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The Challenges and Complexities of Implementing and Evaluating the Benefits of an IT System: The UK Police National Database

Tessa Lambri, Thomas W. Jackson, Louise Cooke
Department of Information Science, Loughborough University,

Loughborough, Leicestershire LE11 3TU, UK

t.lambri@lboro.ac.uk; t.w.jackson@lboro.ac.uk; l.cooke@lboro.ac.uk

Abstract

This paper discusses the various challenges and complexities involved in evaluating the benefits of an information system – the Police National Database. The paper begins by outlining background events in UK policing which lead to the Bichard Inquiry in 2004. The PND is a direct recommendation from the Inquiry, and represents one of the most important developments in recent policing history. The organisational context of implementing the PND is examined to discuss the various business change issues that are apparent, as well as the cultural changes in policing practices. The national methodology for benefits realisation is discussed, and this alluded to the complex context of evaluating evolutionary information systems such as the PND, and the challenges involved in measuring the system's productivity and performance. Previous research carried out in relation to evaluating information systems, has enabled the development of distinct methodologies, and have assisted in identifying appropriate evaluation metrics for the PND. The paper concludes by summarising the complexities of performance and evaluation in information technology, and how future research planning will determine the development of an appropriate and robust evaluation framework for the PND.

1.0 Introduction

Following the tragic deaths of Holly Wells and Jessica Chapman in Soham, Cambridgeshire in 2002 and the subsequent conviction of Ian Huntley, an inquiry was established under the Chairmanship of Sir Michael Bichard. The Inquiry was set up to examine the process and effectiveness of intelligence based record keeping and information sharing. Sir Michael made a number of recommendations, one of which was that a national information technology system to support police intelligence should be introduced as a matter of urgency [1].

The Police National Database (PND) has been developed to meet Sir Michael's recommendation. It will, for the first time provide a single view of data held in police intelligence, custody, crime, child and domestic abuse systems across the whole of the UK. It will not replace local police systems but it will allow all forces to see and share information that until now has only been available within individual force boundaries. However, the PND is more than just a powerful research tool, it will facilitate the development of analytical applications that will enable forces to match records and identify new links and patterns in offending at a local, regional and national level.

2.0 Background

Historically, all UK police forces have collected information relating to arrests, incidents, crimes and intelligence and stored this within their own force computer systems. Whilst this has worked well for a number of individual forces, a number of high profile incidents in recent years, have demonstrated that forces not only need to share the information they have collected, but also need to see information collected by other forces. The PND is one of the most important developments in national policing in recent history. For many years, the police service has recognised that it needs to share intelligence and operational information through one system, and the PND provides this opportunity. Tasked by the Home Office, the National Policing Improvement Agency (NPIA) is currently delivering the PND, working with forces in loading their data onto the new system. The overarching benefit of the PND is the capability to electronically share, access and search existing local intelligence and operational information nationally.

3.0 Organisational Context

The PND will be accessed through secure role-based access and will allow sharing, searching, linking and association of information from the 43 forces of England and Wales, 6 Scottish forces and the Police Service of Northern Ireland. This is intended to enable forces across the UK to support public protection and in particular to enhance the safeguarding of children and vulnerable adults, countering terrorism and assisting major crime investigations.

The delivery and implementation of the PND is well documented in the NPIA's Business Plan for 2010-2013 [2]. The project sits under the umbrella of the IMPACT programme, which is about improving police performance within the sphere of information, intelligence and science. The management of police information (MoPI) is a significant component of the IMPACT programme, as its guidance ensures that police information is managed appropriately and consistently in all police forces in the UK. The MoPI Code of Guidance [3], was introduced to forces in 2006, and has subsequently informed PND practices in the recording of police operational information and intelligence. It has also provided forces with guidance as to data quality and data management standards, and has further developed the 5x5x5 intelligence management process, a derivative from the national intelligence model [4].

Delivering the PND is not simply about the delivery of IT. Delivering the PND is about business change enabled by IT and is a complex process, ensuring not just the right IT capabilities and functionality are delivered, but also that the data are prepared and the necessary supporting business change elements are in place. This requires time and careful planning if the Police Service is to realise the benefits from the PND. Consequently, this will be managed in stages. The initial phase began in 2010, and will bring together data from five operational areas of policing – custody, crime, intelligence, child abuse and domestic abuse - into one central system. This will support the following areas of policing [5]:

- Protecting children and vulnerable adults, by being better able to assess risks, and by carrying out more thorough vetting of people in positions of trust and responsibility
- Understanding the threat posed by terrorism of whatever nature, and helping to reduce the risk of terrorist activity
- Disrupting and preventing major, organised and serious crime.

4.0 Proposed Implementation and Evaluation Methodology

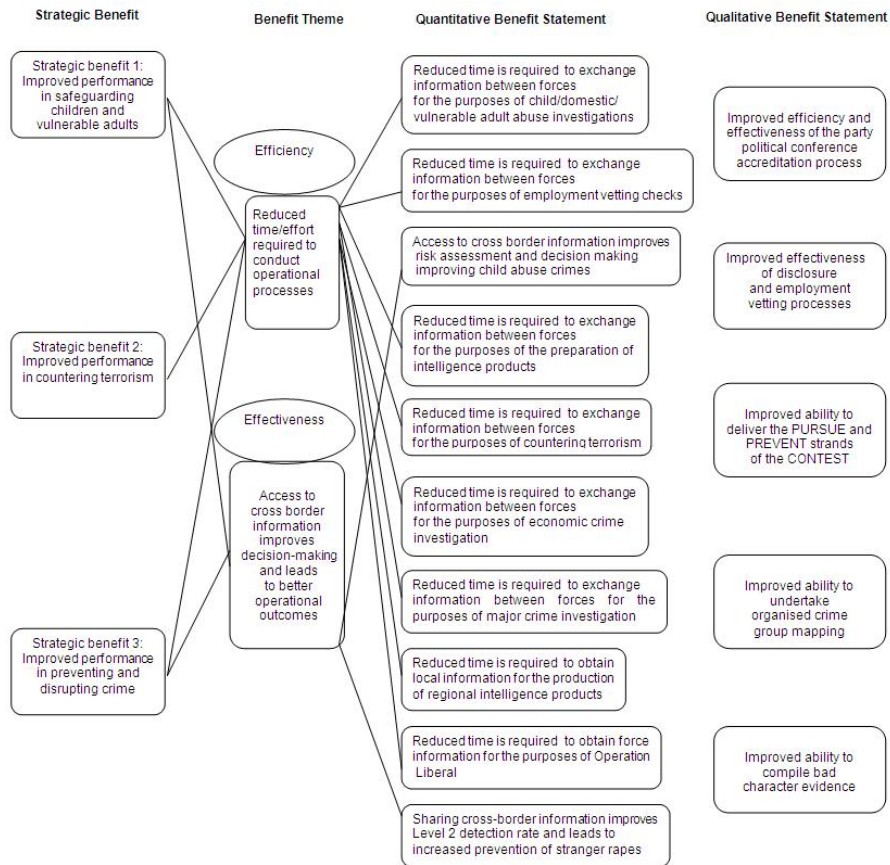
The implementation of the PND is currently being delivered by the NPIA as a PRINCE2 managed project. The methodology adopted to measure the subsequent outputs and outcomes is underpinned by the realisation of measurable benefits. The PND is a benefits-led project and metrics have been designed centrally for forces to capture data against, which would then enable them to realise their own local benefits. In collaboration with PricewaterhouseCoopers consultants and the Cranfield School of Management, the NPIA formulated a Benefits Management Strategy and a Benefits Realisation Plan to guide forces in developing their own practices for recording data systematically. This has led to the formulation of Force Action Plans and Peer Reviews to assist this ongoing process. Forces are also encouraged to develop their own benefits realisation plans to bring structure and rigour to local benefits management.

4.1 Performance Management

Figure 1 illustrates the strategic benefit areas, the benefit theme that to which it relates, and the quantification of certain benefits and qualitative areas of benefits measurement. Within these three strategic benefit areas, it is hypothesised that two key types of benefits are possible [5]:

- Efficiency: reducing the time and/or effort required to exchange information with other forces; and
- Effectiveness: using information more readily available from other forces to inform decision-making and improve operational outcomes.

Figure 1: PND Benefits Framework [5]



In planning for benefit realisation, the metrics designed by the NPJA are exclusively underpinned by the theme that the PND will demonstrate effectiveness and efficiency in improving police performance in the policing areas described. The criteria for all metrics designed locally and centrally must be meaningful, attributable to the PND, and practically possible to collect the data within realistic timescales, and at resources cost that is proportionate to the benefit itself. The NPJA is using the concept of a ‘tiered’ approach to measure benefits, including metrics that demonstrate force-specific benefits and service-wide benefits.

5.0 Evaluating Information Systems in a Complex Context

Analysing appropriate methodologies for evaluating the effectiveness and efficiency of a newly designed and implemented national information system for

the police service requires consideration of several disciplines and paradigms; for example, information science and information management, criminology, sociology, philosophy and to some extent anthropology. This is partly due to the various business processes involved in delivering a national information system like the PND, as well as the wider social and environmental mitigating factors associated with implementing new technology in large organisations. It is therefore necessary to explore the role of information technology and information systems in organisations and the reasons why large organisations such as the police service, need to continually adapt and respond to constant change and uncertainty.

Central to the discussion of developing an evaluation framework for the PND is to understand both the business context of the information system, as well as the information technology that is to be used to support and improve new business processes and business change. In the context of policing, the PND has the capability to become an invaluable investigative tool, but the measurement of its 'value', 'performance', 'impact' and 'benefits', are as discussed earlier, dependant upon the creation of appropriate evaluation metrics [6]. The fundamental 'human element' of using and interacting with an information system or database is what can be primarily relied upon to make sense of the data not information technology; and that the technological aspect can only succeed or perform adequately if it is with the combination of their use - "that is the crux of the matter" [7].

This means that without the important tacit knowledge of people and professional judgement and experience, in this case, of police officers and staff, implementing information systems with sophisticated technology, and without measuring the process of engagement between users and technology, would make the development of an appropriate performance evaluation framework difficult. In policing the architectural infrastructure of information management systems are based on specific data handling procedures. Data held on systems is classified information and only becomes intelligence when it has been deciphered, and analysed for either tactical and/or strategic purposes. Knowledge creation is the end result coupled with a high level of interpretation so that it can be used in some form of action [7]. The National Intelligence Model defines intelligence as information that has been subject to a defined evaluation and risk assessment

process in order to assist with decision-making. All intelligence should be actionable [8]. This continuum or layered nature of police data is to be recognised, as it further contributes to identifying the challenges and complexities of measuring benefits that are directly or indirectly attributable to the performance of a new information system, such as the PND. The point being made is that a 'knowledge system' or 'knowledge base' of individual's actions, knowledge, experience and judgement will also be simultaneously created alongside the PND, and it is this knowledge system that will take the captured electronic information and create extensive user knowledge, which could therefore inform the very basis of a sound evaluation framework for realising PND benefits. Developing an information system/information technology strategy for knowledge management, means thinking strategically and planning for the effective long-term application and optimal impact of electronic information to support knowledge management in organisations [7].

Sociological post-modernist theories allude to the importance of understanding personal experience and personal perception, and that one's own interpretation of the world is as valid and realistic as anyone else's. This is particularly relevant in the process of benefits evaluation, in that the evaluation itself is to be thought of as an interpretation of the value of an information system is, to the person or group using it [9]. Using information systems as a determinant of police performance presents challenges, which need to be explored. Gottschalk [10] suggests that by developing a structured approach linking performance to knowledge sharing, occupational culture, leadership roles and the use of information technology, these significant determinants can be identified and applied in improving police investigations by law enforcement agencies. This reinforces the requirement that using information systems as a means of evaluating its performance within a policing context, must also encapsulate contextual determinants such as user requirements and expectations, the operational environment and the overall performance capability of the new system.

Police culture can influence human behaviour and attitude, and ought to be borne in mind when attempting to evaluate the implementation of a new information

system requiring new business processes. Professor of Criminology Robert Reiner defines 'cop culture' as a subtle and complex intermingling of police officers' sense of mission, action-orientated behaviour and cynicism where the emphases on danger, suspicion, isolation, solidarity, pragmatism and authority are the core elements [11]. Understanding police organisational culture within the context of implementing a new information system is relevant, because by its very nature police culture could in fact impede the evolutionary development of the PND. The PND will impact upon police culture in terms of challenging its traditional sentiments of exclusivity and by evoking a significant change in the way police do business; which could initially be a potential barrier of use. Other potential barriers to the successful implementation of the PND are in relation to data quality and data consistency. They are not only important aspects of data privacy, but they are also necessary to ensure that the PND is an effective tool and delivers a system that meets the needs of the Police Service. Data which are incomplete, inconsistent, not meaningful or misinterpreted due to the different ways forces manage their information can lead to poor decisions, wasted time or missed opportunities [12].

Research carried out by South Australia Police by Peter Shanahan [15], conceptualises the police service as a learning organisation that has the ability to adapt to rapidly changing environments. The research describes the element of leadership as being essential for the building of a 'learning' organisation. In this way the leader connects the organisation to the environment, which in turn leads people to being empowered and capable of moving toward a collective and shared vision [13]. Leaders are also required to be able to establish systems to capture and share learning, encourage collaboration and team learning, promote inquiry and dialogue and create continuous learning opportunities. Leadership must be present in order to bring all of the 'learning' organisation elements together into a cohesive whole [13]. These findings support Gottschalk's research results [14], in that leadership is a significant determinant in improving police investigations by law enforcement agencies, and can greatly assist in developing a structured approach towards police performance and promoting organisational learning, by building on the essence of effective leadership and teamwork. This is particularly relevant to discussing both the delivery approach to implementing the PND service-wide, and

in relation to the training element and the selection of appropriate training methods for PND users. The research also suggests the importance of open communication between those in leadership roles and operational officers and police staff, to enable a cross-section of the organisation to work together, and to create collective thinking, knowledge and experience. Shanahan [13] states that, "...this gives a sense of the potent energy that could be spread throughout the organisation".

One of the key characteristics of the PND is that an information system that will continue to evolve in the future. PND Release 1 is mainly concerned with data reconciliation whereby forces are loading their data onto the PND (custody, crime, intelligence, child abuse and domestic abuse), and with functionality, which currently matches the existing Impact Nominal Index (INI), which is a national database containing information on criminals only. For PND Release 2, it is anticipated that there will be enhanced functionality including a much more rigorous and in-depth search facility. All forces would need to have implemented the PND by March 2011, as the Impact Nominal Index (INI) database will be discontinued nationally as of April 2011. Forces will then be able to use the PND to generate lines of enquiry, increase operational effectiveness as a result; decrease operational risk and improve the way police do business. This provides a strong basis to suggest that the PND is an evolutionary information system, which will require evaluation throughout the life of the system, and that the management of benefits, risks and costs are fundamental aspects of the PND's performance and evaluation framework.

Khosrowpour [9] suggests that traditional evaluation methods for information systems may be unsuitable for evolutionary information systems, partly because of the number of multiple variables involved, and the difficulty is quantifying individual and organisational tangible or intangible benefits to information systems. Thus, there is a gap in current research in the evaluation of evolutionary information systems. Khosrowpour [9] suggests the adoption of a much broader, post-modernist view, which encompasses perspectives on recent developments in information technology, as well as considering societal changes and human issues. This view does allude to some of the complexities involved in effectively

measuring the performance of a new information system or database. It also reinforces post-modern sociologists in that the modernisation of society and subsequent social anomalies such as rising crime rates, has led to the need for more advanced and industrialised forms of information technology and information systems by law enforcement agencies. In devising an appropriate performance and evaluation framework for the PND, relativism or cultural relativism – an inherent perspective of post-modernism - will be relied upon to gauge individual user's experiences as a central theme in evaluating evolving information systems such as the police national database.

Research carried out by Chen and Chen [15], discusses the importance of evaluating knowledge management systems in organisations. The questions addressed in the research are in relation to organisational investment, measuring the success of the new information or knowledge system and ascertaining whether the system is productive, effective and beneficial. These questions are very similar to the kind of research required to measure PND benefits, where ultimately the focus is not just on the performance of the system, but also on the design of metrics that can rigorously demonstrate whether the initiative has justified the investment. The research recognises how the technological aspect of implementing new information and/or knowledge systems ought not to be the primary focus, but rather the creation of a robust methodology that can evaluate information systems' performance. A quantitative approach was adopted to carry out the evaluation; this was to enable survey results to be typically quantifiable, and therefore amenable to statistical analysis. Using statistical inference also allowed the results obtained from the sample of respondents to extend to a large population, therefore enabling a wider remit and application [15]. For the PND a similar quantitative approach could be deployed to measure its investment and benefits to UK policing. It is envisaged that when the PND eventually becomes part of 'business as usual' for the police service, approximately 56 forces and agencies will be using the system. Realistically, a quantitative approach to benefits realisation would be the most feasible, valid and reliable. The 'Benefit Profiles' will be invaluable from a qualitative perspective, and would contribute and supplement statistical information as a means of providing meaningful context, for example in the form

of case studies, sharing best practice, 'good news stories' and the like.

6.0 Challenges and Complexities in Assessing PND Usage and PND Performance

The Impact Nominal Index (INI) database that is currently being used across the police service in England and Wales produces monthly performance management information for the NPIA. These statistics of INI usage will be used as a baseline of activity, which will then be compared to statistics generated by the PND to measure its usage, although it is recognised that the databases do not contain the same categories of information as INI contains nominals. The comparison of both systems will indicate frequency of access of the national system, the forces that are using the INI, and the strategic business areas that INI is mainly used for, e.g. child protection, major crime, counter-terrorism. As explained briefly, the phasing out of INI is scheduled for April 2011, which means that both the early adopter forces (EAF) Lancashire, Northumbria, Dorset, Gwent and, West Midlands Police, and forces which have progressed well so far with implementing PND locally, such as the Metropolitan Police, and Leicestershire Constabulary, will have the opportunity to access and use the PND for operational and intelligence purposes. The NPIA is currently working towards the aim of simultaneously decreasing INI use and increasing PND use. By communicating the envisaged benefits to forces and by promoting the added functionality that the PND has, compared to the INI, the NPIA anticipates that the PND will quickly replace the INI system. In order to monitor progress on the switchover from the INI to the PND, EAF PND project managers have been invited to work collaboratively with both their local force and with the NPIA, which includes the authors. This is for the purpose of conducting an initial 'early-review exercise', to gain specific quantitative data, and to also identify key performance and benefits areas that the PND facilitates or enables, which can then be explored further in future data-gathering exercises. It will also identify force progress, in particular the EAF's. The following questions (temporal based to assess efficiency) will form the basis of a questionnaire, which will be sent to all EAF's PND project managers.

1. Time taken to prepare a Request Generator Report for the INI.
2. Time taken to search the PND.
3. Time taken to extract information from the PND and analyse results, to determine which intelligence can be eliminated, and which intelligence is relevant to your enquiry.
4. Time taken for receiving force(s) – namely the INI point of contact, to respond to force request (force(s) receiving the request for information from the originating force to provide response time(s)).
5. Elapsed time between sending the request for INI information and receiving a response(s) from the force(s) owning the data. For example, if more than one force being contacted, response times required for each force contacted.
6. Time taken to review data from the INI and analyse results, to determine which intelligence can be eliminated, and which intelligence is relevant to your enquiry.

Analysis of all the data received will collectively indicate both INI and PND access and usage by the number of searches carried out using both systems during the reporting period. It is anticipated that force users will experience for themselves the wider advantages and functionality of the PND, by jointly comparing its capability to the current features of the INI system. However, it does not assess the benefits of using a shared information system, which can be a complex metric to measure, but ultimately can provide massive benefit as alluded to in the introduction section of this paper.

Some of the challenges and complexities that may arise as a result of forces developing their own Force Action Plans for measuring local benefits are in relation to national data collation and data analysis thereafter. The template designed by the NPIA for forces to capture and record data for realising benefits is thorough and detailed and therefore, will provide in-depth qualitative information about the benefits the force perceives they have realised. As mentioned earlier in this paper, forces are being encouraged to produce their own benefits realisation plan and to develop these into force action plans, whereby accountability of actions

and overall force progress can be regularly monitored. Forces will be populating 'Benefit Profiles' to capture their local PND benefits for each strategic benefit area. The 'Benefit Profiles' will include the detail and description of each benefit, including risks, dependencies, metrics and benefit(s) owners [5]. For forces, completing a benefit profile for each benefit realised will be time-consuming; from an analytical perspective, extrapolating and analysing data derived from the profiles will also be time-consuming, as the profile template has been designed to mainly capture qualitative information, with a quantitative emphasis on reducing time (see PND Benefits Framework p.4). Staffordshire Police has recently produced a 'PND Business Benefits Benchmarking Results Report' for the NPIA. Staffordshire Police devised a series of local workshops, with representatives from each strategic business area to effectively enable the collation of data direct from PND users, project managers and PND regional coordinators. Interestingly, for Staffordshire Police, all of the benefits profiles selected "*effectiveness*" in terms of timesaving as a key PND benefit result, and stated how "*...a national picture could be gained very quickly live-time, particularly intelligence that had not been recorded on the police national computer,*" [16].

Data collection and data analysis from a national perspective may present issues of data quality in terms of non-standardised and inconsistent data gathering methods across forces. It is recommended that the NPIA communicates to forces the importance of developing robust research and analytical methods to achieve a realistic level of data standardisation nationally, and that the benefit of this will be ultimately to assist in developing a full national picture of PND impact and performance. Another recommendation for forces is to deploy staff with research and analysis capability and skills in perhaps organisational performance and intelligence roles. Apart from the EAF reviews, forces will also need to report on other aspects of the PND's performance such as access, usability and functionality issues, which will need capturing to further contribute to the evolving national picture.

There are also challenges involved in assessing the benefits, and whether these have occurred as a direct or indirect result of using the PND albeit tangible or

intangible. Policing is a complex environment with a vast array of business processes, business areas and business priorities. Lessons learnt and best practice evidence are fundamental components of PRINCE2 project management and in particular key reporting elements as outlined in the PND business case [2]. Within the context of PRINCE2, benefits and disadvantages can only be identified if a series of project-led outputs have led to a series of outcomes. In PRINCE2 “a benefit is the measurable improvement resulting from an outcome that is perceived as an advantage by one or more stakeholders” [17]. Case studies will be advantageous for this purpose, as they would provide insight of a force’s operating model for the PND – how it has worked operationally as an investigatory tool, and will also allow exploration of causation in order to find underlying issues. In order to sharpen understanding in a systematic way, case studies would give the opportunity to generate and test hypotheses by looking at events, collecting data, analysing information and reporting the results. It is anticipated that work carried out by forces in developing their own force action plans will be used and shared as best practice and lessons learnt, particularly the EAF’s who have progressed very well in capturing their PND benefits, will be cascaded to other less progressed forces. Some of the complexities discussed in gathering and analysing data to measure PND benefits and performance, echo the views of Khosrowpour [9], where traditional evaluation methods may be unsuitable for evolutionary information systems due to the multiple elements and variables that need to be measured, and the challenges of designing unbiased metrics that can accurately provide causal connections between the independent and dependent variables.

6.1 PND Training

A fundamental requirement for accessing and using the PND is training. As briefly mentioned earlier in this paper, the selection of appropriate training tools and training methodology is crucial in enabling future users to benefit from using the PND as much as possible. The NPIA has chosen computer-based training (CBT) as its method for training force PND users. Centrally, the CBT is designed to give users a brief introduction to the PND prior to either extended briefings delivered by the Regional Coordinators, and/or supplemented with further training via forces locally. The aim of the PND e-learning module is to provide a broad understanding

of why the PND has been introduced and how it will benefit its users. It is mandatory that anyone who will directly or indirectly using the PND must complete the module.

The relevance of training is important to the discussion of PND benefits realisation, because training has been identified as a potential barrier of use, which could impact on the successful implementation of the PND. Martin and Jackson [18] recognise the importance of learning and training as key aspects of sustained organisational performance, particularly when introducing new technology to an organisation. Evaluating training and development is crucial in justifying business investment both in time and cost. Unless training activities result in some positive changes in the performance of the organisation, it will be of no relevant value [18]. It will be interesting to ascertain early-users perspectives on the delivery of national PND training, so that feedback can be used to inform future training requirements. The NPIA also facilitated several national PND workshops aimed at senior management and middle management police officers and police staff, to communicate the key PND performance and benefits messages to forces. As discussed by Shanahan [13] and Gottschalk [14], this approach gives emphasis to the element of leadership as being essential for sharing and promoting learning cohesively, for improving police performance and adapting to organisational change.

7.0 Conclusion

In summary, this paper has discussed the delivery of the PND, and the challenges involved in its implementation. Delivering the PND is not simply about the delivery of IT. Delivering the PND is about business change enabled by IT and is a complex process. The realisation of benefits will be a gradual and evolving process, whereby national coordination will play a significant role in collating data and analysing results that will enable a national evaluation of PND impact, performance and justifiable investment. Using a range of research methods including both qualitative and quantitative, will greatly assist in the development of a robust evaluation framework that will measure both the performance of the system, and also its benefits to UK policing. Choosing to adopt quantitative evaluation metrics will permit a wider sample of the population to be researched,

and by using statistical significance and statistical inference will further strengthen and legitimise results from an analytical perspective. Qualitative research tools currently in the form of 'Benefit Profiles' will be used to supplement quantitative data, by providing depth, context, and meaning to support statistical results. It is anticipated that by designing an evaluation methodology for the PND, which uses various research methods will add scientific validation and rigour to the research findings, specifically in relation to the realisation of PND benefits in the near future.

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