Guide to professional Incident Management

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Auteur(s) Prof. Ir. L. H. Immers
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Preface

This report describes the vision of Incident Management (IM) on the Dutch road network for the period 2008 – 2015 as assigned by Rijkswaterstaat’s VCNL. The assignment was carried out over the period June 2006 until June 2007. This vision was arrived at through a number of steps, the first of which saw various representatives from those parties involved in the application of IM on the road network being extensively interviewed. In the second the results of the interviews were presented to and discussed with the participants of an IM study trip to the USA in September 2006 as well as being put on the agenda at a meeting of the National IM Platform. The key aspects of the future vision were highlighted in step 3 during a workshop specially set up for this purpose. All the members of the National IM Platform were invited to this workshop. Finally the process outlined above was completed with the drafting of a vision that reflects the interviews and group discussions during both the study trip and National IM Platform meetings.

The following people have already been interviewed about their views on the application of IM: Ronald Adams, Eeltje Hoekstra, Willem Giesselbach, Jose Hernandez, Andre Solinger (all VCNL), Bert Keijts (Director-General Rijkswaterstaat), Ineke van de Hee (HID Rijkswaterstaat Utrecht), Willem Jan Knibbe (senior advisor AVV), Ronald Auburger, Aad van Velden (province Zuid-Holland), Fup Goudzwaard (chairman Council of Chief Superintendents), Hans Eckhardt (manager strategic information, Zeeland police dept.), Bert Woest (district chief for Gooi and Vechtstreek), Koos Spee (Public Prosecutor’s Office, Field Officer, Ministry of Justice), Jack Kusters (NIBRA), Peter Hartog (manager National Emergency Centre, Ambulance Care), Ernst Pompen (Association of Insurers), Bert Huffener (VBS, Dutch Association of Salvage Specialists), Guido van Woerkom (director ANWB), Co Abercrombie (TLN) and Marcel Zuidgeest (Salvage, director Van Rijswijk).

This project was supervised by Eeltje Hoekstra, Willem-Jan Knibbe, Frans Jorna and Huub Schlundt Bodien.

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Finally, I would like to thank Kees Abrahamse, Rijkswaterstaat, head of the Rijnmond road network and Ernst Lettink, Rijkswaterstaat VCNL, for making available the photos with which the situations that prevail in an incident could be illustrated.

Ben Immers
Delft, June 2007
List of abbreviations used

AVV: Transport Research Centre
BiZK: Ministry of Home Affairs
CBR: Driver and Vehicle Licensing Centre
COPI: Incident Site Coordination Team (formerly CTPI)
CTPI: Incident Site Coordination Team (now COPI)
DVM: Dynamic Traffic Management
EC: European Commission
eCall: Device used in an accident to automatically send an emergency alert to the nearest emergency alarm centre
eSafety: Initiative by the European Commission to boost traffic safety on the European road network using intelligent in-vehicle safety systems (partly through the use of information and communication technologies)
FHWA: Federal HighWay Administration (USA)
GHOR: Doctor Assistance in Accidents and Disasters
GRIP: Coordinated Regional Incident Control Procedures, differentiated by the levels GRIP 1,2,3,4 (see http://www.minbzk.nl/contents/pages/3383/opschaling1.swf)
HID: Chief Engineer Director
ICT: Information and Communication Technology
IM+: Use of public-oriented highways inspectors authorised to regulate traffic
IMICS: Incident Management Information and Communication System
ITS: Intelligent Transportation Systems
MKBA: Social Cost-Benefits Analysis
NDW: National DataWarehouse
NIBRA: Netherlands Institute for Physical Safety
NIFV: Netherlands Institute for Physical Safety (formerly NIBRA)
OM: Public Prosecutors Office
OVD: Incident Supervisor
PD: Crime scene
PIN: Performance Indicator
PSAP: Public Safety Answering Point
RWS: Rijkswaterstaat (Dept. Public Works)
SLA: Service Level Agreement
SMART: Specific, Measurable, Acceptable, Realistic, Time-dependent
STI: Salvage Transport Incident
STIMVA: Association of Incident Management Trucks
TLN: Transport and Logistics Netherlands
UMS: Exclusively Material damage
VCLN: Dutch National Traffic Management Centre
VID: Traffic Information Service
Summary

Current situation

In this report a vision is presented of the most desirable developments in the application of Incident Management on the Dutch road network (highways network and secondary road network) for the period 2008–2015. Incident Management is taken to mean the totality of measures intended to clear a road for traffic use as quickly as possible after an incident has taken place, all being done with regard for protecting the interests of possible victims, the safety of the emergency service workers, traffic safety as well as the control over the damage caused. In 1993 the initiative was taken in the Netherlands to address in a professional manner the handling of incidents on the highways network.

Important results of the development path taken in recent years are:

- Coordination between police, fire brigade, ambulance service and highways authority concerning tasks, responsibilities and powers during the emergency assistance process (Incident Site Coordination Team, COPI).
- Organisation of joint exercises and international study trips.
- Implementation of the National Car Regulation,
- The foundation of STIMVA (the Association of Incident Management Trucks) and the creation of the STI (Salvage Transport Incident) expert.
- Implementation of the National Truck Regulation.
- Implementation of highways inspectors.
- Application of IM on the regional road network.

TNO has calculated that had no IM measures been applied, in 2003 the nation would have been confronted with 65% more hours lost by vehicles as a consequence of incidents. In 2003 the number of hours lost by vehicles per 24-hour period with IM exceeded 60,000 and without IM, 100,000. Annually, this equates to a saving of some EUR 150 million. This calculation takes into account only the saving of hours lost by vehicles.

The importance of ramping up the application of IM on the road network is shown by Figure 1. This Figure shows both the trend in mobility in the Netherlands and the growth in the length of the highways network since 1980. The increasing discrepancy between the trend in mobility and the increase in capacity since 1980 is striking. The increasing weight of traffic jams (vehicle kilometres per kilometre traffic lane, strain on the highways network) is the consequence of this. In turn, the increasing imminence of jams means less is required to trigger a disruption (even small discontinuities can result in a traffic jam). Moreover, the consequences of a disruption (hours lost by vehicles) become much greater. Through the application of Incident Management the negative effects of incidents can be reduced considerably.
Ambitions and ‘SMART’ aims

To provide the guiding principle for the desired professionalisation of the application of IM the following ambitions have been formulated for the medium term:

- More than in the past, capacity to serve the customer (the road user in various capacities) will become the yardstick for the organisation, design and quality of the emergency assistance process, in other words public focus is the key to service in the performance of the government’s core tasks.
- Improved administrative embedding of the cooperation between the chain partners in the IM emergency assistance process both strategically and tactically and at an operational level. This is expected to enable a quick and effective response to social developments and the fast resolution of existing problems in emergency assistance.
- Improved embedding in policy of the cooperation between the chain partners in the IM emergency assistance process, thereby removing any possible barriers to the efficient and effective application of Incident Management.
- The form of these two forms of embedding will be such that it generates a stimulating effect on the continued improvement of the speed and quality of the emergency assistance involved in Incident Management; IM as a continuous improvement process.
- The speed of the emergency assistance process will be substantially improved, in among other ways, by:
  - the continued optimisation and standardisation of the existing emergency assistance process; possible improvements may be derived from, among other sources, the critical path tasks for each type of incident;
  - clearly assigning the directive role in the handling of an incident to one of the emergency service workers;
  - developing accelerated procedures for the completion of the emergency assistance process (from detection to normalisation), especially for truck accidents but also for the documentation of the clues in an alleged offence;
improving the road user’s ability to cope independently. 85% of the incidents concern Material Damage Only (UMS). In the handling of these incidents the road users involved can reduce considerably the disruption to other traffic, without the intervention of the police or other emergency services;

• applying all types of proactive and preventive Incident Management, such as;
  o preventing the rubberneck traffic jam,
  o preventing/limiting secondary accidents by ensuring no one drives into the end of the tailback,
  o the rapid removal of defective vehicles to/on the hard shoulder, especially during rush-hour periods,
  o implementing a tyre check for trucks.

• The quality of the emergency assistance will be improved, in among other ways, by:
  • Improving the coordination between the activities of the various emergency services
    (registration, information and communication), and related to this;
  • Improving the communication between emergency services/service workers before, during and after the emergency assistance process, such that an effective and coordinated response to the incident report can be provided;
  • Professional and, in so far as possible, uniform training of all emergency service workers that culminates in certification;
  • Permanent and thorough evaluation of the IM emergency assistance process that addresses its organisational, communication, technical, financial and legal aspects;
  • Introducing new techniques or improving existing techniques to improve safety, traffic circulation and the legal settlement of the question of who is to blame;
  • Coupling the introduction of new or improved techniques, organisation and forms of communication to a social cost-benefit analysis.

• Full integration of Incident Management and Dynamic Traffic Management (DVM) on the road network (diversion routes, traffic jam information, etc.) based on an integrated vision of traffic movements.

• Improvement of the visibility of the application of IM for the road user.

• Guarantee provided by the Dutch government and involved private parties (such as insurance companies) concerning the financing of the emergency assistance process including the necessary improvements.

The elaboration and realisation of the above-mentioned ambitions form the overture for a continued professionalisation of the IM process. This professionalisation must result in a significant improvement in the speed and quality of the IM process.

As a way of making the planned improvements concrete, the following ‘SMART’ aims (Specific, Measurable, Acceptable, Realistic, Time-bound) for the performance of the IM process have been formulated for the period 2008–2015:

**Duration of IM process:**
• For each accident category identified, in 2015 a 25% reduction in the duration compared with 2008 (possible differentiation by accident category) will be realised.

**Safety of IM process:**
• Significant improvement in the perception of the safety risk as experienced by the emergency services (possibly backed by hard figures),
• (Severe) casualties to be helped more quickly (-25%) and better (trauma team etc.), thereby increasing the chance of survival,
• Reporting of hazardous materials to be part of incident reporting,
• Effective driver warning re. the end of the tailback (number of accidents in the tail of the traffic jam: -25%).

Settling the issue of who is to blame:
• Clarity among all emergency services as to when an investigation of clues is desirable and the implications of this for the performance of the emergency assistance activities,
• Significant reduction in the time needed to investigate clues (-25%).

Information provision to the traveller and media
• Within five minutes road users and the media are to receive information about the expected duration of the accident and an advised alternative route (incl. information about the extended journey time involved).

In a follow-up step, these aims should be further elaborated. This will involve translating them into service level agreements (SLA) between the parties involved and into performance indicators (PIN) for the services to be performed.

Figure 1.2: Incidents have a major impact on the reliability of the transport system. Photograph: Rijkswaterstaat, Rijnmond district.

Recommendations
The ambitions described above have been elaborated for five focal areas, which has resulted in a number of recommendations. The following focal areas have been identified:
• Organisation
• Communication
• Learning and evaluation
• National roll-out
• Technology.
In all, 25 recommendations have been formulated. These recommendations cover the entire spectrum of focal areas. To realise these recommendations extensive effort will be required on many fronts, organisational, financial, administrative and so on. In view of the scope of this endeavour, priorities must be made in terms of realising the recommendations.

In this respect, the following distinctions have been made:

- recommendations that touch upon the essence of Incident Management and must be implemented without question,
- recommendations whose realisation must be addressed immediately,
- recommendations that should be addressed in one to two years’ time, but for which it is important that the desired elaboration become an agenda item now in the regular meetings between the parties providing emergency assistance,
- recommendations of a more general nature that actually require permanent attention.

**Category 1: Recommendations that touch upon the essence of Incident Management and must be implemented without question**

**Recommendation 1:** It is recommended that the application of Incident Management on the Dutch road network be considerably intensified and that this be based on the following considerations:

- incidents have a major impact on the reliability of the transport system.
  The contribution made by incidents to the extent of congestion is significant; an unexpected increase in journey time tends to be involved and it is precisely this unexpectedness that causes major problems,
- in the coming years the strain on the road network will continue to increase, one consequence of which will be that incidents occur more often and that the congestion caused is greater.

**Recommendation 3:** Professional application of IM is highly demanding of the speed and quality of the emergency assistance process. The ultimate product is the result of a complex process in which all involved emergency services cooperate closely. A professional application of IM on the Dutch road network requires that Incident Management be accorded the necessary priority, including at policy level, by all parties involved in the emergency assistance process. Each party will have to secure this assurance within its own organisation.

**Recommendation 20:** It is recommended that for each type of incident (the categorisation of incidents, recommendation 2, can serve as the basis for this) the critical path of the emergency assistance be traced.

With the help of this critical path, a well-focused search for possible improvements can be made in the following areas:

- the organisation of the process incl. the legal aspects,
- the desired information exchange between the involved parties,
- the application of new technologies.

**Recommendation 25:** The best way to organise the financing of interesting IM measures in a manner that is satisfying to all responsible organisations should be investigated. This should make it possible to avoid the financing becoming a bottleneck for the introduction of good measures.

Owing to the way in which the financing of IM is currently organised, it is highly conceivable that the introduction of certain measures, which are highly desirable for society (high cost-benefit ratio), will be severely delayed if not halted altogether.
Category 2: Recommendations whose realisation must be addressed immediately

From discussions with various emergency service workers, it appears that the speed and quality of the emergency assistance are not optimum due to the many misunderstandings that occur. The following misunderstandings are involved:

- misunderstandings about the nature and location of the accident,
- misunderstandings between the various emergency services about the work to be carried out,
- misunderstandings in the communication between the emergency service workers,
- misunderstanding by the road user about how to act if involved in an accident,
- misunderstandings as a consequence of a lack of communication between the IM team and the road user.

These misunderstandings have a range of causes, such as:

- unclear agreements about the division of tasks,
- inadequate and fragmented communication,
- the lack of direction,
- the lack of a clear focus (what are we trying to achieve),
- inadequate training and insufficient expertise.

The frequent occurrence of these misunderstandings not only reduces the quality of the emergency assistance, it also leads to irritation and demotivation among the emergency service workers. In this way, the necessary basis for an attitude focused on the continuous improvement of the emergency assistance process is undermined. It is important, therefore, that these disruptive factors be removed as soon as possible. To this end, the following recommendations should be addressed in the short term:

**Recommendation 2**: The Incident Management emergency assistance process should be organised such that it is completely clear, in view of the incident characteristics, for all phases of the IM process (from inquiry protocol to traffic normalisation),

- which activities must be performed,
• what priority each activity should be accorded, and
• which emergency service authority is responsible for the performance of a certain activity.

In accordance with the responsibility placed upon it, each organisation involved will need to embed the agreed activities in its operating process. To support this approach, it is recommended that all incidents be categorised in a limited number of uniform categories and that for each category the critical path of activities be traced. This critical path provides the definitive answer as to the possibilities for improving the IM process (quick wins). In addition, for each incident category identified it can be established which organisation bears the primary responsibility for the emergency assistance and on this basis shall take the directive role.

**Recommendation 5:** In view of the high demands (speed and quality of the emergency assistance) imposed on the IM emergency assistance process, and in view of the wide range of dilemmas arising during the emergency assistance process, it is recommended that operational IM activities be performed under direction. One of the involved parties will have to fulfil this directive role.

**Recommendation 6:** It is recommended that in UMS incidents (GRIP 0) the highways inspector or the Duty Officer be charged with the directive role. In this role the highways inspector will supervise the coordinated performance of the emergency assistance process. Important considerations for charging the highways inspector with the directive role are:
• the highways inspector bears the primary responsibility for safety and traffic circulation on the road, during the handling of the incident included,
• the highways inspector is often the only person present at a UMS accident.

**Recommendation 7:** It is recommended, similarly, that during complex accidents the directive role be given to one organisation. Which organisation that is depends on:
• the characteristics of the accident; this involves applying the categorisation of incidents proposed in recommendation 2,
• which organisation bears the primary responsibility for the activities to be performed with priority, all this bearing in mind the category of the accident in question.
The assignment of the directive role to a specific emergency assistance organisation can have consequences for the allocation of tasks and responsibilities, in both the primary process (the immediate emergency assistance) and the auxiliary processes (training, evaluation, etc.). It is important that these changes be discussed and approved by arrangement with all involved parties. Moreover, during complex accidents the necessity of consultation with the other emergency services (via COPI) is not, of course, diminished.

**Recommendation 8:** Continued professionalisation of the IM emergency assistance process benefits enormously from a decisive cooperation between the involved parties at the tactical and strategic levels. It is recommended that this consultation at tactical level be given shape by means of the Dutch IM Platform and at the strategic level by means of the IM Council.

It is recommended that over the short term the composition (which organisations and level of representation) of the Dutch IM Platform and the IM Council be established together with the tasks and powers accorded to these consultative bodies. Organisations that have seats on the Dutch IM Platform and/or the IM Council undertake to fulfil the role/function that these boards should serve.

It is recommended that in both consultative bodies the directive role (the chairman’s role) be given to the Ministry of Transport, Public Works and Water Management.

**Recommendation 10:** In order to dramatically reduce the misunderstandings caused by the incident rooms operating to some extent independently of one another, it is recommended that the
information management involved in the reporting and handling of an incident be properly organised. This involves the following:

- processing reports in accordance with a uniform incident room protocol,
- integrating the activities of the incident room with the activities in the traffic control centre.

This approach dovetails seamlessly with the desire to increase the integration of IM and DVM. Moreover, this approach is consistent with the desire expressed by RWS to deploy the highways inspector in a more specific way and to have the traffic control centres supervise the highways inspector,
- the highways authority operating in accordance with the procedures of the safety regions.

Figure 1.4: Complex accidents have a huge impact on traffic circulation. Close cooperation between the various emergency services is a prerequisite. Photographs: Rijkswaterstaat, Rijnmond district.

Recommendation 12: The rapid exchange of reliable information between the various parties involved in the IM emergency assistance process is vital to the safety and quality of the emergency assistance. The present communication process is deficient in many ways. For this reason, it is recommended that the desired communication process be thoroughly documented, its component elements be elaborated and that these be developed in accordance with the blueprint and applied. Important components of the Incident Management Information and Communication System (IMICS) are:

- a uniform inquiry protocol that is used by all incident rooms and whose details are exchanged between the parties,
- a system that enables direct communication between all IM emergency service workers (e.g. the C2000 communication network; can the highways authority join C2000),
- a system capable of accurately pinpointing the location of the various emergency service workers at any given moment (‘tracking and tracing’),
Recommendation 21: The application of Incident Management on the secondary road network (roads with a traffic circulation function; these roads are included in the National Data Warehouse for Traffic Information) should be fostered. The approach on the secondary road network will need to correspond closely with the current national approach on the highways network.

Category 3: Recommendations whose realisation should be addressed in one to two years’ time

As soon as the emergency assistance process has been more clearly defined and the process is running as it should, attention can be turned to the implementation of new measures. The principal aim of these new measures is to design and organise the emergency assistance process such that the process (the participating parties) has the inherent feature of continuous self-improvement. The measures that enable this continuous self-improvement process are present in all three areas: strategic, tactical and operational. For this reason, it is important that permanent consultation take place at all levels between the emergency assistance parties involved. Joint coordination should be realised between the application of IM and the policy aims laid down in the policy documents in the areas of safety, journey time reliability, etc.

Attention will also need to be paid to creating in society a clear profile/good visibility for the application of IM. The effectiveness and efficiency of this profiling can be raised by designing IM as an integral part of Dynamic Traffic Management. In the operational process this integration of IM and DVM requires special attention.

Other aspects that as building blocks of the continuous improvement process require attention concern are:
- an ongoing status evaluation, preferably using quantitative data,
- the regular performance of an international comparison of the IM approach in the Netherlands with the approach in other leading countries,
- the regular performance of a technology assessment,
- the continued expansion of the application of IM to the regional and urban road networks (especially roads with a traffic circulation function),
- a study of alternative financing options for the application of socially relevant IM measures.

By means of the following recommendations the continued professionalisation of the IM emergency assistance process can be designed:

Recommendation 9: It is recommended that the aims of relevance to IM stated in the policy documents (the Mobility Policy Document and perhaps others) be translated into assignments for the application of IM at the strategic, tactical and operational levels. Conversely, the objectives of the Incident Management Vision should be included in the relevant policy documents.

In making the policy aims operational in service level agreements and their related performance indicators, particular attention must be paid to the quality of work performed (content and process) and to fostering and securing the commitment of the involved parties.

Recommendation 13: The road user is the key player to consider in the design and performance of the IM emergency assistance process. In view of this, communication (two-way) between the emergency service worker, road user and traffic information service (ANWB, VID, etc.) is an important part of this emergency assistance. It is recommended that this aspect, which is barely
addressed in the current approach, be thoroughly elaborated and realised with some degree of urgency.

**Recommendation 14:** In conjunction with recommendation 12 it is recommended that the road user be more actively engaged in the IM emergency assistance process. Important elements of this approach are:

- the reporting of the accident coordinates and other important data,
- how a road user should act if involved in an accident, and
- the necessary preparation for an accident.

It is proposed that in cooperation with the CBR and the insurance companies a procedure be drawn up that forms part of the driving test.

**Recommendation 15:** Incident Management is an integral part of Operational (Dynamic) Traffic Management. By better integrating the two processes, the effectiveness of the IM emergency assistance process can be considerably improved. It is recommended that this integration be elaborated in terms of both procedures and organisation and that it become standard in the process of operational traffic management.

**Recommendation 16:** An important element of the continued professionalisation of the application of IM is the visibility fostered in society of the IM emergency assistance process (including its presence in policy and politics). Communication about the IM approach, the results achieved and the role expected of society form an essential part of the communication with society. An annual report that includes the ‘SMART’ objectives, the mutually agreed approach, the measures applied in the past year and the results achieved can be an important element of the IM communication strategy.

![Figure 1.5: Delayed recovery. Photographs: RWS Rijnmond district.](image)
Category 4: Recommendations of a more general nature

This last category of recommendations is more general in nature and for this reason cannot be linked directly to the performance of specific measures.

The contribution made by these recommendations lies chiefly in the fact that they provide the basis for arguments:

- that underline the importance of the application of IM (and its continued intensification) on the road network,
- that stipulate the necessity of the involved parties regularly and by arrangement thoroughly examining the approach and procedures relating to the organisation, the communication and the learning and evaluation of the IM emergency assistance process,
- that stipulate the necessity of seeking to make the organisation and design of the IM emergency assistance process consistent with developments in related sectors (e.g. the safety region).

To this end, the following recommendations are made:

Recommendation 4: The continued professionalisation of the application of IM on the Dutch road network requires an ambitious approach across a wide spectrum of focal areas.

It is recommended that these ambitions and the ‘SMART’ aims based on them be made more concrete (translated into measures to be deployed), realised, evaluated and continuously updated in consultation with the emergency services, the involved policy fields and society (including road users).

To facilitate this approach, it is recommended that a professional form of programme management be introduced.

Important components of this programme management are:

- an Incident Management Agency that bears full responsibility for the operational performance of IM measures,
- a master plan for the period 2008–2015 that includes planned improvement proposals,
- a project plan for each improvement proposal,
- direction of the IM Agency by the Dutch IM Platform and IM Council,
- establishment of the IM Agency by the IM Council.

Recommendation 11: During the emergency assistance process the emergency services operate and communicate in accordance with mutually agreed, national procedures. It is recommended that regularly (e.g. every five years) these procedures be thoroughly evaluated and improved where necessary.

Recommendation 17: It is recommended that emergency service workers be given increased training in the expertise, routine and flexibility that are vital to professional emergency accident assistance. This will be done by means of exercises. These will need to be performed both within a discipline and in cooperation with other disciplines (cross-training). The approach of the Netherlands Institute for Safety Nibra offers a number of starting points for this recommendation.

Recommendation 18: Incident Management is a continuous improvement process. To enable improvements, the IM emergency assistance process must be evaluated permanently and where possible using quantitative data. These evaluations should examine the organisational, communication, technical, financial and legal aspects of IM.

The evaluation process should be designed such that the emergency services encourage one another to enter into an open dialogue. It is recommended that immediately following the handling of an accident, the emergency assistance be evaluated using a standard debriefing of all
involved parties. Supplementary to this, it is recommended that the IM process and the developments in that process be monitored by means of audits.

**Recommendation 19:** The quality of the IM emergency assistance can be improved by setting up certified training in which the nationally agreed IM approach is taught and exercised jointly. Only IM emergency service workers¹ who have successfully completed this certified training (and therefore possess a licence to operate) may be admitted to the IM emergency assistance process.

**Recommendation 22:** Coordination will be necessary between the tasks and responsibilities of the emergency assistance services in the safety regions and the tasks and responsibilities of the emergency assistance services (incl. highways authority) as part of the application of Incident Management on the road network. In this context, the scaling-up models should be harmonised.

**Recommendation 23:** Technology plays an important, facilitating role in the application of Incident Management. It is therefore important that players are kept abreast of new technological developments that can help improve or accelerate the emergency assistance process. It is proposed that this technological assessment be facilitated by the following practical steps:
- the release of an innovation budget that can be used to study and test new, highly promising technologies,
- the (periodic) organisation of study trips to countries where interesting developments concerning IM are taking place,
- the periodic (every three to five years) comparison of the IM approach in the Netherlands with the approach in a number of other leading countries (USA, Great Britain, Sweden). These periodic comparisons could provide the base for a more institutionalised form of cooperation,
- the devotion of greater attention to the psychological aspects (behavioural sciences) applicable to emergency incident assistance.

**Recommendation 24:** It is important that a technology assessment be performed regularly. The focus of this should be the variety of applications for new developments in the fields of ICT, data collection and information management, telecommunication and behavioural sciences for Incident Management.

**Leverage**
Additional boosts can be given to the Incident Management improvement process by hooking up with current developments of relevance to the application of IM. These factors provide leverage for desired developments concerning the IM emergency assistance process. In this context, the following developments can be identified:
- the clustering of emergency assistance activities in the safety regions,
- the development of RWS as a public-oriented service provider,
- the continued privatisation of government tasks,
- European developments in the area of ICT such as: eSafety and eCall.

**Follow-up process**
It takes more than just writing down a vision to realise the ambitions that have been formulated. Following the presentation of this report, therefore, a number of follow-up actions will need to be performed. This should involve addressing the following aspects:
- the creation of a support base for an integrated vision,
- the testing of this vision against and coordination with relevant policy intentions in other policy documents, such as:

¹ Legislation recognises just three emergency services: the police, fire brigade and ambulance service. Other emergency services will need to be recognised as parties in the IM process and they too will need to follow certified training.
the Mobility Policy Document,
- Provincial Traffic and Transport Plans,
- Regional and urban Traffic and Transport Plans,
- the Traffic Management Vision 2020,
- the Better Use (Beter Benut) Vision (draft),
- the Information Provision Vision,

• coordination with the vision of current IM-related initiatives,
• elaboration of the recommendations into concrete measures (incl. MKBA),
• financial elaboration of the proposals and their testing against reserves in policy documents,
• organisation/design of a formal decision-making process.

Figure 1.6: In Incident Management the recovery of traffic circulation has high priority. Photograph: Rijkswaterstaat, Rijnmond district
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1 Introduction

Incident Management is one of the pillars of the Dynamic Traffic Management programme being applied on the Dutch road network (Rijkswaterstaat, 2006). The principle aim of Incident Management (IM) is to improve the safety and swiftness of the circulation of traffic in incident situations. Today various Incident Management measures have been implemented on the Dutch (highways) road network, such as:

- The National Car Regulation, whose aim is the rapid deployment of the vehicle recovery company.
- The National Truck Regulation, whose aim is rapid and effective emergency assistance by vehicle recovery companies and other emergency assistance authorities.
- Accommodation and embedding of the IM Project Agency in the National Traffic Management Centre (VCNL).
- Regional Incident Management: the introduction of IM on provincial and municipal roads.
- IM+: The USE of public-oriented highways inspectors with traffic-regulatory powers.
- Closer cooperation with interested parties, with the aim of accelerating the emergency assistance process and improving the quality of the emergency assistance.
- Greater understanding of the quality of the IM emergency assistance process by means of the ‘ICT Incident Management Information System’.
- Supplementary measures with the aim of supporting new developments in the area of traffic management (e.g. the extra IM efforts entailed in the introduction of rush-hour lanes on the highways network).

All the above measures are being applied at a national scale and/or in a uniform manner, whereby the emergency assistance authorities involved are cooperating in manner mutually agreed between them. Characteristic of the IM approach in the Netherlands is the drive to continuously improve the emergency assistance process. In the past ten years a considerable degree of professionalism has been achieved in the approach by the systematic addition of new components to the system. As a result, the quality of emergency assistance has improved considerably and the time needed to handle an incident has been greatly reduced. Still, there’s more room for improvement; increasingly heavy use is being made of the road network, increasing the likelihood of incidents and broadening their consequences.

Bearing this in mind, it is only logical that the Ministry of Transport, Public Works and Water Management is keen to introduce new, supplementary IM measures. But where is the scope for improvement in the IM handling process? What exactly is the nature of these improvements? Which parties should be involved in the process and how do they view the application of IM on the road network? How do these measures fit in the traffic management investment programme?

In order to answer the above questions, working through the VCNL, the Ministry of Transport, Public Works and Water Management has decided to draw up a vision for the continued application and development of Incident Management on the Dutch road network for the period 2008–2015. VCNL has asked TNO Mobility & Logistics to draw up this vision. The requested vision is presented in this document.
**Objective**
The objective of this project is to develop a strategic vision of the continued application of Incident Management on the Dutch road network and its organisation for the period 2008–2015.

**Product**
Presented in this report is a vision of the most desirable developments in the application of IM on the Dutch road network (Highways network and secondary road network) for the period 2008–2015. This vision is endorsed by VCNL and (preferably) all other parties involved in the application of IM on the Dutch road network.

Elaborated upon in the vision are the ambition, the translation into concrete (SMART) objectives, the implementation in practice by means of new/adapted measures, the organisational embedding and the necessary change process. Proposals for improvement are formulated in the form of recommendations. These recommendations have been assigned a priority and, moreover, several factors offering the leverage to foster their realisation are documented.

This vision is underpinned by an extensive, continuous consultation of all parties involved in the application of IM on the Dutch road network.

**Approach**
To provide a solid basis for this vision the following steps have been taken:
- **Questionnaire**: in preparation for the interviews an extensive questionnaire was compiled (see appendix 1). This questionnaire sought the opinion of the involved parties about the current IM approach on the Dutch road network and about ways of improving this approach.
- **Interviews**: the questionnaire has been submitted to and discussed with representatives of almost all parties involved in IM (list of persons interviewed, see appendix 2).
- **Feedback**: the outcomes of the interviews have been submitted to and discussed with the participants in the IM study trip to the USA. Moreover, the results have been addressed at a meeting of the National IM Platform (see Appendix 3).
- **Vision development**: the most important aspects of the future vision have been addressed in a dedicated workshop. All members of the National IM Platform were invited to this workshop. (For the workshop presentation of the IM Vision, see Appendix 4).
- **Drawing up the draft vision**: based on the workshop outcomes, a draft vision was drawn up. This is the distillation of the interviews and the group discussions held during both the study trip and the meetings of the National IM Platform.
- **Feedback**: the draft vision has been submitted for evaluation to all members of the National IM Platform.
- **Drawing up the definitive IM Vision**: the comments and proposals for improvement have been incorporated to produce a definitive IM Vision.
Diagram text

Incident Management Vision
Introduction
Chapter 1

Why IM?
Chapter 2
Recommendations

IM ambitions
IM aims
Chapter 3
Recommendations

Elaboration of IM for five focal areas
Organisation
Communication
Learning and evaluation
National roll-out
Technology
Chapters 4 to 8
Recommendations
This report is structured as follows (see diagram):

- Presented in the introduction is a short description of the current status of the application of IM on the Dutch road network. The steps by which the IM Vision will be developed are explained.
- Why Incident management? In chapter 2 it is demonstrated why the application of IM on the road network is so important and will becoming increasingly so in the future.
- Incident Management ambitions and aims. Presented in chapter 3 are the ambitions and concrete (SMART) aims for the medium term; these assume the continued professionalisation of the application of IM.
- The IM Vision elaborated: In chapters 4 to 8 five aspects of the IM Vision are explored in detail:
  - Organisation
  - Communication
  - Learning and evaluation
  - National roll-out
  - Technology.
- Each elaboration in chapters 4 to 8 concludes with a number of recommendations. In chapter 9 each of these recommendations is accorded a priority. A few factors that could provide leverage in realising the recommendations are also stated. The report concludes with a short summary of the follow-up process.
2 Why Incident Management?

2.1 Incident Management in the Netherlands

Incident Management is the totality of measures intended to clear a road for traffic use as quickly as possible after an incident has taken place, all being done with regard for protecting the interests of possible victims, the safety of the emergency service workers, traffic safety as well as the control over the damage caused.

More than ten years ago the initiative was taken in the Netherlands to professionally address the handling of incidents on the highways network. Important results of the development path taken in recent years are:

- Coordination between police, fire brigade, ambulance service and highways authority concerning tasks, responsibilities and powers during the emergency assistance process (Incident Site Coordination Team, COPI).
- Organisation of joint exercises and international study trips.
- Implementation of the National Car Regulation.
- The foundation of STIMVA (STichting Incident Management VrachtAuto’s, the Association of Incident Management Trucks) and the creation of the STI (Salvage Transport Incident) expert.
- Implementation of the National Truck Regulation.
- Implementation of highways inspectors.
- Application of IM on the regional road network.

2.2 What has this achieved?

A calculation of the consequences of incidents on the quality of the traffic circulation reveals that in 2000 roughly 21% of the hours lost by vehicles were caused by incidents (Rand Europe, 2006). However, it should be noted that this is a rough calculation. Not all incidents are included in this calculation. For example, the extra stoppage resulting from incidents during the rush hour is attributed to the regular congestion (Jansen and Baart, 2003, Voogd, 2002). Moreover, many incidents are not registered. In the United States it is estimated that ‘non-recurring congestion’ accounts for more than 50%.

With the aid of a quick scan model (Schrijver et al., 2006), TNO has calculated that had no IM measures been applied, in 2003 the nation would have been confronted with 65% more hours lost by vehicles as a consequence of incidents. In 2003 the number of hours lost by vehicles per 24-hour period with IM exceeded 60,000 and without IM, 100,000. Annually, this equates to a saving of some EUR 150 million. This calculation takes into account only the saving of hours lost by vehicles. Incident Management also has a significant positive effect on traffic safety (quick, professional emergency assistance saves lives and reduces the severity of the mental and physical consequences of an accident). Another result of this quick emergency assistance is that fewer secondary accidents take place and the disruptions to journey time remain limited (positive effect on reliability of journey times).

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2 American experts stated this percentage share during the last IM study trip (National Traffic Management Centre, 2006), in both Los Angeles and Seattle.
2.3 Why ramp up the application of IM?

Various reasons can be put forward to justify the necessity of ramping up the application of Incident Management on the Dutch highways network. Firstly, there is still scope for introducing many additional measures that can further reduce the negative effects of incidents (stoppage, danger, damage to infrastructure and environment). In the study “Effects of the national introduction of incident management measures on hours lost by vehicles in the network” (Schrijver et al., 2006) referred to above, a list of possible new measures is presented and their effects estimated. Secondly, the application of IM is becoming increasingly relevant when the increasing load on the existing highways network is considered. The consequence of this is an increased likelihood of incidents, and once an incident has occurred it has a greatly increased effect as more vehicles are held up.

In the Mobility Policy Document great importance is attached to the reliability of journey times. Incident management can contribute significantly to the realisation of this objective; it should be considered that the traveller feels more inconvenienced by the stoppage caused by incidents than the stoppage caused by a regular traffic jam (e.g. during the morning rush hour). Moreover, it should be realised that in moving from A to B the traveller uses more than just the highways network. Consequently, the wider application of incident management on the regional and urban road networks would greatly help improve the reliability of journey times.

Figure 2.1: The trend in vehicle kilometres and lane-length kilometres on the highways network (index 1995=100). Source: Ministry of Transport, Public Works and Water Management (2003).

Figure 7 shows both the trend in mobility in the Netherlands and the growth in the length of the highways network since 1980. The increasing discrepancy between the trend in mobility and the increase in capacity since 1980 is striking. The increasing pressure of traffic jams (vehicle kilometres per kilometre traffic lane, stress on the highways network) is the consequence of this. In turn, the increasing weight of traffic on the highways network means less is required to trigger a disruption (even small discontinuities can result in a traffic jam). Moreover, the consequences of a disruption (hours lost by vehicles) become much greater. Through the application of Incident Management, our primary aim is to reduce the negative effects of incidents. Rapid
emergency assistance has a disproportionately large effect on the reduction in the number of hours lost by vehicles. This effect is illustrated in Figure 2.

2.4 The importance of speed (see Figure 8)

The gradient line $I$ from the root shows the demand pattern (the vehicles entering a road section). The line parallel to this line but shifted along the t-axis shows the traffic exiting that same road section. As a consequence of an accident, the traffic exiting declines to zero. After a certain period $\Delta t_1$, the accident site is cleared for traffic and the exit flow recovers with a value $C$, the capacity of the road section, until (after a period $T$) the traffic jam is dispersed. From that moment on, the exit flow resumes the value $I$. The striped area $A$ shows how many vehicle loss hours were caused by this accident:

$$A = \frac{\Delta t_1^2 I}{2\left(1 - \frac{I}{C}\right)}$$

![Figure 2.2: The consequences of an incident.](image)

The formula shows that the consequences of an incident are proportional to the square of the accident duration. This quadratic relationship illustrates the importance of incident management. If the accident duration increases from $\Delta t_1$ to $\Delta t_1'$ the number of hours lost by vehicles increases substantially (striped area $A'$).

From the formula it can also be derived that road sections with a high value for $\frac{I}{1 - I/C}$ are potentially weak links. The value of the factor depends on the capacity and the load on the road section.

Thus, the number of vehicle loss hours as the result of an incident depends on:

- the time required to clear the road for traffic following an accident,
- the road capacity,
- the extent to which the road capacity is filled.

Speed means two things. Firstly, that the various phases in the handling of an incident are quickly dealt with. Secondly, that when confronted with a dilemma during emergency assistance, an individual can make a good decision quickly.
It is important, therefore, that the IM emergency assistance process be performed quickly but not at the expense of safety and the correct handling of the question of who is to blame.
This imposes high demands on the organisation and structure of the emergency assistance process, whereby all aspects of the emergency assistance are employed. If these demands are to be met, measures must be taken in the operational area (the emergency assistance on the ground) as well as in the tactical and strategic areas that enable the continued improvement of the emergency assistance process at incidents.

2.5 Incident Management in other policy documents

2.5.1 Incident Management in the Mobility Policy Document
Under the heading ‘Streamlining Incident Management’, the following is stated in the Mobility Policy Document: “Central government will provide more efficient incident management so that accidents are handled more quickly and traffic is better diverted. While naturally the first consideration is for victim care, traffic circulation must resume as quickly as possible. This requires good agreements between all involved emergency services”.
In an earlier version of the Mobility Policy Document this passage was followed by: “The Rijkswaterstaat highways inspectors will receive more powers in the handling of incidents in cooperation with the police. Moreover, the traffic control centres will be given a greater role so that they can manage the traffic in good time. Gains can be made here through the use of quicker detection resources and closer communication with emergency services. Communication in particular has the capacity to accelerate the handling from start to finish, often using resources that are already available. To enable further optimisation in future, a monitoring system is being developed and benchmark testing held with railway incident management”.

2.5.2 Incident Management in de Traffic management vision 2020
In the vision entitled ‘Traffic management 2020: Rijkswaterstaat’s traffic management ambition for highways’, the application of Incident Management plays a significant role and is used to tackle the following two primary problems:
- The unreliability of road traffic, using the approach of informing the road user.
- The occurrence of traffic accidents, using the approach of detecting and resolving of traffic accidents.

On the contribution of incidents to the problem of ‘The unreliability of road traffic’ we can read the following: “The road network is becoming increasingly full. Not only during the rush hour but also at other times of the day and evening, and not only in the Western conurbation. The constant weight of traffic makes the highways network ever more vulnerable to incidents and disruptions. A vehicle breakdown may be all it takes to trigger a traffic jam and the same is true of road works. As a result, the unpredictability of a journey is constantly increasing”.

The total loss of journey time due to unreliability on the Dutch highways network (AVV, 2004) was 48 million hours in 2002. Of this, 70% (i.e. 32 million hours) was

Incidentally, it is strange that Incident Management is not mentioned in the list of Traffic Management Measures in the Netherlands, realised up to end 2006. This omission could indicate that that IM is not immediately recognised as a DTM measure!
structural (in the rush-hour) and 30% (16 million hours) incidental due to maintenance / accidents/ calamities, of which 20% during the rush hour and 10% during off-peak hours. Causes for the unreliability were: rain (7%), maintenance (14%), accident (3%), combinations of the above (3%) and no disruptive circumstances (variation in weight of traffic) (74%).

On the problem ‘The occurrence of traffic accidents’ we read: “Accidents lead to a disruption of the traffic picture. The severity of the traffic jams (time x length) varies. In an accident involving a truck the severity is a factor 2.4 higher than in other accidents. Good traffic safety on the highways network is essential. Traffic accidents cause disruptions and in this way cause additional risks. Various autonomous parties are involved in the emergency assistance. Coordination, communication and the optimum use of one another’s resources have a direct influence on accessibility and safety.”

In 2000 on working days approx. 21% of the hours lost by vehicles was caused by incidents, and approx. 28% of the unreliability of the road traffic was attributable to traffic accidents (Rand Europe, 2006). Without incident management the consequences of accidents would have been much greater. The current incident management ensured in 2003 that the number of hours lost by vehicles resulting from incidents could be reduced by 68% (Schrijver et al., 2006).

The Incident Management approach being advocated is described as follows: “Incident management is a question of detecting and resolving incidents as quickly as possible. The incident may be an accident or it may equally include incidental small-scale work activities, a stationary car on the hard shoulder (in certain cases [addition by compiler of this report]) or objects that have fallen along the motorway. By placing cameras, a rapid visual assessment of the situation can be made at the traffic control centre and a lane can quickly be closed. Emergency services and, if necessary, vehicle recovery companies can be called in and/or road traffic supervisors on site can be directed, thereby enabling coordinated traffic management and emergency assistance. The ability to intervene quickly in incidents can prevent or reduce many traffic jams while greatly reducing the likelihood of secondary accidents. The use of the hard shoulder when a lane has been closed by an incident can also reduce the traffic jam. In this case, opportunities for signage above the hard shoulder must be available.”

Incident Management should be accompanied by a number of supplementary measures, such as:
- Signage (50 km and 70 km indications).
- Warning system for slippery road conditions or strong winds.
- Encouragement of in-car systems (e.g. anti-rollover systems in trucks, lane departure warning system and intelligent cruise control).
- The use of control scenarios to combat the disruptions arising from accidents and other causes such as calamities and major events.
Verkeersmanagement 2020

DE VERKEERSMANAGEMENT AMBITIE VAN RIJKSWATERSTAAT VOOR HOOFDWEGEN

Figure 2.3: Vision of the future of traffic management. Source: Rijkswaterstaat (2007).

Traffic management 2020
Rijkswaterstaat’s traffic management ambition for trunk roads

Finally, Rijkswaterstaat’s ambition for traffic management is elaborated according to four levels:
• All Dutch highways, with a minimal level of basic facilities.
• Urban networks with good accessibility.
• Urban ring roads, where traffic remains in motion.
• Highway connection axes that enable rapid and reliable movements between the urban areas.

For each level the incident management approach is proposed:
• All Dutch highways: Cameras to detect and verify disruptions and incident management to resolve them.
• Urban networks: Heavy deployment of incident management on all busy roads in the urban network and the busy roads in the secondary road network, to resolve disruptive factors.
• Urban ring roads: The heaviest deployment of incident management is on the urban rings. This involves the complete equipping of the entire ring with cameras to detect and verify and sufficient highways inspectors, vehicle recovery companies and auto-DRIPs to resolve disruptions as quickly as possible.
• Highway connection axes: Cameras to detect and verify disruptions and incident management to resolve them, including on secondary roads near the junctions with the highway connection axes.

The costs involved in the implementation of supplementary IM measures in the period up to 2020 are estimated at EUR 120 million (as part of a total of EUR 1,700 million for all traffic management measures).
2.6 IM: a core task for all parties

As stated earlier, Incident Management is the totality of measures intended to clear the road for traffic use as quickly as possible after an incident has taken place, all being done with regard for protecting the interests of possible victims, the safety of the emergency service workers, traffic safety as well as the control over the damage caused.

It is necessary that all parties endorse this definition.
Moreover, it is important that all parties are aware of the broad spectrum of ‘concerns’ that must be dealt with during the emergency assistance process, namely:

- Resumption of traffic circulation (quickly clearing the road for traffic).
- Protecting the interests of the victims (safety, assistance, etc.).
- Safety of the emergency service workers.
- Traffic safety.
- Settling the issue of who is to blame (investigation, fact-finding).
- Controlling the damage caused.
- Traffic regulation.
- Provision of information to road users, the press, etc.
- Clearing up the incident site.
- Repairing the damage at the incident site.

It is from this shared perspective that the emergency assistance process is designed. The importance of IM and the intertwined nature of the processes mean that Incident Management must be a core task of each emergency service. In combination with its other tasks, each organisation must decide exactly what this core task entails.

Figure 2.4: Rapid repair of the damage to the road surface at the incident site. Photograph: Rijkswaterstaat, Rijnmond district.

2.7 Recommendations:

Based on the above inventory, the following recommendations can be formulated:

**Recommendation 1:** It is recommended that the application of Incident Management on the Dutch road network be considerably intensified and that this be based on the following considerations:
- incidents have a major impact on the reliability of the transport system. The contribution made by incidents to the extent of congestion is significant; an unexpected
increase in journey time tends to be involved and it is precisely this unexpectedness that causes major problems,

- in the coming years the strain on the road network will continue to increase, one consequence of which will be that incidents occur more often and that the congestion caused is greater.

**Recommendation 2:** The Incident Management emergency assistance process should be organised such that it is completely clear, in view of the incident characteristics, for all phases of the IM process (from inquiry protocol to traffic normalisation),

- which activities must be performed,
- what priority each activity should be accorded, and
- which emergency service authority is responsible for the performance of a certain activity.

In accordance with the responsibility placed upon it, each organisation involved will need to embed the agreed activities in its operating process. To support this approach, it is recommended that all incidents be classified in a limited number of uniform categories and that for each category the critical path of activities be traced. This critical path provides the definitive answer as to the possibilities for improving the IM process (quick wins). In addition, for each incident category identified it can be established which organisation will bear the primary responsibility for the emergency assistance and on this basis take the directive role.

**Recommendation 3:** Professional application of IM makes high demands of the speed and quality of the emergency assistance process. The ultimate product is the result of a complex process in which all involved emergency services cooperate closely. The professional application of IM on the Dutch road network requires Incident Management to be accorded the necessary priority, also at policy level, by all parties involved in the emergency assistance process. Each party will have to secure this assurance within its own organisation.
3 Incident Management ambitions and aims

3.1 Incident Management ambitions

In view of the trend outlined in the preceding section, involving an ongoing increase in the weight of traffic on the network, the importance of continuing to professionalise the application of Incident Management cannot be over emphasised. This application must extend across the highways network, the secondary road network (in any event all roads with a traffic circulation function) and the urban road network (all roads with a traffic circulation function).

Assuming the current status of the application of Incident Management on the Dutch road network the following ambitions can be formulated to serve as the guiding principle for the desired professionalisation over the medium term:

- More than in the past, capacity to serve the customer (the road user in various capacities) will become the yardstick for the organisation, design and quality of the emergency assistance process, in other words public focus is the key to service in the performance of the government’s core tasks.
- Improved administrative embedding of the cooperation between the chain partners in the IM emergency assistance process both strategically and tactically and at an operational level. This is expected to enable a quick and effective response to social developments and the fast resolution of existing problems in emergency assistance.
- Improved embedding in policy of the cooperation between the chain partners in the IM emergency assistance process, thereby removing any possible barriers to the efficient and effective application of Incident Management.
- The form of these two forms of embedding will be such that it generates a stimulating effect on the continued improvement of the speed and quality of the emergency assistance involved in Incident Management; IM as a continuous improvement process.
- The speed of the emergency assistance process will be substantially improved, in among other ways, by:
  - the continued optimisation and standardisation of the existing emergency assistance process; possible improvements may be derived from, among other sources, the critical path tasks for each type of incident;
  - clearly assigning the directive role in the handling of an incident to one of the emergency service workers;
  - developing accelerated procedures for the completion of the emergency assistance process (from detection to normalisation), especially for truck accidents but also for the documentation of the clues in an alleged offence;
  - improving the road user’s ability to cope independently. 85% of the incidents concern Material Damage Only (UMS). In the handling of these incidents the road users involved can reduce considerably the disruption to other traffic, without the intervention of the police or other emergency services.;
  - applying all types of proactive and preventive Incident Management, such as:
    - preventing the rubbernecking traffic jam,
    - preventing/limiting secondary accidents by ensuring no one drives into the end of the tailback,
    - the rapid removal of defective vehicles to/on the hard shoulder, especially during rush-hour periods,
    - implementing a tyre check for trucks.
- The quality of the emergency assistance will be improved, in among other ways, by:
Improving the coordination between the activities of the various emergency services (registration, information and communication), and related to this;

Improving the communication between emergency service workers before, during and after the emergency assistance process, such that an effective and coordinated response to the incident report can be provided;

Professional and, in so far as possible, uniform training of all emergency service workers that culminates in certification;

Permanent and thorough evaluation of the IM emergency assistance process that addresses its organisational, communication, technical, financial and legal aspects;

Introducing new techniques or improving existing techniques to improve safety, traffic circulation and the legal settlement of the question of who is to blame;

Coupling the introduction of new or improved techniques, organisation and forms of communication to a social cost-benefit analysis.

Full integration of Incident Management and Dynamic Traffic Management (DVM) on the road network (diversion routes, traffic jam information, etc.) based on an integrated vision of traffic movements.

Improvement of the visibility of the application of IM for the road user.

Guarantee provided by the Dutch government and involved private parties (such as insurance companies) concerning the financing of the emergency assistance process including the necessary improvements.

3.2 Incident Management aims

The continued elaboration and realisation of the above-mentioned ambitions form the overture for a continued professionalisation of the IM process. This professionalisation must result in a significant improvement in the speed and quality of the IM process.

As a way of making the planned improvements concrete, the following ‘SMART’ aims for the performance of the IM process have been formulated for the period 2008–2015:

**IM General**

- A baseline measurement against which to compare the results of an improvement initiative to be made available.
- Adherence to protocol during IM process.
- Protocols to be coordinated and evaluated (once or twice a year).

**Safety of IM process:**

- Significant improvement in the perception of the safety risk as experienced by IM partners,
- Casualties to be helped more quickly (-25%) and better, thereby increasing the chance of survival,
- Reporting of hazardous materials to be part of incident reporting,
- Road users to be warned as they approach the end of a tailback such that secondary accidents caused by the traffic jam due to the primary accident are reduced by 25%.

**Investigation of clues/the issue of who is to blame:**

---

4 This is taken to mean all operational parties cooperating at the incident sites, namely emergency services (police, fire brigade, ambulance service), highways authorities, vehicle recovery companies and breakdown emergency services.
• Clarity (among police and highways authority) as to when an investigation of clues is relevant.
• Significant reduction in the time needed to investigate clues (-25%) within the framework outlined in the ‘Instruction for Traffic accidents’, with no loss of investigation quality.

Duration of IM process:
• A 25% reduction in incident handling time compared with 2008 to be achieved by 2015.

Information provision to the traveller and media
• In 80% of cases, on IM roads the traffic information concerning an incident (designated as such by VCNL) is to be available to the road user within five minutes.

Organisation of IM process
- Within two years of 2008 there is to be a real-time open exchange between IM chain partners of incident reports and incident data.
- Each IM partner will send to an incident site only employees who are skilled in their discipline and familiar with:
  - The mutually agreed IM procedures.
  - The work processes used by other IM partners.

These aims should be further elaborated in a follow-up step. This will involve translating them into service level agreements (SLA) between the parties involved and into performance indicators (PIN) for the services to be performed.

Figure 3.1: The aim is to achieve a significant reduction in the perception of the safety risk as experienced by the emergency services. Photographs: RWS, Rijnmond district.

3.3 Recommendations

Based on the above list of ambitions and SMART aims, the following recommendation can be formulated:

Recommendation 4: The continued professionalisation of the application of IM on the Dutch road network requires an ambitious approach across a wide spectrum of focal areas. It is recommended that these ambitions and the ‘SMART’ aims based on them be made more concrete (translated into measures to be deployed), realised, evaluated and continuously updated in consultation with the emergency services, the involved policy fields and society (including road users).
To facilitate this approach, it is recommended that a professional form of programme management be introduced. Important components of this programme management are:

- an Incident Management Agency that bears full responsibility for the operational performance of IM measures,
- a master plan for the period 2008–2015 that includes planned improvement proposals,
- a project plan for each improvement proposal,
- direction of the IM Agency by the National IM Platform and IM Council,
- establishment of the IM Agency by the IM Council.
4 Elaboration of the Incident Management Vision

4.1 Introduction

In this chapter five aspects of the Incident Management vision are worked out:

- **Organisation**: the organisation of the responsibilities of the various parties involved in the emergency assistance process.
- **Communication**: communication between emergency service workers, between emergency service workers and the road user and between IM emergency assistance and society.
- **Learning and evaluation**: why is it important to evaluate the IM emergency assistance process and where are the evaluation opportunities to be found? What opportunities exist for continuously improving the emergency assistance process?
- **National roll-out**: is it wise to extend IM to cover the regional and urban road networks? If so, which roads would be eligible? Is a uniform approach desirable on the regional and urban road networks as it is on the highways network?
- **Technology**: technology facilitates many IM measures. What role will technology be able to/have to play in the future in the application of IM and how can we organise this role?

The above aspects are elaborated upon one by one in the following sections. Each section opens with a diagram showing the steps taken to work out the aspect in question. Each elaboration process concludes with number of recommendations.

4.2 Organisation of responsibilities
As stated in the introduction the ‘Application of IM on the road network’ process has been improved step by step in recent years. This has resulted in a uniform, professional approach that has earned great admiration internationally (FHWA, 2005, Stoneman et al, 2006).

But since it has the following characteristics IM is and will continue to be a complex process:

• many emergency service workers are involved in the handling of an incident,
• the tasks of the emergency service workers are interconnected to great extent,
• an accident is a stressful situation in which to work and requires individuals to divide their attention across all kinds of matters (safety, traffic movements, information provision, coordination, etc.),
• every accident is different,
• individuals are required to set priorities continuously and are often confronted with dilemmas.

4.3 Dilemmas on the operational level

Decisions must be taken continuously during the emergency assistance process in a field of tension that can best be characterised perhaps by the following dilemmas:

• Traffic circulation versus safety of the emergency service worker

Incidents happen unexpectedly and it is difficult to calculate the resulting stoppage ahead of time. The desire to limit the stoppage (the loss of time suffered by travellers stuck in the traffic jam caused by the incident) can conflict with guarantees that must be given to the emergency service workers and other road users concerning safety at the incident site. For example, for safety reasons it may be considered necessary to close the road completely for a certain period. This is detrimental to traffic circulation. The secondary effects must be weighed up in the consideration, such as the likelihood of secondary accidents (upstream and in the rubbernecking traffic jam) and the elevated accident risks caused by diverting traffic via the secondary road network.

• Traffic circulation versus patient care/minimising invalidity

The desire to accelerate the emergency assistance process may also conflict with the interests of the casualties involved in the incident. This relationship is ambivalent because on the one hand the speed of the emergency assistance (and the rapid recovery of traffic circulation) positively effect the chances of survival and minimising invalidity. On the other hand, with a view to increasing a patient’s chances of survival and/or minimising invalidity it may be considered necessary to take special measures (e.g. trauma helicopter) that further hinder the traffic circulation.

• Traffic circulation versus investigation preliminary to prosecution

If there is any question of a serious accident with fatalities and/or casualties, the accident is investigated as a crime (Article 6: serious accident is comparable to a crime, see Appendix 5). This requires that the Scene of the Offence (PD) be cordoned off and
that during the emergency assistance as far as possible the destruction of clues is prevented. This approach is extremely detrimental to traffic circulation, mainly due to the duration of the investigation.

Figure 4.1: Vehicles in fend-off position warn approaching traffic. Photographs: Rijkswaterstaat, Rijnmond district.

- Traffic circulation versus traffic movements in the rest of the network

Incidents tend to result in a substantial decrease in road capacity. If the emergency assistance process is going to be time consuming, it is certainly wise to move (some) traffic via alternative routes (fallback options). One consequence of this is an increase in the weight of traffic on the secondary (alternative) network. However, if the reserve capacity of the fallback options is limited, care will have to be taken to prevent gridlock in the whole network.

- Working according to agreements versus customised emergency assistance

Emergency service workers make agreements in advance about the procedures to be followed. This enables the provision of quick and effective help. However, each accident is different and it is often the case that some deviation from the agreed procedures is necessary in order to provide an effective response. When deviation
occurs, the professionalism of the organisations involved guarantees that the coordination concerning other tasks and responsibilities remains assured.

- Personal interest versus shared interest

Every emergency service worker participates in the emergency assistance process on the basis of prior agreements about tasks and responsibilities. In principle, the honouring of these agreements provides the basis for assessing his or her efforts. On the other hand, the quality of the emergency assistance process is determined by the joint efforts of the emergency service workers. As a result, an individual may be required to neglect his or her own tasks because other tasks have greater priority. This consideration is a factor at the tactical and strategic levels as well as at the operational level.

The dilemmas outlined above show clearly that choices have to be made continuously in situations that share the following characteristics:

- work at the accident site is dangerous (the site is complex and unclear, traffic passes by continuously, hazardous materials may be released, etc.),
- the emergency service workers work under high pressure (lives may be at stake and/or the traffic jam is growing rapidly and/or clues must be documented at once while it is still possible, etc.),
- good decisions require consultation, which costs time and there is no time,
- the information needed to reach a well-founded decision is often lacking.

4.4 Direction at operational level

To safeguard the ability to organise the emergency assistance process and to carry it out to completion in the future, the following recommendation is made:

An explicit directive role is necessary to safeguard the speed and quality of the operational emergency assistance process in the future

The use of the directive role involves one of the emergency assistance organisations bearing final responsibility for the completion of the emergency assistance process. The assignment of this final responsibility is no easy task because the performance of the operational direction on site depends on the specific situation and the activity (whether enforcement or traffic circulation or safety or survival or protecting the environment) that carries the highest priority during the emergency assistance.

The following characteristics are important when assigning the directive role to one or more emergency assistance organisations:

- Incidents may be categorised according to the activity carrying the highest priority in the emergency assistance and the directive role assigned to the party responsible for the activity in question.
- In complex incidents in particular the emergency assistance priority may change while the emergency assistance is in progress. For this reason, it is very likely that during complex accidents the directive role will need to be held during various parts of the emergency assistance process by the police (issue of who is to blame), the fire brigade (fire or hazardous materials), the ambulance service (stabilisation of severe casualties and treatment by trauma team) and the highways authority (safety at incident site, traffic circulation).
- The directive role can also be defined as the task (responsibility) by means of which someone sees to it that the process progresses according to the agreements made
jointly by the emergency assistance authorities. Each emergency service remains responsible for the quality of the performance of its own specific tasks, but there is one holder of the directive role who supervises the coordinated performance of the process.

- Most incidents belong in the UMS category (85%). Some of these accidents can be resolved by the road users themselves without any emergency service intervention; others require the intervention of the highways inspector and, to a lesser extent, the vehicle recovery company.
- For the sake of clarity, it is preferable for the directive role to be held by just one individual during the completion of the emergency assistance process.

4.4.1 Direction in UMS accidents

In view of the above considerations, it would seem an obvious choice to assign the directive role in accidents in the UMS category to the highways inspector. The arguments in support of this proposal are that the highways inspector or the Duty Officer respectively:

- Bears primary responsibility for safety at the incident site,
- Bears primary responsibility for the traffic circulation.

The directive role involves supervising the coordinated completion of the emergency assistance process, all being done in accordance with prior agreements.

In order to perform the directive role capably, the highways inspector should possess a number of core competences, namely:

- expertise in the area of traffic circulation in an incident situation,
- expertise in the area of safeguarding safety in an incident situation,
- multidisciplinary knowledge concerning the handling of incidents,
- social skills in making and maintaining contacts with colleague emergency service workers,
- social skills and the appropriate demeanour in making and maintaining contacts with road users.
### 4.4.2 Direction in complex accidents

In complex accidents it will be especially difficult to assign the directive role and the primary responsibility for safety and traffic circulation to one person (organisation). For this reason, it is an obvious choice to arrive at a division of tasks whereby the directive role in complex accidents is assigned to the organisation who is responsible for the work to be performed.

![Direction in complex accidents](image)

The accident can be accorded the appropriate accident categories depending on its characteristics. For each accident category which organisation will be in charge is clearly documented.

The assignment of the directive role to an emergency assistance organisation requires that a number of supplementary agreements are reached:

- the assignment of the directive role to an organisation does not relieve the other emergency services of their own responsibilities for the core tasks,
- should the director not be the first person to arrive at the accident site, the directive role is temporarily held by the emergency service worker who is the first to arrive. As soon as the intended director arrives at the incident site, the directive role is transferred by means of a briefing.
Tasks belonging to the directive role are:

- arrive at the accident site as quickly as possible and preferably first,
- supervise the correct completion of the emergency assistance process, all being done in accordance with mutually agreed procedures and protocols, and ensure decision-making is carried out in consultation with the other emergency services,
- establish the incident type (accident category),
- check whether the desired emergency assistance has been activated,
- supervise the smooth flow of communication during the emergency assistance process,
- supervise the recording of the completion of the emergency assistance process,
- organise the evaluation of the IM emergency assistance process.

These core competences will need to be thoroughly taught and practised in the (certified) training programme for IM emergency service workers.

### 4.5 Direction at strategic level

The demand for an explicit directive role applies not only to the operational process. The continued improvement of the emergency assistance process necessitates that the desired improvements be given the necessary priority at strategic level in the policy and administrative process. It is important that there be policy agreement (or at least the desire for cooperation) between the involved parties (ministries, organisations) about the aims to be achieved and the course to be followed.

#### 4.5.1 Dilemmas at strategic level

Similarly, at the strategic level dilemmas also arise that can have a major influence on the way in which an incident is handled.

In the interviews the following dilemmas are addressed:

- Criminal handling of an incident versus a handling in accordance with administrative law

The responsibility for enforcement lies with the police (see Appendix 5). If an accident is the consequence of an offence, it is the job of the police to investigate the accident and to establish any criminal behaviour.

The Public Prosecutions Department determines which offences warrant investigation. In short, only some incidents are investigated as crimes, namely Article 6 accidents: a serious accident that is comparable to a crime. If Article 6 applies, the Scene of the Offence (PD) must be cordoned off, in particular to avoid clues being destroyed. In principle, anyone can cordon off the Scene of the Offence, e.g. the emergency services worker who is first to arrive (highways inspector, vehicle recovery company, fire brigade). The performance of the investigation of clues requires a certain amount of time during which vehicles involved in the accident may not be moved. This method of working is extremely detrimental to traffic circulation. By limiting the involvement of the police to incidents in which an offence has occurred (and thus enforcement applies) many accidents can be handled much more quickly. It is even possible that the police would allow other parties arriving earlier at the accident site to document the accident situation so that the road could be cleared for traffic use more quickly. Ascertaining

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5 The number of offences warranting investigation is limited and may change over time.
which offences warrant investigation (deployment of police required), ascertaining which accident sites actually require cordonning off and the allocation of the responsibility for performing the investigation of clues largely determine the speed with which the road can be cleared for use by regular traffic following the accident.

- Responsibility for the application of IM on the road network lies with the government (highways inspector) versus a situation in which the responsibility lies with the market (vehicle recovery company and other private parties).

IM is regarded as a core task of government. This is consistent with the vision that the application of dynamic traffic management on the road network is a government task. The question arises whether this division of tasks should continue in future? In the Netherlands and our neighbouring countries (e.g. England) we are observing a new development, namely that the government in its capacity as highways authority is transferring tasks and responsibilities to the market (e.g. road management and maintenance, DBMFO, etc.). A similar development is conceivable for the transfer of tasks and responsibilities in the area of Dynamic Traffic Management and, as part of that, Incident Management. Besides, private parties are already actively participating in this field, for example by providing traffic information to the road user and, in the area of IM, the role filled by the vehicle recovery company on less busy parts of the network.

It must be stated that the current situation, in which it is unclear which party bears final responsibility for the performance of the emergency assistance process, offers insufficient prospects for a professional approach to IM (insufficient management of the improvement process, chance of misunderstandings, etc.).
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