

WMP Briefing Paper

Force Contact Demand Forecasting

Ethics Committee (03 Nov 2021)

This project is at the proposal stage and is presented to the committee 'in principle' so that any immediate concerns can be raised.

The finer details of the methodology, exact data to be used and mode of communicating the results will not be determined until after the exploratory data analysis (EDA) phase has been undertaken.

Once the analyses have been completed the project will be presented to the Committee again so that the data used, methodology, findings, intention for deployment and communication plans can be examined in more detail.

Legal opinion and a Data Protection Impact Assessment (DPIA) have been sought.

Tasking

This project was requested by Chief Superintendent Richard Fisher in September to support the *Act with Precision* strand of the Force Strategy.¹

Purpose

The purpose of the project is to develop a forecasting tool of demand for Force Contact (FC) services covering 999 and 101 calls as well as Live Chat. The forecasts would be for a week in advance and cover calls coming in, handling times and the number of calls abandoned. Working patterns should also be taken into account (number of breaks, shift patterns, planned leave, etc.).

Context

Nationally, there has been an increase in calls for service since the lifting of Covid-19 restrictions. The National Police Chiefs' Council (NPCC) stated in July that the volume of 999 emergency calls was regularly as high as usually seen on New Year's Eve.²

West Midlands Police (WMP) has experienced an increase in calls for service in line with the national trend. Calls for service have regularly passed 6,000 records a day via a combination of:

- 999 emergency calls
- 101 non-emergency calls
- Live Chat, the on-line web service

¹ Force Strategy *This Work Matters*: https://www.west-midlands.police.uk/flysystem/public-sync/inline-files/This_work_matters_0.pdf

² NPCC 'Demands on 999 hitting New Year's Eve levels every day' <https://news.npcc.police.uk/releases/public-urged-to-use-999-system-responsibly>

In July 2021, the Force received 77,276 calls, almost 2500 more than the previous highest month on record (July 2018).³

Emergency 999 calls are prioritised and call handling staff are dynamically moved to maintain this principle. The recent unprecedented demand resulted in a reduction in service levels, with call waiting times for 999 increasing from an average of 10 seconds to 25 seconds. At the same time the impact on service levels for 101 meant that call waiting times increased from an average of 5 minutes to over 13 minutes. These increases result in more abandoned calls which creates additional demand and service recovery requirements. To manage this level of demand additional resources were temporarily deployed to FC from other departments during the summer.

The efficiency of the FC function is of the utmost importance to the service provided by WMP to the public. The department consistently resolves 75% of all demand into the Force. In recent years the service has been modernised with the introduction of Live Chat in 2018, which now deals with 41% of non-emergency demand, reducing the pressure on 101 call handlers. In addition, during active hours the automated chatbot deflects 30% of Live Chat demand away from call handlers.

Intended activity resulting from the project

Whilst FC has made significant changes to improve the contact options available to the public and to ensure that those who require an emergency response receive the best service, recent levels of demand have demonstrated that the department needs to be able to predict demand levels and understand the extent to which it can flex staffing levels.

This analysis will enable the department to deal with demand more efficiently, prioritise the service to the 999 emergency channel and better manage risk and vulnerability by supporting decision making capabilities in respect of resource planning.

In addition, it will assist with planning for other essential staff developmental activities such as briefing sessions, training and individual staff and supervisor discussions, without impacting service levels at critical periods.

There are third party tools on the market which offer a solution to this issue, however, if the DAL can develop a tool in-house this will reduce costs and allow for future development of the tool.

³ Strategic Police and Crime Board (SPCB) 28/09/2021: Agenda Item 5 Crime and Performance <https://www.westmidlands-pcc.gov.uk/strategic-policing-and-crime-board/agendas-minutes-reports/>

Data

Data to be used:

Data relating to the following:

- Control works (calls)
- Live Chat (echat)

Level of analysis:

Individual

Individuals aggregated?

Yes

The data would relate to calls rather than individuals *per se*.

Reliability of data:

The data are sourced from WMP systems which are used as part of daily business.

An extensive exploratory data analysis (EDA) phase will be undertaken to examine the extent of any data quality issues, including processes to identify the presences of any bias, to ensure that no bias is built into the models.

Discussions with subject matter experts (SMEs) will be undertaken both to capture any extraneous requirements and to sense check the analyses.

Sample or entirety:

Entirety

Type of analysis:

Exploratory

Explanatory

Predictive

Optimisation

Proposed methodology:

Not currently known (likely to be multivariate time series)

Will the project eventually be automated:

Yes

No

Means of evaluation:

If the tool proves useful, it would be employed by WMP FC for resource planning purposes.

ALGO-CARE considerations

As this project is at the proposal stage and is presented to the committee 'in principle' in order that any immediate concerns can be raised, the finer details of the methodology will not be determined until after the EDA. Once the analyses have been completed the projects will be presented to the Committee again so that findings and methodology can be examined in more detail.

Advisory	
If applicable, are the outputs from the algorithm to be used in an advisory capacity?	The outputs would be used by FC for resource planning purposes on an on-going basis.
Does a human officer retain decision-making discretion?	Yes – resources and their uses would be decided upon by FC.
Lawful	
What is the policing purpose justifying the use of the algorithm (means and ends)?	This project supports the Force Strategy and the <i>Precision Policing Doctrine</i> by ensuring that resourcing decisions are based on data and evidence. The intention is to help maximise resource use within FC and ensure that an excellent service can be maintained.
Is the potential interference with the privacy of individuals necessary and proportionate for legitimate policing purposes?	The objective will be to forecast the aggregate number of calls / visits rather than to assess any details of them so the privacy of the public would not be interfered with. Whilst the structure of shifts and breaks of FC staff / officers would need to be understood, this would also be at an aggregate level and the privacy of these individuals would not be eroded.
In what way will the tool improve the current system and is this demonstrable?	There is no current tool in operation. FC have looked at a third party provider, so if this project can be developed with a 'good' degree of accuracy, then WMP would be able to save expenditure.
Are the data processed by the algorithm lawfully obtained, processed and retained, according to a genuine necessity with a rational connection to a policing aim?	The data used would be gathered from the day-to-day operations and systems of WMP in relation to the receipt of emergency and other calls / enquiries and as such are collected in the appropriate manner for the appropriate purposes.

Is the operation of the tool compliant with national guidance?	The analyses proposed would accord with the DCMS Data Ethics Framework 2018. ⁴
Granularity	
Does the algorithm make suggestions at a sufficient level of detail given its purpose and the nature of the data processed?	The resulting analyses will provide information about the likely volume of calls and visits received by FC. The project would aim to provide forecasts at a level of detail to prove useful for their resource planning purposes.
Are data categorised to avoid broad-brush grouping and results and therefore issues of potential bias?	Calls coming into FC are already categorised and this would be retained of the purposes of this project. There will be an extensive EDA phase which will include an assessment of any biases.
Do the potential benefits outweigh any data quality uncertainties or gaps?	An ability to undertake effective resource planning and organisation would prove of great benefit to FC and ultimately the public. Any gaps or deficiencies in the data would be examined and assessed so that the output would be capable of producing the benefits.
Is the provenance and quality of the data sufficiently sound?	The data have been gathered during the day-to-day calls and website visits into WMP and will enable analyses of the type envisioned for this project.
If applicable, how often are the data to be refreshed?	Weekly / daily (the data are updated every 6 hours with a smaller, core, dataset updated every 15 minutes).
If the tool takes a precautionary approach in setting trade-offs, what are the justifications for the approach taken?	Not yet known (to be examined during the development of the project).
Ownership	
Who owns the algorithm and the data analysed?	WMP owns the data and any resulting models.
Does WMP need rights to access, use and amend the source code and data?	No.
Are there any contractual or other restrictions which	No.

⁴ <https://www.gov.uk/government/publications/data-ethics-framework/data-ethics-framework>

might limit accountability or evaluation?	
How is the operation of the algorithm kept secure?	The data and the analyses are contained wholly within the WMP Hadoop system and the security measures employed therein.
Challenge:	
What are the post-implementation oversight and audit mechanisms, e.g. to identify any bias?	Tests for accuracy and any biases would form an on-going element of the output if it continues to productionisation.
If the algorithm is to inform criminal justice disposals, how are individuals notified of its use?	N/A
Does the specification of the algorithm match the policing aim and decision policy?	
	The research question matches the policing aim and is aimed at supporting the <i>Precision Policing Doctrine</i> . The nature of the analyses used will be determined to be the best means of addressing the research question.
Can the accuracy of the algorithm be validated periodically?	This would form an on-going element of the output if it progresses to productionisation.
Can the percentage of false positives / negatives be justified?	Not yet known, however any model developed would aim to minimise estimation errors.
How was the method chosen as opposed to other available methods?	Yet to be determined.
What are the (potential) consequences of inaccurate forecasts?	Potential consequences could be underutilised resources (if overestimate) or over-stretched resources (if underestimate).
Does this represent an acceptable risk?	Given the potential benefits arising from good resource planning and the aim to minimise prediction errors it is likely that any risk arising from the use of forecasts would be low.
How are the results checked for accuracy and how is historic accuracy fed back into the algorithm for the future?	Not yet known in detail, but forecasts would be regularly checked for accuracy (as part of the on-going productionised process) to identify if there is accuracy drift, etc.
How would inaccurate or out-of-date data affect the	If data were to be wholly inaccurate then the analyses would essentially provide inapplicable

result?	findings. The Lab will seek to minimise this potential through a thorough analysis of the data in an extended EDA phase including their pitfalls, issues and overall nature. Discussions with SMEs should also highlight effects that may arise due to erroneous data.
Responsible	
Would the operation of the algorithm be considered fair?	The analyses will be fair in that each data point will be considered on its own merits.
Is the use of the algorithm transparent (taking account of the context of its use), accountable and placed under review?	The use of the outputs will be transparent and made accountable via review being part of the productionised process.
Would it be considered to be used in the public interest and to be ethical?	The efficiency of the FC function is of the utmost importance to the service provided by WMP to the public (the minimisation of wait times for calls or live chat communications would be highly beneficial).
Explainable	
Is information available about the algorithm / decision-making rules and the impact of each feature?	This will be assessed (and presented) as the project moves forward.

Appendix 1: Glossary of Terms

WMP / Law Enforcement Terminology	
DAL	Data Analytics Lab
DPIA	Data Protection Impact Assessment
DPO	Data Protection Officer
FC	Force Contact
SME	Subject Matter Expert
WMP	West Midlands Police

Data Science Terminology	
ALGO-CARE	All projects have used the ALGO-CARE to consider ethical implications: Advisory, Lawful, Granularity, Ownership, Challenge, Accuracy, Responsible, Explainable
DCMS	Department for Digital, Culture, Media and Sport – developed the Data Science Ethical Framework.
EDA	Exploratory Data Analysis
Productionise	To 'productionise' means that once we are satisfied that the model works well, we would automate the process of providing predictions on a regular recurring basis.