**Geo-ICT and the role of location in Science, part 6: Criminology**

**'Criminologists are divided about the value of Geo-ICT'**

*On American television Geo-ICT is prominently present in crime investigation programmes. To what extent are these applications scientifically founded? And how does the American situation relate to that in other countries, particularly the Netherlands. We met two prominent spatial criminologists at the Netherlands Institute for the Study of Crime and Law Enforcement (NSCR) and a team of crime investigators at the National Police Services Agency (KLPD). Both for scientific and practical purposes the use of Geo-ICT in the Netherlands seems to run a few step behind that in the USA. Although the scientists are interested in spatial aspects they are sceptical about the opportunities that the current GIS-systems offer. The crime investigators seem more optimistic and more eager to try out the new technology, but find themselves held back by a lack of uniform databases and software.*

Crime and its scientific investigation (criminology) is in many ways an location issue: for both solving and preventing crimes the *where?* and *why there?* question is of vital importance. Criminology is a young, dynamic and interdisciplinary discipline, which is assumedly open-minded towards new technologies and methodologies. Hence, a science with a lot of potential for GIS, as both a technological tool as well as a way of approaching spatial questions. We spoke to scientists and crime investigators to see whether our high hopes were indeed justified.

**Geo-criminologists**

"Spatial- or geo-criminology is a relatively small strand within criminology", says Wim Bernasco, coordinator of the research group 'Mobility and Distribution of Crime' at the NSCR. "My colleague Henk Elffers and I are, together with Johan van Wilsen of the Universiteit Leiden, the only scientists in the Netherlands who study the spatial dimensions of crime. And worldwide there are probably about 40 criminologists who specifically look at spatial dimensions."

Last summer the NSCR hosted a conference on geo-criminology, a unique occasion that attracted scholars from various European countries as well as Canada and the United States. "Usually we attend general criminology conferences, where at times geographic factors are discussed or quantitative methods assessed. There are no special journals for geo-criminologists."

Elffers and Bernasco's research group focuses on two main questions:

1. Where do we find which types of crimes? Why there? And which spatial choices has the individual offender made while carrying out his crime (both his choice for a specific location as well his way of getting there)?
2. What is the (spatial) relationship between the criminal's behaviour and measures taken by law enforcers (police, ministry of justice and local government)?

Elffers: "Although psychological insights, particularly the 'rational choice theory', are central to our approach, we also use sociological methods developed by criminologists to analyse the impact of social and natural environment factors on the individual decision maker." This so-called 'environmental criminology' is partly based on geographic principles: for example, the idea that the shorter the distance between objects and between

persons, the stronger is their relationship. But the role of GIS in carrying out analyses so far remains limited."

"When I joined the NSCR in 2000, I thought it would be necessary for me to become a GIS-specialist. But luckily that was not the case," says Elffers, who was originally trained as a mathematician, but also worked in a geography department for four years. "We have purchased some basic GIS-software and some colleagues took a training course. But we use these systems primarily to generate spatial variables, which are then analysed in advanced statistical models."

Bernasco adds: "For one of our former PhD-students GIS *is* more important. He is involved in geographic profiling, a method used to reconstruct the offender's hiding place, based on the location of different crime scenes that seem to be related (based on forensic evidence). Recently, about 30.000 resolved 'monetary crimes', committed by over 1600 different offenders, were drawn into a map to see if there were patterns in the spatial behaviour of 'marauders' – offenders who operated in an area with which they are familiar, usually near their own house – and 'commuters' – criminals who leave their living area to commit a crime in a relatively remote site. It was a labour intensive job. And it confirms our perception that calculations can often be made much more quickly and much more easily in a statistical model, rather than with the help of GIS."

Unlike scholars in other disciplines, Bernasco and Elffers are also sceptical about the added value of visualisation. Elffers: "I can't remember that drawing a map has ever given me any new insights, or that it changed my way of thinking. But maybe this is partly due to my old-fashioned, mathematical mind set; that I am simply not used to such an approach."

On the other hand, both scientists see the benefits of having geo-referenced data. Elffers: "It would be great to have a system which could instantly produce data on the ethnic backgrounds, average age and so on of a certain geographic area, or that could accurately calculate the distance between different locations." Bernasco adds: "Such a system would extent the geographic range of our findings. Our current studies are largely based on data from the area around The Hague; our models only apply to this specific geographic context."

To what extent are Elffers and Bernasco's experiences and perceptions representative for scholars in other countries? "I would say that colleagues in the Anglo-Saxon countries *are* using Geo-ICT at a more advanced level," says Bernasco. "George Rengert, an American scholar who gave a paper at our conference, uses it creatively for his research on the relationship between the location of criminal offences and the proximity of certain facilities: shops, pubs, etc. Using a GIS, Rengert has created areas with a radius of 200 meters around such facilities, and then compared what kinds of offences and in what frequency took place within and just outside the area. Others go a step further and try to simulate the movement of criminals in virtual maps to discover how the presence of shops on the right or a police station on the left affect the criminal's decision to turn left or right at the next cross-road."

Elffers: "That our colleagues in North America have collected greater quantities of useful data is partly a product of the smaller distance there between science and society. The American Ministry of Justice has invested a lot of money in so-called 'crime mapping' – applying GIS to police data – in which many scientists are involved." Bernasco: "Scientists

are also consulted when judges, in cases of sexual crimes, intend to apply 'residency restrictions' (areas where the convict is not allowed to live) or 'access restrictions' (areas where the offender is not allowed to come). To simulate the implications that such restrictions would have, the particular objects that the offender needs to avoid are selected in a map and, using a GIS, surrounded by a 'buffer zone'. Sometimes such simulations show that the restriction would bind the offender to his home, or that he cannot visit his 'rehabilitation councillor'; hence that they need to be made less restrictive."

**KLPD**

To what extent is there a similar, fruitful exchange in the Netherlands between science and practice? To what extent is there a specific place for geographic insights in crime investigations? And what is the role of Geo-ICT in this story? Cleo Brandt and Bram van der Meer, part of a team of behavioural specialists the National Police Services Agency (KLPD), argue the fact that Johan van Schaaik was recently added to their team has made a significant impact. Brandt: "Although spatial- and temporal aspects were already part of our standard explorations, Johan van Schaaik *has* developed and professionalized our geographic analyses further."

How does the team carry out their behavioural analyses? And how do they reconstruct the offender's location of departure (often residential or work address)? First of all, the 'raw facts' are collected and described from what can be drawn out of eye-witness accounts, coroner's reports and the reports by forensic experts. This includes information such as the location of the crime scene, times at which certain actions took place and means of transport used by the offender. Afterward, from the available data the behavioural and geographic elements are extracted. Based on these elements, conclusions are drawn which can be used throughout the further investigation. Carrying out an investigation is a matter of making choices and the geographic and behavioural analyses support these choices. Sometimes comparative enquiries are made to see if there are behavioural or geographic overlaps with other unresolved crimes."

"This is of course not a matter of hard science," stresses Brandt. "A crime is not carried out in a laboratory and because there are numerous interactive variables, we cannot simply apply scientific findings to our practice. Our choices are partly based on experience. But we never draw conclusions that are not supported by findings from our investigation. Although we are not always successful – not all crime investigations in which we have been involved have been resolved – but we are convinced that behavioural and geographic analyses do contribute to solving crimes. We keep the scientific principles in the back of our minds, but we can't follow them blindly."

Van Schaaik illustrates his point with an example: "In 2004 we advised in a case that eventually led to the life-long sentencing of a criminal in the eastern part of the Netherlands, who had abused and killed numerous animals and people. Our behavioural and geographic analysis contributed to the offender's conviction. He turned out to reside 600 metres from the centre that had been indicated as his 'departure area'."

**Struggling**

Which role does Geo-ICT play in this work? Van Schaaik: "Despite some positive developments regarding GIS in the police organisation, things are still far from perfect. I am currently using a relatively simple, user-friendly programme, MapPoint. Data integration, overlay and buffering are not really possible with this software. The maps are

often incomplete or not up to date and it is not really possible to split them up into different layers. I also use a programme called CrimeStat III for making geo-statistical calculations."

"The police data systems lack uniformity, which makes it difficult to extract geographic information. Although there are some steps being taken towards a more professional geographic information system for the police organisation, as part of the projects 'Sherpa' and 'Location Based', I believe that it is all going much too slowly."

What are the attractions for Van Schaaik and his colleagues in having a professional GIS-environment? "Once we have a GIS-environment that matches the standards and needs of the Dutch police organisation, it should enable us: (1) to link our software to different police registration systems, which will contain geo-referenced data; (2) to integrate data from different sources, for example to combine aerial shots, socio-economic data and demographic information; (3) to use a range of GIS-functions for consultation, visualisation, measuring and analytical purposes; (4) to exchange and share research findings with other researchers involved in the investigation as well as with those who ordered the assignments in the first place."

Unlike Elffers and Bernasco, Van Schaaik does believe in the explorative powers of visualisation: "Just plotting the 'facts' in a map sometimes raises questions with the investigators, which then lead to further spatial- or temporal analyses. And this will only improve if our new GIS-environment enables us to switch environmental characteristics on and off, for example only to show cycling paths or specific locations."

But there are other geographic dimensions that are of interest to Van Schaaik's department, for example in relation to written threats. Traditionally, investigations into these cases focus on technical aspects of the threats, while ignoring linguistic aspects. Recently techniques have been developed to draw linguistic and behavioural conclusions from a text.

As part of these analyses, geographic dimensions could also come into play. Van Schaaik: "Besides questions such as '*where* was the letter posted' and '*where* is this type of paper sold' one could also ask '*where* is such a dialect in use' or '*in which areas* do we find this type of slang'? We are planning to consult the makers of digital dialect maps, and see if we can place the dialect or slang that we find in the letters, which may then help us to identify the author's identity and/or his place of residence. This last example shows how GIS can serve as a binding/bridging-tool."

Niels van Manen, Henk Scholten and Rob van de Velde
SPINlab, Vrije Universiteit Amsterdam