## ‘Innovation and the Application of Knowledge for More Effective Policing’

## N8 Policing Research Partnership Catalyst Project

**PROJECT TITLE: THE PRACTICE OF PREDICTIVE POLICING AND SELF-SERVICE BUSINESS INTELLIGENCE IN THREE UK POLICE SERVICES.**

Public safety organisations across Europe have rapidly responded to the opportunities offered by datification through the use of new forms of data analytics and algorithmic decision-making. This is an area where there is both a paucity of research on the practice of use and where there are deep societal concerns about the use of these technologies. In this research, we focus on two conjoined approaches: algorithmic decision-making in predictive policing and self-service business intelligence.

**KEY FINDINGS**

Our analysis of the data gathered, confirmed the presence of risks which have been raised in earlier research. It also provides an understanding of practice which demonstrates that police services are both acutely aware of these risks and actively addressing them. We identify five themes, which describe five current practices in the police services studied: (1) shading; (2) activities in the shadows; (3) grey areas; (4) black boxing; and (5) finding boundaries. Each of these themes are discussed in turn in the main text. These themes point to the following implications for practice and policy:

- If police services wish to deploy data driven approaches to decision-making while maintaining officer discretion and value professional judgment, officers must be provided with timely initial and ongoing training on the tools deployed and skills in ‘data literacy’ pitched at the right level. This will be key to ensuring informed users of systems and appropriate use of systems.
- The underlying logic used within tools deployed should be transparent and explanations should be provided that are meaningful to the officers expected to use the tools. This should align with a rigorous approval process for any new predictive tools.
- Decision-making based on quantitative data relies upon a high-quality data. This was an area for concern for all services. The use of the tools studied can amplify these issues and lead to problematic decision-making. Statistical techniques can be used to clean data and mitigate the effects of dirty data. We recommend, however, that further resource be placed on identifying and eradicating the root causes of the data quality in areas of activity where tools for algorithmic decision-making and self-service business intelligence are used.
- Cultural norms within services, such as the norm of peer support, are already important in determining use. They can prove beneficial, however, can also act as barriers to use, reinforce localised solutions, lead to the development of shadow systems or legitimise resistance to use. We would recommend codifying existing good practice and reinforcing norms and values through further training.
- Given the challenges identified in this research it would be prudent to build mechanisms into the tools to allow for and encourage professional judgement and alert users to the intended use of the dashboards provided.

- Given the issues raised in relation to training, data quality, variable levels of data literacy and understanding of the self-service tools the role of the professional analysts is particularly important. They currently play a key role in supporting self-service BI, effective development and use of tools, developing officer understanding and supporting officers skills development in areas such as the appropriate and effective visualisation of data.

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Public safety organisations across Europe have rapidly responded to datification: the process whereby life-processes are converted into streams of data inputs for computer-based processing (Couldry and Yu, 2018). Over a period of decades, they have expanded their databases, implemented real time identification systems, implemented approaches to predictive policing technology and focused on the analysis of heterogeneous datasets (Jansen, 2018). Described as 'Data Driven Policing' (Kearns and Muir, 2019; Jansen, 2018) this has been driven, in large part, by the simultaneous reduction of resource for the public sector and availability of digital data (Dencik et al., 2018; McQuillan, 2018). More recently, this has rapidly expanded to include the use of new forms of machine learning and advanced analytical techniques. This research was designed to explore one aspect of this data driven approach: the use of new analytical techniques to automate elements of decision-making or to augment decision-making by police officers about individuals through the use of self-service business intelligence.

It has been argued that researchers have only just begun to 'scratch the surface' of the range of issues emanating from the increased prevalence of datification in organisations (Galliers, Newell et al., 2017). Günther et al. note that there is a lack of empirical research and that "…the literature can still reasonably be characterized by its many speculations and opinions" (Günther et al., 2017). In the context of the public sector and policing these observations are particularly pertinent. Work undertaken in the context of policing has had to rely heavily upon information police services are legally required to provide, press reports (Karppi, 2018), limited sets of informant interviews across services and stakeholder organisations (Couchman, 2019); or combinations of novel techniques focusing on remote data collection (Dencik et al., 2018). There is limited evidence on the efficacy and efficiency of different systems used (Oswald and Babuta In Press) and the current approach to predictive policing has been described as being "based on convincing arguments and anecdotal evidence rather than on systematic empirical research" (Meijer and Wessels, 2019). This lack of both transparency and evidence reflects a wider concern of understanding practice in UK public sector organisations.

The campaign group Liberty (2019) in their report 'Policing by Machine' (Couchman, 2019) raised very significant concerns about the negative effects of the use of predictive policing tools in UK police services. They noted that "predictive policing compound the crisis of unfair treatment of marginalised communities. What's more, their use provides a front of allegedly 'impartial' statistical evidence, putting a neutral technological veneer on pre-existing discriminatory policing practices." (Couchman, 2019, p. 15). Their view that the impact of the use of these technologies on society and on individual citizens was so negative that the use of such technologies should end.

Others have raised concerns about the 'algorithmic impropriety' (Grace, 2019) pointing to concerns around police discretion, bias, or failures to take relevant information into account and 'data discrimination' (Oswald and Babuta In Press). Deep concerns have been raised about the legitimacy of such techniques (Couchman 2019) and their impact on public acceptance of policing (Rowe and Muir, 2019).

In parallel with this project we designed and developed of a quantitative t ool to investigate and diagnose the root causes of underlying information quality issues within police services and the effectiveness of mitigating activities. This was co-produced with one service, however, its deployment was delayed by the COVID pandemic and movement of staff.

Five themes emerged from our initial analysis of the data: (1) shading; (2) activities in the shadows; (3) grey areas; (4) black boxing; and (5) finding boundaries. Shading is the term we use for the obscuring of crime or performance because of limitations in the data. The description of shading of individuals or criminal activity based on data quality concerns reinforces concerns about 'algorithmic impropriety' (Grace, 2019) and 'data discrimination' (Oswald and Babuta In Press). The research, however, also revealed that the services were acutely aware of the potential of shading and took steps to mitigate this. Activities in the shadows refers to workarounds deployed in response to breakdowns or tensions created by the implementation of the systems. These took the form of the use of shadow IT or work systems. Shadow IT (not sanctioned by organsiations) was used both to augment existing systems and as a mechanism to compensate for the limitations of both the data and the tools provided. Shadow work activities are alternative approaches to undertaking tasks or work activities. Black boxing was the use of algorithms without explanation, which was described as impairing the ability of end-users to understand decisions made by the technology. This contributes to concerns raised in the nascent literature on the transparency of algorithmic decision-making (Vorm, 2019) and visualisation (Mühlbacher et al., 2014). A 'black-boxed' algorithmic systems, whose operations are invisible and inscrutable, can constitute a threat to professional judgement and autonomy of workers (Pasquale, 2015; 2019). The third theme of grey areas recognised identified the role of professional judgement in the use of self-service BI and predictive analytics as a 'grey area' of ambiguity. The mediating influence of analytical tools intended to replace human decision-making in policing was explored by Allen (2011). He identified resistance to machine based decision-making in policing, the use of alternative forms of decision-making based on heuristics and mixed modes combining heuristics with information rich forms of decision-making. In this research project, while concerns remain, the three services identified the importance of mixed modes of human decision-making inscribing the ability of individuals to override algorithmic decision-making into tools. Finally, the theme on finding boundaries related to significant individual differences in both understanding of the systems provided and data literacy linked to a perceived lack of training. Officers learned to use the tools through informal practices and peer-to peer-support and training through experimentation, and trial and error. This emphasised the vital importance of the role of an analyst as an intermediary.

The research highlighted five very important themes which were termed shading, activities in the shadows, grey areas, black boxing, and finding boundaries. The themes point to implications for practice and policy concerning: training; transparency around the logic used within tools deployed and a rigorous approval process for any new predictive tools; data quality; cultural norms; the use of professional judgement; and the role of professional analysts.

The disruption caused to the project (described below) means that the findings of this research should be read as indicative and analysis of the data gathered within this project is continuing, as is dialogue with the police services. Detailed reports relating to the wider findings have been submitted to the services that supported this research.

Data gathered for this research comprised of 64 semi-structured interviews. Telephone and face-to-face interview were initially conducted with the lead for data analytics in ten of the 45 territorial police services in the UK. These interviews were analysed to identify potential case study sites, cross cutting issues and approaches used. Using this data, five sites were identified for data collection. All were willing to provide unfettered access. Early on within the research two of cases withdrew from the research project and data collected in these sites was not used. The three remaining cases provided access to analysts, IT staff, organisational leaders and end users. End users that engaged with the research volunteered to participate and did so on a confidential basis. Fifty-four face-to-face interviews were then undertaken in the three organisations.

The data was analysed using Activity Theory as an overarching theoretical framework (Kaptelinin and Nardi, 2006; Allen et al., 2011; Allen et al., 2013; Karanasios, Allen and Finnegan 2018). In this approach, work practices are analysed as activity systems consisting of a subject, individual or collective using tools to act on an 'object of activity'. An 'object of activity' is the focus of a subject's attention, for example Performance Management, where the subject's motivation is to achieve a desired outcome, such as understanding and reviewing performance of teams (Kaptelinin, 2005; Nicolini et al., 2012). Activity takes place in the context of a community or communities, with shared rules of interaction, and a specific division of labour (Engeström, 1987; Kaptelinin et al., 1995). In this research we focused on understanding tool use within work activity systems. Tensions and contradictions were identified in the form of breakdowns, shadow systems and technological workarounds. These were linked to either contradictions or congruencies introduced into the work activity system by the use of the technology.

The work of this project was constrained. The RA working on the project had to take a planned three-month career break prior and due to COVID-19 was only able to return to the project for a very short period. Researchers recruited to work on the project were only able to start work in February 2020 and were then significantly affected by the COVID 19 Pandemic. Professor Allen's work on the project (including travel costs and transcription cost) were not funded by the N8PRP and delays were caused by the need to agree alternative funding from Leeds University Business School to pay for transcriptions of interviews and his travel.

The research data collected provides the largest qualitative study of algorithmic decision-making in predictive policing and self-service business intelligence in policing in Europe. Further analysis of the data, combined with data gathered from other public sector services, is on-going to explore the use of tools within the following areas of practice: response to domestic violence, management of high risk offenders, performance management and neighbourhood policing.