

# Practice Sheet

## Predictive Policing Tool



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Can algorithmic prediction of crime really facilitate the work of police?

Overcoming the challenges of traditional Predictive Policing with integrated knowledge and information sharing in the state of Lower Saxony (DE)



### The Cutting Crime Impact (CCI) project



During the *Cutting Crime Impact* (CCI) project, the Lower Saxony State Office of Criminal Investigation (LKA) in Germany set out to address shortcomings in its implementation of Predictive Policing. The LKA conducted research into the use of

their predictive system by police officers, including the ways in which predictions were incorporated into daily briefings. This enabled the LKA to better understand how relevant information could be more usefully and efficiently identified and shared.

### Context

A police force with a prediction software system and a goal of improved information management

Since 2014, the region of Lower Saxony has tested, developed and deployed a predictive policing model. Predictive software was initially jointly developed with the IBM corporation. However, the LKA decided to complete development of the technology in-house due to a number of concerns:



- Concerns about the sharing of confidential crime incident data and the predictions produced by the system with an external development company.
- A concern that, if developed by an external party, the resulting system would be a 'black box' and the LKA would not fully understand how predictions were generated. Understanding and controlling the selection of data and information used to create predictions was prioritised by the LKA. With the system being developed in-house, the LKA has a comprehensive understanding of both the data being used to generate predictions, and how the results should be interpreted.

The current software, named *PreMAP*, is based on geo-spatial data and identifies locations that have a high probability of burglary. In addition, the system generates a map showing all relevant, police-recorded criminal offences from the previous four weeks.

Using various research methods, including observations and interviews, LKA researchers explored the practical use of *PreMAP* results by front-line police officers. This revealed that predictive data was not provided in a way that suited the needs of officers. In addition, research found that *PreMAP* data was just one of many types of information that needed to be provided more systematically in daily patrol briefings. As a result, the LKA developed the PATROL Tool. This tool is tailored to the local policing context, and includes various elements that support comprehensive information processing and effective internal communication.

#### Keywords

Predictive Policing  
Patrolling  
Data management  
Data culture  
Communication  
Cooperation  
Patrol briefing  
Research methodology

## Objective of Research

To understand the effectiveness of current Predictive Policing practice

The objective of this research was to understand the experience of different police end-users of the *PreMAP* predictive policing system — including information analysts, shift managers, and patrol officers. This enabled researchers to better understand and frame the problems these police staff encountered when using *PreMAP* and its output.



## Target group

End users — learning about their problems, needs and requirements

The PATROL Tool was developed for use by internal stakeholders involved in the process of collecting and sharing information, including those who use such information in their daily work:

### Police analysts

Observation and interview research was undertaken to understand what information from *PreMAP* was being sent to shift managers, and how this information was presented / communicated

### Shift managers

Observation and interview research was undertaken to understand shift managers' decisions on the information used in briefing their patrol officers, and how this information was presented / communicated

### Patrol officers

Observation, interview and focus group research was undertaken to better understand the types of information officers found most valuable in their daily work, and how they currently received and shared such information.

## Activities

### How to get an insight into the daily needs and requirements of police officers?

CCI adopts a human-centred design approach, deploying a research methodology focused on gaining deep understanding and insight into the end-user perspective. The CCI methodology is characterised by three principles:

- 01 The inclusion of end users (i.e. front-line practitioners) and a focus on the humans that will using the design solution that is to be developed
- 02 The collaboration and exchange of knowledge and experience between stakeholders and across different professional disciplines to enable problem framing and solution ideation (in a DesignLab)
- 03 The early development of solution prototypes, and prototype testing with end users to support solution validation, feasibility testing and design decision-making.



The development and testing of design solutions is an iterative process — one in which solutions can be amended and improved in response to feedback from those that will ultimately use and benefit from them. For CCI, end-users are LEA practitioners and their delivery partners, while the design solutions are the Tools developed in the project.

LKA researchers worked closely with the different police officers using *PreMAP*. This allowed them to gain insight into the problems end-users faced, the context in which they operated and the requirements the CCI tool needed to fulfil. In line with CCI's human-centred design approach, research, development and delivery of the Tool followed the *Triple*

*Diamond model* of design development. Phases of divergent thinking (Discover and Develop) allowed for discovery and reframing of problems and the development of multiple solution options, while phases of convergent thinking (Define and Deliver) allowed problem definition and Tool development, testing, refinement and delivery.

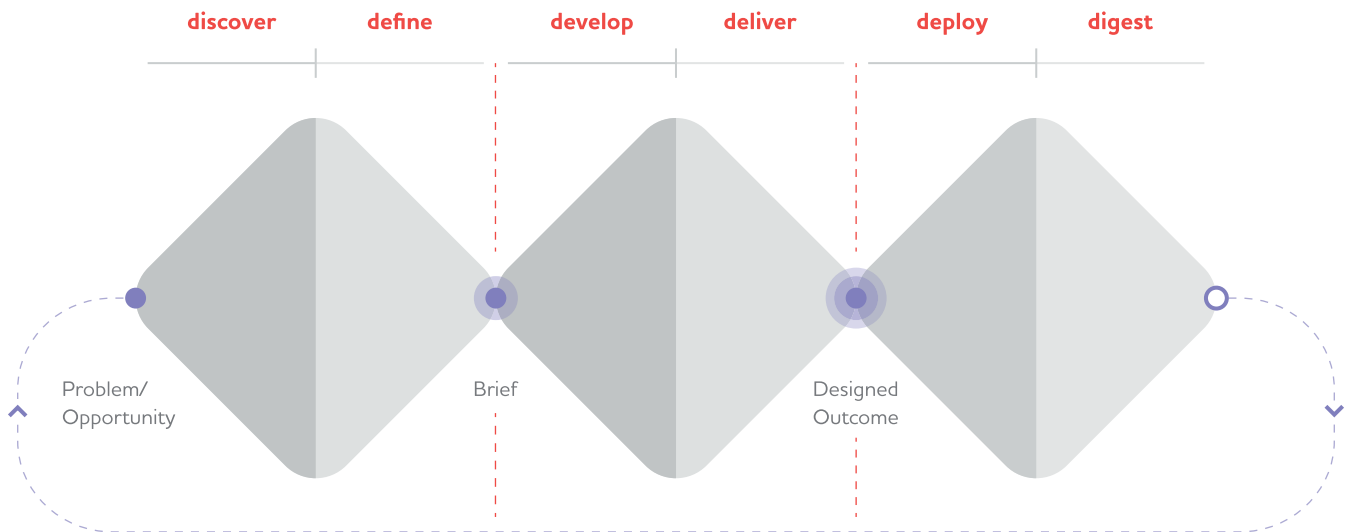


Figure 1: Triple Diamond design process (Wootton & Davey, 2011)

01

At the outset of the CCI research, in the *discover* phase, the problem that the LKA ended up tackling emerged. In order to understand how end-users were using *PreMAP* data, LKA researchers identified key end-users: police patrol officers, shift managers, and data analysts. During six months of requirements capture, the LKA undertook observation, interview and focus group research, identifying a number of interlinked problems. The observations provided insight into end-users' everyday activities without interrupting or influencing their flow. They also informed the ensuing interviews, allowing researchers to refine and target the questions they posed to stakeholders. The headline finding from this research was that *PreMAP* was not in fact being used by front-line police patrol officers. The research identified problems linked to internal communication and data management, as well as general issues related to the accuracy and reliability of predicting crime.

02

During the *define* phase, these key problems were presented and analysed during a DesignLab session. The *DesignLab* is a facilitated, collaborative ideation event, during which requirements capture findings are presented, research insights discussed, problems reframed, and initial solution concepts developed. Multiple stakeholders participated in the DesignLab, representing a diverse array of disciplinary backgrounds and professional experiences, and enabling creative thinking. The DesignLab concluded with the development of 'pitches' for two concept solutions. DesignLab participants voted on the different concepts.

03

Following the DesignLab, the CCI coordinator analysed the results and identified a number of '*potential solution directions*' for tool development. These were discussed with the LKA and the design concept that led to the final LKA PATROL Tool solution selected.

04

The design concept was developed, prototyped, tested and refined during the third (*develop*) phase and finalised and produced during the fourth (*deliver*) phase of CCI.

## Solution

**From traditional Predictive Policing to integrated knowledge and information management**

Observation and interview research clarified that the main issues impacting practical use of predictive policing outputs were not technical (i.e. relating to the software or algorithms in use by analysts), but rather related to the poor integration of predictive data with the practical job of police patrolling.

This resulted in the development of PATROL, a Tool comprising **three components**:

**01**

### **The Analyst Manual**

providing LKA analysts with guidance on the creation of a daily updated overview of the crime situation for use in the briefing of police patrol officers. This document includes a template to improve and standardise the visual style in which analysts present data.

**02**

### **The Briefing Manual**

providing shift managers with a standard protocol for the process of briefing patrol officers when starting their shift (early, day and late shifts). Briefings include the crime analysis provided by analysts, and aim to enhance the knowledge of every officer, thereby improving the effectiveness of police patrols.

**03**

### **Briefing Templates and NiMes-Channel**

bespoke PowerPoint templates enable shift managers to clearly communicate crime data analysis in a standardised way. These are also used to communicate the briefing and further updates through the NiMes channel, an internal LKA messaging platform available to officers via their handheld mobile devices.

## Perspectives

**The CCI human-centred design approach allowed a reframing of the problem being addressed by the LKA from:**

"How can we improve predictive policing and get police patrol officers to use it?"



"How might we better support the information needs of police officers responsible for patrolling?"

This led to the insight that the systematic inclusion of all relevant information in patrol officers' daily briefings was lacking. Information, insights and intelligence was not being shared across different groups and between shifts. This included – but was not limited to – predictions from the *PreMAP* system.

In developing the solution, the LKA shifted from a focus on their Predictive Policing system (a technology-centred focus), to focusing on improving the quality, clarity and flow of information to the police officers responsible for patrolling (a human-centred focus).

The CCI focus on end-user research during the “fuzzy front end” of the development process not only supported this problem reframing, but encouraged it. Requirements capture

research revealed the real problems related to communication, relegating the Predictive Policing component to just one aspect of many. The challenge was transformed into how to integrate effective information sharing protocols within existing processes.

When beginning CCI, the LKA researchers held a number of assumptions with regard to the nature of the Tool that would be developed by the project. Observational research was fundamental in confronting the LKA with the stark reality of end-users' operational context, challenging researchers' assumptions and necessitating a reframing of the original problem. LKA researchers' observations allowed development of more pertinent questions for the later interview research — an approach that generated greater insight than simply conducting a survey.



The LKA recognised the potential problems that could be caused by research subjects perceiving the CCI researchers as occupying a higher position in the organisational hierarchy. To mitigate any negative impact of perceived 'top-downness', researchers took care to conduct the research in as open and inclusive a manner as possible. The police officers with whom the main LKA researcher spent time were often around his age, which greatly facilitated their perception of him as an equal observer. This familiarity enabled subjects to feel comfortable and more openly share their personal experiences and clarify their needs and priorities. Methodological subtleties such as these need to be taken into account when conducting observational and qualitative research in traditionally hierarchical organisations.

This practice sheet was produced by the **European Forum for Urban Security (Efus)**, the **Design Against Crime Solution Centre** at the **University of Salford**, in collaboration with the **LKA** and the **Rijksuniversiteit Groningen** as part of the **Cutting Crime Impact** project.



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