Part I  Developing crime mapping
1 Developing geographical information systems and crime mapping tools in New Zealand

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1.1 The starting point

New Zealand (NZ) Police decided as part of a new records management system (RMS) being developed during the mid-1990s, that a key reporting tool for this system would be geographical information system (GIS) based, that would allow users to query police systems to ascertain patterns of crime, by specific areas in requested time frames.

Based on site visits made in North America, NZ Police information and communication technology (ICT) staff commenced analysis of a client-based GIS package to be tailored to local, personal needs. The approach taken was that ICT would develop the tool and then gauge end-user interest of what would be the final product. Nationwide interest was assessed and the front-end GIS application was developed for an initial rollout of 19 analyst sites throughout NZ Police. The product was delivered in early 1999.

This approach resulted in limited frontline interest due to two main factors. First, because there was no previous exposure to GIS packages, some of the analyst staff could not understand the concept of what the application would potentially offer. They questioned the need for it and, to a lesser degree, questioned how usable it would be. Second, the package was to involve a local cost to each site or station receiving it.

Although the NZ Police ICT Service Centre developed and deployed the tool, each site was responsible for the cost of the customised workstation and printer that was
deemed a requirement for the application to operate effectively. This was an obstacle for the project. The local cost was significant and, in some cases, even where analysts were eager to obtain the package, their managers were not willing to spend the money for it to occur.

These factors aside, when the application was completed and ready for deployment, the initial target of 19 sites had resulted in an increase to 33. Word-of-mouth and support from others had seen the target group increase by one-third. After a successful local pilot, the desktop package was initially well received by staff, with some sites quickly producing useful and worthwhile outputs. The analysts at each site were able to import raw crime data, specific mapping data for their area and run customised queries to suit local needs.

Street-level base mapping data was supplied to each site from the NZ Police ICT Service Centre. This proved hard to maintain and manage (particularly with software and data version updates) due to end-users being required themselves to perform the local installs of these data on their custom workstations. Over time, there were a number of incompatibility issues with other NZ Police applications, leading to a high maintenance requirement for this GIS tool. The training provided did not completely meet users’ needs, which meant some sites were unable to realise the full potential of the application. Eighteen months after distribution of this package, NZ Police made the decision to decommission this application and replace it with a web-based mapping solution.

1.2 Developing a web-based GIS solution for NZ Police

Other than the escalating cost associated with high maintenance, NZ Police had implemented a focus on thin-client-based applications, which were easier to maintain and provided access for more end-users to ICT tools. The requirement for specialist workstations disappeared and was replaced by solutions that any of the 5500 networked computers could use and support 10,500 staff to view the new mapping application.

The focus then became replicating as many of the existing functions that users had grown accustomed to using, but doing it within a thin-client solution. An inaugural browser-based mapping application called MAPS (Map-based Analytical Policing System) was released on the police network in late 2000. Although there were a number of GIS desktop functions that could not be replicated in this thin-client application, a decision was made to proceed with the decommissioning of the GIS tool anyway.

Even though MAPS was predominantly built for and used by Police intelligence analysts to assist in identifying crime patterns and trends, it allowed basic mapping
queries to be compiled with a wizard-based formula that could be conducted by all operational police staff. It provided users access to two key sources of police data:

1. The Police Communications and Resource Deployment (CARD) Centre information. Three centres operate nationally in New Zealand. All public calls for service, general and emergency come through these centres. The three centres transfer data to a common read-only database which MAPS accesses. This allows staff to generate maps of calls for assistance as timely as 15 minutes after the police response and attendance.

2. The National Intelligence Application (NIA). NIA is a national records management system that all NZ Police staff use to record key offence and intelligence information. MAPS accesses a repository version of this data and again, within 15 minutes of being recorded within NIA, MAPS is able to create a map of those recorded events.

As with all mapping applications, MAPS relies on geocoded information to be able to display these locations to the analyst. Whereas the CARD system had always geocoded an address for deployment reasons, NIA did not initially enforce structured location data for crime/incident data entry. This required a cultural change across NZ Police to emphasise the importance of meaningful location data for ICT tools to be able to analyse at a future time. The percentage of accurate geocoded data in these early days was in the vicinity of 50%. It was quickly realised that this did not make for a very complete or accurate crime map.

Within a short amount of time a structured crime location data entry process was mandated within NIA. Along with that mandatory requirement came rules on how frontline staff could and could not record these locations. There was initial resistance within some levels of the police to this change. Constant education and reiteration of the importance of meaningful crime data to create meaningful analysis has seen significant business practice change within the past 5 years. Location data is now conservatively estimated to be in the range of 75–80% accurate. The NZ Police continue to work on their quality control for location-based data. Data quality still varies in consistency across the department, with some areas of NZ focusing on the data entry standards more than others.

1.3 Building on the map-based analytical policing system (MAPS)

The past 6 years since the introduction of MAPS have seen three upgrades involving improved functionality, better architecture platforms and better system performance. The focus has been to constantly bridge the functionality gap between a thick-client
desktop GIS and the thin-client web browser application that has created MAPS. Improvements in this area have been made but, technically, some things are still not possible.

In 2004, NZ Police invited Spencer Chainey and Dr Jerry Ratcliffe to look at the MAPS application with the focus being on professional guidance on where the tool should be taken in the future. This proved invaluable with constructive guidance on what was required to better meet analysts’ needs. This formed the basis of the functionality added to the following two versions of the application. The first version was warmly received by the analyst audience (see Figure 1.1) and NZ Police are, at the time of writing, releasing the second comprehensive version.

Six years on and ICT are still managing the expectations of high-end analyst users who require the use of a full GIS package. Some of these analysts were previous users of the desktop package and some have come into NZ Police having used desktop

Figure 1.1 NZ Police’s Map-based Analytical Policing System (MAPS) (v4.0) interface. MAPS allows users to build a query, select, display and explore crimes for any location in New Zealand. This example shows the Lower Hutt Central Business District with National Intelligence Application (NIA) data for March 2007. The person icons represent recorded NIA ‘dishonesty offences where a suspect or offender was nominated.’
GIS in other industry or overseas police departments. This was a point not lost on Chainey and Ratcliffe who had also recommended the need for a reintroduction of a desktop GIS package for a key group of end-users. With enhancements in technology, NZ Police have a strategy to offer the abilities of a desktop GIS to intelligence analysts again. This will utilise the centralised mapping data and provide access to NIA and CARD via the thin client, while providing the GIS analytical tools to the user at the front end.

As part of this future strategy NZ Police will focus on data management, through improved data warehousing structures, and data entry functionality for operational police. The quality of data will continue to be a focus for all of NZ Police with the endeavour of making crime analysis as accurate and useful as possible, while working towards the NZ Police vision of Safer Communities Together.