

# RSE Case Studies

## Dan Birks and Alex Coleman

**Dan Birks** is Associate Professor of Quantitative Policing and Crime Data Analytics at the University of Leeds School of Law, and a Turing Fellow of the Alan Turing Institute.

His research focuses on how computational methods can be applied to administrative criminal justice data to better understand, predict and respond to real world crime problems.

**Alex Coleman** is a research software engineer at the University of Leeds in the Research IT Team. Previously, he was a Data Scientist Intern at Leeds Institute of Data Analytics.

He has a background in molecular biology with experience using R and Python.

### Can you give us an overview of the project?

Over the last 20 years the demands on police services have changed dramatically. How police forces plan for changes in these demands is a crucial strategic question.

Computational models offer a potential avenue for simulating these complex systems and could offer insight to help police forces plan for future changes in demand.

The project aimed to build on initial proof-of-concept work to modelling police demand and supply. It aimed to develop a microsimulation functionality into an existing toolkit for forecasting future rates of crimes on a daily basis within a specific geography that could act as an input into an agent based model that could model basic responses by police forces to crime-related demand.

### Did you work with an RSE from the beginning of the project?

This piece of work began as a bespoke project commissioned by Dan Birks for an RSE in the Research IT team with Alex Coleman acting as the development lead.

### What was the benefit of working with an RSE?

Working in collaboration with an RSE from the get go meant the project could begin at pace and develop towards specific research outcomes. Furthermore, it ensured reproducibility and robust code design were considered and incorporated from the start of the project ensuring this piece of work can be continued in the future.

### What tools and software did you use for your analysis?

All the code was written into the python package `crime_sim_toolkit`, [https://github.com/Sparrow0hawk/crime\\_sim\\_toolkit](https://github.com/Sparrow0hawk/crime_sim_toolkit).

This is hosted on GitHub but code runs weekly builds via TravisCI, implements testing using Pytest, and uses code quality tools Codacy and SonarCloud of linting and coverage reporting.

### Having worked with an RSE, will it change your approach in the future?

As research increasingly engages with computational methods alongside more traditional quantitative approaches, it's vital to ensure that professional software development practices become an integral part of the research enterprise.

Working with the RSE team means that we can draw on expertise and skills to ensure that the software tools we develop to solve real research problems are robust, scalable and reproducible. It's certainly something I'll be doing again.

### Can you tell us more about your current or any future research projects?

Myself and colleagues are involved in a range of projects exploring how advances in the quantity and quality of data collected by public sector agencies can support evidence-based, ethically sound decisions that result in better outcomes for citizens and societies.