SAFETYCT
CONSULTING & TECHNOLOGY

Successful incident command with networked incident information

Networked information ensures greater effectiveness and more safety in fire fighting operations. Here you can find out how you can utilise networked information strategically, step by step, for your emergency response personnel.

White paper
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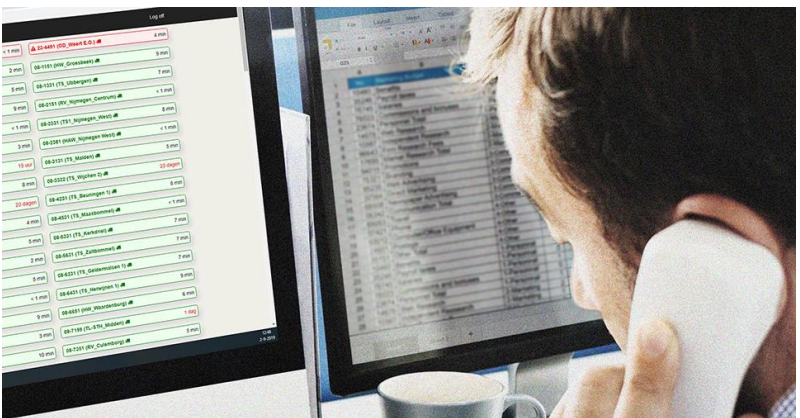

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1 Modern digital incident command as a challenge for fire brigades

More information. More speed. Digitalisation is changing our society. Digitalisation changes society in all kinds of areas. It leads to an ever-increasing amount of available data and the acceleration of processes. A range of trends have direct effects on the fire brigade:

- *Intelligent cities.* Cities are complex systems, which are characterised by the interaction of a large number of systems such as traffic control and environmental control. All these systems contain useful information for the fire brigade.
- *Digital twins.* Architects and builders develop projects entirely on the computer with fully three-dimensional building models. This information is very detailed but is rarely available to the fire brigade as property information in the event of an incident.
- *Networked vehicles.* Vehicles are developing into mobile computers on wheels with a large number of sensors. An advanced example of this is the development of autonomous driving. As a result, a comprehensive image of the vehicle's situation is available before accidents occur. However, while this could be useful to the fire brigade to assist in getting an overview of the situation, these images are not available to the fire brigade.

Digital networking as a challenge for incident command for the fire brigade. Digital networking increases the requirements for the effectiveness of fire fighting organisations. Citizens and politicians continuously experience changes in their private and professional environments caused by digital networking. These experiences lead to higher expectations regarding the effectiveness of emergency response organisations.

Incident command involving the fire brigade is particularly affected by these changes. Incident command is an important factor in the success of emergency control and response. The whole management process, from the initial alarm notification through the emergency vehicles en route to the decisions of the Officers in Charge and incident commanders, is affected, not only selected areas of the process.

Against this background, the persons responsible for the organisation (heads of a fire brigade, Group Managers and Area Managers) face a range of challenges to ensure sustainable safety and to increase quality in line with changing expectations. For the persons responsible for EDP (Electronic Data Processing) and IT (e.g. information and communication managers), the challenge is to meet these requirements and at the same time keep an eye on quality and cost effectiveness.

En route to the incident:

- How can I reliably and safely organise operational trips for emergency response personnel?
- How can emergency response personnel already en route prepare themselves for their deployment in the best possible way?
- How do I ensure that response times are as short as possible?

On arriving at the incident site:

- How can emergency response personnel make sound and educated decisions in the best possible way?
- Have we used all the available information to protect our personnel at the incident site? Have we taken into account special circumstances of, for example, complex buildings or industrial plants?

During operations on-site:

- How can emergency response personnel move around on the incident site in a goal-oriented way?
- Where are hazards and the operational target located on the incident site?
- How are emergency response personnel informed if the situation changes?
- What information does the public have?

In (EDP/IT) administration:

- What information from preparation and related areas is relevant for emergency response personnel?
- How do I get incident information into the appliances/vehicles and into the hands of emergency response personnel?
- How are data sources integrated into the existing system?

2 Networked incident command for greater effectiveness and more safety

Networked incident command leads to greater effectiveness and more safety in fire fighting operations. Drivers, Officers in Charge and incident commanders all benefit from faster decisions, error prevention and greater safety for emergency response personnel.

The key to success is the systematic use of networked incident information and providing this information to the various roles involved in a precise and targeted manner.

Depending on the operational phase and the degree to which the digital support is used, various clearly measurable advantages are the result.

Arriving at the incident site quickly and safely: With optimised dynamic navigation, emergency vehicles and personnel reach the incident site via the best and safest route. Emergency vehicle drivers in particular benefit from these improvements.

Arrive at the destination as fast as possible. Thanks to navigation, emergency vehicle drivers can concentrate on controlling the vehicle and take the best and safest route to the incident site. The vehicle arrives on site via the best route – this route has been optimised by taking into consideration the vehicle's profile (height, width, ...).

Depart immediately with a clear overview. Navigation is ready and available as soon as the drivers get into the vehicle, and stays available en route. The driver receives an overview of the route immediately on getting into the vehicle, without any interaction from the driver required. The navigation starts when the vehicle drives off, also without any driver interaction.

Prevent dangerous driving manoeuvres. With the dynamically optimised navigation route, dangerous turning manoeuvres/U-turns during the trip to the incident site can be avoided. Roadblocks or other closed roads (e.g. due to construction sites) can also be avoided this way. This saves superfluous correction manoeuvres and the routes the navigation provides are optimised for each vehicle type. When the vehicle is in proximity of the incident site, the driver is guided as close as possible to the site, even if roads are closed or blocked. This saves the personnel valuable time and prevents them from having to walk further than necessary.

Enable distraction-free driving. Distraction-free driving is extremely important for drivers. The driver can focus on the road, without removing their hands from the steering wheel. The driver can rely on navigation recommendations, as the maps reflect the real situation accurately. This applies to all light conditions in the

emergency vehicle. In the event of inaccuracies in the navigation, the driver's feedback can be used to improve maps.

Not having to worry about site changes. In the event of incident address changes, the driver does not have to worry about a thing, i.e. the driver does not have to enter new address information if their destinations change.

Making informed operational decisions at any time: Managers (Officers in Charge, incident commanders) can make faster and more precise decisions using mobile, dynamic incident information. The manager can prepare the operation en route to the incident: Having arrived at the incident site, the manager can coordinate well-prepared and make informed decisions during operations on-site. This enables managers to save valuable time, avoid serious errors during operations and increases the safety of personnel.

Having management information available en route to the incident site. As soon as the Officer in Charge gets into the vehicle, information regarding the operation and incident site is visible to them in a quick and easy manner. The Officer in Charge does not have to search for operational information or maps of objects on the incident site.

Incident-relevant information at hand at a glance. On site, Officers in Charge have all the relevant information at hand in a quick and easy manner for making their decisions. This includes, for example, the assessment of hazards and the evaluation of warnings that have occurred, targeted deployment of emergency response personnel on the incident site and surrounding area including coordination of the approach route and identification of the water supply (locations and capacity).

Be up-to-date with personnel actions. Incident commanders are kept informed about operational changes from the control centre at a glance and can quickly get an overview of the situation of the operation, including the actions of emergency response personnel on site.

Independent of communication connection. Emergency response personnel do not have to worry about their communication connection, as the main part of the systems also operates offline, independently of the network status.

Understanding digital opportunities and using them cost-effectively. The EDP/IT administration of fire brigades can develop suitable skills and procedures to support the emergency response personnel purposefully. To this end, the administration can establish necessary processes and EDP/IT infrastructure and use these in a cost-effective way.

Minimise personnel required for data maintenance. For example, the operations preparation department can save time in setting up maps (entering emergency-specific road information changes) by using optimised map data. Thanks to optimised management of maps and their changes, no individual changes in the

road network are lost by the map updates. These process optimisations are key to cost-effective operation of the fire fighting organisation.

Integrate existing and new data sources. The targeted integration of existing and new data sources in the main system enables flexible and cost-efficient data storage. Emergency response personnel will benefit directly from expansion of the database if this database is linked to the systems used by emergency response personnel.

In short: networked incident command is the key to taking advantage of these benefits. This includes the systematic linking of information (existing and new data sources) and preparation tailored to the various roles during an emergency response operation.

3 The strategy: Make information usable for emergency response personnel step by step

The benefits of networked incident command for the fire brigade result from making the underlying networked information available to the emergency response personnel during deployment. A tried and tested strategy for achieving this vision is to implement multiple projects in order to establish the networking of incident-relevant information in an incremental way.

In SafetyCT's experience, the following procedure has proven to be successful:

Understanding the situation and challenges. What is the current status of the fire fighting organisation? Which challenges are already known, which are foreseeable? Which technical trends must be taken into account and what technical topics will be relevant in the foreseeable future?

Setting realistic goals. Which goals are realistic for the fire fighting organisation, particularly with regard to existing skills in EDP, processes and fire brigade requirements?

Making existing information sources gradually accessible to emergency response personnel. To which information sources does the fire brigade already have digital access? Which information is only available in analogue form or digitally with media disruptions (e.g. non-networked applications without technical interfaces)?

Developing information sources strategically. Which other information is important to Officers in Charge and incident commanders? What priority does this information have in view of the local circumstances in the response area? What effort is required to make this information available on emergency vehicles?

3 examples of networking projects and their workflow are given below. They describe successful projects in which SafetyCT worked closely with the fire brigade departments involved to make existing and new information sources available to emergency response personnel during deployment. The role of the control centre as a central information hub is also made clear.

3.1 Example: Introducing navigation specifically for emergency vehicles

The challenge. In the event of an incident, fire engines have to reach the incident site as fast as possible on the safest route. The navigation to the incident site by the driver must be fast, reliable and safe. An well-functioning navigation is particularly important to the fire brigade with vehicle-accessible sites within the response area (e.g. high-risk industry) or where complex road networks have to be navigated. In

order to be fast, the driver must be informed of the destination of an incident trip, acknowledge it and notify the vehicle navigation system with the least possible effort. This becomes even more important if, for example, the incident destination is not fully known at the start of the journey or the destination is updated during the journey. During the journey, the driver must pay attention to changes in the road network (e.g. temporary or recurring roadblocks due to construction sites or events). Off-the-shelf navigation solutions are not suitable due to the special routing requirements for emergency vehicles (e.g. driving in the wrong direction down a one-way road, driving on private roads and forest or farm roads, using bus and taxi lanes). In addition, emergency vehicles with different sizes and weights need different routes (e.g. some underpasses are impassable for the larger fire trucks but are for the incident command vehicle).

The solution approach. SafetyCT was tasked with introducing professional emergency vehicle navigation, in which the destination and the route to the incident site are entered automatically via the control centre link and are updated regularly. At the start of the project, SafetyCT held client workshops to determine the individual needs and wishes of the client and input its experiences from completed projects. The introductory project will be completed in several phases. The most important thing is to choose professional emergency vehicle navigation that meets the identified requirements. The emergency vehicle navigation must be linked to the control centre and the resulting alarm messages. The incident destination read out from the alarm message is transferred automatically to the emergency vehicle navigation. The road network of the response area must be recorded digitally, e.g. including any temporary or recurring roadblocks within the response area. Furthermore, routing suitable for emergency vehicles must be developed. To this end, the navigation routes network must be created. This means that, for example, bus and taxi lanes and passable private roads that can be used by emergency vehicles must be recorded. At the end of this phase, the emergency vehicle navigation must be installed in the emergency vehicle together with the suitable hardware. This hardware must fit into the existing EDP infrastructure. Thereafter, the new integrated emergency vehicle navigation is piloted and tested intensively before it is used in normal operations.

The advantages. The integrated emergency vehicle navigation has considerable advantages, especially for the driver. The driver can get into the vehicle and drive off immediately, confident that an optimised reliable trafficable route has been selected. Even if the incident location changes, the driver can concentrate on driving the emergency vehicle and on the surrounding traffic thanks to automatically adjusted routes. The fire fighting organisation provides the best and safest route to the incident site, suitable for the time of day and traffic situation, for each individual vehicle. The response preparation staff can easily adapt these routes to new situations, to local wishes or acquired experiences.

Key success factors. The introductory project should include piloting in the most difficult part of the region/city, in order to find out how reliable the database is and how stable the process is, and to adjust the road and route network if necessary. Apart from introducing the software, hardware and corresponding processes, training and instructing the emergency response personnel is essential. The data integration with the control centre must be reliable, planned robustly accordingly, and tested intensively. The routes must be correct in order to gain the driver's trust. Maintaining the road network is a regular task, a large part of which can be carried out automatically.

References. Gelderland Zuid safety region (NL), Limburg Noord safety region (NL), Hollands Midden safety region (NL)

3.2 Example: Providing Officers in Charge with current incident & "vicinity" information

The challenge. During operations, fire brigade managers (Officers in Charge, sector/incident commanders) need suitable information during the journey to, on arrival at the incident site and during deployment to enable them to make decisions quickly and effectively. This information includes incident information (alarming, buildings/properties concerned, building/site plans, hydrants in the surrounding area) as well as "vicinity" information (weather, buildings/properties in the surrounding area and any adjacent hazards or installations worth protecting / critical infrastructure). Fire brigade departments, such as incident prevention and incident response preparation, process this information after which it is provided to emergency vehicles, for example in folders or in different digital applications that are accessed on a tablet installed in the vehicle.

A range of challenges occurs in the management and provision of this information.

Transferring the information to the incident commander via different media is susceptible to errors. For example, this is the case if, during the journey, the incident commander receives a change in the incident address over the radio several times and then has to enter it in a navigation system manually.

Managers collate the information they need for their decisions from folders or from different digital applications – a process that is susceptible to error, and which also costs valuable time in the decision-making phase. Furthermore, room for interpretation of information can lead to errors in decisions.

In the administration, manual processing and updating of this information is time-consuming and staff-intensive. If paper/folders (hard copies) are used, the large amount of printing required means that the folders in the stations and emergency vehicles are only updated every few weeks or months. For managers on operational duty, this may result in access to outdated information because the circumstances on the incident site have changed in the meantime.

Furthermore, emergency response personnel may not have certain information needed for decisions at all, because certain data sources such as land registry office data or weather information that exists in the city cannot be accessed in the vehicles. The reason for this could be, for example, a lack of an internet connection or a lack of tablets in the emergency vehicle.

The solution approach. SafetyCT was tasked by several safety regions in the south and centre of the Netherlands to make incident information from existing property plans and the hydrant network available to the Officers in Charge on operational tablets in the emergency vehicles.

In the initial project phase, SafetyCT worked with the departments involved to determine the roles involved (Officers in Charge, incident commanders) and the needs of each role. From this, a clear objective was determined for the provision of suitable information blocks, project goals were defined and a common understanding of these project goals was ensured in workshops.

SafetyCT divided the implementation of the introductory project into two phases: information preparation and operational tablet. In the information preparation phase, information sources were prepared and integrated in existing systems (e.g. the control centre), and the fire brigade-specific management processes for this information were adjusted. For example, the storage of the hydrant data in the control centre was added to an existing geoinformation system. Coordination of the different fire brigade departments such as the control centre, incident preparation and EDP is worth highlighting in particular. In the operational tablet phase, the content to be displayed to the Officer in Charge was defined on the basis of an optimised sequence that was also developed. The display application on the operational tablet was selected on the basis of this. The whole solution was then piloted intensively on individual emergency vehicles, further improved on the basis of feedback from emergency response personnel and then rolled out for all emergency vehicles.

The advantages. With the operational tablets, Officers in Charge can now acquire an almost complete overview of the incident site, its surroundings and the water supply in less than 30 seconds. Before their introduction, the Officers in Charge had to determine the incident-relevant information after arriving on site and had to take parts of the information with them from the paper file. This saves emergency response personnel valuable time in critical situations. Emergency response personnel can therefore make better decisions and avoid errors en route to and on arrival at the incident site. In case of available updated information, the data are made available on the operational tablets without delay – and compared to the previous situation, this updating sequence requires far less personnel time.

Key success factors. *Create an understanding for potential solutions.* On the one hand, previously unknown options must be pointed out in order to define goals

particularly worth achieving (e.g. the transfer of an updated alarm using an existing 4G mobile phone connection). On the other hand, a realistic estimation of the time, costs and limits of technology and processes must also be determined. *Provide technical knowledge for all systems involved.* In order to organise the integration for the entire emergency response organisation robustly and efficiently, technical knowledge in the control centre, technical knowledge of the linked communication networks and technical knowledge of the software/hardware of the operational tablets are required. *Establish user acceptance systematically.* Any reservations that arise, e.g. among colleagues who are not particularly technophiles, must be removed early through systematic involvement and through an emphasis on optimal user experience. *Requesting extensive support.* The system support provided by the service provider must be aligned with operation in the fire brigade, i.e. the service provider must also be available and able to provide solutions during at weekends.

References. Brabant Noord safety region (NL), Zeeland safety region (NL), Haaglanden safety region (NL)

3.3 Example: Consolidating control centres from 25 to 10

The challenge. The Netherlands has 25 regional control centres for fire fighting and rescue services nationwide. Starting with joint control centre software, over 15 years of operation, the safety regions adapted their work processes and information management very much to individual circumstances. For example, the use of incident keywords and stored response orders are structurally different. These fully developed heterogeneous structures make cooperation between the control centres significantly more difficult. In the event of a control centre failure, adjacent regions cannot take on the duties of the control centre where the failure takes place. In the event of major incidents, other control centres cannot provide additional capacity. The maintenance costs for the individual safety regions are high.

The solution approach. The government of the Netherlands decided to harmonise the control centre systems and working practices in a national standard and at the same time to reduce the number of control centre locations from 25 to 10. SafetyCT was tasked with implementing the control centre consolidation project. The project will extend over a 10 year period with subprojects to consolidate 2-5 adjacent regions into one region. SafetyCT is responsible for the (technical) project management, provides migration specialists and carries out the migrations. At the start, SafetyCT undertook detailed actual status and effect analyses in each of the 25 regions concerned. Based on these analyses, SafetyCT developed a template for the procedure and a migration plan. SafetyCT could thus ensure a uniform procedure for each of the 10 migrations to the target control centres and at, the same time, was able to map regional differences that continue to exist as variants in a new national standard that would be created. In the following migration phase, adjacent regional control centres will be consolidated at staggered intervals. SafetyCT is thus only migrating up to 5 adjacent control centres at the same time in

a separate subproject. SafetyCT will first establish live operations in this consolidated regional control centre and thus close this subproject before starting the next migration. After completing the ongoing migration phase, the plan is to network the 10 target control centres via a central national infrastructure and then, in a final migration, roll out the uniform national control centre system in the regional control centres.

The advantages. As a result, the Netherlands will have a networked national control centre infrastructure with regionally distributed, uniform control centres. Through the networking, the remaining 10 control centres can support each other in the event of a high workload and can take on the tasks of other control centres. This networking via a data hub is operational 24/7. The networked control centres thus serve as immediately available back-ups in case an individual control centre should fail. Employees nationwide can thus work in the regional control centres on the basis of the national structure and appropriate training is simplified. Due to the common operator guidance, the employees can be deployed in all regions of the country. The networked system is future-proof, as it can be further developed systematically and changes can be made in a cost-effective way. On the costs side, fewer staff members are required for operation, maintenance and development.

Key success factors. The project was characterised by a combination of high technical complexity and a long duration. SafetyCT had to identify suitable specialists and unite them with the existing project team. Detailed risk management was integrated in the project management, in order to enable a response to any delays in parts of the project and to estimate effects early on. Regular meetings to discuss the current project status with the client’s employees made it significantly easier to prioritise important and/or urgent topics. For SafetyCT, it was important to closely align the tasks of the team with the wishes of client and to identify potential problems at an early stage. Due to the large workload for the employees involved, it was important for SafetyCT to keep an eye on the work/life balance of the employees. Together with each individual employee, preventive and, if necessary, corrective measures were taken with the aim of keeping the whole team happy and healthy.

References: Limburg control centre (NL), Bergen op Zoom control centre (NL), ‘s-Hertogenbosch control centre (NL)

4 SafetyCT – A trustworthy partner with longstanding experience

SafetyCT is a trustworthy partner for fire brigades with many years of experience in digital system integration in the world of fire fighting.

4.1 Market leader in digital system integration for fire brigades with 20 years of experience

Market leader in the Netherlands and Belgium, active in Denmark and Germany. SafetyCT is the market's leading provider of digital system integration for fire brigades in the Netherlands (all 25 safety regions are our clients) and Belgium (22 of 34 emergency aid zones are our clients) and is active in Denmark (e.g. the Copenhagen safety region) and in Germany.

Successful on the market for over 20 years. Since it was founded in 1999, SafetyCT has grown continuously. SafetyCT started in the late 1990s as a control centre consultancy (functional management of control centre and police systems), operating under the company name AVD ICT. In 2002, it introduced the requirements planning software Care, which allows fire fighters to carry out fast and precise calculations with which they can effectively (re-)locate fire stations and fire vehicles. In 2009, Falck, the world's largest private security company for fire brigades and rescue services, bought the company and initially renamed it Falck AVD ICT, and later rebranded it as Falck Consulting & Technology (Falck C&T). In the following years, Falck Consulting & Technology developed its software products for fire brigades in the fields of operative incident information, incident site navigation, dynamic alarming and control centre data hubs. In 2019, SafetyCT was formed as an independent company, as a spin-off of Falck Consulting & Technology.

Our employees are the embodiment of protection and rescue. The culture of SafetyCT thrives on its cooperative working environment, team spirit and its experienced employees, most of whom have been on board for many years. Most of SafetyCT's employees are actively involved in their local fire brigade outside work or have a background of many years in fire-fighting. On the IT side, SafetyCT benefits from dozens of projects involving control centres, fire fighting IT and the networking of systems in this field.

Client satisfaction and innovation are what drive us. In its 20+ years of existence, SafetyCT has continuously developed new digitally-supported services and products for fire brigades – always working in close collaboration with our clients. The satisfaction of public and private clients was and is our highest priority.

4.2 Get in touch with us – personal advice

We would be pleased to talk to you about your requirements. We will gladly take the time for you and your employees. Briefly describe your request to us. We will develop an agenda for a meeting with you, so that we can get to know each other – by means of a video conference or a workshop on your premises, for example.

Onno Stumphius

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Onno Stumphius runs SafetyCT and manages the company for the Netherlands, Belgium, Denmark and Germany. Onno has been at SafetyCT for 10 years and has a Master's degree in

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SafetyCT is a leading provider of integrated (mobile) incident information systems for fire brigades.

With mobile incident information systems and integration services for control centres and related digital systems, SafetyCT assists public and private fire fighting organisations in increasing their effectiveness and safety in incident management. More than 80 fire fighting organisations worldwide trust in the flexible solutions and service portfolio of SafetyCT, which was founded in 1999. Its clients include the safety regions in the Netherlands (100%) and Belgium (65%), the Copenhagen fire brigade and the national crisis management system of the Netherlands.

More information available at www.safetyct.com

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