

## SUPPLYING DIGITAL CARTOGRAPHIC DATA TO THE EMERGENCY DISPATCH SERVICES IN THE NETHERLANDS: A FIRST SURVEY

by R.O. Koop

Cartography Department  
Faculty of Geographical Sciences, Utrecht University  
PO Box 80.115, 3508TC Utrecht, The Netherlands  
tel. +32 30 531379 / FAX +31 30 540604  
e-mail: O.KOOP@FRW.RUU.NL

### Abstract:

The paper will cover the results of an extensive survey of the emergency dispatch scene in the Netherlands. This survey is the first in its kind in this country and was supported by the Justice Department and the Department of the Interior. The survey covered the three main disciplines that rely on dispatch services: police, fire departments and ambulance services. The main objective of the survey was the gathering of quantitative data about the control rooms and their involvement with maps and geographical data. The survey showed an increased interest from the emergency dispatch services towards the introduction of a centralised agency that supplies the services with digital cartographic data. This clearing house should not only bring cartographic data to the these users, but also supply them with knowledge of how to use the data properly within their operations.

### Introduction

In the Netherlands GIS has developed itself the last ten years from an experimental tool to a mature aid in resolving problems of a spatial nature. More and more government and private organisations discover the benefits of GIS in their daily practice. Organisations that are usually not associated with spatial issues enhance their activities with this new technology. A nice example of this is the world of marketing where desktop mapping packages become popular in direct target marketing campaigns.

It was of course a matter of time before a group of professionals in society that, by nature, use geographical space implicitly, would end up with GIS technology to enhance their operation: the emergency dispatch services. As in most other countries the emergency dispatch services are subdivided into police, fire departments and ambulance services. Before we proceed to elaborate on the GIS situation within the emergency dispatch services we should explain first how the things are organised in the Netherlands. Subsequently a survey that was held among the switch board personnel will be discussed. We will conclude this paper with the recommendations that we made and will try to extrapolate these to a more general level. The main issue investigated and reported upon in this paper is the feasibility of a centralised bureau that supplies the emergency dispatch services with cartographic and geographic base data and relevant supportive knowledge.

### The emergency dispatch services in the Netherlands

#### Police

The Dutch police is the largest and most substantial of the three disciplines. Since April 1994 the police is organised regionally. The country is subdivided in 25, more or less autonomous, police regions/departments each of which has its subdivision in districts. On top of this there exists a 26th body (KLPD), also known as the 26th "region", that covers all activities that should be organised nation-wide, like highway patrols, criminal information services and the telecom and information technology service. These services cater both the civilians as well as the individual police regions. The 26 police departments are all independent as to how to spend budgets and the priorities in, for instance information technology. This situation makes dealing in a centralised way with the police rather cumbersome. On the national level the Ministry of the Interior is responsible for the police. The Ministry of Justice however may be considered as the only customer of the police and is responsible for the policies concerning law enforcement.

### **Fire Departments**

Fire fighting is a crucial service to maintain law, order and security in society. In the Netherlands only a minor part of fire men/(women) are professionals. As in many other countries most fire men are volunteers, who are very well trained for the job though. The diversity of the type of service requires centralised authority. The fire departments are also financed, as the police is, by the Ministry of the Interior. Although there is a subdivision in districts, these are merely utilised as a subdivision of responsibilities. Financial autonomy is much less compared to the police force. The fire departments host the ambulance radio operators in their control rooms in many cases so there exists a co-operation in the field of communication technology.

### **Ambulance Services**

Ambulances are the least organised of the three emergency dispatch services. Any one may qualify to start an ambulance company. Only the centralised facility, the dispatch switchboard and control room is shared. The ambulance fees are almost 100% paid by health insurance companies. The insurance companies are actually the ones in charge over the ambulances. They decide how much and how far an ambulance should drive. They have an incessant drive to cut back on the number of trips. Every trip is being charged with the insurance companies as a medical supply to a patient. A surcharge is paid to maintain the centralised services like the switch board. This situation is even more cumbersome to deal with than with the 26 police departments. In many cases the switchboard and control rooms are shared with fire departments.

### **Centralised disaster control**

When confronted with a major incident or even a disaster the three emergency dispatch services immediately will start (trying) to co-operate. To make life easier disaster control and mitigation plans should come into effect once a disaster has struck. Smooth information exchange is vital to an efficient handling of all aspects of a disaster. Sharing and exchanging geographical data/information is one of the main concerns these days. Disaster control is co-ordinated from within the Ministry of the Interior and the Ministry of the Environment. The fire departments are the main actors in this situation aided by the other two disciplines and the armed forces. The types of disasters most likely to occur in the Netherlands are

- natural: river- and sea induced flooding
- man induced: nuclear meltdown, chemical/gas releases, plain crashes, forest fires

With this overview we tried to give an idea about the structures someone has to deal with who wants to establish a centralised co-operative service facility concerning the supply of geographical data to the emergency dispatch services. To summarise the situation: We have to deal with 26 police departments, 45 fire departments and 45 ambulance control rooms, the Ministry of the Interior, the Ministry of Justice, the Ministry of the Environment and the health insurance companies. All these organisations have a say in these matters.

### **The current situation concerning GIS**

Investigating the GIS situation with the emergency dispatch services is like exploring unknown continents. Once in a while the caravan of merchants comes through, offering transistor radios that appeal very much. Unfortunately the merchants on their camels don't tell the natives that transistor radios need electrical power to run and quite soon, when the batteries run dry, the people are left frustrated. This is not far from the situation that may be found in the world of the emergency dispatch services where knowledge concerning digital geographical aids is almost absent. Vendors offer GISes for switchboard and control rooms without proper regard to the most essential item of them all in GIS: the base map data.

Although the various departments are aware of the fact that they are dealing with geographical space and that they are avid map users the awareness of the options GIS may offer to them is lacking. Being

exposed to the zealous effort of the vendors to sell GISes they learn quickly though. Still, the fact that up to date digital maps are an essential for the successful operations of a GIS in a control room remains neglected. Another problem is the fact that sooner or later this awareness will come and will pose the emergency dispatch services with serious problems since the base map material costs a premium compared to the investment in hard-and software to run it on. It is a generally accepted fact in the GIS world that in most cases 50-80% of the investments in a operational GIS go into the base map material. That the share is so huge is mainly caused by the fact that purchasing a digital topographical map is not a one time activity, but repeats itself, usually on a yearly basis. The map must be taken in subscription or is, in many cases, leased. The vendors of the map have to make high investments to collect data to keep the maps up to date. Therefore the base maps are quite expensive. In the Netherlands, as is the case in most other Western European countries, there is no such thing as free government collected data. Another fact is that building a body that centralises the purchase of the base maps "en gros" will reduce the purchase costs substantially. Early investigations by the police (KLPD) showed a reduction in costs of approximately 60%. So this alone should be incentive enough to pursue centralisation with respect to GIS data services. In order to justify the initial investments and to persuade the central government into this venture a survey was held to collect data on this issue in the field.

Although the image that we created here is quite clear, it is somewhat charged. In fact a handful of departments, in particular within the police force, is currently operating pilot projects with GIS technology and is doing this quite successfully. However they are the exception on the general situation and may be considered as early adopters. Another fact that must not be overseen is the activities of related departments in these organisations particularly various branches within the police departments are looking at GIS from a more analytical point of view. Especially those that deal with crime analysis and the environmental law enforcement (tracing spills, tracking permits etc.). Currently a student of the department of Cartography is working on a thesis in conjunction with the activities of the crime analysis branch of the Utrecht police department. They start using Atlas\*GIS as an analysis tool.

### The survey

Early 1994 the project team KAR (Kaarten Alarmdiensten en Rampenbestrijding), which stands for *Maps, Emergency services and Disaster control*, was founded by the following participating organisations:

- KLPD, Information Technology branch (police)
- Ministry of the Interior, directorate of Fire and Disaster Control
- The Dutch Ambulance Platform (society of ambulance control rooms)
- Department of Cartography, Faculty of Geographical Sciences, Utrecht University

KAR was founded to investigate all ins and outs of the establishment of a centralised services bureau that currently is known under the acronym BIAR (Bureau Informatievoorziening Alarmdiensten en Rampenbestrijding) or *Bureau for the Information Supply to the Emergency Dispatch services and the Disaster Control*. Let it be clear that this bureau is non-existent yet.

The first assignment to KAR was the handling of a survey. This survey was held mainly through a questionnaire. In order to bring the issues concerned under the attention of the respondents we wrote an information leaflet and had it designed by a professional graphics designer. The philosophy here was that if you approach your target group with "mature" looking informative material the respondents would take this chore more seriously. This approach turned out successful and it put the KAR-initiative "on the map". Writing an exposé in one and a half page for the leaflet in which the *why* and *how* of GIS and base maps in the environment of the emergency dispatch services is no sinecure. Nevertheless it is necessary to introduce the audience to the subject.

The response to the questionnaire was high. It was sent to 110 control rooms, many of these to the same control rooms since fire departments and the ambulance services share facilities in many cases. Their activities differ substantially though. For instance the operator behind the ambulances switchboard should have medical knowledge to assist the personnel in the vehicle if required. That is why we asked both disciplines to answer the questionnaire separately. Eventually 90 questionnaires were returned, which is a more than sufficient response.

All responses were entered into a database and were processed into a report. To get some more direct data on the GIS situation now and in the future at the control rooms 15 facilities were visited by the team and the personnel was interviewed. Next, we will elaborate on the results:

### The results of the survey

The survey was the first instance in which a nation-wide investigation was performed, directly with the co-operation of the personnel in the field. It gave us an estimate about how many people work behind switchboards in control rooms around the clock. The following table gives the figures as given by the survey:

	Total	Police	Fire Dep.	Ambul. Serv
number of operators	1505	847	337	321
average size control room	19.05	37.83	12.04	11.46
smallest control room	2	16	2	2
largest control room	90	90	50	37
not responded	11	1	8	2

The numbers show clearly that the police is the largest force in this field and we must take the combined nature of the fire departments with the ambulance services in 39 co-located sites (4 of which also include the police) which makes a total of 78 of the 90 respondents.

The survey was subdivided in two parts:

- questions about the current "paper map" situation
- questions about the present and/or future plans

### paper maps

Most control room map are being used to look for locations, addresses. Street maps and town plans are being used for this. We asked to specify what maps (brands) were used. Most control rooms said that they used the FALK town plans and the 1:10.000/20.000 *Straten Atlas van Nederland* (street atlas) which covers areas that are left out by FALK. Another map type that is quite common is the topographical map 1:25.000 of the Netherlands, usually applied as wall map for orientation and planning. This map type is also relevant for tracking activities during co-ordinated disaster control. It was interesting to note that the fire departments are the most avid map users. One could even state that they have a tradition in this field. Since fire fighting involves plans of buildings and their surroundings fire men and women are knowledgeable about using maps, especially on large scales. One fire department even made its own 1:10.000 map series of their region, even selling it to other authorities. To make life in the vehicles easier maps are sometimes cut to smaller pieces and mounted on cards and laminated with plastic. Sometimes they put the pieces in a book or binder (also in plastic). In the vehicles there are also maps available, usually the same as in the control room. An exception to this are the vehicles that are managed from control rooms that use sophisticated street finding systems (pre-GIS).

On a yearly basis the emergency dispatch services spend approximately Fl 220.000,- (US\$125.000,-) on paper maps. On top of that a lot of time is being spent by the personnel to update the maps or map features that are out of date. They also draw topography in the map that is absent, but essential for their activities. An example of this are the fire hydrants and other water sources (this is in particular crucial

in forest areas). They also draw planned topography, like newly build-up areas of towns in order to service these areas during construction and, even more important, right after, when the area is not yet mapped by the publishers. In the country an estimate of about 130 people in control rooms work on this regularly. This amounts to a total of about 3.2 full-time jobs involved. Multiply this by FL 60.000,- per job another FL200.000,- (US\$110.000,-) should be added to sum of the map purchase.

Although the fire department and ambulance services value an accurate map a lot, the police find it less important. Most respondents say that the up-to-dateness of the maps could be better. Most of the respondents ask around for themselves if new maps have been published. This takes some effort and could be easily incorporated in the tasks of a centralised bureau with the aid of a newsletter or electronic bulletin board.

### ***GIS and the digital map***

The control rooms have gone through an extensive process of automation the last few years. Integration between the incoming incidents and the handling of the subsequent processing has already gone quite far. So far the link to a GIS has been lacking. Linking on the other hand is not easy because the major prerequisite to facilitate this is the inclusion of a location item (co-ordinate) in the incident handling. To collect the location however we need a GIS. So this is a "catch 22" that must be resolved. Vendors of the control room systems are working on this and the Ministry of the Interior is also defining a nation-wide concept for a standardised integrated control room information system in which a link to GIS is included. To run a GIS successfully we need the proper digital base maps, which, as we stated, are expensive. To look into this problem from the user point of view we queried the respondents with a number of questions concerning this issue.

First of all our suspicion that the knowledge about GIS is non-existent was confirmed. The knowledge about information technology in general however, is relatively good. 73 Respondents stated that they had knowledge of information technology. We did not go into further detail concerning this. The average number of years that they were working with computers was 6.74. Most experience may be found with the police (8.48), followed by the fire departments (7.26) and the ambulance services (4.68).

On the question if people have been considering GIS as an option for their activities, 48 answered affirmative. Only 8 of them actually had some sort of "GIS" in their control room, although none of these system may be considered a real geographical information system. When talking to vendors about implementing a GIS, the map is ignored or gets much less attention than the system functions itself. A tender issued by the KLPD showed that, on the question if the vendors could supply them with digital base maps they all had to yield and point at the known producers of digital maps.

Most control rooms are just in a state where they are observing what others, the early adopters, are doing. The control rooms that actually do have a system attract a lot of attention therefor. There is no such thing as a GIS-working group to ease this situation. The KAR-initiative is the only platform for the moment, but not by the users though.

The majority of the respondents likes to have a "smart map". We deliberately avoided technical terms like vector, raster and topology. A smart map is a map with which a user may interact, but still is "recognisable" as such. This means that this "smart map" is a combined raster scanned backdrop of a paper map combined with (invisible) vector data that are used for the interaction. Figure 1 shows all the results of this particular question. The fact that the only "smart" answer would have been "smart maps" is illustrative for the lack of understanding about GIS may do for their activities.

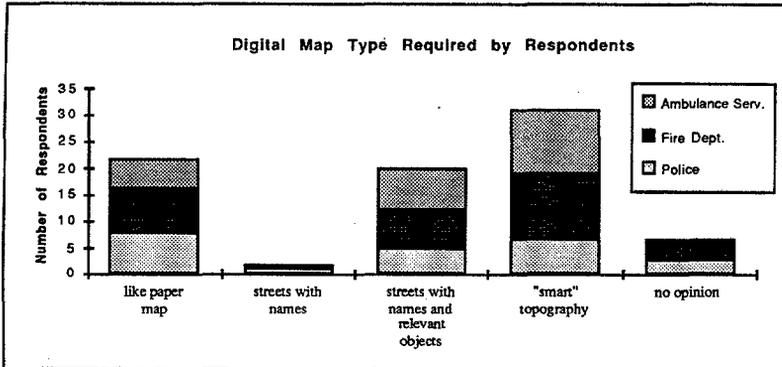


Figure 1

Another important issue is the actual application the system will be used for. Figure 2 shows the result to this question. We defined 18 possible types of functions that should be possible with the combination GIS/map. The most valued application is the pin-pointing of incidents by means of street name and house number. Others are the route finding function and keeping track of obstacles and temporary blockings of streets during special events, like markets and parades. It is also noted that many people are aware of the fact that a link to their corporate data base is valuable.

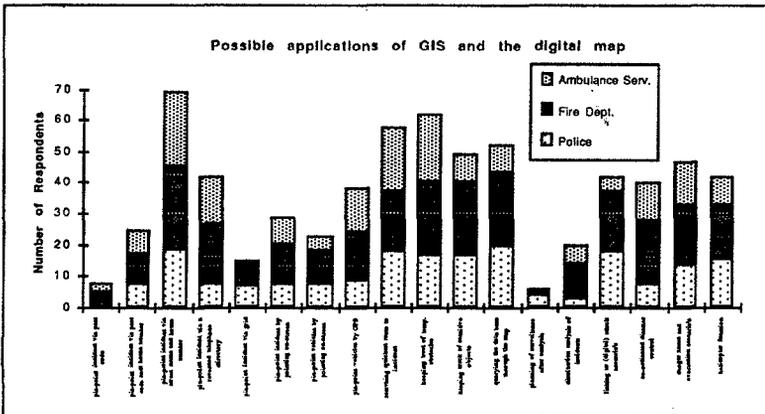


Figure 2

### **the need for centralised services**

We concluded the questionnaire with some questions if the control rooms are aware of the fact that digital base maps are expensive and that buying these collectively would save a lot of money.

Almost all respondents agreed with this and showed interest in a centralised purchase of the material. The question that arises next is: How do we proceed in establishing the Bureau (BIAR). In the beginning of this paper we pointed out that the number of parties involved is very high. Not only the number of possible participants, but also the difference in culture and the fact that there are some competitive sentiments between them does not make things easier.

As far as the KAR-team is concerned, a bureau should be established that will cover the following tasks:

- definition of the digital base map material to be purchased
- actual centralised purchase for all parties involved
- establishment of an expertise centre to aid the clients in the use of their material
- quality control of the purchased material, in particular its op-to-dateness
- collection of additional topography essential for the emergency dispatch services (hydrants etc.)
- supplying all this to the participants.

The bureau will operate on a non profit basis, but with cost recovery objectives. To actually realise the bureau a lot of work still has to be done. First of all a feasibility study must be performed, and all parties involved must be approached, in particular the central government and the health insurance companies, since they will be the initial funders of this project. The feasibility study will take place in 1995. Hopefully some careful steps towards a centralised bureau may be made in 1996.

### **Conclusion**

To end this paper we would like to summarise some of our experiences as GIS experts with the emergency dispatch services. First, the need for GIS with the emergency dispatch services is ever growing. They lack the knowledge, experience and, in many cases, the financial means, to properly implement this new technology in their switchboard and control rooms. The financial issue is mainly caused by the fact that the map data are so expensive and that this investment returns at least yearly, on a lease or subscription basis. Co-operation would therefore make sense, since the vendors of the base maps will be dealing with one huge national body that will purchase all necessary material for the whole country at once. This will make the deal for the vendor rather strategic and will cause a dramatic drop in price level (up to 60%). Furthermore the users must be supplied with objective information about purchasing and maintaining their GIS. It would therefore be very wise to have a help-facility for the at hand. Also the emergency dispatch services need topography that will never be collected by the vendors and will remain the responsibility of the emergency dispatch services themselves. Since they are to dispatch vehicles and not to make maps this will typically be a task for the bureau. However the Dutch government is promoting less involvement in these types of activities, so there must be established a more or less independent body. The first investments must come from the central government, just to get started. Our task in the next year and a half will be to convince the central government and persuade them to establish the bureau.

### **References:**

Projectgroep KAR, 1994, De behoeften aan digitaal kaartmateriaal gepeild  
Internal report of the Ministry of the Interior, the KLPD and the Faculty of Geographical Sciences,  
Utrecht University