WMP Briefing Paper

Long-term Forecasting of Serious Violence

Ethics Committee (14 Dec 2020)

> This project is at the proposal stage and is presented to the Committee 'in principle' so that any immediate concerns can be raised.
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> 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.
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> Once the analysis has been completed the project will be presented to the Committee again so that the data used, methodology, findings, intention for deployment and communication strategy can be examined in more detail.

Tasking

This project was requested by the Senior Responsible Officer (SRO) for Project Guardian (Superintendent Gareth Morris) and the Director of the West Midlands Violence Reduction Unit (VRU) (Clare Gollop).

The VRU is a collaboration of specialists from local government, health, education, police, and criminal justice who work alongside partner organisations and communities and whose remit is to reduce serious violence.

Project Guardian is the West Midlands Police (WMP) team aligned to the VRU. Both receive funding from the Home Office and the Office of the Police and Crime Commissioner (OPCC).

Purpose

The purpose of this project is to provide long-term forecasts of serious violence (between one and five years in advance).

The analysis has been requested to provide an evidence base to aid strategic decisions about the prioritisation of investment from the Home Office and the OPCC in order to reduce violence in the West Midlands.

This project is complemented by the Knife Crime forecasting project also being submitted to the Committee in December 2020, as well as the shorter term predictive work presented earlier this year.

Context

The VRU Strategic Needs Assessment[1] states that in the West Midlands:

> Violence of all types is high compared to other parts of the country and some kinds, such as knife crime, are showing worryingly steep increases in recent years. In 2019, the West Midlands experienced the biggest annual increase in knife crime of any area in England – up 17% on 2018.

Reducing violence is a Force priority and therefore WMP is a committed partner in the VRU which promotes an evidence-based, public health approach to violence reduction[2]. Project Guardian also supports the Force's ambition to *Act with Precision* (*Figure 1*), which means responding to identified threat and risk by deploying the right people, in the right place, at the right time.

Whilst intelligence analysts have traditionally identified where violent crime hotspots have occurred historically, they do not have the tools or expertise to forecast the likely volume or locations of offending in the future. Currently, resourcing decisions are based on analysis of historic crime data.

The purpose of this project is to build a model which can provide predictions to assist strategic decision making and would most likely provide estimates of the total levels of serious violent crime over time and possibly identify broad locations, for example at the level of Neighbourhood Policing Units (NPU).

This project will test the accuracy of our current assumptions about where violence is likely to occur and provide a sound evidence base for long-term investment of resources by the VRU and Project Guardian. This supports the precision policing model and by sharing the findings with partners in the VRU the Force intends to develop innovative ways of collaborating with partners to tackle complex issues and to build trust with communities (*Figure 1*).

It is recognised that policing often responds to symptoms of complex social issues. This often mirrors the inequality within society. This can manifest as certain communities and areas subject to higher rates of representation within the criminal justice system or within proactive policing methods like stop and search.

In order to direct intervention work where it is most needed, we need to develop data sets to help identify where partners, the Violence Reduction Unit and educational establishments can best assist. By addressing issues through early intervention and support at the earliest stage we hope to reduce the chance of people becoming perpetrators or victims of violence and in turn reduce the risk of certain communities becoming focal points for responsive police tactics.

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[1] West Midlands Violence Reduction Unit Strategic Needs Assessment April 2020 https://westmidlands-vru.org/data-insights/strategic-needs-assessment/
[2] West Midlands Violence Reduction Unit https://westmidlands-vru.org/about/
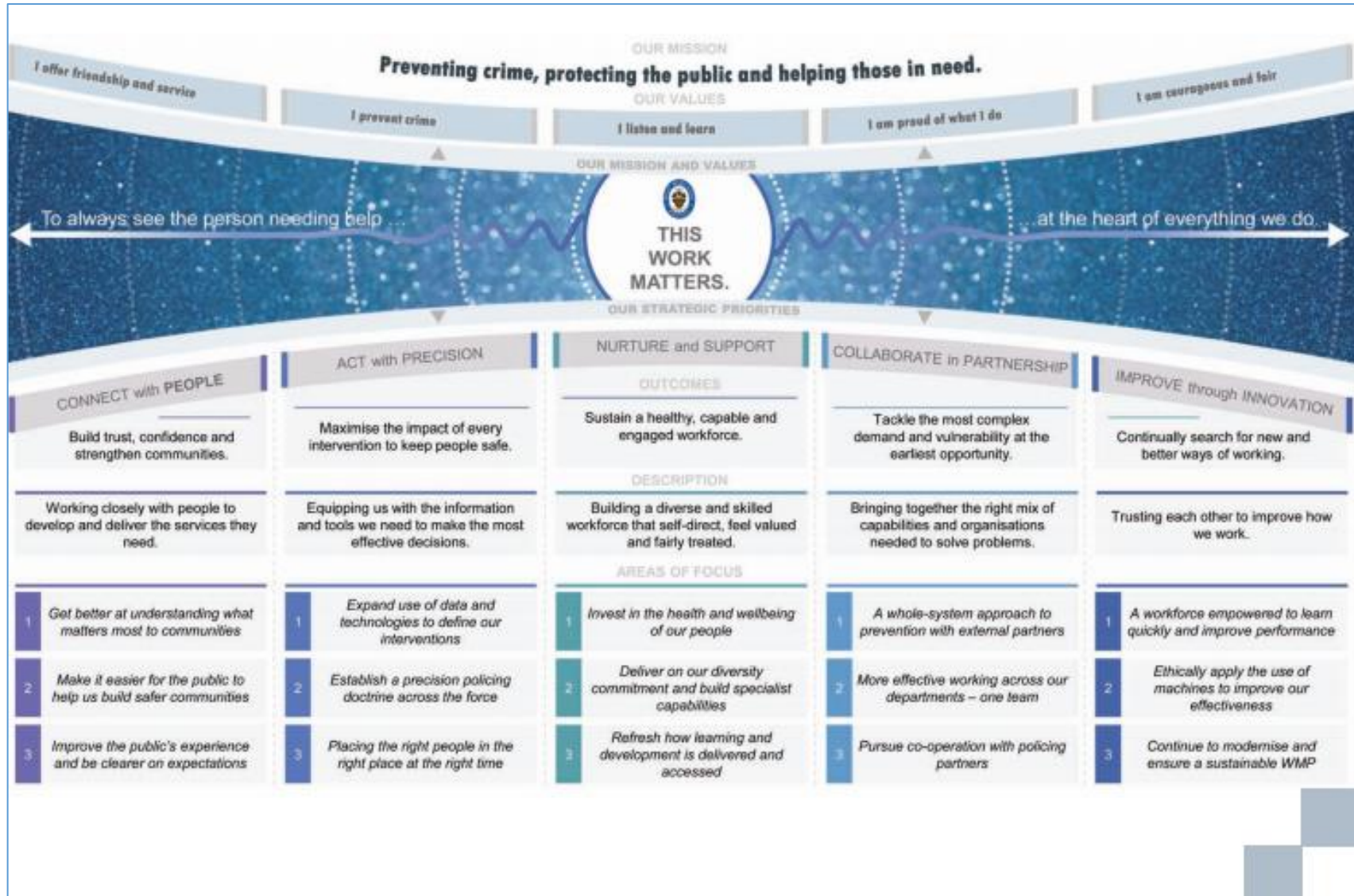
Figure 1: WMP This Work Matters Strategy

Intended activity resulting from the project

The results of this analysis will feed into the strategic decision making processes of the VRU agencies including WMP via Project Guardian. The focus of Project Guardian resources have been aligned more closely with the aims of the VRU. This ensures that the policing response to reducing serious violent crime is firmly rooted in long-term, collaborative problem-solving, rather than merely responding to individual events as they occur with enforcement activity. This approach is outlined in the Force's Violence Strategy for 2020/21 (*Figure 2*).

Examples of the types of interventions that the VRU and Project Guardian will deploy as a result of this analysis include:

- Using our Cadet and Youth Engagement Officers to enhance the youth voice within our Independent Advisory Groups (IAG) which provide community scrutiny of our activity.
- Working with education partners to understand the evidence based opportunities they can provide to both victims and offenders of violence.
- Enhancing Night Time Economy (NTE) health provision and safe havens (developing the Safespace model[3] and Cardiff approach[4]).
- Increasing the use of Out of Court Disposals (OOCD), such as the Restorative Justice (RJ) Conditional Caution, as an option for violence/knife possession supported by the Youth Offending Teams (YOTs).
- Developing the Checkpoint[5] deferred prosecution pilot to support suspects in violent and knife related offending.
- Educational/Media package supported by families of knife crime victims and offenders in prison.
- Supporting partners in education system, local authorities and CPS to adopt trauma informed approaches.
- Expanding the provision of Mentors in Violence Prevention from secondary schools to further education; primary schools; faith settings and sports clubs.
- Offering specialist mentoring services such as for resettlement.
- Using faith and hospital settings to offer interventions to those identified as being at risk of being exploited.
- Reachable/Teachable moments: Intervention and community based mentoring for young people coming into contact with police or arriving at Emergency Departments.
- Leading nationally on targeted sports impact activity.
- Place-based pilots, supporting community led systems change in each of the Local Authorities.

Whilst WMP will continue to use enforcement activities such as stop and search when appropriate in response to specific intelligence, this project is **not** intended to inform the deployment of such activity.

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[3] Safe Space pilots, funded by the OPCC in NTE areas, are designed to help those who feel unwell or need assistance if they have become detached from their friends, or if they need a taxi home. The facility is supported by a dedicated St John's Ambulance team. https://www.westmidlands-pcc.gov.uk/arcadian-centre-safe-space-funded-for-three-more-months/

[4] The Cardiff Model, developed by surgeon Professor Jonathan Shepherd, facilitates the sharing of anonymised Emergency Department data about injuries caused by violence to be shared with police and local authorities to inform violence prevention strategy and tactics. https://www.cardiff.ac.uk/research/impact-and-innovation/research-impact/reducing-violent-crime

[5] An offender management programme developed by Durham Constabulary tailor-made to the individual, giving them the opportunity to tackle underlying issues such as their mental health, alcohol and drug misuse. It aims to improve the life chances of the participants and raises awareness of and provides access to health-based interventions. A similar pilot, Turning Point, was also trialled in the West Midlands. Both have been evaluated by Cambridge University. https://www.durham.police.uk/Information-and-advice/Pages/Checkpoint.aspx

Figure 2: WMP Violence Strategy 2020/21

Data

Level of analysis:

☐ Individual
    Individuals aggregated?
    ☐ Yes
    ☐ No
☐ Specific Area:
    ☐ Output Areas
    ☐ Super Output Areas - Lower
    ☐ Super Output Areas - Mid
    ☐ Wards
    ☐ Districts
☑ West Midlands
☑ Other (type of crime)

Reliability of data:
An extensive exploratory data analysis (EDA) phase will be undertaken to examine the extent of any data quality issues.
Sample or entirety:
If sample: N/A Method of sampling: N/A Method of choosing sample size: N/A Sample size: N/A
Type of analysis:
☐ Exploratory ☐ Explanatory ☑ Predictive ☐ Optimisation
Proposed methodology:
Not currently known
Will the project eventually be automated:
☑ Yes ☐ No
Means of evaluation:
If a predictive model can be built, this would be tested on a separate test dataset (separate from the data used to train a model).

ALGO-CARE considerations

Advisory	
If applicable, are the outputs from the algorithm to be used in an advisory capacity?	Findings from the initial EDA would be assessed as to the ability to build a long-term predictive model. If it is considered that a predictive model can be built, the eventual results from the model would be fed into the wider business, particularly the VRU and Project Guardian.
Does a human officer retain decision-making discretion?	Any decisions arising from the provision of any information resulting from this project would be subject to decision making by officers and partners in the VRU.
Lawful	
What is the policing purpose justifying the use of the algorithm (means and ends)?	The reduction of violence is a key aim of WMP and a tool such as that proposed could be invaluable by way of feeding into long-term planning decisions to help achieve this aim.
Is the potential interference with the privacy of individuals necessary and proportionate for legitimate policing purposes?	Whilst it is likely that data relating to individuals will be processed as part of the project (notably in relation to crimes), the outputs from the project (including any predictions) would not relate to individuals. Therefore it is unlikely that the privacy of individuals would be affected to any greater degree than would occur in normal police activity.
In what way will the tool improve the current system and is this demonstrable?	There is no current system for forecasting levels of violence on a long-term basis. If such a system can be developed this would enable improved decision making in attempting to reduce violence.
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 that would likely be analysed are collected as part of WMP's duty to collect, assess and investigate crimes and as such have been collected in the appropriate manner for the appropriate operational purposes.
Is the operation of the tool compliant with	The analyses proposed would accord with the DCMS Data Ethics Framework 2018.[6]

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

national guidance?	
Granularity	
Does the algorithm make suggestions at a sufficient level of detail given its purpose and the nature of the data processed?	It would be the aim of any model that is developed to provide predictions in such a manner as to be of use to WMP decision making – most likely estimated total levels of violence, possibly also including broad location such as a Neighbourhood Policing Unit (NPU). Details are currently unknown given the thorough EDA required to make an assessment as to the possibility of building a model.
Are data categorised to avoid broad-brush grouping and results and therefore issues of potential bias?	Other than types of crime, it is unlikely that categorisation would be required.
Do the potential benefits outweigh any data quality uncertainties or gaps?	If potential levels of violence could be identified long-term, then it is possible that WMP would be able to undertake longer-term planning and so be better enabled to optimise the use of resources.
Is the provenance and quality of the data sufficiently sound?	The data have been gathered during the day-to-day policing work of WMP and should enable analyses of the type envisioned for this project.
If applicable, how often are the data to be refreshed?	The underlying data are refreshed a number of times per day. Should a predictive model be productionised it is likely that it would be run once per month.
If the tool takes a precautionary approach in setting trade-offs, what are the justifications for the approach taken?	Ultimately any model developed would aim to minimise prediction errors as much as possible so as to produce predictions that are suitable for resource planning.
Ownership	
Who owns the algorithm and the data analysed?	WMP once developed.
Does WMP need rights to access, use and amend the source code and data?	No
Are there any contractual or other restrictions which might limit accountability or evaluation?	No

How is the operation of the algorithm kept secure?	Any model developed from this project would be kept wholly within the WMP computing environment.
Challenge	
What are the post-implementation oversight and audit mechanisms, e.g. to identify any bias?	Should any model be developed that is then productionised, checks will be made as to its accuracy on an on-going basis as well as any consistent patterns that may represent biases.
If the algorithm is to inform criminal justice disposals, how are individuals notified of its use?	Not applicable
Does the specification of the algorithm match the policing aim and decision policy?	Cannot be answered at this time. However, should it be considered that any model cannot make predictions within bounds of error narrow enough to usefully inform resource allocation / decision making, then the model would not be used.
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 currently applicable.
How was the method chosen as opposed to other available methods?	Not currently applicable.
What are the (potential) consequences of inaccurate forecasts?	Misallocation of resources in the long-term.
Does this represent an acceptable risk?	The likely degree of risk associated with this would be ascertained as part of the model building process.
How are the results checked for accuracy and how is historic accuracy fed back into the algorithm for the future?	If any model were to be productionised, accuracy would be assessed on an on-going basis so that any degradation of the model could be tracked and the model rebuilt if necessary.

How would inaccurate or out-of-date data affect the result?	This is partly dependent on the nature of any model should one be capable of being built. Generally inaccurate or out-of-date data could detrimentally impact on the model's performance (in terms of accuracy), however currently the potential for any such issues is unknown.
Responsible	
Would the operation of the algorithm be considered fair?	During the development of any model, the presence of any biases in the underlying data or for predictions to produce biases would be fully examined and mitigated if the potential for them was present. Due to the nature of the question however, it is unlikely that any biases would be present (given the interest being in total levels and at any large spatial scales).
Is the use of the algorithm transparent (taking account of the context of its use), accountable and placed under review?	The details of any model arising from this project would be provided and, as mentioned above, if productionised there would be on-going checks as to model performance.
Would it be considered to be used in the public interest and to be ethical?	The reduction of violence would be the aim of the project and given the cost to society of violence, enabling more effective means of its reduction would likely be seen as positive.
Explainable	
Is information available about the algorithm / decision-making rules and the impact of each feature?	Such information would be available for any model arising from this project.

Appendix: Glossary of Terms

WMP / Law Enforcement Terminology	
AEP	Alternative Education Provider
DAL	Data Analytics Lab
IAG	Independent Advisory Group
NTE	Night Time Economy
NPU	Neighbourhood Policing Unit – aligned to the seven Local Authorities; but with two NPUs covering Birmingham LA
OOCD	Out of Court Disposals
OPCC	Office of the Police and Crime Commissioner
RJ	Restorative Justice
SRO	Senior Responsible Officer
VRU	Violence Reduction Unit
WMP	West Midlands Police
YOTs	Youth Offending Teams

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 at regular intervals.