explanations for it

[during the period of the offence the phone]
“used cell 300374 1069 in the Aston area of Birmingham”

“Cell ID 1069 is a serving cell at [the scene]”

“.... The data ...is consistent with ... having been in the Aston area of Birmingham ... at or in the area of [the scene]...”

APPARENT PROBATIVE VALUE
Interpretation - 4

Forensic Inference –
Interpreting the results in the light of hypotheses

• The location of the phone is not in the records
• Any assessment of where it was at the time of the call event is inference....
  ....implication...?
  • How safe is that inference?
  • What are the uncertainties in source data?
  • What are the uncertainties in the processes used to analyse that data?
  • How discriminating is the inference drawn?
  • How should all of that uncertainty be assessed and expressed?
• What question is being addressed?
  – Is it appropriate?
  – Was it answered?
## Uncertainties – Technical Interpretation - CDRs

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Uncertainties – Technical Interpretation - Surveys

- What assurance can there be that all of the legitimately serving cells at a location have been selected?
  - Validation of the method, both the equipment and the manner in which it is used
  - Assessment of uncertainty – false positives, false negatives
- Validation helps inform what opinions can, and cannot, be safely expressed from the data
A survey is a sampling method, and there is uncertainty in the results. It is unlikely to be “the whole truth.”

Opinion of which cells serve at a location, or the service area of a given cell, is informed by the survey data and not defined by it. Other views may be formed, even from the same data.
What cells were detected at the locations of interest, and do they occur in the CDRs?
- Known to be flawed, errors of omission, tendency to mislead

Question defined in terms of a technical process. Is this even a reasonable question to address?

A more useful question is:
Would the call data be expected given the scenario:
- Proposed by the Prosecution
- Proposed by the Defence

How discriminating are the findings?
“Phone A used Cell ID 1069 during the period of the offence”

“Cell ID 1069 was detected as a serving cell at the scene”

“The data …is consistent with … having been in the Aston area of Birmingham … at or in the area of [The Scene]”

**APPARENT PROBATIVE VALUE**
A more appropriate question

Evaluative inference

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<td>Reynolds House</td>
<td>08/03/2011</td>
<td>21:45:03</td>
</tr>
</tbody>
</table>

Would the call data be expected if the phone was:

- at the scene, as alleged by the Prosecution
- at the alibi location, as alleged by the Defence

Does the service area of Cell ID 1069 include the scene and/or the alibi location?
- i.e. can we distinguish between the locations, and if so with what assurance?
Cell ID 1069 was the most commonly used cell in the CDR. The second most common was Cell ID 8c99 also detected in the surveys serving a similar area of Aston, and beyond. Two thirds of all calls were handled by one cell or the other, other cells used much less often.

“Phone A used Cell ID 1069 during the period of the offence”
“Cell ID 1069 was detected as a serving cell at the scene”
“....and at the alibi location”
"Consistent with being..at or in the vicinity of the scene... in the Aston area of Birmingham"

"Consistent with" being:

...At the Scene.... And at the alibi location....
...In Aston... and 17km from Aston...
...In the area in which the phone is most often used.... whatever that area may be

"‘consistency’ is quite often of no probative value at all..” [R v Puaca]
“...half a mile away is not in normal English at the place, and you could have explained that” [R v Brookes]
“...unhelpfully conflated the location of a particular mast with the question of what safe inferences can be drawn about the telephone using it” [R v Calland]
**False Negatives**

<table>
<thead>
<tr>
<th>LOI</th>
<th>Location Name</th>
<th>Address</th>
<th>Post Code</th>
<th>Significance</th>
<th>T-Mobile GSM (2G) (NC 30)</th>
<th>Cell ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Barton Arms PH</td>
<td></td>
<td></td>
<td>Crime Scene</td>
<td>1069</td>
<td>8c99</td>
</tr>
<tr>
<td>6</td>
<td>Hanover Close</td>
<td></td>
<td>B6 SES</td>
<td>Home Address</td>
<td></td>
<td>8c97</td>
</tr>
</tbody>
</table>

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One cell detected as serving at the home address using **method #1**
Four cells detected serving using **method #2**

...Should this affect how the survey results are interpreted?  
...Are they “factual”, to be taken at face value?

What if the phone had used 8c99 instead of 1069?  
...8c99 was the second most commonly used cell, after 1069....
Reliability of evidence

“Consistent with being...at or in the vicinity of the scene... in the Aston area of Birmingham”

**Balanced?** — The expert should address at least one pair of propositions usually one based upon the prosecution issue and one based upon an alternative (defence issue). If a reasonable alternative cannot be identified then the expert may address only the one proposition but will make it clear that he cannot evaluate the strength of the evidence.

**Logical?** — The expert will address the probability of the evidence given the proposition and relevant background information and not the probability of the proposition given the evidence and background information.

**Robust?** — The expert will provide opinion that is capable of scrutiny by other experts and cross-examination. They will base their opinion upon sound knowledge of the evidence type(s) and use wherever possible verified databases. They will be satisfied that the results of the tests and examinations upon which they have based their opinion are themselves robust.

**Transparent?** — The expert will be able to demonstrate how they came to their conclusion. They will set out in the statement or report the basis of their opinion viz.:
- Hypotheses addressed.
- Test or examination results.
  - The background information used in arriving at the conclusion.
  - They will be able, if required, to provide the data used and its provenance.
Forensic Environment - Court

Roles

Investigative Mode
• Produces theories in terms of likely explanations of data
• Assists investigation
• Offence focus (may not even have suspects yet)
• Iterative process
• Ranks likely explanations to refine theories (probability of scenarios given evidence)
• Risk of misleading

Evaluative Mode
• Assists court process
• Defendant focus
• Assesses data in the context of presented scenarios (probability of evidence given scenarios)
Forensic Environment
Hierarchy of Propositions

How to start to define a question....

Offence
• Did the accused commit the offence?  

LEGAL QUESTION - JURY

Activity
• Would the data be expected given the suspect undertook specific actions? (those actions are usually related to the offence)

Source
• Does A match B?
  • How sure are we of that?
  • How discriminating is that match?
AFSP Standard applied to Cell Site

“I did this…”

“This means…”
Thank You
## Skills, Knowledge, Understanding

<table>
<thead>
<tr>
<th>Skill</th>
<th>Knowledge</th>
<th>Understanding</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fact</strong></td>
<td>Explanation of terms</td>
<td><strong>Technically Interpreted</strong></td>
</tr>
<tr>
<td></td>
<td>Presentation of data that</td>
<td>Technical explanation of Data or</td>
</tr>
<tr>
<td></td>
<td>requires no inference</td>
<td>Process</td>
</tr>
<tr>
<td></td>
<td><strong>Opinion</strong></td>
<td>Assessing what the data/ results</td>
</tr>
<tr>
<td></td>
<td></td>
<td>mean in the context of prosecution</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and/ or defence scenarios</td>
</tr>
</tbody>
</table>

### Analyst

- None
- Lower Risk: Risk of inaccurate/incomplete/misleading evidence if not possessing appropriate Knowledge and Understanding
- High Risk: Effect of case circumstances on output

### Expert Witness

- High Risk: Effect of case circumstances on output
4. Q&A

- Dr Gillian Tully CBE, Forensic Science Regulator
- Matt Tart, Principal Expert, CCL Forensics
- Neil Matthews, Technical Support Manager, East Midlands Special Operations Unit
- Jim Arris, East Midlands Special Operations Unit
- John Beckwith, Digital Forensic Science Capability Lead, TF
- Kevin Sullivan, Standards and Accreditation Subject Matter Expert, TF
- Paula Mulroy, Training and Competence Manager, FCN
5. Closing remarks

T/ACC Mark Callaghan, Deputy Programme Director, Transforming Forensics
www.fcn.police.uk

https://knowledgehub.group/group/fcn
https://knowledgehub.group/group/transforming-forensics