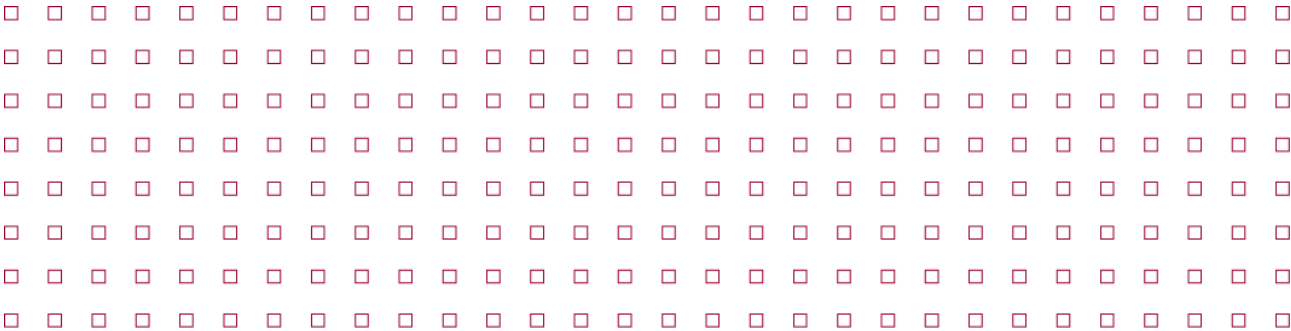Ministry
of Justice

Justice Data Lab

The pilot year

Ministry of Justice Analytical Services

13th March 2014

Analytical Services exists to improve policy making, decision taking and practice by the Ministry of Justice. It does this by providing robust, timely and relevant data and advice drawn from research and analysis undertaken by the department's analysts and by the wider research community.

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Contents

Introduction

The Justice Data Lab was launched as a pilot for one year from April 2013, with the aim of providing easier access to aggregate re-offending data for organisations that provide services to offenders. This document therefore aims to share learning from our experience of running the pilot. The document includes the following;

- Key findings through the Justice Data Lab to date – in this section we detail some of our key findings, and also reflect on who has used the service

- Reflections on our processes – in this section we look at each of the key stages in producing a Justice Data Lab analysis, and consider whether there are any improvements which we should bring into our service going forward

- User Engagement – in this section we detail the activities we have undertaken to reach our users, and changes to the service that we either have made, or intend to make to the service as a result of feedback

- Future of the Justice Data Lab service – in this section the next steps for the Justice Data Lab are discussed

This document sits alongside our current guidance on the service, and also the published Official Statistics from the service.

We welcome feedback on this report, and the Justice Data Lab service. Please email your feedback to justice.datalab@justice.gsi.gov.uk.

Background to the Justice Data Lab service

In the past, many providers of offender services, particularly in the Voluntary and Community Sector (VCS), have struggled to access re-offending data relevant to the offenders they work with. This has meant that organisations have experienced significant difficulties in measuring the effectiveness of their rehabilitation work with respect to a reduction in re-offending. The lack of access to high-quality re-offending information has also prevented some organisations learning from and improving the services they deliver; and has made it difficult – if not impossible – for them to demonstrate their impact to commissioners.

The Justice Data Lab was established in April 2013, and has attempted to address these needs by providing organisations with aggregate re-offending data specific to the offenders they have been working with, and that of a matched control group who have very similar characteristics. We hope that by providing re-offending information through the Justice Data Lab, these organisations will be able to reflect on their success, and also understand how they can improve and develop their services – ultimately leading to a reduction in crime in the future.

The Justice Data Lab team is currently staffed by 3.5 full time staff, who are employees of the Ministry of Justice and who are qualified statisticians.

How does the Justice Data Lab work?

Participating organisations supply the Justice Data Lab with details of the offenders they have worked with and information about the services they have provided. The Justice Data Lab team matches these individuals to the re-offending datasets held within the Ministry of Justice and uses statistical modeling techniques to generate a matched control group of individuals with very similar characteristics; including demographic, criminal history and employment and benefit history.

As standard, the Justice Data Lab supplies aggregate one-year proven re-offending rates for that group, and a matched control group of similar offenders. The re-offending rates for the organisation's group and the matched control group are compared using statistical testing to assess the impact of the organisation's work on reducing re-offending. We have also started to include the frequency of proven re-offending over the one year as standard following feedback from users.

The results are then returned to the organisation, with a period for quality assurance and feedback. Finally, the tailored reports produced for each organisation are published on the gov.uk website as Official Statistics, alongside a summary of the findings to date, to promote transparency and ensure that findings produced through this service can be used by others to improve the rehabilitation of offenders.

Full guidance about how the Justice Data Lab works can be found at the following link: **www.justice.gov.uk/justice-data-lab**.

Overview of pilot year

To date, the Justice Data Lab has published 57 reports showing the impact of a wide range of different programmes and services on re-offending. These reports have covered the work of providers from across all sectors and have identified programmes that appear to lead to both reductions and increases in re-offending. Among others, the Data Lab has identified new evidence on the effectiveness of:

- Interventions aimed at getting individuals into employment

- Programmes which aim to improve learning whilst in prison

- The provision of accommodation to offenders on community sentences, or after release from custody

The experience gained in operating the Data Lab over the pilot year has also enabled us to review our processes and, combined with the feedback we have received from past and potential users of the service, we have identified a number of areas where improvements

could be made going forwards. These are outlined in more detail in this document but include:

- Improving our data upload template so that better information can be captured from organisations about their work and how they identify offenders to work with

- Providing further detail within our reports on the matching of offenders to MoJ data and the reasons why some offenders have to be excluded from the analyses

- Providing additional re-offending metrics such as the severity of re-offence or re-incarceration rates

- Providing further profiling of our re-offending metrics, for example to include breakdowns for different types of offenders where possible

- Improving the availability of data underpinning our service, for example moving to quarterly updates of the re-offending cohorts and incorporating other administrative datasets to improve our modelling

We are looking forward to bringing about improvements in these areas over the extended pilot period and will continue to work closely with our Expert Panel as we seek to implement these changes.

Key findings through the Justice Data Lab to date

This section details the number of requests for information through the Justice Data Lab, and the key findings of the Justice Data Lab to date. To view all the published findings from the Justice Data Lab, please follow this link: www.gov.uk/government/collections/justice-data-lab-pilot-statistics

Requests for information

During the period 2nd April 2013 to 28th February 2014, there were 80 completed Data Upload Templates sent to the Justice Data Lab – each one defined as a request for re-offending information. Of these requests;

- 57 requests have been completed and published

- 12 requests could not be answered as the minimum criteria for a Data Lab analysis had not been met.

- 1 request was withdrawn by the submitting organisation

- The remaining requests will be processed in due course

Key findings

Of the 57 published findings; 19 reports have detailed that individuals receiving the service experienced a statistically significant reduction in re-offending behaviour; 3 reports detail that individuals receiving the service experienced a statistically significant increase in re-offending; the remaining reports detail findings which are currently inconclusive from a statistical perspective.

The programmes which detail statistically significant decreases in the one year proven re-offending measure include:

- Blue Sky who provide short term employment contracts to offenders released from custody

- Preventing Offender Accommodation Loss (POAL) project run by Brighton and Hove Council to offenders released from HMP Lewes

- NOMS CFO co-ordinates 9 regional contracts which supports offenders get into employment. The programme is delivered in the community, and within custody. These contracts are funded in partnership with the European Social Fund. This programme is delivered by 8 providers, 7 of whom have cohorts which experienced a statistically

significant reduction in re-offending where the programme was delivered in the community. These 7 providers are; Leicestershire and Rutland Probation Trust, Merseyside Probation Trust (2 breakdowns), London Probation Trust, Serco (who deliver the contract in two regions), Sova, A4E, and The Manchester College.

- A national analysis of the NOMS CFO co-ordinated programme described above

- Adelaide House Approved Premise for women

- Warwickshire Youth Justice Service provided to young offenders who have committed violent offences

- Home Group (Stonham) short term accommodation for individuals released on HDC

- Four reports for the Prisoner's Education Trust looking specifically at receipt of grants in custody for the following;

  - All persons receiving a grant to complete distance learning or to purchase learning materials

  - Grants received for arts and hobby materials

  - Grants received for BIS Unaccredited programmes

  - Grants received for Open University courses

In addition, there were some programmes where the one year proven re-offending measure was not statistically significantly different from the matched control group, but the frequency of re-offending showed a statistically significant decrease:

- A4e First Steps programme

- Everyday Skills employment programme

- Safe Ground Family Man programme

The programmes where the participants experience an increase in the one year proven re-offending measure include:

- Shelter's housing programme at HMP Leeds

- Home Group (Stonham) Residential and Support service for both prison leavers and individuals receiving community sentences (these were evaluated separately)

Figure 1 below shows the published findings broken down by main need that the intervention or service was aiming to address. This table shows that interventions or services that aimed to address employment issues were the largest category analysed through the Justice Data Lab; and that this category also had the highest number of statistically significant reductions in the one year proven re-offending measure. Interventions or services aiming to improve education or learning in prison had the highest proportion of statistically significant reductions in re-offending.

Interventions or services aimed at addressing accommodation needs have shown mixed results; including some services associated with a reduction in re-offending, and others associated with an increase in re-offending. This range of results may reflect variations in the severity of the accommodation needs that are being addressed; but also some very different approaches to tackling these needs. We have looked at projects where accommodation needs are tackled very intensely – for example by providing accommodation within an intensively monitored environment; or other less intensive services – for example providing advice about accessing other housing agencies.

Figure 1: Published findings from the Justice Data Lab to date, broken down by intervention type, and whether the service had a statistically significant increase or decrease on the one year proven re-offending measure
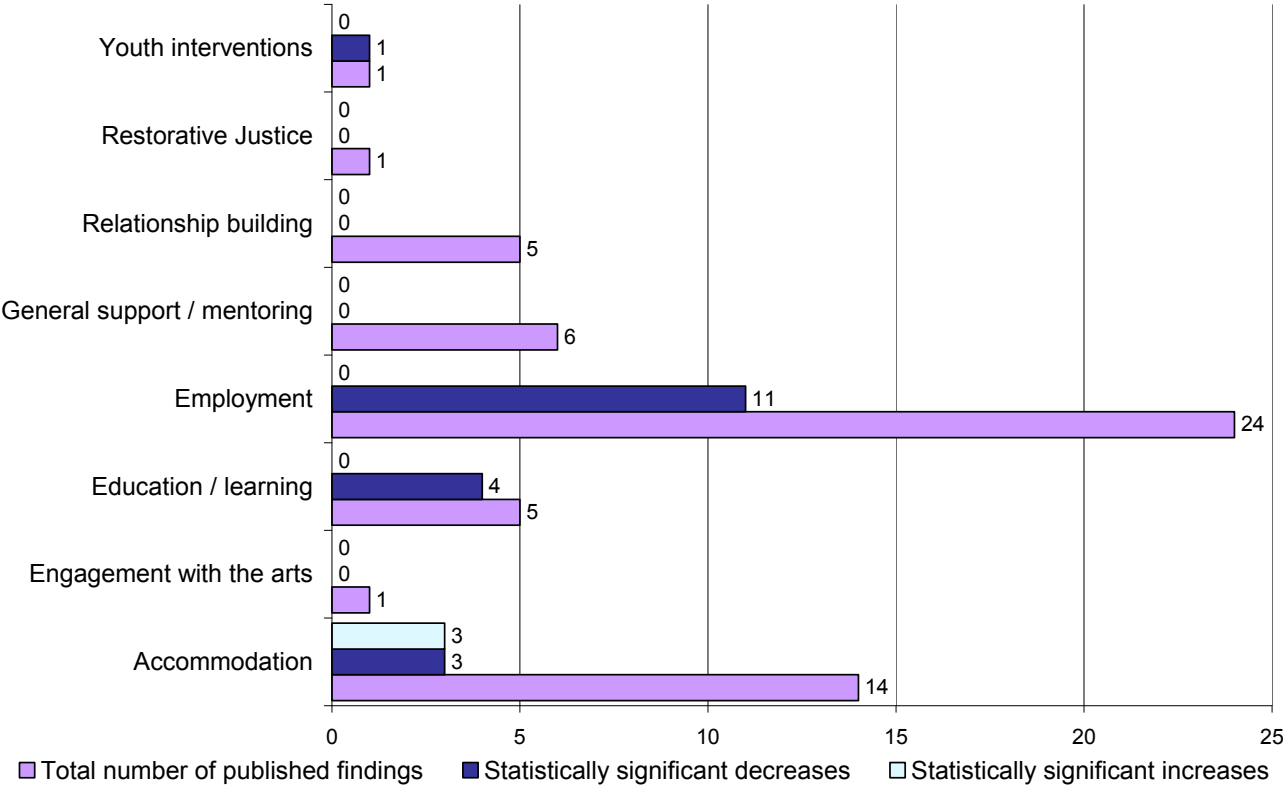
Figure 1 above only refers to the effectiveness of programmes evaluated through the Justice Data Lab only, and so should not be taken as definitive advice on which programmes are likely to reduce re-offending. Where an inconclusive result has been observed, this does not mean that the programme does not impact on re-offending and may in part, be related to the small number of individuals that the organisation has worked with. In all cases where an inconclusive result has been observed, the organisation has been recommended to submit further years of data when they become available to more precisely identify the impact of the service or programme on re-offending.

Figure 2 below looks at the published findings from each of the sectors that have requested information, including the Private sector, the Public sector, the Voluntary and Community Sector (VCS), and Educational Institutions. The largest number of published findings pertains to interventions or services carried out by the VCS, and this sector also demonstrate the highest number of statistically significant reductions, and increases, in the one year proven re-offending measure.

Figure 2: Published findings from the Justice Data Lab to date, broken down by sector type
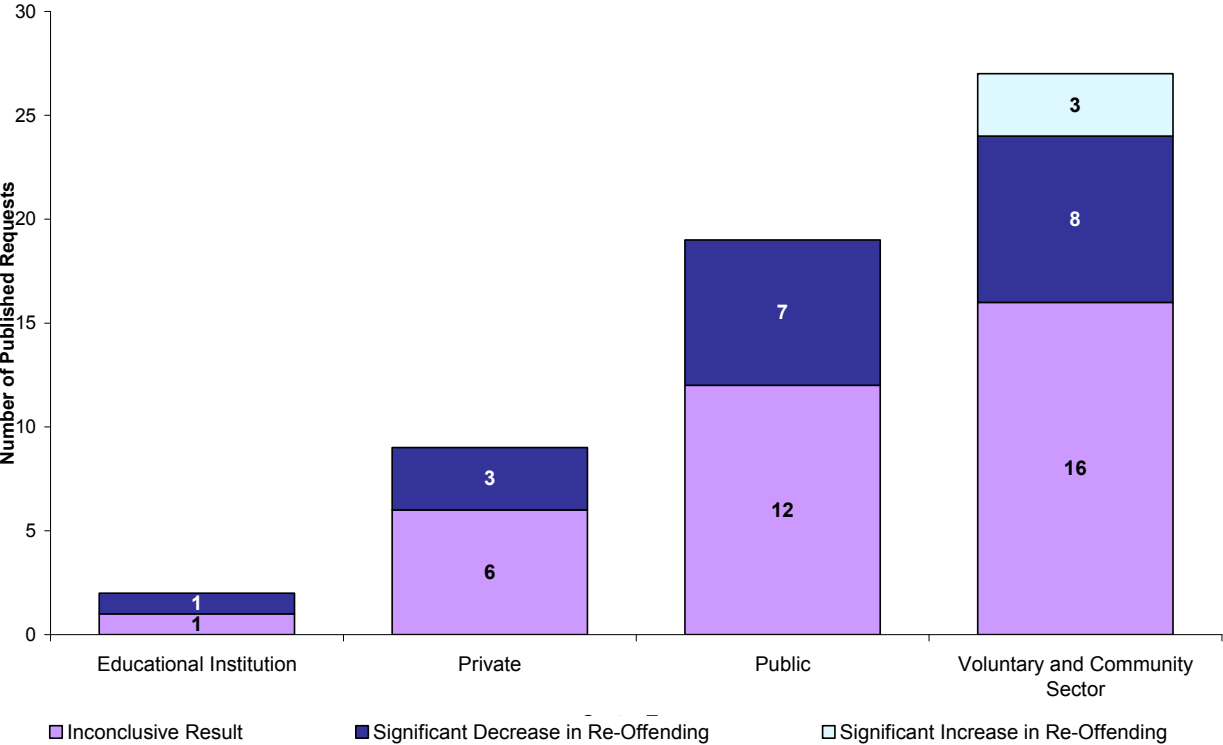
Reflections on our processes

This section looks at each stage of the production process for an analysis through the Justice Data Lab, and considers whether this has been successful, and if any improvements could be bought into the service. This section specifically looks at:

- The provision of information from providers

- The success of matching providers' data to the Ministry of Justice administrative datasets

- The creation of a matched control group

- The measurement of the re-offending outcomes

The provision of information from providers

The Justice Data Lab is a new and innovative use of Ministry of Justice administrative data. The sharing of externally held data for the purposes of matching and analysis to internally held administrative data has never been attempted before on this scale. The fact that we have received so many requests where an analysis has been possible is very positive, and reflects well on the potential for further work.

One of the key challenges for the Justice Data Lab so far, has been the information supplied in the Data Upload template. The specific challenges have included;

- Quality of the individual level information needed for matching

- Information about the intervention or service, and how it is delivered.

Of the two issues above, the information about the intervention or service, and how this was delivered has been the most pressing area where communications, and the quality of information could be improved. The Justice Data Lab team have spent significant amounts of time with some organisations trying to get more accurate information about what has been delivered to individuals, and how. In particular, understanding how an organisation starts the service with an individual is key to understanding how we should search for that person in our administrative datasets; this makes a material difference in many cases to how many individuals we are then able to match. There are many ways in which individuals will start receiving a service or intervention; some examples of this would be knowing if a person was referred to the service during the trial at court, or that it was an intervention delivered within the prison setting. It is important that all referral routes of clients to an organisation are described accurately in the Data Upload Template.

We intend to improve the Data Upload template with a series of questions around referral routes and sequencing to make it easier for organisations to provide this information. We understand that for some organisations there will be many referral routes used for their

clients – but the clearer that an organisation can be, the more confident that the Justice Data Lab will be in its analysis.

On the whole, the individual level data required by the service, including names, dates of birth, gender, and an intervention start or end date has been of good quality. However, there have been some themes where information could be improved, such as; always including date of birth where possible, and to check that the date of birth was accurate (for example, that it wasn't during the last year); and explaining any date information that is included accurately.

There are a few requests where we have attempted to use only initials, as full names could not be provided – however the matching using only this information was not satisfactory, and we will reject these requests in future due to the much lower confidence we have in the matches produced.

There have additionally been instances where duplicate records for an individual have been submitted; often this appears to be because an organisation worked with the individual more than once. It would be helpful if there was only one entry per individual; although if it is common that an individual would receive the service or intervention multiple times, this should be reflected in the information about the service / intervention.

Where organisations have been able to supply Police National Computer number (PNCid), or Prison number, this has improved our ability to match individuals significantly. We would recommend that if organisations are able to include either of these fields in their Data Upload Template in future, that they take opportunities to do so. We would also recommend that if organisations who do not currently record this information are able to collect either of these fields administratively in future, that they take opportunities to do so, ensuring that this collection complies with their responsibilities under the Data Protection Act.

To summarise this section, the following checklist outlines the key steps that we recommend organisations consider when submitting individuals to the Justice Data Lab:

1. Has the requirement for a minimum number of 60 individuals been met?

2. Has each individual got the following; full name; date of birth; gender; intervention / service start or end date.

3. Additionally, is the intervention start or end date within the time period specified by the Justice Data Lab, and can this date be fully explained in relation to the referral route to the organisation (i.e. did the intervention occur in prison, or after a referral from the courts?)?

4. Furthermore, can any administrative identifiers such as PNCid or Prison number be included for any individuals?

5. Are there any duplicates within the cohort submitted? If so, why are there duplicates?

6. Has adequate information about where the service or intervention was received been specified? Has information about the delivery and nature of the service been given to its fullest possible extent?

The success of matching providers' data to Ministry of Justice administrative datasets

This sub-section looks at the process by which we identify individuals for analysis.

In order to ensure a consistent approach, we currently use a defined process which selects individuals systematically for analysis. This process is detailed in every published report, with number of individuals matched at each step – and any relevant reasons why individuals were not included for analysis. The criteria we use are tightly defined to ensure that the final analysis is as robust and specific as possible. From this perspective, the attrition we see is not unexpected; and ensures that through tightly defining the cohort for analysis we can generate the most accurate control group for comparison; and therefore draw any resulting conclusion with more certainty.

The reasons for individuals being lost from the initial sample include:

- The primary reason for not matching individuals where the intervention / service is delivered in the community is because we impose a time limit between the start of a community sentence or release from custody and the start of the intervention or service. This time limit will not usually be applied by the organisation in the delivery of the service to individuals, but it is right from a statistical perspective to do this to generate a matched control group of individuals who have the same sentence, but who have not re-offended within the equivalent time limit imposed. This ensures that any difference in the re-offending measure is more likely to be attributable to the work of the organisation, rather than the sentence plan of the offender or any other factors.

- For interventions or services delivered in prison, the primary reason for not matching individuals will be because they have not yet been released from prison before the end of the period for which we currently have re-offending data for. For those individuals who were still in prison at this time, a re-offending follow up will not have been appropriate.

- Conversely, for some individuals where the intervention was delivered in prison, if the individual has many prison sentences within a short space of time, and if there is any uncertainty around the intervention or service start date, matches will often be rejected if we cannot decide with complete certainty which prison release should be used as a basis for the re-offending follow up period.

- The individuals could not be found on our administrative datasets; possibly because the information about the individual (i.e. name, date of birth, sentence information) was not the same as what is held administratively, and we would not be confident with this match as a basis for analysis.

- For interventions taking place in the community, the individual re-offended before intervention or service started, but after receiving their sentence.

- The organisation submitted individuals where the service or intervention took place after the period for which we currently have re-offending data for.

- Individuals who have ever committed a sex offence are removed from the analysis, as individuals who have committed sex offences tend to have very different patterns of re-offending, meaning that the one year follow up period is often not appropriate.

Worked example

A worked example is presented below to help make our explanation of the matching processes we use clearer. The request came from the organisation Foundation, and this information was previously published in December 2013.

1,246

Foundation sent information to the Justice Data Lab with 1,246 records or individuals who received the support service provided by Foundation between 2004 and 2010, and who left the service in 2009 or 2010. This included some duplicate records.

1,125

1,125 of the 1,246 records were matched to the Police National Computer, a match rate of 90%. 6 individuals were not matched because date of birth was not accurately provided for them. There were 34 individuals who do not have any convictions recorded on the Police National Computer.

347

In total, sentences were found for 916 individuals– a match rate of 81% of those matched to the Police National Computer. Of those, 347 offenders received the Foundation support service within 6 months of an identifiable community sentence during 2004 to 2010. Having a 6 month period between the start of the probation and the start date of the support service run by Foundation means that any observable difference in the 1 year proven re-offending rate would be more likely to be attributable to the work of Foundation, rather than any other factors which may have had an effect.

Analysis of the unmatched data revealed the following:

- There were 355 records relating to 168 individuals who received the Foundation service more than once. All 355 records were examined to work out which was the right follow up period for re-offending for that individual but ultimately this meant that 187 records were dropped at this stage.

- Some were individuals who did not have a Community Order or Suspended Sentence Order as the most recent proven offence before receiving the support service from Foundation; this could include persons who received a caution, fine, absolute discharge, conditional discharge, positive drug test, prison sentence or youth sentence (491 individuals across all different sentence types, 251 of these individuals received the support service from Foundation within 6 months of receiving a sentence). It would be possible for an additional analysis of the effectiveness of the Foundation Service for

these sentence types. In particular, we recommended that this analysis is additionally carried out for persons receiving the service after leaving custody.

- There were 78 individuals who had a Community Order or Suspended Sentence Order as the most recent proven offence before receiving the support service from Foundation, but who were not included in the analysis. 69 of these individuals did not start receiving the support service from Foundation until at least 6 months after the start of a Community Order or Suspended Sentence Order. 9 of the 78 individuals could not be included in the analysis as their index offence appeared to be of a sexual nature.

- Relevant sentences could not be found on the administrative datasets for 22 individuals.
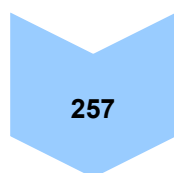
257 90 persons were removed because they had committed a re-offence before the support service provided by Foundation commenced.
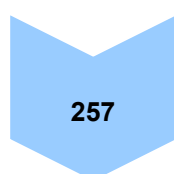
257 All of the 257 offender records for which re-offending data was available could be matched to offenders with similar characteristics but who did not receive the support service run by Foundation. The final analysis was based on 257 individuals who started receiving support from Foundation within 6 months of a probation sentence, and hadn't re-offended before the support from Foundation began.

For the worked example above, it would appear that attrition is very high – initially 1,246 individuals were sent, but only 257 were selected for the final analysis (21%). However, in total, sentences were found for 916 individuals (81% of those matched to the Police National Computer), and the majority of remaining cases were excluded on the basis of there being more than 6 months between their sentence date and Foundation commencing the programme. Including these cases in the results would reduce our confidence that any difference in re-offending was related to Foundation's work and not other factors. The report for Foundation outlined further groups of individuals where an additional analysis could be completed.

We are intending to put this level of detail in reports going forward where possible to help explain the findings and potential for further analysis in more detail.

For those interventions which take place in prison, we have identified that there is another specific improvement that we could make to the Justice Data Lab service; where groups of individuals don't appear to have been released from prison during the period for which we currently have re-offending data, we will see if it is possible to identify the later time when these individuals have been released, and advise when a future submission to the Justice Data Lab would be appropriate. This information is not currently available to the Justice Data Lab, but it is available administratively to the Ministry of Justice.

The creation of a matched control group

During the pilot year, we have continually reviewed the robustness of our methodology. These reviews have proved to be very useful and have helped shape decisions for the future of our service. Consideration of our methodology is given below, supported by feedback received from other areas.

The full methodology used in the Justice Data Lab has been published, and can be found at the following link: http://www.justice.gov.uk/downloads/justice-data-lab/justice-data-lab-methodology.pdf

There is evidence to suggest that the methodology used for the Justice Data Lab analyses is working effectively. In almost all cases where a minimum of 30 individuals and their follow up period had been identified, the Justice Data Lab has been able to find a matched control group of individuals with similar characteristics to those individuals but whom the organisation have not worked with, and then carry out statistical analyses on these groups. Throughout the pilot we have developed a deeper understanding of our how Propensity Score Matching should be applied for different sentence and intervention types. This has enabled us to improve and develop our methodology accordingly, increasing the efficiency with which we are able to carry out a request.

We are confident that the results the Justice Data Lab produce are replicable. Quality assurance processes that are carried out once an analysis is complete have proved there is consistency within our results. Sensitivity testing has allowed us to demonstrate that using slightly different parameters throughout the methodology process will not have a significant impact on the results - again confirming that we can be confident in the results that we produce.

Our Propensity Score Matching approach to creating a matched control group makes use of the wealth of data that is available to the Justice Data Lab. However, there are limitations as detailed in our published methodology paper and within this publication. These include the quality of data that we receive from an organisation, attrition throughout the process, the fact that we are unable to account for any other interventions/services that offenders may have received, and that we may have been unable to account for some important variables directly relating to the service.

We have identified a number of key areas where improvements could be made to address these areas. These include:

- Availability of underlying data; at the moment the annual re-offending cohorts have been used to identify the relevant follow up period for an individual. These cohorts are produced on a rolling quarterly basis, and could be included in our underlying methodology.

- Enhancing our understanding of the criminogenic needs of individuals - we are aiming to bring Offender Assessment (OASys) data into our service, to see if it is possible to take more specific needs of individuals into account in our analyses. There have been mixed results for those interventions which aim to tackle housing, or homelessness

- Providing additional metrics on the re-offending outcomes; such as the severity of re-offending or re-incarceration rates. This will help us understand more fully how the intervention or service may have affected re-offending; we are currently investigating these ideas.

- Account for regional data when matching the treatment and control groups. Currently the matched control group will consist of individuals across England and Wales. However, we think there is an increasing case for controlling for area differences where possible.

Measurement of the re-offending outcomes

In every Justice Data Lab report about the effectiveness of an organisation or service, the best estimate of the impact on re-offending is given; alongside a range where the true impact will lie (this range is known as a confidence interval). Expressing this range is important because each estimate of impact will be subject to uncertainty; primarily from the selection process, but also because generally speaking, most organisations will only work with a small number of individuals in any given period and who may have atypical characteristics. This sub-section looks at the findings published by the Justice Data Lab to date, and how increasing the number of individuals submitted to the service will increase the precision of our estimates. This sub-section is divided into the following topics:

- Effect sizes observed through the Justice Data Lab

- The statistical power of our analyses

Effect sizes observed through the Justice Data Lab

In this section, we look at the re-offending outcomes that we have reported for each request, and discuss why the confidence intervals around the estimate of the impact can sometimes be large.

In order to ensure that the findings generated through the Data Lab are as robust as possible, it is important that any differences observed between the re-offending rates of the organisation's cohort and those of the matched control group are tested for statistical significance.

This process, which involves calculating a range (known as a confidence interval) within which we can be confident that the actual difference in re-offending brought about by the organisations work falls, reduces the risk that that any positive or negative results are reported when these could have occurred simply by chance. A range is used, because due to the process of selecting individual for analysis, some individuals will have been removed from the initial selection – and therefore the final figure for the one year proven re-offending measure will be an estimate, subject to a degree of uncertainty.

In supplementing the observed differences in re-offending rates with confidence intervals, we gain a more accurate picture about whether the provider's work has had any real impact or not on re-offending; if the range of the confidence interval crosses zero, this suggests to us that there is still a large degree of uncertainty around the true impact on re-offending of this organisation – this is known as an inconclusive result. It is still right that we publish these findings, because it may be that for the first time, an organisation understands the re-offending behaviour of its clients, regardless of understanding with completely certainty, a measure of their impact on this outcome.

The Justice Data Lab uses 95% confidence intervals for all of its analyses, which means that we lower the risk of identifying an incorrect result to 1 in 20.

Figure 3 below illustrates the relationship between the size of the matched treatment group and the range (confidence interval) presented around the change in re-offending.

Each request that has been published to date is represented by a diamond and line. The diamonds show the best estimate of the effect size, which is the difference between the one year proven re-offending rate for the final matched treatment and control groups and the size of the final matched treatment group. For example, if the one year proven re-offending rate for 100 offenders participating in an intervention was 30%, compared with 36% for a matched control group, the best estimate of the effect size would be 6 percentage points and the size of the final matched treatment group would be 100.

The lines going through the diamonds represent the confidence intervals around these estimates. If the confidence interval crosses 0 on Figure 3, it indicates that the request has an inconclusive result which means we cannot be sure either way that receiving the intervention led to a reduction or increase in re-offending and thus cannot draw a firm conclusion about its impact. However, if the confidence interval does not cross 0, this indicates a statistically significant result meaning that we can be confident that there is a real difference in the re-offending rate for the persons who received the intervention.

From Figure 3, it is clear that as the treatment group size increases, the precision of the effect size of the one year proven re-offending rate increases. We can tell the precision of the effect size increases by looking at the width of the confidence intervals, which get narrower as the size of the cohort increases. Also figure 3 demonstrates that the majority of the final matched group sizes published to date have been less than 500 and have therefore been presented with quite large confidence intervals.

Figure 3: Effect on the one year proven re-offending rate against treatment size (All requests published to date)
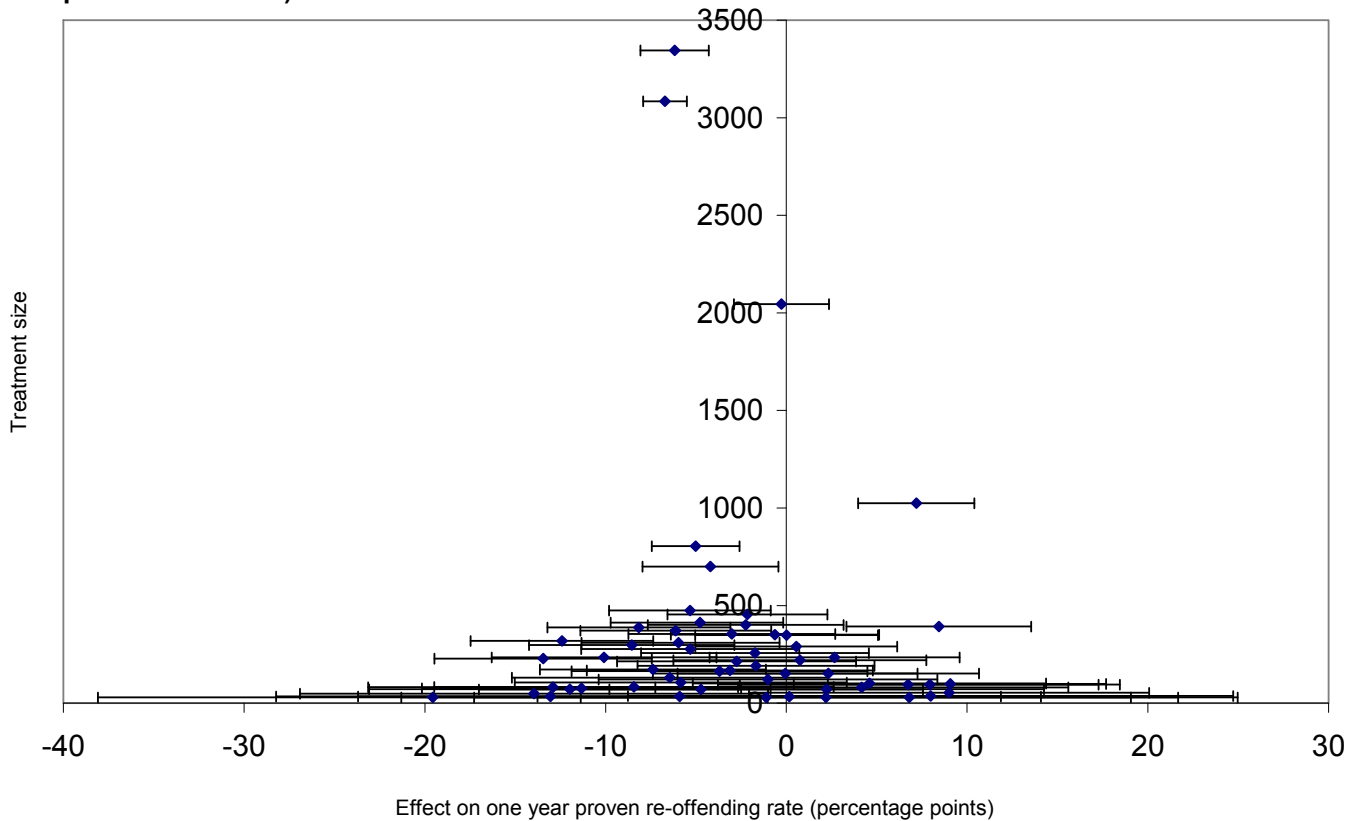

Figure 4 below provides a similar illustration but is limited to those reports that have shown a statistically significant change in re-offending.

We can see that so far 19 requests have indicated a statistically significant reduction in re-offending and 3 requests have indicated a statistically significant increase in re-offending. The smallest treatment size that has shown a statistically significant result so far is 30. Figure 4 also shows that there are 15 significant requests with a sample size over 200, which is a very large proportion of the significant requests published to date.

Figure 4 also confirms that it is possible for smaller organisations to demonstrate a statistically significant finding; the smallest group on this graph was for the Preventing Offender Accommodation Loss (POAL) project, run by Brighton and Hove Council, where only 30 individuals were matched and analysed. This project shows that the best estimate of the impact is that the re-offending behaviour of the clients was reduced by 20 percentage points, however we can only be statistically confident that the reduction in re-offending was between 1 and 38 percentage points. For this particular request, the confidence intervals around this estimate were very wide.

Figure 4: Effect on the one year proven re-offending rate against treatment size (All statistically significant requests published to date)
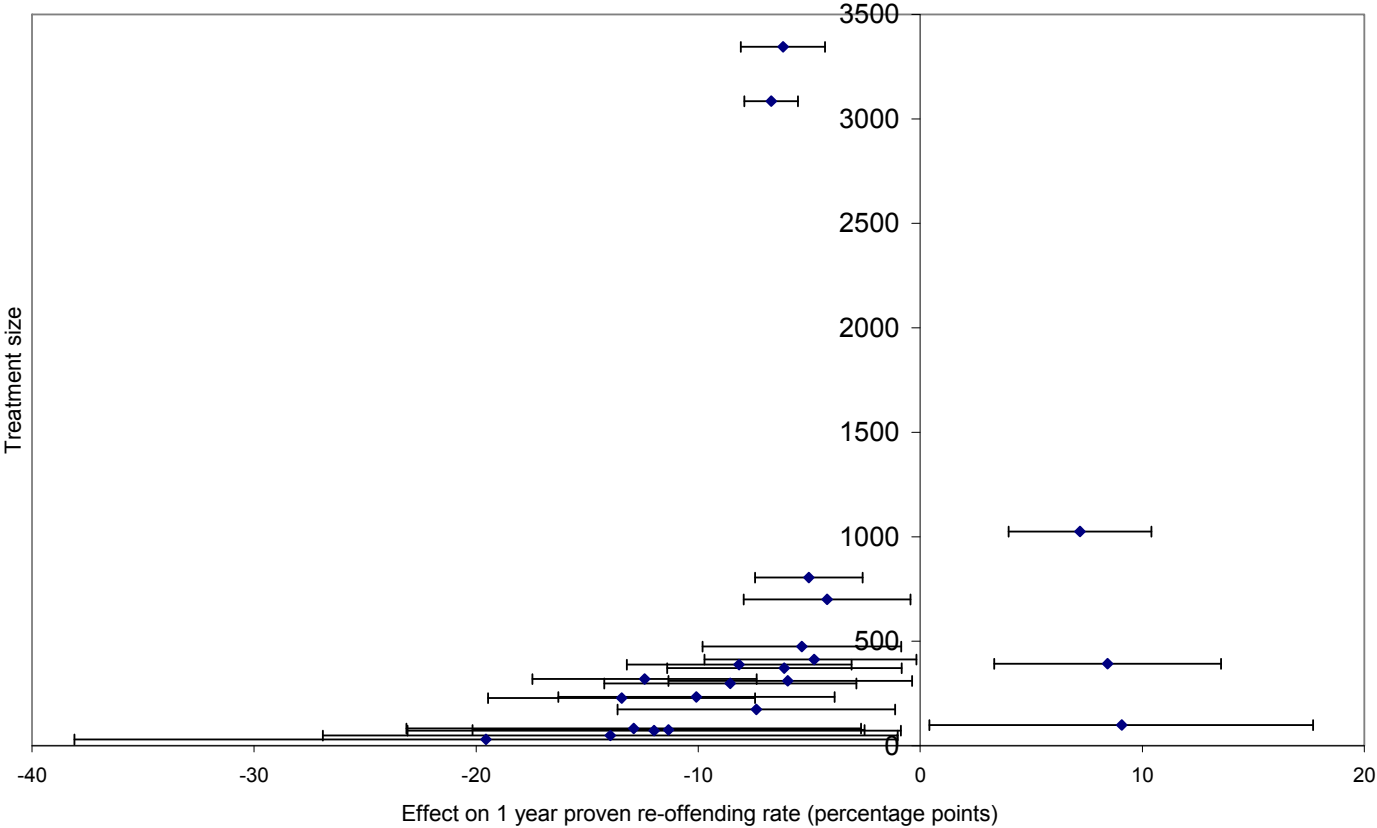
Statistical power of our analyses

Figures 3 and 4 above have highlighted how with an increasing sample size, we can produce analyses with an increasingly precise estimate of the impact on re-offending. However, we know it will not be possible for the majority of organisations to submit a cohort with over 1,000 individuals, so instead we have tried to provide guidance on how many individuals would produce a significant result, for different effect sizes. Our intention with this section is to manage expectations for organisations, and to build on the information provided about why so many inconclusive findings have been observed.

Cohort size matters because it determines the confidence with which generalisations can be made to the wider population. Generally, the larger the cohort, the more confident we can be that it is representative of offenders generally, or those with the specific characteristics the organisation is seeking to address, and hence the precision of our estimates improves. Analysis on small cohorts can rarely produce a definitive outcome; because there may be differences within that cohort that make it more difficult to generalise these findings.

One of the most common means of assessing the accuracy of estimates is statistical significance. Statistical significance refers to the likelihood that an observed difference occurred by chance and is commonly computed at a value of 95 percent - denoted as a p-value of 0.05. A finding of statistical significance with p-value of 0.05 indicates a one in twenty probability that the observed difference occurred by chance.

We can work backwards from using a p-value of 0.05, and an estimate of the effect size we want to see, by coming up with the table below which looks at the number of individuals we would need to analyse to determine with confidence that effect. We have looked at the number of individuals needed to detect reductions between 1-10 percentage points.

In table 1 below, we have taken an example of the organisation Foundation, using information that was previously published in December 2013 for a power analysis test. We have taken the approach of using a worked example here because the results for Foundation were inconclusive, and this therefore could be of more use to organisations thinking about using our services. The one year proven re-offending rate[1] for 257 offenders who received the support service run by Foundation was 33%, compared with 35% for a matched control group of similar offenders, however this difference was not statistically significant.

It is important to note that the estimates in table 1 below are subject to a number of limitations. We have assumed that in the "matched treatment group" size, the group will contain individuals with some variation in re-offending behaviour, and reaction to the service or intervention that was delivered. If an organisation works with individuals who are all very different to each other, and are likely to receive very different other services or interventions as part of their rehabilitation for reasons which we cannot statistically control for – then these numbers will not be an appropriate guide to determine these effect sizes. The power calculations also assume that an individual's motivation to tackle their re-offending behaviour will be the same in both groups – if this is not the same, this again will mean that these figures will be limited.

From table 1 we can see that to obtain a precise estimate of the impact on re-offending we would need a large matched treatment group. When trying to detect a small change in re-offending, a larger cohort size is needed because the precision of the estimate has to be much tighter to detect that a genuine change has happened. The figures below highlight that it is very challenging to detect small changes in behaviour for the one year proven re-offending rate, but large changes in behaviours will be more realistic for the Justice Data Lab to detect.

For example, to detect a one percentage point reduction in re-offending, Foundation would have needed a minimum size of 240,648 for the matched treatment group. As the precision of the estimate of the impact on re-offending decreases (the expected percentage point reduction in the one year proven re-offending rate increases), the minimum size of the matched treatment group also decreases.

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[1] The **one year proven re-offending rate** is defined as the proportion of offenders in a cohort who commit an offence in a one year follow-up period which was proven through receipt of a court conviction, caution, reprimand or warning during the one year follow-up or in a further six month waiting period. The one year follow-up period begins when offenders leave custody or start their probation sentence.

Table 1: Minimum treatment group size required by expected reduction in the one year proven re-offending rate for Foundation[a]

Expected percentage point reduction in the one year proven re-offending rate	Minimum size of the matched treatment group
1	240,648
2	9,327
3	3,584
4	1,925
5	1,207
6	829
7	605
8	461
9	363
10	294

[a]It was assumed that the control group size was 33,111 (as published in December 2013), and a two-sample t-test was used with unequal group sizes 95 per cent confidence and 95 per cent power (type II error).

It is important to reflect here that detecting a genuine change in the one year proven re-offending measure may be challenging for some organisations. The estimates of the minimum matched treatment group size would be similar for another organisation, but it would not be exactly the same because the individuals themselves, and the reaction to the service provided will also be different. We recommend that organisations submit as many individuals as possible including previous years of information to improve the chance of obtaining the most precise estimate of the impact on re-offending possible.

User engagement

In this section, we detail the key ways in which we engage with our users. This is important because the Justice Data Lab was established in order to address a need and we need to ensure that our service continues to meet the needs of those and future customers. User engagement is therefore a key theme of our work, which this section details.

Summary of our user engagement during the pilot

The Justice Data Lab carries out detailed analysis of interventions or services delivered by a range of providers. Our statistics are organisation-specific meaning that direct communication (between the Justice Data Lab team and data providers) is essential to reflect each service fairly.

- We make sure organisations know what we do, how they can get involved and what they will get back from us through **our website guidance; attending events; and responding to general queries via email and telephone**

- We have built, and will continue to build our knowledge of the barriers external organisations face in collecting or submitting data to us through **our Expert Panel; feedback survey of users; and taking on board information through conversation with providers**

- We are very grateful to those organisations who have **hosted us** at events or alliances

- We try to understand the service that we are generating analysis for, and the individuals who received it **by getting in touch with the organisation directly and frequently once analysis has started and keeping in touch throughout**

- We want improve the quality of our work **through feedback from those who have used the service; other stakeholders; and internal experts**

Our monthly publication is the primary outlet for communicating project results publicly, and we have very regular communication with providers in the four week period leading up to this. Once an analysis is finished, we draft a report and send it to the data providers who then have a four week review period, during which we can answer queries about the analysis and make amendments to the reports according to the feedback we receive. The level of communication during this period has varied widely, where some organisations don't indicate any changes to our initial report and others recommend many changes. This often reflects the quality of information received in the Data Upload Template.

One of our main aims is to communicate our results in an accessible and effective way that gives that organisation a real understanding of their impact on re-offending. Our outputs are

designed to be understandable to a non-statistical audience; however these results are produced using a complex methodology. We answer queries on this methodology frequently (further to signposting to a guidance document) and have improved our ability to communicate statistical concepts such as confidence intervals and propensity score matching directly through our communications on this with individual data providers.

We have also experienced some issues which could have been avoided through better communication. For example, we have been sent data for analysis by organisations where the contact is then subsequently unavailable due to various reasons. These have included temporary staff or staff nearing the end of their tenure at the organisation who did not communicate to others within the organisation that they had submitted a requent to us. It is important that organisations agree internally to submit their information to the Justice Data Lab, going through the appropriate governance so that the results do not come as a surprise to the organisation when we return them. This aspect of our work has at times been extremely time-consuming and ultimately impacts on the number of requests we are then able to look at.

Our analysis timing varies widely from a few days to several weeks, depending on the complexity of the analysis, and so the impact of this issue has similar variability. We have learned that when organisations use a CJSM account to submit their data to the service, they may not check these accounts again – so all organisation should clearly flag an alternative account that we can send emails to, or a phone number allowing us to call them when we have sent a message to their CJSM account.

We have received positive feedback on our communication, particularly from those with whom we have frequent contact. Looking forward, we hope that the quality of information provided by organisations, as well as our good working relationships with them, continue to improve through our communications.

Our feedback survey of users

The Justice Data Lab team gather feedback on their service in a range of formats, one being a short, anonymous, online survey. After each publication round the Justice Data Lab send their feedback survey to be completed by those organisations whose reports were published in the previous month. This gives the organisation approximately a month to reflect on the findings in their report and gather feedback themselves if desired. This survey forms part of the Justice Data Lab conditions of service that an organisation agrees to be contacted at a later point in time about the experience of requesting information through the Justice Data Lab as part of the "Roles and Responsibilities" of the organisation.

The response rate to the survey has been reasonable at 60% to date and we would like to thank those organisations who have completed the survey for doing so. We take the feedback mechanism of our service very seriously in order to understand improvements for our service and take action on the feedback where possible. We have directly used the survey results to help evaluate the success of the Justice Data Lab pilot and make recommendations for the Justice Data Lab's future.

Key findings of the feedback survey to date:

- The expectations around the Justice Data Lab were clear and have been met, although we could do more to keep our customers up to date. There is an action here for us to improve the quality and regularity of our communications with users, especially when we begin an analysis.

- The Justice Data Lab is a useful service, providing useful information on re-offending rates and the impact of organisations on re-offending, presented in a clear and helpful way.

- A more flexible service with information on additional outcomes, including further outcomes on re-offending such as severity and re-incarceration rates, would be helpful.

- There were a range of perceptions as to how useful the service is for various aspects of organisations, however the majority have used/ plan to use their Justice Data Lab results to understand and demonstrate the impact of their service both internally and externally.

The role and feedback from our Expert Panel

The organisation New Philanthropy Capital (NPC), and the infrastructure body, Clinks, were both instrumental in helping us establish the Justice Data Lab. Since the Justice Data Lab pilot was established, both organisations have supported our operation fully by being critical friends. In January 2013, NPC established an Expert Panel that consists of; staff from MoJ; NPC staff, Clinks, VCS organisations, the organisation Social Finance, and academia. Prior to the launch of the Justice Data Lab, the Expert Panel met approximately monthly, and provided feedback on the development of the pilot. Since the launch of the pilot, the Expert Panel have met approximately quarterly, and have continued to provide feedback on how the service has progressed from their perspective, the reception of the service and our outputs.

The challenge and support from the Expert Panel has been extremely positive, and we are grateful to every member of the group who has given their time freely to this purpose. We feel that the Justice Data Lab has genuinely benefited from this input, and that we have managed to improve our service as a result. In particular, the specific improvements that we have made include;

- Ensuring our guidance is clear and accessible to those outside MoJ

- That our published outputs can be easily understood and interpreted by both the lay person and the methodology critic

- Supporting our decision that the frequency of re-offending should be included as standard in all reports

- Improving the understanding in the sector of the Data Protection principles that apply when accessing the service

- Supporting the service in communications to other users (and this often means being clear about the limitations of our service!)

The Expert Panel have also provided the Ministry of Justice with regular feedback on the barriers to accessing the service, and how these barriers could be addressed. These improvements include:

- That the Justice Data Lab does not yet provide a service which would be suitable for certain types of interventions; specifically for those that target drug and alcohol use.

- That we could provide more on the re-offending outcomes, so that the journey of desistance from crime is understood alongside the one year proven re-offending rate.

- That we also look to see if outcomes, other than re-offending could additionally be included.

- That we ensure that the coverage of our underlying data is kept as recent as possible.

- That we support organisations to know how to collect information better in future; there are some recommendations in this document which we will hope will provide a foundation to that effect.

- That we could provide further information about statistical power, which we hope that this document also starts to address

Future of the Justice Data Lab service

We are pleased to announce that the Justice Data Lab will continue to be piloted for another year from April 2014. The service will continue to be free at the point of use, and the same service model will continue to operate, as detailed in our guidance.

Throughout this document, there have been various suggestions on how the Justice Data Lab can be improved and move forward as a service. We will need to ensure that we balance continuing to deliver the Justice Data Lab service alongside bringing in the improvements which are mentioned below. The key improvements that we want to bring in over the next year include:

- To improve our communications with users, so that users to the service feel that we have responded accurately and professionally to all their queries. This is something that we have actioned and will continue to improve on.

- Improving the Data Upload Template with further questions about referral routes to the organisation, and where the intervention or programme was received. We will release an updated version of our Data Upload Template over the next few weeks alongside updates to our guidance documents.

- Providing greater detail on the selection of individuals for analysis in the section "Processing the Data", giving fuller detail about why individuals were not included where possible. If it is possible to indicate for persons who were not included in the analysis because they are still in prison, approximate dates of when they were released from custody. We want to bring this improvement in over summer 2014.

- Providing additional metrics on the re-offending outcomes; such as the severity of re-offending or re-incarceration rates. This will help us understand more fully how the intervention or service may have affected re-offending; we are currently investigating these ideas as this is the main improvement we would like to make, and will start including as standard any measures which meet the expected quality standards over the coming months.

- Availability of underlying data; at the moment the annual cohorts have been used to identify the relevant follow up period for individuals within our underlying dataset. These cohorts are produced on a rolling quarterly basis, and could be included in our underlying methodology. We want to bring this improvement in by summer 2014.

- Enhancing understanding of the criminogenic needs of individuals - we are aiming to bring Offender Assessment (OASys) data into our service, to see if it is possible to take more specific needs of individuals into account in our analyses. Related to this, requests for those organisations that target accommodation needs of offenders have shown the greatest mix of results - we are eager to investigate how we can control more accurately for the type and strength of accommodation needs an individual may have. We are due to receive the OASys data in spring 2014, and we anticipate starting to feasibility test this data from then.

- Account for regional data when matching the treatment and control groups. Currently the matched control group will consist of individuals across England and Wales; however we think there is an increasing case for controlling for area where possible. We are aiming to start the feasibility of this work in summer 2014.

- Within a request, giving the re-offending outcomes by different demographic profiles where possible – for example, giving the re-offending outcomes for those in different prisons; or intervention type; or demographic variables such as gender. This will have to be done on a case-by-case basis because as a minimum requirement there must be enough individuals in each category for us to be confident in these results and not to disclose personal data. We hope to bring this improvement in from spring 2014.

- An assessment of the statistical power within each published request; for those organisations who receive an inconclusive result, they may want to know how many individuals would have made the findings statistically conclusive. We hope to bring this improvement in from spring 2014.

Recommendations for users of the service

This document has also detailed recommendations about how users of the service could improve their access to the Justice Data Lab. These recommendations are reiterated below:

- Ensure that the Data Upload Template is completed to the fullest and most accurate extent, including the individual level data and the information about the intervention or service.

- Ensure that an application to the Justice Data Lab has been approved through the relevant governance within the organisation.

- If an organisation submits their Data Upload template through CJSM, they must provide alternative contact details to allow us to get in touch with them (or that they check this CJSM account regularly).

Contact Points

Press enquiries should be directed to the Ministry of Justice press office:

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Other enquiries about the analysis should be directed to:

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General information about the official statistics system of the United Kingdom is available from www.statistics.gov.uk