

# National Data Analytics Solution

Submission to the WMP Ethics Committee July 2020

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## Modern Slavery

### Ethics committee response and next steps

We thank the Ethics Committee for their deliberations over this model and the advice to proceed with minor amendments. In relation to the specific comments we can report as follows:

- *Care should be taken, when operationalising the tool, to ensure that it is designed to augment rather than replace the identification of cases and allocation of resources, and that the potential error rate is highlighted to decision-makers.*

The initial operationalisation will be in West Yorkshire only, which gives us an opportunity to work closely with the force to ensure that this and other considerations are embedded in their processes, and we will work for a “home page” for the visualisation tool that makes this clear to operators.

- *The committee requests that the NDAS team returns to the committee once plans for operationalising have been developed for further advice, and at this point, provide more information about the planned use cases.*

The first phase of operationalisation will be running a one-time data extract through the model to ensure that it works, which will visualise more current insights. At this stage, we will be able to get an understanding of what those insights are and what activity they would lead to in the force. At this stage, we will be about 4-6 weeks from operationalisation. We will report our findings back to the Committee.

- *The committee recommends a modern day slavery stakeholder advisory group as a priority, to gain the opinions and perspectives of the third sector and other experts at this early stage, to feed into the development of the model.*

We have briefed the Independent Anti-Slavery Commissioner on this use case. Her role is to encourage good practice in the prevention, detection, investigation and prosecution of modern slavery offences and the identification of victims. The Commissioner was supportive on NDAS as a useful tool in achieving these aims. We have also made contact with both the West Midlands and West Yorkshire Anti-Slavery Networks, and we will brief them on this as well as the Organised Exploitation use case and seek their feedback. There is good representation on these groups from organisations that support victims, such as Salvation Army, Hope for Justice and Barnardo’s, and we

will be seeking their feedback on the effect the model might have on helping to achieve better outcomes from victims.

- *In order to ensure that communications around the use cases are accessible, the committee recommends that the following format is used:*
  - *Out of a population of N (people in our data) we would expect to identify X people as involved in MS;*
  - *Of those people, Y will have been falsely identified;*
  - *Within this population, there will be Z people involved in MS who the model will not identify.*

This will be built into the “home page” on the visualisation tool in due course.

As indicated above, the next steps of this use case will be to ingest a fresh one-time data extract onto the platform to run functional tests, before we start to operationalise with live data to generate live and actionable insights. As we operationalise with live data on a week-by-week basis we will be able to report back the outcomes of the model and the effect that these outcomes have on the policing activity. This is an iterative process so we will be updating the Committee and seeking feedback in response to the specific scenarios.

## Most Serious Violence

### Updated problem statement

As per the previous brief update to the Committee, a flaw affecting the predictive modelling has been found with the code for the most serious violence (MSV) use case, meaning that we are unable to rely on the precision rates of the model. Therefore, where we believed that out of a cohort of 100 people identified as high risk, 54 (West Midlands) or 74 (West Yorkshire) would commit their first offence of MSV using a gun or a knife, we know now the actual level of precision is significantly lower. We are satisfied that this flaw is now fixed and does not affect any of the interim results that follow.

A number of options were considered, which examined the effect of the different variables within the problem statement of the use case. These variables are:

- First time offence
- Use of a weapon
- The weapon having to be a gun or a knife

Table 1 shows the different options and the effect on the precision rate of the model:

Table 1: Five MSV problem statement options.

|          | MSV Option  | Option Description  | Initial Precision For Top 100 High Risk Range (min – max) |          |
|----------|---|---|---|----------|
|          |   |   | WMP   | WYP      |
| Option 1 | Most Serious Violence Recurring with Gun or Knife | This model would look to predict the likelihood of an individual committing a most serious violence offence with a gun or knife no restriction on the weapon use.   | 14-19%  | 9% - 18% |
| Option 2 | Most Serious Violence First Time with Any Weapon  | This model would look to predict the likelihood of an individual committing a first time most serious violence offence with any weapon type but no restriction on the weapon use.   | 14%-18%   | 15%-16%  |
| Option 3 | Most Serious Violence Recurring with Any Weapon   | This model would look to predict the likelihood of an individual committing a most serious violence offence with any weapon type but no restriction on the weapon use.  | 13%-20%   | 25%-31%  |
| Option 4 | Most Serious Violence First Time                  | This model would look to predict the likelihood of an individual committing their first time most serious violence offence but no restrictions on the weapon type and the weapon use.   | 17%-20%   | 18%-22%  |
| Option 5 | Most Serious Violence                             | This model would look to predict the likelihood of an individual committing a most serious violence offence. This removes the following components of the original problem statement first time, weapon type, and weapon use. | 25%-38%   | 36%-51%  |

It should be noted that “MSV” as a crime type is considered a constant rather than a variable, as the model is predicate on targeting this crime type. It should also be noted that the precision rates recorded are indicative only, this table is based on an early re-iteration of the model which is being constantly refined.

It can be clearly seen from Table 1 that the use of these variables significantly reduces the precision rate, and there is a step improvement in the precision rate when all variables are stripped (highlighted as Option 5). Option 5 was therefore considered to be the best problem statement to progress with.

### The ‘focal cohort’

Whilst it clearly has the best precision rate, Option 5 is not necessarily ready to operationalise as it is. There are two issues: firstly, the precision rate is lower than the precision rate we believed we had achieved for the model previously, however it is important to note that the precision rate is still higher than a random example (e.g. from approximately 400,000 nominals there is a 1.9% chance that an MSV offender could be randomly selected), it is suggested that the weight of this depends on the views of the Committee, decision makers, practitioners and anyone overseeing policing activity. The second issue with Option 5 is that focusing on very highest risk nominals would not necessarily lead to the most effective use of resources. A lot of these individuals will already have had significant police interaction and in many cases interventions to prevent violence will already have been attempted.

It is recognised that most forces will already have processes for identifying violent offenders. The decision-making processes around these are often based on policy that filters from national to local. The Metropolitan Police’s identification of habitual knife carriers, and West Midlands Police’s identification of individuals for intervention by Project Guardian, both focus on the national problem of young people carrying and using knives, often leading to devastating consequences. Different

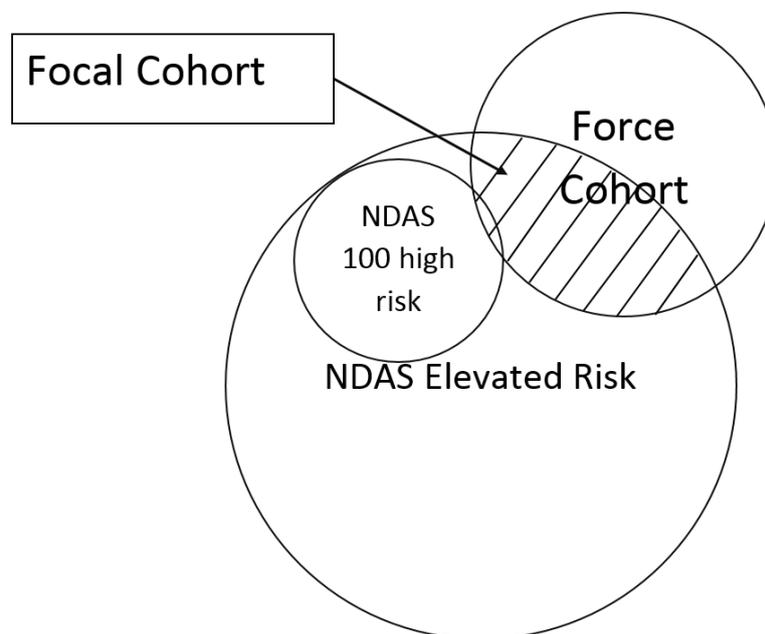
forces have different methods of identifying cohorts of violent offenders, from the use of varying degrees of sophisticated analysis to professional judgement.

This leads us to the consideration that NDAS might be used to augment these current decision-making processes in seeking to classify and prioritise individuals who are part of a cohort that are being selected anyway as a result of policing priorities that are overseen by the executive and national policing leadership and by democratic processes, as well as being open to public scrutiny. It is suggested that NDAS may provide an extra tool to support decisions on the allocation of resources for intervention.

As well as the 100 high risk individuals, NDAS could be used to identify a larger cohort of 'elevated risk' individuals. This could be (for example) those individuals for whom the precision rate is over 30%. For example, if we identified 2,000 individuals, we could be confident that at least 600 of them would go on to commit an MSV offence within the next two years. The 100 high risk individuals are a sub-set of this larger cohort.

What this leads to is the Venn diagram at Fig. 1, which shows the overlap of the NDAS-identified individuals with a cohort identified by the force, and the 'focal cohort' that contains individuals who are both identified by the force and identified as elevated risk by the NDAS model.

It is suggested that the NDAS 100 high risk individuals can also be a useful decision-making tool in its own right, but practitioners in a force must review the individuals in this high risk category and justify activity. Simply being on the list would not be enough to justify the use of police resources in an intervention. Similarly, those in the 'elevated risk' group would not see an intervention unless they also formed part of another cohort.



*Fig. 1. Venn diagram showing the interaction between Force and NDAS cohorts, and the identification of the 'focal cohort'*

To model what this might mean in practice, the NDAS team are identifying, understanding and modelling decision-making processes in partner forces to be run alongside the NDAS model. Because of some of the relatively small numbers involved, these models will have to be re-run several times before we can be sure of the results, so the below results should be seen as preliminary. We will not be operationalising the model before we have seen, and shared with the Ethics Committee, a representative set of results.

The Op Guardian model in WMP will identify a cohort of 65 individuals in a particular month for intervention to prevent knife crime. Of those 65 individuals, 24 (37%) will go on to commit an MSV within the next two years and eight of these (12% of the original 65) will commit that MSV using a knife<sup>1</sup>.

The 'focal cohort' between the Guardian and NDAS models consists of 29 people. In other words, 29 of the original 65 individuals are identified as 'elevated risk' by the NDAS model. Of these 29 individuals, 13 (45%) will commit MSV within the next two years and six (21%) will commit that MSV using a knife.

Only three individuals in the NDAS high risk 100 are in the Op Guardian force cohort. Due to this small number, unless anything changes as the model is re-run, it is not proposed that any extra significance is attached to this particular part of the focal cohort.

In general therefore, the indications are that the NDAS MSV model has a part to play in augmenting current decision-making to identify cohorts and individuals and direct police and partner interventions accordingly.

### Wider benefits of the model

As well as augmenting the identification of cohorts, there are wider benefits of the model. These wider benefits are:

- The ability to share best practice between forces. In modelling existing decision-making processes in forces, and allowing the user to assess the precision rate of that model and the NDAS-augmented focal cohort, forces will be able to test the benefit of the decision-making processes in other forces and fine-tune the selection of their own cohorts according to the evidence they gather.
- There will be a number of standard filters that a user can apply to any cohort, these being:
  - Involved knife
  - Involved gun
  - MSV any role
  - MSV offender
  - MSV suspect
  - MSV victim
- Understanding the nature of these cohorts and how they interact is likely to be of benefit to setting policy to ensure policing priorities and resources are prioritised where they can have the greatest effect on reducing harm to communities.

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<sup>1</sup> \* These numbers are generated from a replication of the Guardian model on one snapshot of historical data and therefore are not indicative of future runs. Guardian may be targeting a different number of nominals in each run and therefore the precision rates may differ.

- The model still offers the user the ability to quickly and effectively visualise the data in a way that can focus practitioners on understanding the data, so they can focus on the dynamic, contextual factors behind the static, actuarial factors that the model provides, to help improve their ability to put in place a positive and meaningful intervention

## Interventions

As per documents previously submitted and discussions with the Ethics Committee, we believe an ethical framework that covers both the development of advanced data analytics and the use of such models in terms of interventions. We are also aware that there is an ambition for an Authorised Professional Practice to be drafted for the ethical use of such technology in policing which the NDAS team will actively seek to contribute to. We will keep the Committee informed of development in these areas.

## Conclusion

This model is radically different from the previous iteration that was initially presented to the Committee. We believe it offers the benefit of adaptability to specific national and force priorities which are set within the current governance structures of policing. We also believe that the model demonstrates the use of data analytics augmenting rather than replacing or overly influencing decisions on the selection of cohorts for intervention, helping forces ensure resources are used more efficiently and effectively. There is also the benefit of the visualisation of the results, developed with subject matter experts over the course of the project, ensuring the better understanding of cohorts and individuals to focus limited resources where they can have most impact.

The model allows a force to use the dashboard in different ways:

- Helping to classify and prioritise individuals in a particular cohort
- Applying further filters to a cohort to focus on specific areas of interest
- Applying best practice from another force to their own data to establish that will inform their approach to identifying cohorts for intervention
- Identifying a high risk cohort and reviewing that cohort for intervention opportunities.

It should be noted that we do not feel that we have a model that is ready to be operationalised at the current time. The purpose of this submission is to invite the Committee to consider the approach and address any concerns, to give us the opportunity to consider those concerns as we develop the model. We will not be operationalising this model until we have had that feedback and been able to re-run the model to get a better understanding of precision rates. We will of course keep the Committee updated with our progress.

## Organised Exploitation

This is a new use case which we believe is approaching readiness for operationalisation. Please see Annex A for a detailed briefing note.

## Firearms

This is another new use case which we believe is approaching readiness for operationalisation. However, because of limited Committee time and project timescales, it is not proposed to bring a

full briefing note to the Committee at this stage. It is proposed instead that we will summarise the problem statement and the approach to see if there are any broad issues the Committee wishes to raise, that we can include in the development of this model before submitting a briefing note to the Committee.

### Problem statement

The problem statement for this use case, designed by SMEs, is:

Identify firearms trends through exploring networks of people, objects, locations, and events, aligned to the following themes:

- Movement of firearms across force boundaries
- Linking events and firearms to organised criminality

The model will use data from Crimes, Intelligence, Custody, Organised Crime Group (OCG) and Missing Persons to understand the people, objects, locations and events that link to firearms activity. Other data will be considered including data from the National Ballistics Intelligence Service (NABIS). It performs a geospatial, network and behavioural analysis of people and events and visualises this analysis from a high trend level, through the geographical and network level, to the individual profile.

All NDAS use cases up to now have avoided using geographical data as such data can reflect bias in policing. An analytical model that reflects this geographical bias, risks increasing policing activity in locations where there is already an elevated level of activity, leading to the gathering of more data in these areas which will feed the analytical model to further increase the policing activity. Geographical data can also be considered a proxy for ethnicity, where there is a higher concentration of a certain ethnicity in a particular area. It follows that if that area sees an elevated level of policing activity, people of that ethnicity are more likely to be subject to a police encounter or intervention. It is believed that the use of geographical data is justified in this use case, because there is a pressing social need to protect communities from this type of crime and geographical data to help decision makers understand where this crime is taking place is vital to this effort.

The intention is to allow practitioners to understand which firearms trends are presenting risk or causing harm within the community and to understand where this risk and harm is taking place and the networks of individuals involved. This will inform decisions as to the interventions to be put in place to reduce risk and prevent harm, disrupt and dismantle the networks, targeting specific individuals who present a risk or are known to be causing harm.

A full briefing note will be produced for the Committee in due course, and in the meantime, we would welcome the Committees views on this general approach to help inform the development of this model.



## Ethics Committee Briefing Note

### Project Reference: National Data Analytics Solution – Organised Exploitation

#### Purpose of data analysis:

The strategy document ‘Policing Vision 2025’ outlines the need for technology to be central to how law enforcement operates, calling on forces to embrace innovation so that policing can adapt to new threats and opportunities posed by the 21st century.

The National Data Analytics Solution (NDAS) aims to become a centralised advanced analytics capability for UK policing. UK police forces have access to a vast amount of digital data, but arguably lack the technological capability to use it effectively.<sup>2</sup> By proving that advanced analytical methods can be applied to existing law enforcement datasets, it is hoped that actionable insights grounded in data could be used to guide local intervention efforts and support the cross-cutting outcomes that evolved from the reform strands within the Policing Vision 2025. Putting information at the heart of decision-making in policing by connecting existing datasets for new insights should inform risk assessment and resource prioritisation.

The founding partners of the NDAS are: West Midlands Police; Warwickshire Police; West Mercia Police; West Yorkshire Police; Greater Manchester Police; Merseyside Police, the Metropolitan Police Service; Staffordshire Police, and the National Crime Agency.

NDAS demonstrated the capability to use advanced data analytics to provide actionable insights during its Foundation Phase, which ran from September 2018 to April 2019. Three high-priority use cases were run as a proof of concept: Most Serious Violence, Workforce Wellbeing and Modern Slavery. It was agreed that Most Serious Violence and Modern Slavery should be developed further and both of these use cases have been considered by the Committee.

The development of advanced data analytics for policing implies the need not only to prove the concept of individual use cases and bring them to operationalisation where appropriate, but also to prove the concept of a constant process to develop new use cases aimed to deliver insights to help solve different problems.

This submission to the WMP Ethics Committee concerns the Organised Exploitation use case, which looks to create a network-driven insights platform that aids the identification of events and people related to Organised Exploitation. The model also seeks to identify the hierarchies within the networks, to identify who is potentially being exploited (currently termed “workforce”) and who is likely to be involved in the “management” of the networks – i.e. the possible exploiters.

#### Source of analytical question / hypotheses to be examined:

<sup>2</sup> A Babuta, *Big Data & Policing* [URL: [https://rusi.org/sites/default/files/201709\\_rusi\\_big\\_data\\_and\\_policing\\_babuta\\_web.pdf](https://rusi.org/sites/default/files/201709_rusi_big_data_and_policing_babuta_web.pdf)]

Through the development of this use case, NDAS worked with a range of subject matter experts (SMEs) involved in organised exploitation to identify a key operational challenge in managing the complexity of, and effectively identifying cases. Due to a number of factors it was decided that NDAS would progress with an exploratory Proof of Concept to assess how advanced analytics could develop actionable insights into Organised Exploitation. These include – but are not limited to:

- The exploitation of vulnerable people, both through child sexual abuse and exploitation (CSAE) and county lines activity, is a key threat affecting communities across the UK<sup>3</sup>
- There are challenges faced by police officers working in a partnership environment to understand and tackle this threat, in analysing multiple data sources such as Crimes, Intelligence and Missing Persons systems
- There are limitations in identifying Organised Exploitation, without respective Crime / Intelligence / Missing Person headers. For example, an offence of Possession with Intent to Supply class A drugs may be recorded and it may not be immediately apparent that this relates to county lines exploitation
- NDAS provides an opportunity for the formation of informative networks that assist relevant teams to better understand and tackle the threat

The joint effort between the SMEs and NDAS team resulted in the development of the Organised Exploitation capability, which is being validated and refined, with the intention to operationalise during the financial year 20/21.

**Data to be used:**

- Intelligence information – 2010 onwards
- Crimes information – 2010 onward
- People information across Crimes & Intelligence
- Information from missing person records (systems that record incident of missing people, and track investigations and other information in relation to locating them)
- Information relating to the involvement of individuals in organised crime groups (OCGs)

**Level of analysis**

This will be an analysis of the problem from a force perspective, aggregated from the data relating to individuals linked to organised exploitation events. The capability will then allow analysis at a network and an individual level.

The initial intention will be that this is operationalised in West Yorkshire and the West Midlands, with the intention of rolling the use case out across new partner forces. It is also the intention to work with the National Crime Agency's project, the National Data Exploitation Capability, as well as the Tackling Organised Exploitation Hub (a National Police Chief's Council project) to enhance the national understanding of the threat of organised exploitation.

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<sup>3</sup> National Crime Agency (2019), *National Strategic Assessment of Serious and Organised Crime* [URL: <https://nationalcrimeagency.gov.uk/who-we-are/publications/296-national-strategic-assessment-of-serious-organised-crime-2019/file>]

**Reliability of data:**

The data is sourced from core systems used daily by police forces. Systems that support the analysis are used by the forces on a day-to-day basis. NDAS has previously brought use cases to the Committee using data sourced from crime, intelligence, custody and organised crime group systems, the new data source in this case is missing persons. In the case of missing persons, all data is manually inputted by police officers in the course of the process of recording and investigating reports of missing people.

**Sample or entirety:**

Entirety

**If sample:**

N/A

**Method of sampling:**

N/A

**Method of choosing sample size:**

N/A

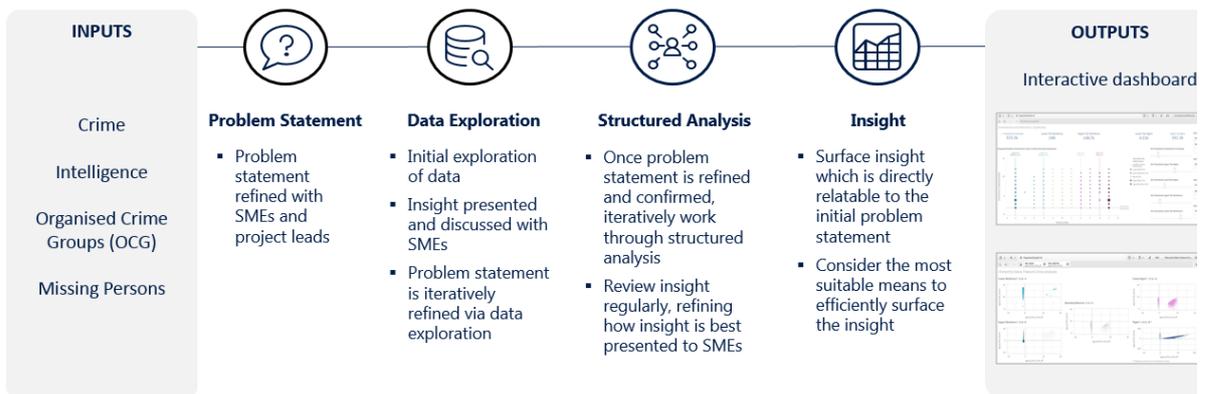
**Sample size:**

N/A

**Type of analysis: Exploratory**

**Methodology:**

There are four components to the NDAS methodology: problem statement; data exploration; structured analysis, and insight.



**1. Problem Statement**

The first stage of this process is defining the problem statement. The problem statement takes the initial guidance from the Partner Forces engaged with NDAS to assess how advanced analytics could develop actionable insights into Organised Exploitation, aiding the process of identifying events and understanding networks both in terms of the threat posed by people controlling the networks and the potential harm that may be caused by those who are exploited. It has been decided that an exploratory analytical approach would be the most suitable for this use case. The

lack of historical data and limited understanding of the challenge as it stands ruled out a problem statement alluding to predictive modelling.

To define the problem statement for this use case, time has been spent with several Organised Exploitation Subject Matter Experts (SMEs), spanning both operational and strategic roles. Using a combination of the in-depth knowledge and experience from the SMEs, with the NDAS team's understanding of possible analytical approaches to assisting with current challenges, the most appropriate problem statement has been defined.

From the explorative work carried out during the Foundation Phase, the problem statement was further refined for the Acceleration Phase to ensure it would be fit for purpose for operational usage.

The problem statement:

**Identify networks of nominals linked to organised exploitation using known terminology related to county lines, child sexual abuse and exploitation and associated cases (e.g. charged offences, intelligence logs and safeguarding efforts) to identify hidden networks and the exploitation of vulnerable people across force boundaries.**

## 2. Data Exploration

Data exploration happens iteratively along with defining the problem statement. This involves investigating hundreds of tables across the key data sources to find data fields that help to turn the problem statement from a business problem into a technical solution.

For this use case, this process is driven by initially understanding what key data points are important to those who are responsible for the threat, both operationally and strategically, and then identifying the data sources for these data points and building the logic to create them. In some instances, these data points could be taken directly from source tables and in other cases some derivation is required to transform the raw data into logic-driven "Risk Factors", as identified by Organised Exploitation SMEs. The NDAS team also investigates all tables across the key data sources to find other information that could be useful for the use case. Once data exploration is complete, the raw data is transformed to create analytical tables in preparation for analytical modelling (e.g. NLP and network analytics). The process of data exploration assisted in identifying the initial source systems that would deliver the most value at the stage of operationalisation, and those that could be incorporated at a later stage. For example, the National County Lines Co-ordination Centre hold data that is uploaded from forces and regions to assist with the national picture; NDAS has not used this to date but will continue to explore the possibility of augmenting the model with this data set.

## 3. Structured Analysis

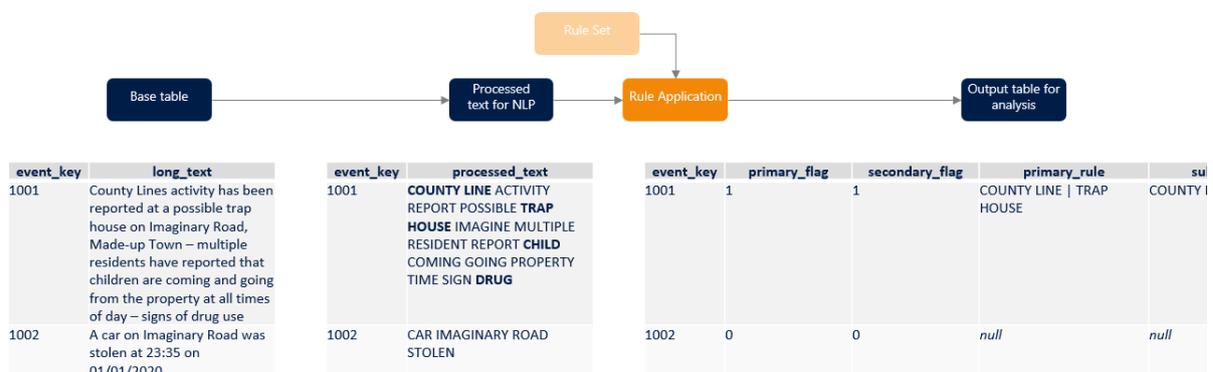
There are no consistent, formal flags or recording of crimes that would allow a model to be trained to apply natural language processing (NLP) for the Document Classification of "organised

exploitation” events so the approach that has been taken to identify organised exploitation events is different from the approach taken in the modern slavery use case.

The approach that has been taken is to produce a Reference File of words and phrases that is populated by topical terms, identified through SME engagement, and research/intelligence led terms, populated from the current intelligence relating to county lines activity. An example of the former would be the term “TRAPHOUSE” indicating a location where drugs are dealt with in a county lines scenario. The latter would be the specific “brand name” of a drugs line or indeed the phone number linked to that line. There are five sub-categories of terms within the Reference File:

- Vulnerability – terms in this sub-category identify both Sexual Exploitation and Criminal Exploitation events
- CSAE – these terms identify Sexual Exploitation events
- Line – terms and numbers that identify Criminal Exploitation events
- Financial – terms indicating financial exploitation that identify Criminal Exploitation events
- OCG – terms indicating links to organised crime that identify Criminal Exploitation events

These words and phrases lead to rules that are applied in the free text fields of crime reports, intelligence logs and missing person reports to identify Organised Exploitation events. The examples below are two intelligence logs, one of which links to organised exploitation and the other is unrelated. This shows how the model identifies the organised exploitation event and dismisses the unrelated event:



The strength of this approach is that it allows the knowledge of SMEs to be inputted directly into the system, both in terms of the general language associated with organised exploitation events, and current trends in terms of specific lines that are presenting a threat to communities. The challenge will be to keep the model up to date. This will require a periodic validation of the model output (i.e. the model’s effectiveness in identifying criminal exploitation events) and refining the rules through the maintenance of the reference text file. This constant monitoring and keeping the model up to date will be built into the working practices of NDAS and will involve regular SME engagement to validate the model’s output.

Another way in which an Organised Exploitation event is identified is through *nominal characteristics*. An example would be a young person linked as a suspect to a crime of possession

with intent to supply (PWITS) class A drugs. This is a good example of an event that is not in itself flagged as an Organised Exploitation event. If the young person is linked to other events (e.g. missing persons or intelligence that the long text indicates through *key words/phrases* or *context* that is an Organised Exploitation event) then the Qlik interface can be used to filter on nominal characteristics (e.g. a PWITS marker), which then allows for other events to also be discovered as related to Organised Exploitation. This allows the identification of individuals (exploiters or victims) linked to this event as linked to organised exploitation.

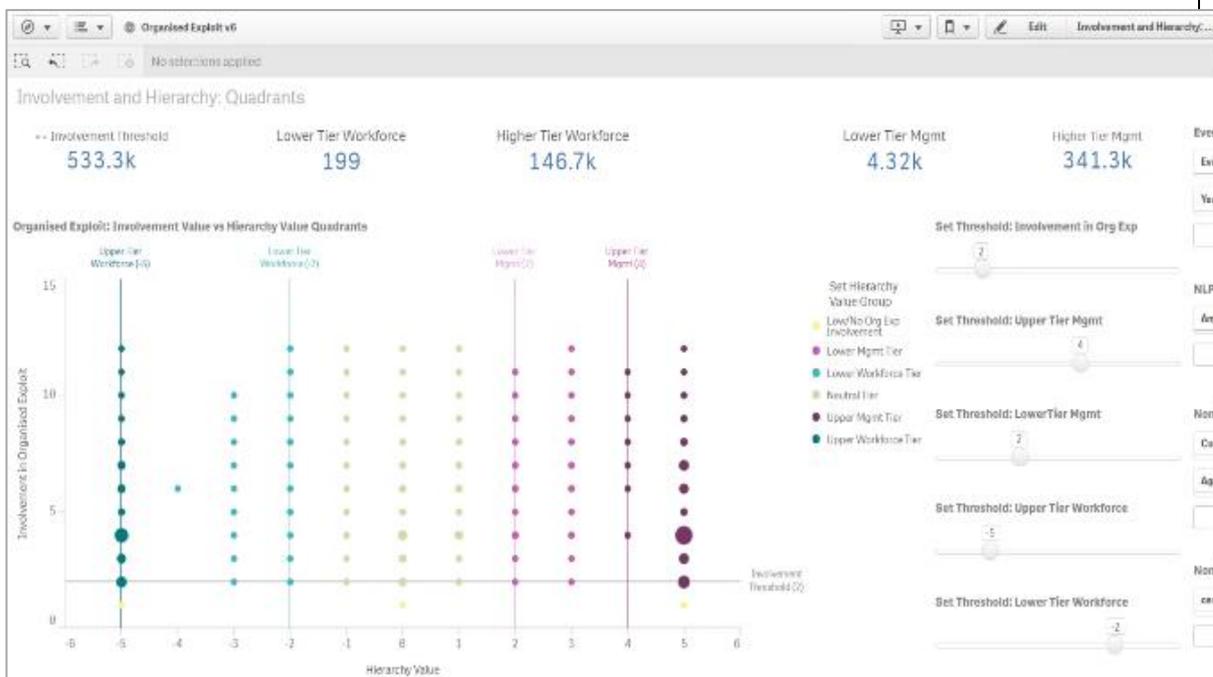
Once the model has identified events related to organised exploitation and the respective people (per system relationship data), it then seeks to place these in a hierarchy, from what NDAS are currently terming “workforce” to “management”. This is defined based on a set of business rules that leads to a hierarchy score. These business rules have been developed with SME input, based on the professional judgement of SMEs to identify those factors which indicate a person is being exploited versus factors that indicate the person is exploiting others. One of the main factors is age, so the model is skewed towards young people under 16 involved in organised exploitation being classified as workforce, with non-vulnerable adults over 22 classified as management. Individuals who are identified as Principle or Significant members of OCGs are also considered to be management (the OCG classification process is a manual process based on known and verifiable evidence and intelligence that all forces undertake to understand the threat of organised crime).



The process formed is a replication of the common approach deployed by many forces, where key information is used to identify events of interest when dealing with the threat of organised exploitation. The difference is that these events are often identified in a manual fashion as they occur, for example when a young person goes missing and a parent raises concern over them being involved in county lines activity, or a young person is arrested or indeed comes to harm whilst being involved in drug dealing in another part of the country. The manual process is

constrained by time required to interrogate and join up data across systems, and is thus limited and prone to error and / or bias.

The anticipated benefit of the approach proposed is that rather than dealing with organised exploitation on a case-by-case basis, the system will give a force a fuller understanding of the networks involved and therefore be able to deal with the exploitation in a more systematic manner. To use the “4P” methodology<sup>4</sup> they will be able to Pursue the most serious offenders, Prevent the recruitment of victims and Protect those victims that are identified. They will also be able to carry out disruption activity on those in the middle of the hierarchy who are identified as facilitating but not necessarily directing the activities of the main offenders. In order to do this, the model performs network analytics (see below) and also plots the individuals identified on a chart, where the x-axis is the hierarchy score (from -5 to +5) and the y-axis is the involvement in organised exploitation score (from 0-12):



This chart can be produced for the force area as a whole, so that decisions can be made about the safeguarding of the most vulnerable individuals (at the top left of the chart), or tasking pro-active investigations against those most involved in the management of organised exploitation (the top right of the chart). The chart can also be produced at a tactical level for particular networks, to enable the 4P approach with police and partners as described above. This approach would be led through the established community safety partnership of statutory partners who are configured to manage the threat of organised exploitation along with other threats to communities.

<sup>4</sup> Home Office (2013), *Serious and Organised Crime Strategy* [URL: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/248645/Serious\\_and\\_Organised\\_Crime\\_Strategy.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/248645/Serious_and_Organised_Crime_Strategy.pdf)]

It is recognised that the effectiveness of the use case, and therefore the appropriateness of any intervention that is put in place, depends on the validity of the business rules that lead to the identification of events and people involved, as well as their place in the hierarchy. At the time of writing, the project team are going through the process of validating the results with SMEs and will be presenting the use case to independent experts from the West Midlands and the West Yorkshire Anti-Slavery Network for their feedback. Feedback is also invited from the Ethics Committee on any improvements that can be made to the business rules. This use case will not be operationalised until we are sure that the model is as effective as possible, and it will be subject to constant review and improvement once operationalised.

It is anticipated that as the use case progresses, it will give us enough data on confirmed organised exploitation events and people to give us training and test sets of data to be able to apply machine learning to identify cases of organised exploitation, thus improving the efficiency and accuracy of the model. This would of course be a major change in the model and would be brought back to the Ethics Committee for their consideration.

### **Network Build**

One of the biggest factors in effectively identifying, understanding and investigating criminal activity is understanding the connections between people. A key insight from engagement with organised exploitation operational case officers is that it is viewed as a network-based problem, where offenders and victims are often part of a wider network of individuals, and understanding these networks is vital to tackling the issue systematically through a 4P approach.

The network-based approach is therefore an important part of the problem statement definition. The NDAS team have therefore developed an interactive network of connected individuals to aid the tackling of the threat.

### **4. Dashboard & Insights**

The final stage of the analytics process is to present the data in a way that informs and assists the end user in identifying organised exploitation and taking the suitable action. This encompasses not only the network visualisation and metrics as discussed, but the relevant contextual information related to the events and associated people. This information is presented at both low and high levels of granularity, allowing the tool to serve two audiences. The granularity within the high-level aggregated view allows for management teams to utilise the tool to inform strategic decision making, with improved understanding of organised exploitation through trends and statistics. The low-level granularity enables an operational team to follow-up on identified cases (e.g. specific networks or drug lines) through existing police and partner processes. Those tackling the threat to see the network from a number of perspectives.

- How the network interacts with high-level trends
- Networks showing centrality of individuals
- Network showing hierarchy of individuals

Each of these can also be shown on the chart to show the involvement and hierarchy of the individuals involved. The visualisation tool also allows a view of individuals to summarise the police data including a view of that data over time.

### **Will the project eventually be automated?**

Yes

No

Some of the data, such as OCG data and data relating to specific lines, are essentially manually inputted. Other data are identified through the Reference File of key words and phrases that are determined by SMEs and will be reviewed through the validation testing of the model output. Any decisions made as to interventions as a result of the insights will be based on professionals' understanding of the threat and the police and partner resources available to tackle that threat.

### **Means of evaluation:**

#### Internal Technical Evaluation

The problem statement, methodology and Proof of Concept model results will be reviewed as part of an internal evaluation to provide recommendations on how to improve the validity of the use case. The reviewer has not been involved with the NDAS project, and internal evaluations such as this are conducted as part of general quality assurance activities by the NDAS' delivery partner.

Similar to the Modern Slavery use case, it is anticipated that the internal evaluation to improve the data quality of the tool will include the below – of which, the team is already progressing towards :

- Creating a labelled data set to validate Organised Exploitation versus non-Organised Exploitation events that is currently being determined through key-word matching. This task entails NDAS team to review the event text to manually determine whether the event belongs to organized exploitation or not. Then this will be reviewed by SMEs from the force and finalize the validation set. This validation set will then be used assess the accuracy of the key-word matching.

As the internal technical evaluation is completed, NDAS will follow-up with the ethics committee on the associated recommendations, and associated updates on the above points.

Our own methodology/approach will consist of regular model monitoring and capturing/reviewing the results that are generated as part of the output.

#### Independent Evaluation

In addition, as part of this phase of work we are working with the College of Policing to establish independent academic evaluation of the project as a whole, from the data science behind the

analytical models to the efficacy of the model in improving the efficiency and effectiveness of the police response to strategic threats.

**ALGO-CARE considerations:**

**Advisory**

**If applicable, are the outputs from the algorithm to be used in an advisory capacity?**

The output of the Organised Exploitation analytical model will be used as a source of information to assist police intelligence in the understanding and identification of Organised Exploitation and associated insight. The NDAS capability is not a tool that substitutes the professional judgment and discretion of law enforcement practitioners for automated decision-making. It is designed to assist human decision making, with added efficiencies through automated processing of the identification and visualisation of data.

**Does a human officer retain decision-making discretion?**

Yes. The Organised Exploitation dashboards will only be used to supplement existing processes designed to target organised criminals and safeguard victims of exploitation.

It is anticipated that the interactive dashboard which encompasses outputs from this use case will support the overall process by identifying connections between information already held within police systems. There will in general be two audiences for this output: force intelligence and organised exploitation SMEs (operational staff at a local level engaged in the police and partnership work to safeguard victims of exploitation and disrupt and dismantle networks involved in the exploitation); and strategic analysts (focused on understanding high level statistics and trends relating to the threats in the force area, and making resourcing decisions based on that assessment).

**Lawful**

**What is the policing purpose justifying the use of the algorithm (means and ends)?**

The purpose is to better identify and understand how networks of people are connected through organised exploitation events, enabling better understanding of the scale of such networks to improve intelligence, guide investigations, and inform the delivery of interventions by the police and other statutory partners under the Crime and Disorder Act 1998 for potential victims and perpetrators. The use case demonstrates the ability to see these networks of in an innovative, interactive manner at an unprecedented scale, which would provide a simplified view of an otherwise very complex crime, where it is difficult and time-consuming to identify links between multiple nominals as well as the part the nominals play within the network.

**Is the potential interference with the privacy of individuals necessary and proportionate for legitimate policing purposes?**

The model relies on personal information which is already in police systems. The model brings relevant data to the surface and shows insights relating to the individuals and the networks

involved. This is in relation to a key strategic threat which it is widely agreed is having a devastating effect on the lives of young and vulnerable people within society and the broader community. Any intervention that is put in place as a result of the insights from this use case will be to protect vulnerable people, and to disrupt and dismantle the networks that are allowing this harm.

**In what way will the tool improve the current system and is this demonstrable?**

During the development of this use case it quickly became evident, from engagements with SMEs, that a lot of the data required to understand, identify, and tackle organised exploitation already existed within police source systems. However, due to the constraints of how the information currently presents itself, it is often not possible, or it is extremely time-consuming, to gain a full understanding of the threat in order to systematically target the networks involved.

During our engagement sessions with a number of SMEs, it was clear that there is no consistent way that organised exploitation events are tagged to be able to inform the understanding of the threat effectively except on a case-by-case basis. Therefore, the focus of the use case adapted to understanding how organised exploitation events could be identified from a more strategic perspective. It also became apparent that it was difficult, without manually researching intelligence about numerous people, which in itself is flawed because of the sheer volume of data helped about individuals, to identify what part each person plays in the networks of exploitation. Therefore, the model was developed to give an understanding of the hierarchy which is important in terms of the tasking of resources. For example, once the business rules are validated we will be able to identify those individuals who are most likely to be having the greatest impact on the threat to young and vulnerable people, in order for resource-intensive pro-active investigations to target them. Conversely, we will be able to identify those most at risk, so that we can ensure the police and partner response to safeguard them is as effective as possible, and efforts can be made to understand the risks to vulnerable people and put measures in place to prevent the recruitment of other vulnerable people to the network.

We are therefore expecting a qualitative improvement in a partner force's ability to tackle the threat of organised exploitation, as well as a quantitative improvement, as it is estimated that the ability of NDAS to visualise a network in seconds will save thousands of hours of an analyst's time per network, freeing up this time for forming a better understanding of how to tackle the networks to support a key force and national priority.

This is demonstrable as it will be monitored through the project management process (feedback through the meetings with the partners force single point of contact) and the academic evaluation of the project.

**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?**

All data used by the NDAS is derived from existing police systems, meaning the data was obtained and processed for criminal law enforcement purposes under Section 3 of the Data Protection Act

2018. In addition, the acquisition, processing, and retention of data by the NDAS on behalf of West Midlands Police is governed by an information sharing agreement (ISA) between partner agencies.

The ISA stipulates:

‘Each national analytics assignment commissioned through NDAS governance will look to answer a specific problem (or “use case”) on behalf of the Partner Forces, in line with one or more of the following policing purposes:

- Protecting life and property
- Preserving order
- Preventing the commission of offences
- Bringing offenders to justice, or
- Any duty or responsibility of the police arising from common or statute law.’

In this way, all data sources will be shared for a common, lawful and specified purpose.

In accordance with the Information Commissioner’s guidelines, a full Data Protection Impact Assessment was conducted for both the Foundation and Mobilisation phase. It is attached in the appendix to this submission. A legal review from the WMP legal team will follow in due course.

#### **Is the operation of the tool compliant with national guidance?**

The National County Lines Co-ordination Centre currently have a database of ongoing county lines investigations, designed to allow a national view of the offending and law enforcement response. The National Police Chief’s Council (NPCC) have a project to develop a Tackling Organised Exploitation Hub to better co-ordinate the national response to the issue of organised exploitation. These are key stakeholders in the development of this use case, to ensure data analytics is used to improve the work that they are doing by enabling forces to understand the landscape of organised exploitation more comprehensively. The development of this use case is also overseen by the Home Office’s National Police Capabilities Unit to ensure it aligns with national policy.

The overall aim of NDAS is to fulfil the ambitions of the Intelligence Portfolio of the NPCC, which has articulated a national aim for a data analytics capability for UK law enforcement. In line with this aim, recommendations on national guidance establishing minimum standards on how data analytics platforms should be developed and used by law enforcement need to be produced.

In the absence of a framework regulating analytics in law enforcement, the NDAS has looked to ensure that its general operation remains aligned to the relevant existing national guidance that applies to law enforcement, particularly with regard to relevant data protection and administrative laws. We are also developing a proposed framework which brings some of the leading thinking around the development of data analytics together with the policing Code of Ethics and where applicable the ethical codes for each individual force, so that guidance on the use of data analytics is grounded the ethical principles that govern policing generally and have

been built on the foundations of the Peel’s ‘founding principles on British policing’<sup>5</sup>. In the Building on our completion of a Data Privacy Impact Assessment, NDAS is engaged in the Information Commissioner’s Office Project DALE (Data Analytics in Law Enforcement) and is committed to continuing to ensure that all operations adhere fully with general data protection requirements for law enforcement.

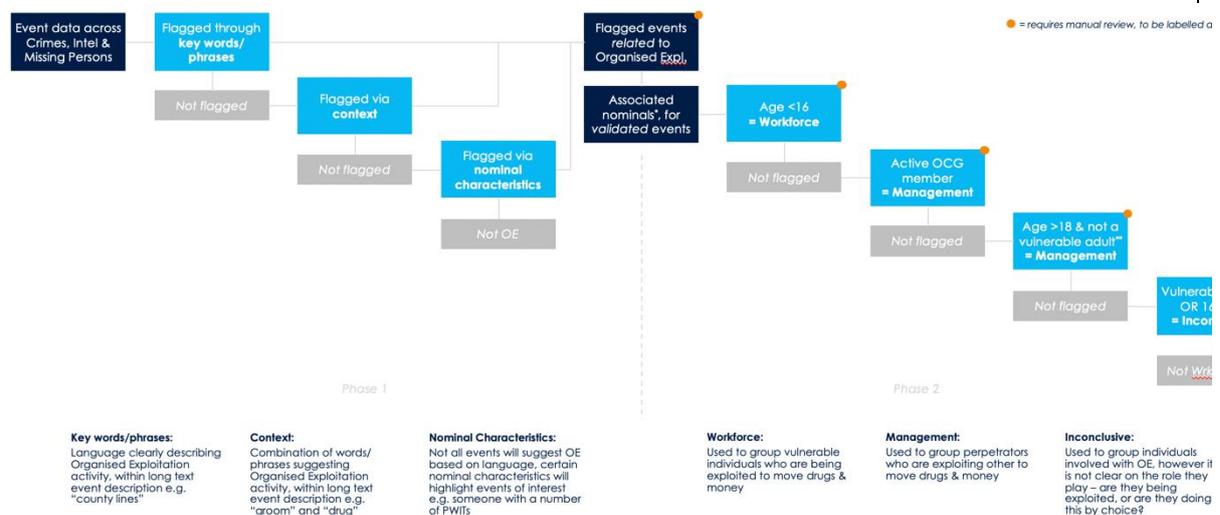
## Granularity

### Does the algorithm make suggestions at a sufficient level of detail given its purpose and the nature of the data processed?

The model provides detail at an individual, network level and aggregated view. This is considered sufficient to understand, identify, and support interventions based on the use case’s problem statement. It should be noted, however, that the value of the model depends on the quality of the insights which will be validated through feedback with SMEs. At the time of writing, this validation work has not been completed.

### Are data categorised to avoid broad-brush grouping and results and therefore issues of potential bias?

The following diagram describes how organised exploitation events are identified and individuals categorised.



It should be noted that there is a potential for bias in that, as per the experience of SMEs the age of individuals involved in an organised exploitation event is a determining factor as to whether or not they are deemed “workforce “ or “management.

<sup>5</sup> College of Policing (2014), *Code of Ethics: A Code of Practice for the for the Principles and Standards of Professional Behaviour for the Policing Profession of England and Wales* [URL: [https://www.college.police.uk/What-we-do/Ethics/Documents/Code\\_of\\_Ethics.pdf](https://www.college.police.uk/What-we-do/Ethics/Documents/Code_of_Ethics.pdf)]

**Do the potential benefits outweigh any data quality uncertainties or gaps?**

Yes. Firstly, no significant data quality issues or gaps were identified. Moreover, there is the social benefit of being able to identify networks of organised exploitation within the existing data, which we expect to lead to more efficient safeguarding of victims and targeting of those who exploit them.

**Is the provenance and quality of the data sufficiently sound?**

The data comes from core source systems used on a day to day basis by forces and do not show evidence of significant data quality issues.

**If applicable, how often are the data to be refreshed?**

Data will be refreshed daily, but the frequency of dashboard refresh will be confirmed in due course, in partnership with the forces' needs (in-line with existing scanning timelines).

**If the tool takes a precautionary approach in setting trade-offs, what are the justifications for the approach taken?**

Not applicable. The model does not set accuracy trade-offs. However, it is arguable that there is a net positive result of identifying and disbanding an organised exploitation network, with the aim of long-term public protection and restricting its ability to exploit victims. In addition, where there are unidentified offenders, the model could improve the policing ability to target the highest-risk organised criminals in this field. Police and partner resources are limited, and it is not expected that every single insight identified can be managed and actioned.

**Ownership**

**Who owns the algorithm and the data analysed?**

WMP owns all models developed as part of the National Data Analytics Solution, on behalf of the Home Office. Each partner force owns their own data being analysed and the insights derived.

**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?**

Partner Forces' data will be transferred to the secure NDAS AWS cloud platform via Secure File Transfer protocol (SFTP). All data will be held and processed throughout the delivery of the use cases. More detail on the security specifications can be found in the Data Protection Impact Assessment. The AWS platform has passed a penetration test and confirms to standards as set by National Police Risk Information Management Team (NPRIMT).

**Challengeable**

**What are the post-implementation oversight and audit mechanisms, e.g. to identify any bias?**

A range of governance mechanisms are in place to monitor the progress of the NDAS project as it moves toward, and beyond, its first operationalisation phase:

- National oversight is provided by the Home Office’s National Police Capabilities Unit (NPCU)
- Strategic oversight is provided by the NDAS Chief Officer and Stakeholder Governance Group, which includes the Chair of the West Midlands Ethics Committee
- Funding for the project is overseen by the NPCU and the West Midlands Office of the Police and Crime Commissioner
- The NDAS is engaged with the development of an ethical framework for the use of algorithmic systems in law enforcement, overseen by the CDEI
- The NDAS is engaged with the Office for the Information Commissioner on developing guidance over the use of data analytics in law enforcement

In addition, algorithmic systems deployed in this context will be closely supervised using ongoing human monitoring and auditing of performance against metrics such as accountability, bias, and security. As part of ongoing model maintenance and monitoring, the NDAS team will conduct regular reviews of the model to monitor against bias, including providing a statistical analysis of the impact of errors in the output (e.g. false positives and false negatives). The NDAS will work with the end users — operational investigators and strategic analysts—to support the development of a decision-making oversight and audit mechanism.

**If the algorithm is to inform criminal justice disposals, how are individuals notified of its use?**

The insights generated by the organised exploitation analytical model will not be used to inform criminal justice disposals, including decisions on charge or bail; or decisions as to whether to continue an investigation into allegations concerning a subject. There will, however, be a process for notification, challenge and complaint within existing police systems.

In addition to notification, external observers and data subjects shall be able to challenge the process by which an outcome was reached, to ‘ensure that such tools are being used in accordance with the requirements of the relevant data protection legislation and principles of accessibility and natural justice under the Human Rights Act 1998’.<sup>6</sup> In line with this aim, NDAS governance forums should work with partner forces to embed standards for fairness, accountability, and transparency not just in the analytical models developed but also in the overall decision-making process that uses the outputs generated. For example, if a data subject wishes to challenge a decision that has been made with NDAS output (providing supplementary information to the decision-maker), a process will be established to allow the subject to scrutinise the model outputs.

**Accuracy**

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<sup>6</sup> Alexander Babuta, Marion Oswald and Christine Rinik, ‘Machine Learning Algorithms and Police Decision-Making: Legal, Ethical and Regulatory Challenges’ (2018) [https://rusi.org/sites/default/files/201809\\_whr\\_3-18\\_machine\\_learning\\_algorithms.pdf.pdf](https://rusi.org/sites/default/files/201809_whr_3-18_machine_learning_algorithms.pdf.pdf)

**Does the specification of the algorithm match the policing aim and decision policy?**

Yes. The model was developed directly as a response to the problem statement which was defined in collaboration with partner forces.

**Can the accuracy of the algorithm be validated periodically?**

The product in question is predominantly a discovery tool to support analysis of officers and does not have predictive modelling elements however accuracy scores will be calculated for event identification. This will be achieved through manually creating a validation set and evaluating performance of the business rules periodically.

**Can the percentage of false positives/negatives be justified?**

Through the validation process mentioned in this report the NDAS team are currently reviewing the current effectiveness of the tool and will be able to report on the results in due course.

**How was the method chosen as opposed to other available methods?**

The process to identify and define relevant events and nominals was developed based on discussions with SMEs who have identified which key words, phrases and specific intelligence that they believe identify events and nominals that are linked to organised exploitation. A previous use case with a similar aim (Modern Slavery) used a slightly different methodology, using known modern slavery events to train the model to identify other events using natural language processing. The lack of a labelled set of events for “organised exploitation” (i.e. count lines and child sexual exploitation) means that a different approach had to be taken and the model has essentially been given every term that we can identify that helps to identify organised exploitation events. This process can be adapted over time as we build an assessment of the efficacy of the agreed key words.

**What are the (potential) consequences of inaccurate forecasts?**

The output generated during the use case will be provided as a supplementary source of information for operational officers and strategic analysts with their work, as opposed to stating an automated recommendation for them. In practice this means that an inaccurate forecast would have minimal impact, as the officer looking into the insights would be advised to use the solution and its insights as just one piece of information in the wider context of additional information, in combination with professional judgement. The output of the model alone should not be used to drive direct action.

**Does this represent an acceptable risk?**

Yes. A plain-language explanation of how the output was generated and the factors that influenced the output will be produced alongside the output itself. In addition, it is intended that police end users review and interpret the model’s results—in combination with the associated key predictive indicators—to complement other sources of information in order to develop a targeted, well-informed interventions approach.

**How are the results checked for accuracy and how is historic accuracy fed back into the algorithm for the future?**

As SMEs interact with the tool and discover means to improve the effectiveness of the identification, the reference file will be able to accommodate insertions and removals of key words/phrases.

**How would inaccurate or out-of-date data affect the result?**

NDAS platform is configured to take in latest data and data quality will be assured through numerous checks, including nominal matching to eliminate the possibility of duplicate nominals output by the model.

**Responsible**

**Would the operation of the algorithm be considered fair?**

One of the risks of deploying data analytics technology is the amplification and reinforcement of existing human biases. Some of these biases are unintended and arise from a lack of diverse perspectives when developing and training an analytical model. In other cases, decision-making can be skewed by reliance on incomplete data where other relevant factors are omitted or by personal conscious or sub-conscious bias. Finally, the historical data on which analytical models are trained may be biased. An analytical model merely manipulates data in order to produce an outcome. If the source data itself is biased, the model will inadvertently reflect biases inherent in the dataset.

In a law enforcement context, the perpetuation of these biases can be especially pernicious: for example, there has been much discussion over the potential for indirect racial bias to creep into analytical models used in law enforcement. It is well-documented that postcode information can function as a proxy variable for ethnicity or social deprivation, resulting in algorithmic outcomes that perpetuate bias.

Recognising these risks, ethnicity and gender variables were not used as inputs to the analytical model. Similarly, location variables were also omitted to avoid this information becoming a proxy for other factors, helping to mitigate any undue bias that may arise in the analytical model. The NDAS team is monitoring any bias in the data that might affect the model output.

**Is the use of the algorithm transparent (taking account of the context of its use), accountable and placed under review?**

As part of our continuous engagement with SMEs, including operational and strategic decision-makers, we will support accountability in the decision-making process by helping decision-makers fully understand the output generated. We will continue to work with SMEs to define what this process and associated standards will look like.

Public engagement for transparency and accountability

Ensuring there is public trust in policing is paramount. The risks of damaging public confidence and trust in law enforcement are manifold, and the consequences well-documented. The application of advanced analytics adds complexity to this: although such technologies have been

broadly applied in the private sector, it is still relatively new within policing—however, in both cases the level of public discourse is nascent. Compounding this, the opacity of how personal data is collected and used has understandably raised surveillance and privacy concerns—in addition, the pursuit of new technological initiatives without public consultation has arguably led to diminishing public trust in technology.

Despite these challenges, there is an opportunity for the NDAS to engage citizens to influence its operation and build local accountability in developing ethical approaches to the use of analytics in law enforcement. A plan for meaningful public engagement should play a role in this. The Royal Society of the Arts (RSA)<sup>7</sup> suggests the application of ‘a process of citizen deliberation’ in the deployment of analytics across three phases:

1. Public scrutiny through consultation when such systems are being introduced
2. Technical oversight through testing predictions for accuracy or expert-led auditing; and
3. Monitoring how the system is used by humans and evaluating it for accuracy

We suggest that point 1, public scrutiny through consultation, be delivered through the Office of the Police and Crime Commissioner (at this stage, by the West Midlands OPCC). It is recognised that it takes real resource and commitment to deliver a plan for public engagement on this topic, and that consideration must be made towards being as representative of local citizens as far as possible to build local-level democratic accountability. We will also be engaging with the West Midlands Anti-Slavery Network and potentially other similar networks in other parts of the country, to explain the model and seek their feedback.

2 and 3 will be done through the process of the project, overseen by the stakeholders including the Home Office to ensure we are accountable to the public.

**Would it be considered to be used in the public interest and to be ethical?**

Yes. If it is demonstrable that the use case has the potential to rapidly identify information (that already exists, but would take longer to analyse manually) to support interventions to prevent organised exploitation, it is arguably within the public interest for it to be operationalised, in a way that is proportionate to any potential impact on individual rights.

It is appreciated that in identifying potential victims of criminal exploitation, the deployment of this use case may lead law enforcement to locate peoples who do not wish to be safeguarded, and the ability of the police to safeguard victims once found is reflective of existing national structures and policies and will vary depending on the particular context and experience of individual victims. The overall aim of this use case is to allow police and partners to move beyond the reactive safeguarding of individuals to take a more systematic approach and achieve sustained public protection through the disruption and dismantling of networks involved in organised exploitation.

**Explainable**

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<sup>7</sup> RSA, ‘Artificial Intelligence: Real Public Engagement’  
[https://www.thersa.org/globalassets/pdfs/reports/rsa\\_artificial-intelligence---real-public-engagement.pdf](https://www.thersa.org/globalassets/pdfs/reports/rsa_artificial-intelligence---real-public-engagement.pdf)

**Is information available about the algorithm / decision-making rules and the impact of each feature?**

A description of all words and phrases used to define an organised exploitation event is captured at an event level to detail why a piece of free text was deemed to be related to Organised Exploitation. In relation to individuals' position in the hierarchy of a network, the business rules will be made clear to the user, and the visualisation tool allows the user to fully understand the police data that led to the determination by the model that an individual is in a particular place in the hierarchy.