WMP Briefing Paper

Force Response / Contact Service Ratios

Ethics Committee (06 July 2022)

Due to operational demands, this project has not been presented to the Committee 'in principle'. This briefing paper outlines the broad intention of the request to assist with reaching a legal opinion.

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

The Data Protection Impact Assessment (DPIA) is being reviewed by the Force Data Protection Officer (DPO).

Tasking

This project was requested by Chief Superintendent Andrew Hill in February 2022. The request is to redevelop the Service Ratios used by Force Contact to understand the likely number of incidents that will need attending on any day /shift against the number of deployable Response units available.

Purpose

The purpose of this project is to enable Force Contact to project when they are likely to be unable to deploy a resource to all incidents that require attendance using only Response Units. This knowledge will assist with future planning for times when additional support might be required from other departments such as Neighbourhood Policing.

Context

Force Response attend incidents which have been graded P1, P2 or P3 according to an assessment of the level of threat, risk and harm they pose. Recently, an additional grade of T3 has also been included for a 'telephone response'.

For some years, Force Contact Service Delivery Officers (SDO) have used an excel based tool known as the 'Service Ratio' to assess the likely number of P1 – P3 incidents that would occur on a particular day, plus any un-resourced incidents from previous shifts, against the actual number of deployable units on duty for the current shift. The tool is used at the start of each tour of duty to make resourcing decisions and to understand when a 'tipping point' might be reached which signals that additional resources from other departments will be required to assist with front-end demand management. The tool was last refreshed in 2019 by the Performance Team, using the tools and expertise available.

The continuing increase in demand for service has led to a requirement for a more sophisticated understanding of the demand profile and how best to optimise the resource available and therefore the

intention of this request is to utilise the expertise and advanced statistical tools available in the Data Analytics Lab (DAL).

Intended activity resulting from the project

The intention is that this analysis will form part of a wider project to enable the Force Executive Team (FET) and Operations Portfolio to make decisions about the level of resource required in Force Response and how this changes according to temporal variations; as well as determining the level of service expected from the department.

The intended output is a Business Insight (Qlik) dashboard which could be accessed by users and which can be updated on a regular basis.

Data

Data to be used:

- Incident data (ControlWorks)
- Resourcing data (MyTime data)

Level of analysis:

☑ Individual
Individuals aggregated?
☑ Yes. Officer data will be understood as deployable units.
☑ Specific Area:
☑ Neighbourhood Policing Unit (NPU)
☑ West Midlands

Reliability of data:

The data are sourced from WMP systems 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 model.

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:

Essentially this will involve assessing the number incidents coming in during a shift (including banded shifts), assessing the number of resources available (both NPU and Force Response) and calculating the relevant ratios but for each season → month → week of year.

1. Examine demand (calls for service / incidents) over past years (Control works), by priority, season, month and week of year.
2. Compare to dispatch / availability data.
3. Calculate ratios (from season down to week of year number).
4. Develop Qlik app to display the data (and be capable of updating)
5. Following the above (i.e. as a second element), undertake forecasts at the monthly / weekly level of the following year's likely demand and assess against the ratios calculated in (3) to assess the potential degree of disagreement (over / under provision).

Will the project eventually be automated:

☑ Yes

Means of evaluation:

Any model which is to be developed and productionised, checks will be made as to its accuracy on an on-going basis and sense checked with subject matter experts.

ALGO-CARE considerations

Due to operational pressures, this project has not been presented to the Committee in principle. The analysis is close to completion and will be presented to the Committee again so that findings and methodology can be examined in detail.

Advisory	
If applicable, are the outputs from the algorithm to be used in an advisory capacity?	The output would be a dashboard for use by the Operations Portfolio (Force Contact and Force Response) to make resourcing decisions in combination with other information. The information will be used in an advisory capacity.
Does a human officer retain decision-making discretion?	Yes, the Service Ratio will be one strand of information taken into account in decision making processes at both strategic and operational levels.
Lawful	
What is the policing purpose justifying the use of the algorithm (means and ends)?	This project supports the Force Strategy and the *Precision Policing Doctrine* by ensuring that resourcing decisions are based on data and evidence. The intention is to enable departments to plan the allocation of resources effectively according to seasonal demands which can be predicted.
Is the potential interference with the privacy of individuals necessary and proportionate for legitimate policing purposes?	There will be no interference with the privacy of individuals since the analysis will only seek to aggregate incident data at NPU level (essentially Local Authority). Data relating to officers will be aggregated to understand them as deployable units using a call sign.
In what way will the tool improve the current system and is this demonstrable?	The current methodology is out of date and was developed at a time when the Force did not have access to the tools and expertise now available in the DAL. This analysis will be more sophisticated and able to deal with data issues such as those caused by the impact of CoVID lockdowns on 'normal' patterns of demand.
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 are gathered from day-to-day operations and systems of WMP where crimes are recorded. As such the data 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 Government Digital Service Data Ethics Framework 2020.[1]
Granularity	
Does the algorithm make suggestions at a sufficient level of detail given its purpose and the nature of the data processed?	The Service Ratios will be provided at a granular level (week of year) to assist with resource planning.
Are data categorised to avoid broad-brush grouping and results and therefore issues of potential bias?	Some categorisation may take place in forming the features of the modelling, however, the details will become apparent during the analyses which will check for any potential bias.
Do the potential benefits outweigh any data quality uncertainties or gaps?	The project will include an extensive EDA element and this should highlight areas of heightened uncertainty in the data or where particular gaps exist. The intention is that the analysis will enable the Force to make the best resourcing decisions.
Is the provenance and quality of the data sufficiently sound?	The data have been gathered during the day-to-day work of WMP and will enable analyses of the type envisioned for this project.
If applicable, how often are the data to be refreshed?	To be agreed with customer. Historically the Service Ratio tool has been updated daily.
If the tool takes a precautionary approach in setting trade-offs, what are the justifications for the approach taken?	Any model developed would aim to maximise accuracy (measured by the RMSE / MAPE) as possible. This approach would mean that we could best allocate WMP resources.
Ownership	
Who owns the algorithm and the data analysed?	WMP own the algorithm and data.
Does WMP need rights to access, use and amend the source code and data?	No

[1] https://www.gov.uk/government/publications/data-ethics-framework

Are there any contractual or other restrictions which might limit accountability or evaluation?	No
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?	Any model which is to be developed and productionised, checks will be made as to its accuracy on an on-going basis and sense checked with subject matter experts.
If the algorithm is to inform criminal justice disposals, how are individuals notified of its use?	Not applicable
Accuracy	
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 *Precision Policing Doctrine*. 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?	The productionisation of any model resulting from the project would include checking its accuracy on an on-going basis.
Can the percentage of false positives / negatives be justified?	Not yet known, but the previous Service Ratio tool used by Force Contact was a much less mature model than that proposed here. Note that being time series, the appropriate measure of forecast accuracy would be RMSE / MAE / MAPE, etc.
How was the method chosen as opposed to other available methods?	The method will be chosen once discussions have taken place with SMEs and the EDA has been undertaken.
What are the (potential) consequences of inaccurate forecasts?	The gap between demand and resource could be under or overestimated and resourcing decisions made on that basis.
Does this represent an acceptable risk?	The output of the Service Ratio will be used alongside the experience of senior leaders and practitioners within the Force who will be able to mitigate against obvious inaccuracies.

How are the results checked for accuracy and how is historic accuracy fed back into the algorithm for the future?	The model will be reviewed and amended as necessary as part of ongoing updates.
How would inaccurate or out-of-date data affect the result?	If data were to be wholly inaccurate then the analyses would essentially provide inapplicable findings. The Lab has sought to minimise this potential through a thorough analysis of the data and their pitfalls, issues and overall nature; through discussions with SMEs.
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?	Yes. It will be developed with the end users who have considerable experience in this area of business and will be able to challenge discrepancies. The Service Ratio will be updated regularly – frequency to be agreed.
Would it be considered to be used in the public interest and to be ethical?	The information provided will assist the Force in making resourcing decisions for Force Response and potentially supporting departments such as NPUs. This will ensure that the right resources are being used at the right time and in the right place, offering best value for money to the public.
Explainable	
Is information available about the algorithm / decision-making rules and the impact of each feature?	A technical report will be produced which will include information about the methods used and assumptions made.

Appendix 1: Glossary of Terms

WMP / Law Enforcement Terminology	
DAL	Data Analytics Lab
DPIA	Data Protection Impact Assessment
DPO	Data Protection Officer
FET	Force Executive Team
NPU	Neighbourhood Policing Unit
SDO	Service Delivery Officers
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
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 at a frequency to be agreed.