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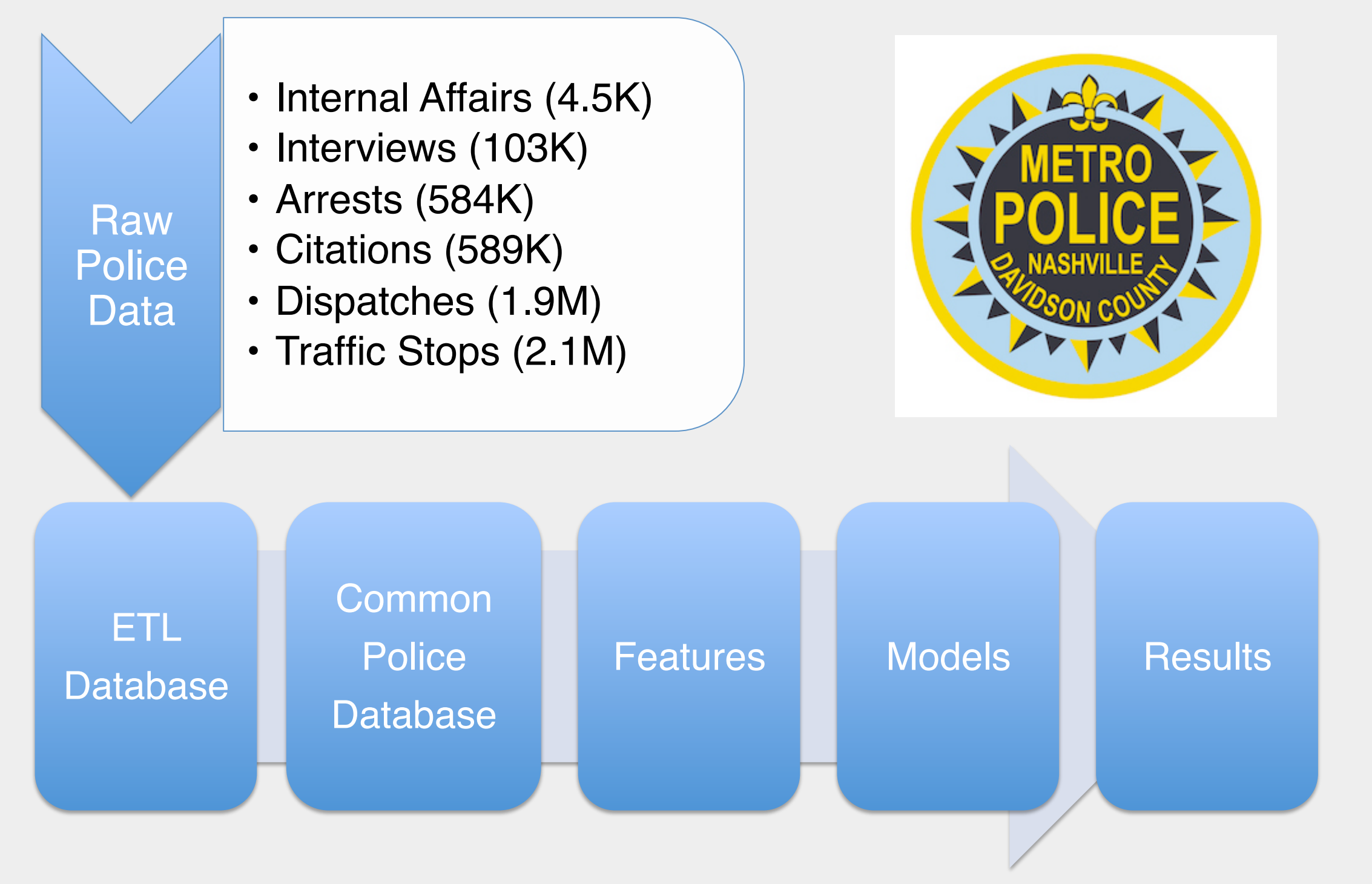
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## 1 Introduction

Recent high-profile events across the country have highlighted the need for police departments to address the issue of adverse police incidents. Currently, there is a critical gap in early intervention systems for predicting which officers are at risk of having an adverse event. Creating such a system opens new opportunities to develop targeted interventions, such as training and counseling for officers to prevent future adverse interactions.

## 2 Data

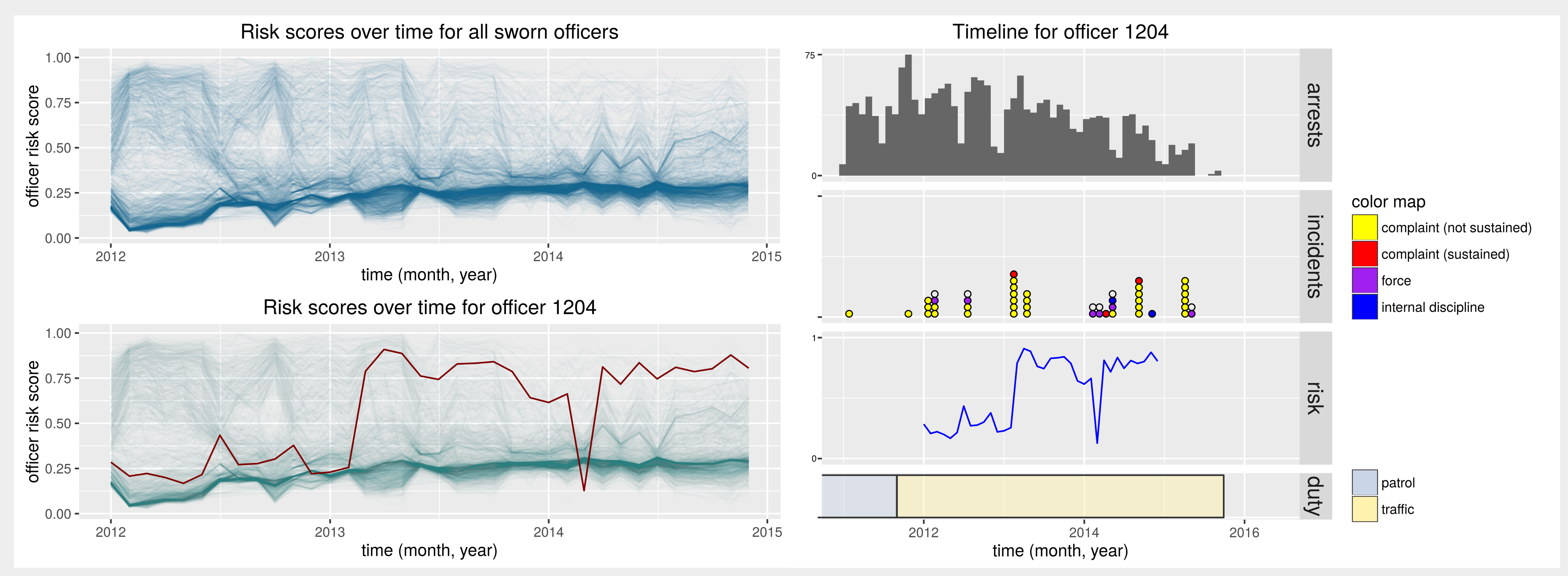
We are working with the Metropolitan Nashville Police Department (MNPd). This project builds on work started in collaboration with the Charlotte-Mecklenburg Police Department (CMPD) last year, which has been continued by a second DSSG team as well. We collaborated extensively with the CMPD team to create a common system for data storage and model development. A long-term goal of both projects is to build an early intervention system that can be applied to many police departments.



Our data are police records from 2011-2016 that describe various characteristics about an officer, the interactions they have had with the public, and any investigations into adverse incidents they have had (such as accidents or complaints). The data are loaded into a common data structure that works across multiple police departments. This common format is used in feature generation. Our models use these features and store the results in a database.

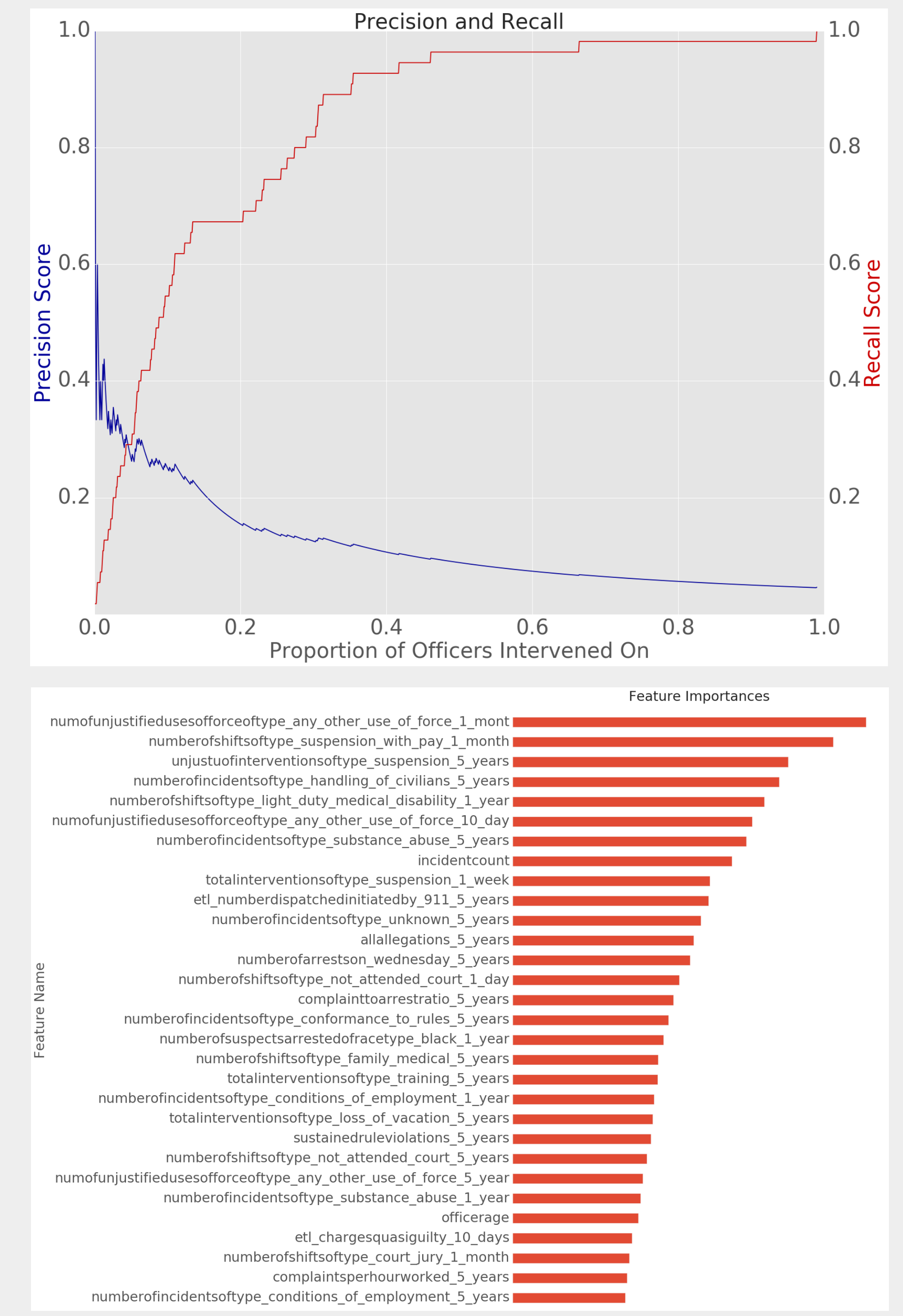
## 3 Officer Risk Timelines

Our model can show how officer risk changes over time. Officers at the highest risk for an adverse incident can be flagged for intervention at the direction of a supervisor. Below, we can see how the risk score of an officer changes along with their activity, accounting for arrests, complaints, uses of force, and internal discipline, and see how it compares to all officers in the department.



## 4 Model Performance

Precision-recall curves and feature importances for an ExtraTrees classifier model with 100 estimators and about 800 features.



## 5 Prediction Rate

Of the approximately 1000 police officers in MNPd, about 50 officers have a serious sustained complaint or disciplinary action in a given year. Our model, depicted below, correctly identifies 80% of these officers while intervening on 30% of all officers.



## 6 Impact

Using our model, if we intervene on the top 30% of officers, we can identify 80% of officers who will go on to have an adverse incident. We can also give insight into why these officers are at high risk, so that MNPd can use suitable interventions to prevent these events from ever occurring. We have learned important lessons about how these relationships generalize to other police departments and look forward to expanding the deployment of this intervention system to other departments in the near future.