Incident Management
Fact Sheet

Introduction

The CEDR TNM WG Fact Sheet on Incident Management (IM) is based on the proceedings and outputs of the 3rd CEDR Traffic & Network Management (TNM) Working Group Workshop under the CEDR FA3: SAFETY, OPERATIONS, MOBILITY & PERFORMANCE held in the Danish Road Directorate in Copenhagen on 19-20 September 2018.

Scope of the IM fact sheet is limited to the needs and requirements of NRAs towards IM planning and deployment highlighting the main relevant issues and best-practice assessment results discussed in the working group. The aim is to summarize experiences with focus on impacts and factors related to IM deployment and give recommendations and arguments for NRAs to implement and deploy advanced IM.

The Fact Sheet will not include IM basic concepts or technical deployment guidelines, as these guidelines are well known and published, e.g. the EasyWay Incident Warning and Management Deployment Guideline (http://dg.its-platform.eu/DGs2012). A good overview of IM basic concepts and definitions can also be found in the CEDR Task Group T12 report Traffic Management to reduce congestion (http://www.cedr.eu/download/Publications/2013/T12_Traffic_management.pdf).

The CEDR TNM WG IM Workshop minutes and presentations are available on the CEDR website in the members' area (www.cedr.eu).

Definition of Incident Management

Incident Management (IM) is the implementation of appropriate responsive actions by several specialist services to a traffic incident and handling of the traffic until normal traffic conditions have been restored. (see CEDR T12 report).

Conclusion and Main Position of WG TNM on IM

Based on the previous experiences of countries where IM has been in operation for several years, incident management contributes significantly to:

- **reduced delays**
- **improved journey time reliability**
- **increased safety of responders and public**
- **reduced risk of secondary incidents**
- **freeing of police for non-traffic duties**
- **better incident logging and statistics**

Evaluation studies in the Austria, Denmark and the Netherlands reveal that with proper design and deployment of IM resources can in terms of impact assessment, result in a significant faster and imporved way of incident detection and a decrease in duration of accidents and motorway closure. Other impacts of effective IM include decrease in secondary incidents upstream of the incident location and increased safety both for road users and road incident handling and clearance site teams.

IM provides a valuable tool to react on traffic problems in a fast and safe way. Beside investment in ITS technologies for incident detection and control, an organizational set-up for IM encompassing public stakeholders as NRAs and the police and private companies such as insurance and site clearance services is a must for effective IM delivery. While the construction of an additional lane takes several years on average, the deployment of effective IM measures on the road normally can be realized in a relative short space of time, with a more smooth-running planning process.

IM Planning & Deployment Recommendations

The recommendations adopted by the CEDR T13 Final Report on Best Practice in European Traffic Incident Management on the following key essential elements of effective IM deployment:

1. **Speedy incident detection and response** through reliable detection tools and measures and communication platforms
2. **Good information about location, severity, and any attendant hazards** through a well-structured process involving either mobile innovative traffic units or well-trained traffic police to coordinate and manage the incident site.
3. **Protection of the scene and ensuring the safety of responders, victims, and the public** as in (2) above
4. **Coordinated response with a clear structure of authority, roles, and responsibility**. Clear guidelines and protocols for IM at the regional and national levels need to be setup and taken up by all stakeholders. Regular training exercises to ensure timely and coordinated response in incidents is a must.
5. **Reliable communications between responders and with the public** through integration of IM with traveler information services at both the road-side and centralized levels.
6. **Provision of appropriate equipment, facilities, access paths (emergency corridors), and management.** Necessary resources need to be ensured to allow safe access to incidents and on-site management of incidents according to deployment guidelines and service level agreements.
7. **Sufficient backup services to ensure speedy clearance** to minimize congestion. Contractual relationships with police and emergency/rescue services need to be developed to ensure speedy clearance of incidents.
8. **Information exchange through specialized training programs and debriefing systems**
9. **Written IM deployment guidelines and formal agreements**, Deployment guidelines for IM need to be developed and updated. There is also the need to come up with common and harmonized guidelines for the set-up and operation of emergency corridors on European motorways to allow safe and fast access of emergency services to incidents. Where necessary, formal agreements need to be developed between network managers and police. Such agreements and guidelines are necessary components to ensure consistent and coordinated IM.
10. **Monitoring, performance assessment, and feedback into practice**. An incident database is quite essential in order to monitor and assess the performance of IM and improve the operations. In this context, consistent KPIs need to be used to measure the performance of IM work as part of overall network management. In addition, formal audits need to be regularly set up to review incident management procedures in order to identify required improvements.

For a successful introduction and operation of IM, the following issues should be considered by NRAs as they are identified as important by the CEDR working group for the planning and deployment stage (without claim of completeness).

1. Roles and Responsibilities of Stakeholders:
    a. Who are the stakeholders involved in the incident management and what are their main roles? Who is leading incident management in the field?

   b. Are there clear roles and responsibilities throughout the whole incident management process between the involved organizations? Are there agreements and protocols enacted? Is there a good coordination and understanding with traffic police and emergency services at national and local levels?
2. Traffic Management Centers (TMC) Organzation:
   a. How are TMCs organized to handle incident management? What is the role of the control centres and traffic managers in the centre?
   b. How is the hierarchy between regional, local and national control centres?
   c. Are there designated traffic managers on the motorway?
   d. Are the current ITA deployments continuing to benefit IM and do not constrain access to incidents?
3. Common IM Guidelines and Protocols:
   a. Is there a common understanding all the way down through the organizations to the crew on the road and in the Traffic Centre? (e.g., common guidelines/procedures, common education, common training/practice, evaluation of the effort and cooperation in selected incidents?)
   b. Is there a national concept for IM operations?
   c. Are there consistent training programs developed for implementing such guidelines and protocols?

For IM deployment, the following issues were identified as important to consider by TNM WG members:

1. Are critical sections of the motorways covered by IM measures?
2. Operational Protocols:
   a. Are there specific protocols for incident management? What kind of national operational models (or procedures) are being applied to incident management?
   b. Is there a common operational picture with service providers?
   c. Are there consistent KPIs used to measure and improve the performance of IM operations and offer a good level of service to road users?
3. Incident Detection:
   a. What type of technology measures are being applied for incident detection and management and what are the experiences of the performance of technology in practice?
   b. How can road authorities and their partners reduce the time from an incident happens until it is detected?
   c. Are there new sources of alarms that should be considered, e.g., eCall, C-ITS (V2I and V2V) and floating car data from smartphone apps and navigation systems?
4. Consistent Traffic Information:
   a. What traffic information channels are used for IM?
   b. What challenges are experience by NRAs with unclear/inconsistent information about the incident and traffic situation on different channels from different service providers (maybe also from some of the involved organizations) that differs/conflicts with the NRA's own information?
5. Emergency corridors on motorways
   a. Which rules/regulations/guidelines govern the planning and deployment of emergency corridors on motorways?
   b. Is the deployment of emergency corridors harmonized across borders/Europe?
6. How are data for incidents registered to be used in traffic safety analytics on motorways?
7. How are IM skills developed for traffic managers? It is crucial that training procedures and protocols are developed and training programmes are consistently implemented to allow for certified training of all IM involved actors.
8. Surveillance with video cameras/CCTV
   a. How important are video cameras for visual incident detection on motorways compared to e.g. calls from road users and police, alarms from AID-systems and visual readings from maps based on real time traffic data?
   b. Is there a strategy or plan for placing cameras on strategic important locations?

Many of the above issues are handled in detail in the EasyWay Incident Warning and Handling deployment guidelines that can be used as good starting point for planning deployment of IM along European harmonised framework (See link: http://dg.its-platform.eu/DGs2012). In addition, a useful source for IM deployment requirements can be found in the CEDR T13 Final Report on Best Practice in European Traffic Incident Management.

Mobile Unit ASFINAG Traffic Manager

On-Site Incident Handling in Flanders

Benefits - Best Practice Assessment

In general, incident management running offers advantages for a better network performance due to:

- Increase of capacity
- Decrease of congestion
- Reduction of delays
- Shorter travel times
- Benefits on traffic safety, air quality/environment and socioeconomics
- Positive impacts to secondary road network.

During the workshop, it was found that very few studies identified impact assessment in terms of before- and after-estimates for incident management strategies. This is due to the fact that incident management is handled between multiple agencies and due to the difficulty of separating incident management impacts from the overall impacts of traffic management actions on the motorways. Most of the incident assessment results were reported based on overall incident reports stored in incident databases. Assessment included overall incidents by type, incident reaction time, clearance times and overall incident duration to measure the effectiveness of the incident handling process on the motorways.

In terms of impact assessment, the Danish Road Directorate has developed a socio-economic method to measure the value of time loss due to accidents on motorways as well as a tool that can be used by the traffic center to measure the socio-economic time loss in relation to accidents with one or more lanes closed. Socio-economic value of time loss in 2016 due to accidents on Danish motorways was estimated at approx. 95 million Euro. In one major accident that lasted more than 6 hours with more than 10 Km queue length on the E-20 motorway, approx. 1.8 million Euro were estimated in socio-economic time loss. In the Netherlands, a benefit/cost ratio of around 5 was estimated as a result of effective incident management.

In 2017-2018, a European benchmarking study was recently commissioned by the Danish Road Directorate with the purpose of identifying which frameworks, processes and instruments are used in 5 comparable European countries and to identify best practice within Traffic Incident Management (TIM) in terms of organization and performance. An overall summary of the benchmarking study results was presented in the IM Workshop in Copenhagen with the detailed results to be published soon. The summary of the study has been uploaded in the Members' area of the FA3.3 Traffic and Network Management on the CEDR website.

Furthermore, the UK Office of Road Rail has recently commissioned a study to assess the practice of IM in the UK and to compare UK and international IM organizations. Results and recommendations of the study are consistent with the IM deployment recommendations outlined in the Fact Sheet.

More information on incident management case studies and above guidelines, reference studies and reports can be found in the following links:

- Annex of EasyWay Incident Warning and Handling Deployment Guidelines. See link: http://dg.its-platform.eu/DGs2012
- IM Fact Sheet from CEDR Working Group T12 "Traffic Management to reduce congestion" Final Report (http://www.cedr.eu/download/Publications/2013/T12_Traffic_management.pdf), 2012
- CEDR T13 Final Report on Best Practice in European Traffic Incident Management, 2011
- Danish Road Directorate (2018). International Benchmarking Study of Traffic Incident Management.
- UK Office of Road and Rail (2018). Highways England and Incident Management Study- Final Report. See link: https://orr.gov.uk/__data/assets/pdf_file/0014/40370/highways-england-and-incident-management-study-2018-12-19.pdf
- FHWA (2010) Traffic Incident Management Handbook. See link: https://ops.fhwa.dot.gov/eto_tim_pse/publications/timhandbook/tim_handbook.pdf
- CEDR T13 Final Report on Best Practice in European Traffic Incident Management

Recommendations and Next Steps

It is of value for NRAs/CEDR countries to exchange and discuss experiences, partly to learn from each other and partly to get closer to a more harmonised approach that will benefit all NRAs.

The TNM WG Workshop on incident management showed the necessity, advantages and the success of sharing, exchanging and discussing experience, knowledge and best practice examples in a specific field of traffic management measures. The mix of participants from experts having years of operational experience, countries with first experience from pilots to countries with interests in introducing the measure ensures a fruitful discussion of the overall process from planning, deploying to operating and therefor a useful output for several members of CEDR. It has also strengthened the network between the involved experts, which is expected to make it easier to keep in touch and share knowledge in the future.

As added value to the thematic recommendations regarding incident management, the necessity and the benefit of having workshops on specific topics like IM were confirmed and the structure of the workshop was established as successful. Existing guidelines, assessment studies and best practice examples including lessons learnt are very useful and helpful in order to avoid unnecessary mistakes and introduce new measures efficiently. For that reason, such guidelines and documents should further be established and updated.

The following recommendations for continuing the work were developed in the CEDR TNM IM Workshop by the workshop participants:

- IM effective deployment measures: the recommendations adopted by the CEDR T13 Final Report on Best Practice in European Traffic Incident Management were taken up as highly relevant IM deployment recommendations by the TNM WG members.
- Teamwork is key component of effective incident management on motorways. An organizational set-up for IM encompassing public stakeholders as NRAs and the police and private companies as insurance and site clearance services is a must for effective IM delivery. Effective and high-quality partnerships and operation protocols with police and emergency services and clear roles and responsibilities are essential.
- Clear information chain for reporting and managing incidents is key to effective incident handling and management
- A fast-responding mobile unit with state-of-the-art equipment is crucial for effective network operations in urban areas. As in Austria, the Netherlands and Sweden, a fast-responding mobile unit/road assistance service with state-of-the-art equipment is crucial for effective network operations in urban areas
- Consistent KPIs need to be used to measure the performance of IM work as part of overall network management. In addition, formal auditions need to be regularly set up to review incident management procedures in order to identify required improvements. Based on the KPIs agreed in the first TNM WG Workshop on KPIs and to be used for annual reporting of TNM deployment by TNM WG members, the following KPIs are proposed for reporting IM deployment and impact of:
    - Level of IM Deployment on motorways (length of critical motorway sections covered by IM measures)
        - Availability/Capacity:
        - Change in % of network congestion per day averaged over year
    - Incident Management:
        - No. of incidents by Type (accidents and vehicle breakdown incidents- trucks involved and rest) per Km of network averaged over year
        - Average Incident Duration (from detection to clearance) of network by type of incident: accidents and vehicle breakdown incidents- trucks involved and rest – unplanned/non-recurrent incidents on network
    - TMC Operation:
        - Number of lane-Km controlled per traffic operator (workload)
        - Average Number of incidents per year per TMC traffic operator
        - Average Number of planned events (road works and other events) per year per TMC traffic operator
    - Safety:
        - Number of accidents with injuries per Veh.Km. of network over a year
        - Number of accidents with fatalities per Veh.Km. of network over a year
    - User Satisfaction:
        - NRAs to report their own Customer Satisfaction indicator according to own method
- **Develop a Knowledge Base of best-practice IM deployment case studies** building on the CEDR members' IM evaluation reports and international deployment reports, as well as the Knowledge Base of European best-practice IM deployments found in the EasyWay IM Deployment Guideline.
- In coordination with EU ITS Platform, CEDR members to set up a mechanism and resources to **update existing IM Guidelines**, e.g. the EasyWay Incident Warning and Handling Deployment Guidelines, in line with latest developments and evaluation reports in IM.

Contribution

This position paper was compiled by CEDR WG Traffic and Network Management.

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CEDR IM Copenhagen Workshop minutes and presentation are available in the Members' Area under FA3.3 on the CEDR website (www.cedr/eu).