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"Cooperation and a Geographic Information System Makes a Very Much Safer Place To Live"

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Introduction

The City of Doncaster and Templestowe, the Victoria Police and two private sector companies have combined to create an exciting new crime fighting and crime prevention tool which has the potential to make the battle against crime far more effective.

During 1992 the four organisations worked together, on a no-fee basis, to test the value of Geographic Information System computers in crime prevention. The hypothesis we tested was that the vast amounts of crime and vandalism data which the police and local councils store can be made more effective by processing it through a Geographic Information System computer. The results of the test were every bit as successful as we had expected.

What is a Geographic Information System?

By way of a very brief definition, geographic information systems (GIS) are powerful but small computers which store maps instead of, or in addition to, text-based files and which are able to answer questions about the relationship between features on the maps. The same computers often store information related to the maps such as the names of owners of particular properties etc.

The computer usually has a 'base map' which shows all the basic information about the area. It then stores all other information as 'overlays' which can be 'placed' over the base map so that the user can see all the basemap features and all the features on the overlay. Countless overlays can be used at the same time and individual overlays can be added or removed as required by the user.

The maps can be 'zoomed' to whatever scale is most appropriate simply by highlighting the area of a map which is needed in greater detail. The initial view a user may have is a map of Australia which, in itself, is useless for studying the properties at risk if a gas main had ruptured and was leaking a cloud of explosive gas. Using a GIS the operator could indicate that the emergency area was Melbourne and the view on the screen would be focussed on the greater Melbourne area. The operator could then narrow the focus still further by indicating that the gas main is in the eastern suburbs of Melbourne. The next view would be more detailed and the operator could instruct the computer to show the route of the gas main, the names of the streets and the property boundaries. Not only can numerous overlays be selected to be seen at once but the scale of the map can be tailored by the operator to suit whatever they are doing.

The uses to which geographic information system computers can be put are practically limitless and include:

- a. improving local security as has been demonstrated by this pilot study;
- b. controlling landscape development;
- c. studying the relationship between vegetation, terrain and snow depth;
- d. displaying the effects of mining on river deltas;
- e. determining areas for fixed route transit services etc.

The uses can be scientific, administrative or historical, there are no bounds and the technology is affordable by most organisations.

Geographic information system computers are being used in increasing numbers by councils, government departments, and some large corporations to manage areas of land and assets such as roads, drains and electrical reticulation systems. Virtually anything that can be shown on a map can be shown to more advantage on a geographic information system because of the computer's inherent capabilities to integrate and process vast amounts of information very fast. Geographic information systems cannot perform tasks which cannot be done manually using maps and pencils and pins and enormous amounts of time. But geographic information systems can combine and process information on maps so fast that they have revolutionised most map-related tasks. For example, a council may want to write a letter to all home owners within a 500-metre radius of a particular street corner. To do the jobs manually, a circle of the right size would have to be drawn on a paper map, then someone would have to make a list of all the property numbers and street names within the circle. Then the council's computer system could make a list of the home owners names for those addresses. That list could then be used to produce the mailouts. At the very best that is a full day's work, in all likelihood it would take two days to complete with all the in-built delays which could occur. Using a geographic information system the person making the list would use a computer mouse to mark the centre of the circle and to show the computer how big the circle should be and would instruct the computer to produce a list of all the properties inside the circle. The entire task, including the production of a merge file with all the names and addresses on it may take only a couple of minutes.

Similarly, a geographic information system can be used to compare the proximity of various events or types of people, for example the addresses of disabled people who receive home assistance from the council could be compared to the bus routes which have facilities for disabled access. On a more critical level the addresses of people who depend on electricity for life support systems could be provided a better service if the electrical

supply authority could see on a map which people are affected by a localised power blackout.

The capabilities of this branch of computing seem to be bounded only by our imagination. It is imagination which provided the link between our local security problem and its solution. We only used the existing capabilities of a geographic information system - from our imagination came the questions which linked together lots of available information, through the geographic information system, to produce some very useful pictures of security issues in the City of Doncaster and Templestowe.

Cooperation

One of the hallmarks of this project was the exceptional level of cooperation which existed between two private sector companies and two public sector instrumentalities. Intergraph Corporation and MITS Limited were full members of the study team and they loaned a computer and the map base, respectively. They both also assigned staff to take active parts in the development of the pilot study. The Victoria Police and the Doncaster and Templestowe Council both devoted staff time, space and the information on which to develop the study. Each of the organisations contributed their time and equipment free of charge in a true show of community cooperation. We conducted a very successful pilot study which certainly proved what we had set out to prove but we had not developed a product which any one of us could sell or even recoup our investment. That is a true test of community spirit and corporate citizenship.

This morning I am going to show you the results of cooperation between a progressive local Council, the Victoria Police and two private sector companies which has produced a system which will help the Police and local councils focus activities in making the city a safer place to live.

Background

Some major incidents have occurred during the last two years which have been of considerable concern to the whole community. Doncaster and Templestowe, in general has relatively low crime statistics but statistics are of little concern to older people living alone who feel at risk of attack or burglary or to people who do not feel safe outside at night.

In early 1992 Council established a committee to improve security for residents. A number of initiatives were discussed including the idea of hiring private security companies to patrol the streets to supplement the number of patrols which our local Police were able to perform. The idea caused a great deal of controversy and in itself came to nothing, but it did focus the discussion on helping the police to increase their visibility and overall effectiveness.

In July 1992 Council funded the purchase of a police car and a personal computer for the local police so that they could increase the amount of time spent actually patrolling the streets.

Council's security committee also viewed an video of a computerised emergency service dispatching system which was based on a Geographic Information System computer. When someone rang to report an emergency the location of the caller was shown on a computerised map. The emergency operator could also see on the map the location of the nearest suitable emergency vehicle and could direct the vehicle to the emergency. The version we saw also worked out the most direct route for the vehicle to take. This was a magnificent and practical use of technology but it was not appropriate for our situation. The vision of a computerised map being used to help in emergency situations provided the seed which grew into this project. In discussing the idea we eventually involved Intergraph, MITS and the Victoria Police. All parties agreed that the idea had merit and we all volunteered our time and efforts.

Intergraph Corporation loaned a Geographic Information System computer and software and considerable staff time. MITS Limited loaned and refined the computerised map of the area of the city we decided to test our ideas on. The police provided advice, 'sanitised crime reports' and the assistance of a computer literate officer. Council provided the venue for the development, advice, data, funds for training and considerable staff time.

Why Do We Need a GIS To Improve Security?

Both the police and local councils have a role in local security. Without being too trite, the police role is to deter criminals and to 'police' our laws - make sure they are obeyed. Council's role is to help local residents avoid the effects of crime and to protect the community's assets. Our roles are different but complementary but at the moment we are both forced to use similar reactive methods of working because the paper form of storing records really is not conducive to being proactive.

Current police procedures have numerous copies of paper based information and data in a wide variety of places. When an analysis of a particular crime is attempted a number of personnel are required to collect and collate the relevant information from sources at local level, district level, state-level or by talking to local residents. Once this information is gathered they can start to find some answers but it has taken time and expensive human resources. Valuable evidence can also be lost. Very much the same can be said for local government systems although our work is somewhat less exciting.

The Study

In assessing the use of a GIS we looked at three areas of anti-social activity:

- a. Neighbourhood Watch
- b. vandalism; and
- c. a simulated major crime

Analysis 1 - Neighbourhood Watch

The aims of this analysis were to show crime trends in Neighbourhood Watch and non-Neighbourhood Watch areas and to assess the value of Neighbourhood Watch.

The study area included Neighbourhood Watch and non-Neighbourhood Watch zones. Two of the non-Neighbourhood Watch zones were a major shopping centre and a private golf club.

When all the crime reports for the study period were electronically transferred to the GIS computer we were able to study the patterns of thefts and burglaries. When we separated thefts from burglaries it was apparent that the majority of the thefts were occurring in the non-Neighbourhood Watch areas. A review of the crime reports indicated that this was true and that there was a rash of thefts from motor cars in both the shopping centre carpark and in the non-Neighbourhood Watch area.

The study then examined the pattern of burglaries in both areas. A pattern was instantly apparent - the burglaries were clustered along the main roads. Prior to that everyone had presumed that quiet backstreets with little traffic and movement provided the conditions for break-ins. A further examination of the pattern using data which was provided from the crime reports looked at the time of the break-ins; the vast majority were during the day. Many of the houses located along these main roads have high front fences to block out some of the traffic noise and to provide the occupants with privacy. It now appears that those front fences are providing a haven behind which criminals can operate in similar privacy.

This information is immediately useful. The police are now able to target their patrols along main roads and to brief their officers to watch for higher levels of break-ins behind the high fences. Neighbourhood Watch zones have been advised of the patterns and can now take steps to help their members hiding behind high front fences with home security.

If and when this trend of 'crime behind the fence' changes the GIS will alert Police and Neighbourhood Watch zones so that they can review their actions in a timely manner.

Further intelligence, in the community cooperation vein, could be obtained by asking bus drivers along these routes to keep their eyes out.

Vandalism

Vandalism costs Doncaster and Templestowe Council in the order of \$500 000 each year. Most people ring the Council to report vandalism and graffiti and some people ring the police. No link is made between the two reports. This makes it hard to find the trends which can be used to work ahead of the problem. This analysis was based on the consolidation of both sets of data.

After all the data was entered into the computer, a pie chart was requested from the computer to show a breakdown of the types of vandalism and graffiti occurring in the area. This indicated that graffiti was the most frequent so the study concentrated on graffiti.

The reports classified the graffiti as simple or complex. It is known that simple graffiti is normally the purview of school children whilst the complex multi-coloured work is normally not related to school children and often the 'artists' identify themselves because of pride in their work.

The location and type of all graffiti in the area was displayed on the screen and it revealed a clumping, rather than random spread. The clumps were not easily associated with any school or other source of young people. The next step taken was to test the sites against proximity to bus routes and the computer was asked to show the bus routes which occurred within 200 metres of the graffiti. Some bus routes were identified and these were then tested against their proximity to schools. Three schools were linked by this circumstantial evidence to the graffiti.

The immediate outcome of this newly available information is that Schools Resource Officers (police officers) could then conduct anti-graffiti programs at the schools and educate the problem away.

Major Incident

The next analysis was set up as a major type of incident in the pilot area. Data that would be used to assist with the solving of this situation is held in the main Victorian Police data base and at local level within the Doncaster District.

Universal data such as vehicle registrations and criminal records is matched to local data to assist in building a picture around an incident.

The event is fictitious and serves only to show the capabilities of the GIS technology in helping to solve this type of incident. All the information used here is fictitious but is similar in structure and content to data actually held on police systems.

This particular incident commenced as an eight-year-old girl walked home from her school at 3.30 pm. She walked through a large park towards her home. One Friday a man attempted to drag her into his car which was parked near the toilet block in the park. This happened at 3.35 pm. The girl managed to run away to her home. Her mother immediately called the police.

Once the police have attended the scene and interviewed the girl there are a number of queries that then need to be undertaken at the police station. Using the GIS we asked these questions of the data and showed it in a graphic form on the screen.

We first reviewed any similar types of offences reported for the preceding six months and where they occurred.

The next query was to show all suspicious vehicles (suspect vehicles) which had been reported as being seen in this area near parks and schools and shopping centres.

A flow on question was to show where all suspicious persons (suspect loiters) had been seen in the area near schools, parks or shopping centres. We might show this for locations where the two, both cars and people have been seen in close proximity to where the modus operandi is similar.

From the data records of known sex offenders, we asked for home addresses of those people within this area.

The girl after a little while remembered that the car was big and yellow. We could then refine the question about known offenders and ask to see the addresses of known offenders who are known to drive a yellow car.

In this scenario, by linking together local knowledge and data from the police databases we identified a potential suspect. The investigation also revealed two other similar incidents in which he may have been involved - yellow cars were associated with both incidents but had never been associated with this suspect.

The scenario displayed may not provide the complete solution to an incident or crime but the GIS system would certainly provide investigators with a great deal of information which would otherwise take many hours or weeks of work. The information we have just found would take only a matters of minutes to show.

This type of system is not proposed to overtake the fundamental reporting and recording processes by Police or Council, rather it adds value in that 'localised 'real time data from numerous sources can be quickly integrated to enable investigators, and Council staff if appropriate, to plan a course of action.