WHITE PAPER

Intergraph Planning & Response

Effective Information System for Command Staffs and Special Operations Rooms

Version 2.4
(latest Update: October 29, 2013)

PART OF HEXAGON

INTERGRAPH®

Contents

1 Introduction

High-level state visits, sporting events or political demonstrations or unpredictable events such as floods, landslides, industrial accidents, kidnappings or terrorist attacks – these exceptional major events are enormous challenges to the planning and coordination of all the security and emergency organisations. In special situations, an effective and successful strategic, tactical, and operational command often requires the use of potential assistance from police, fire and rescue service, as well as air, water and mountain rescue, technical agencies, army or crisis teams – often spanning multiple administrative or even national borders. The challenge to operational control is heightened in such situations, requiring rapid reaction to any changes in the situation, and the coordination of actions to ward off potential threats, limit damage, and by cooperation between all agencies, guarantee the best possible response on the ground.

An effective IT solution for Special Operations Rooms (SOR), Command Staffs, and command posts in the field must be available at all locations and fully integrated. The SOR / command staff needs direct access to a variety of historic and event data and it must be presented clearly and concisely. Likewise, simple and reliable communications and information sharing between the participating bodies must be ensured. Simple, intuitive applications are essential to allow the user to focus on the leadership challenge, even in extreme situations. The purpose is to get a Common Operational Picture.

Note: This document describes both current and planned features. The key words and text sections marked with an asterisk (*) are the subject of the development plan for Intergraph Planning & Response and will be implemented in one of the next versions.

2 Objectives

The orderly flow and safety of the public and involved units is a primary purpose that must be ensured. From reconnaissance, deployment of barriers, to decontamination sites, exclusion zones and evacuation – informed, evidence-based decisions are always called for. A rally can escalate suddenly, fire break out in a stadium or even an assassination attempt be perpetrated on a celebrity guest or against a crowd.

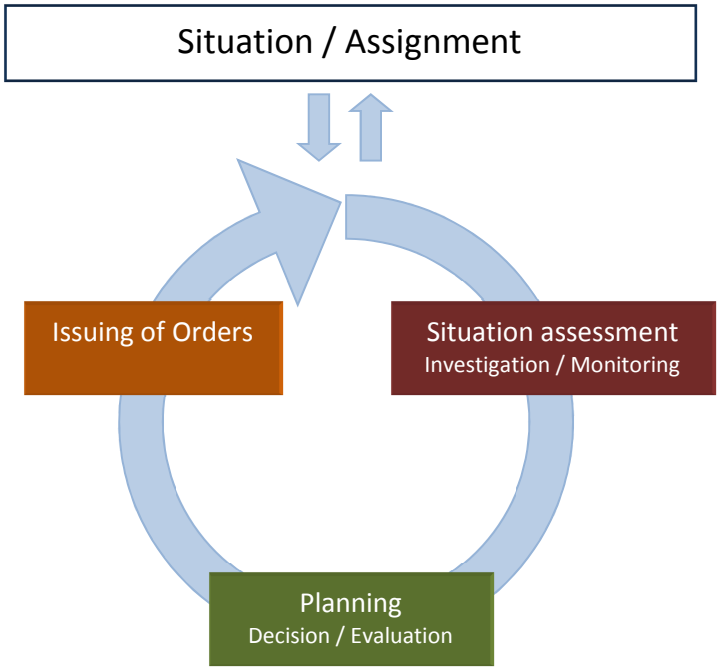


Figure 1: Model of the operational management process
(in accordance with service regulations DV100, issued by the 'Ständige Konferenz für Katastrophenvorsorge und Katastrophenschutz' - Permanent Conference for Disaster Prevention and Disaster Protection, Germany)

Effective IT support for an operation, from planning and response to subsequent analysis requires that situation information is distributed to all locations without delay. The clear presentation of all spatial data is the basis for correct assessment of the situation and thus for the resulting decisions.

Information from master data, such as lists of activities*, maps, operational plans*, etc. must be available to all authorised users. In addition, messages must be reliably delivered to the appropriate recipients. Information must be available at all times and must be capable of being analysed by time interval, etc. This ensures an optimal exchange of information between agencies and individuals.

A complete audit trail of all information is essential – particularly for post-event analysis.

Intergraph Planning & Response is a customisable, modular solution to effectively support strategic, tactical, and operational command, based on established practice and protocols.

Intergraph Planning & Response is an effective IT solution for Special Operations Rooms (SOR) and Command Staffs, and it is expressly not a Command and Control / Computer aided-Dispatch System.

3 System Features

Intergraph Planning & Response is based on Intergraph's GeoMedia Smart Client, Using this web-based technology means that users require only a standard PC with network access features to give access to all key operational data from anywhere. Full functionality is available even on mobile computers – either online or offline*. The application requires no software update process, thereby significantly reducing administration overhead.

The system is workflow-centric, so users are shown the precise functions that are expedient to the current work step. This ensures that the application remains simple and intuitive even when staff is under stress. In addition to that this solution is optimised for keyboard control.

A key feature of the application is that it provides multiple views of the situation, which can be processed and analysed by the operator. The user may switch rapidly between temporal, spatial and tabular views. At every point, detailed information may be accessed interactively, functions performed or appropriate work procedures started.

Of course, the direct integration into I/CAD, Intergraph's computer aided dispatch system, is included, whereas the data access is read only in the common database, and write permission is based on the redundancy mechanisms of I/CAD. Thus, a seamless interaction between a command and control center and the Special Operations Room (SOR) / Command Staff / command post in the field is ensured. Command and control systems from other vendors can also be interfaced with Intergraph Planning & Response; in doing so this kind of implementation is according to a specific project order.

Figure 2: Timeline, Map

Important information such as messages or orders is distributed in real time by an active server-based push mechanism. Important information is thus delivered without delay to the recipients, without any requirement for them to refer to a separate mailbox, or to refresh.

Intergraph Planning & Response combines maps, aerial images and (easy to generate) icon-based tactical symbols in accordance with – if applicable – applied local/national regulations, including images and videos from surveillance cameras or mobile video streams. The current positions of action units and emergency services personnel are updated in real time, and important documents such as

maps, reports and tables are directly accessible. For this purpose, all major spatial data formats can be connected in native format via data interfaces. This includes for example, the interfaces based on the European INSPIRE directive (http://inspire.jrc.ec.europa.eu). The integration of live data from services like Google Maps or Microsoft Bing Maps is also possible. A standardised, web-based interface allows the direct connection of input and use of resources from command and control systems. The access to Intergraph‘s I/CAD and Intergraph’s data base occurs directly through an interface.

Several operations can be worked independently but may also be linked to each other. Thus, it is possible to merge operations with a different mix of organisations or of areas of responsibility.

The use of Intergraph's standard products for the design of forms and workflow processes allows workflows and procedures to be adapted to specific customer requirements quickly and simply, without the requirement for specialist programming skills. Appropriate administration tools are provided for this purpose. Moreover, the integration of additional applications into the portal allows the client to configure the entire environment to include “favourites”, giving a familiar feel to the user.



The offline capability* of Intergraph Planning & Response is a prerequisite for smooth, reliable mobile applications and the use of potentially unstable networks (such as free internet). A bandwidth-saving client cache allows offline operation necessary for data access to all location related data – even spatial data – securely. Automatic synchronisation on resumption of the online connection ensures reliable data exchange between remote clients and a central database.

The access to the application and the access permissions to functions, operations or parts of operations are controlled via an integrated user management subsystem synchronised where appropriate to existing directories such as Active Directory or LDAP, in order to be able to integrate the access control in current installed IT rights systems. The definition of roles and rights, and the assignment of users to roles within the Emergency Organisation (corresponding to spatial, functional, thematic or technical criteria) provide each user with specific situational and related functions appropriate to their role. This fine-grained user management also allows subordinate units within an overall organisation to perform their duties even when isolated and separated from one another, with the relevant and appropriate data about other organisations’ units available to them.

Maximum availability is guaranteed since all significant system components (database server and web / application servers) can be configured for redundancy.

3.1 Overview of the Modules

The modular design of Intergraph Planning & Response is the basis for a high level of quality and stability as well as for the easy integration of extensions. The following table shows the available modules and the module-function blocks. The modules can be used separately. Thus, for example, as a complement to any existing situation documentation system, the Map, Resources and Interfaces modules can be used and the function to document the situation remains in the existing documentation system. In order to prevent media breaks, it is recommended that the various applications are connected to one another through appropriate interfaces.

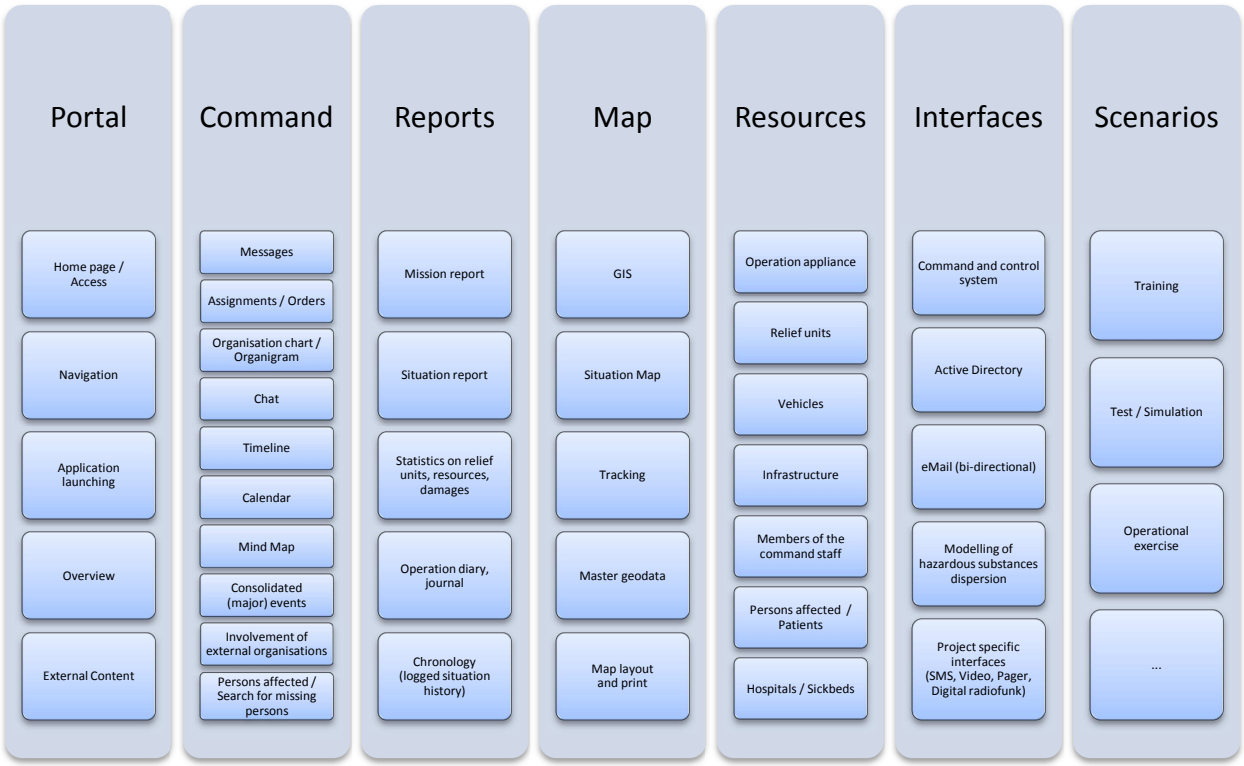


Figure 3: Module overview of Intergraph Planning & Response

Functional overview of the Modules

- Portal
  - Central home page
  - Main navigation for workflows / processes
  - Launch of key applications / components
  - Overview of the most important tasks, information and operations
  - Full-text search*
- Command
  - Generation, processing and forwarding of notes, command messages, orders and multiple orders
  - Organisation chart / Organigram
  - Timeline
  - Calendar
  - Message overview
  - Mind Map
  - Consolidation / Merging of several situations to a major event
  - Involvement of external organisations in the own situation/major event (Liaison Officers)
  - Persons affected or search for missing persons (matching and match display according to selected filter criteria)

- Reports
  - Reporting for situation reports and mission reports (operations diary)
  - Rapid overview of the relief units and resources currently involved and of the reported damage and casualties directly on the map
  - Continuous audit logging of all information, facts, actions, etc.
- Map
  - Geographic Information System / Map module
  - Definition and management of attribute and geospatial operational information
  - Interface for online GPS tracking
  - Library of tactical symbols in accordance with the organisation-specific, applied local/national regulations
  - Geospatial analyses such as evacuation lists
  - Incorporating models of hazardous substances dispersion
- Resources
  - Management of operational forces and resources
  - Management of action units and their availability
  - Management of persons affected and patients, and management of searchers
  - Management of ambulance and hospital bed capacities
- Interfaces
  - Interface to I/CAD (Intergraph Computer-Aided Dispatch)
  - Project-specific integration of third-party command and control systems as well as into external communication systems and other applications (Video, Modelling of hazardous substances dispersion, etc.) via an open web-service interface
- Scenarios
  - Availability of test scenarios for training, simulation and operational exercise purposes

4 Example Configuration

The web-based design of the Intergraph Planning & Response system fits perfectly with the decentralised, networked nature of an operation involving cooperation between multiple agencies. Every workplace with appropriate access authorisation can be independent of its location and has the full functionality of the application (depending on the role of the user). This makes it possible for clients at the command post (staff room / control room) to be connected to the mobile clients in the on-site command post vehicle or to participating clients at a fire or rescue station retrieving or adding information. This allows creation of a “virtual command staff”, located in multiple geographically separated locations. The key infrastructure (database server and web / application servers), may also be located in separate physical locations, giving a highly available and scalable configuration.

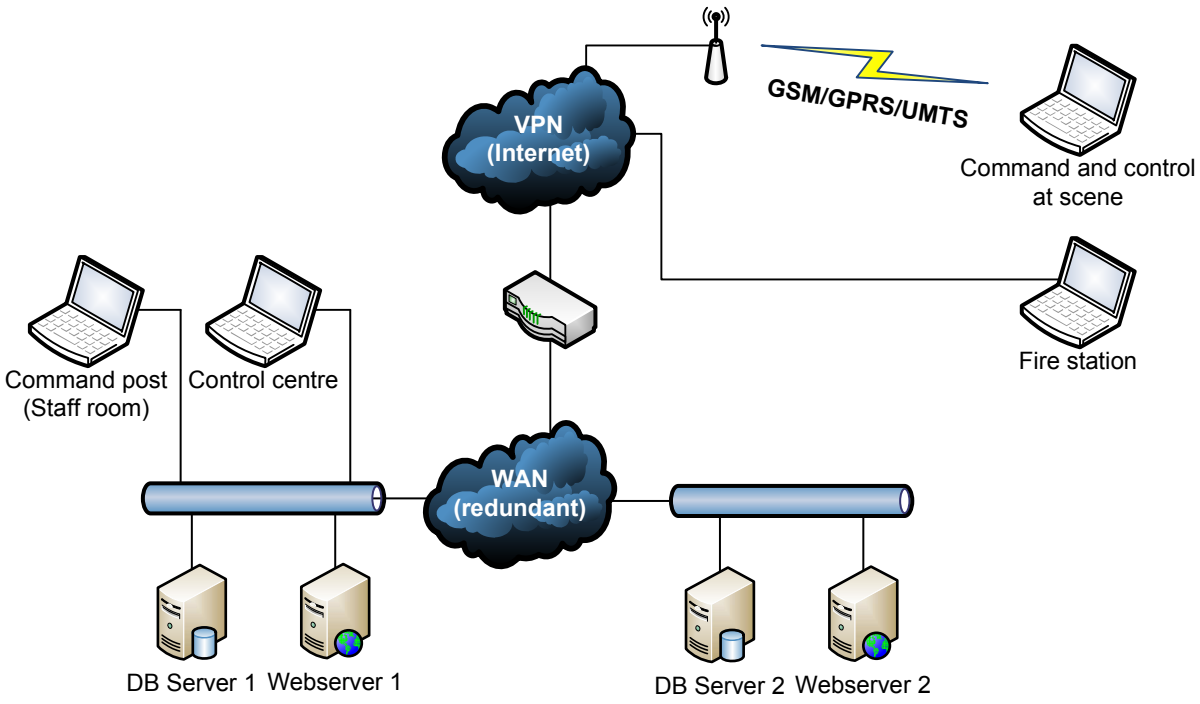


Figure 4: Schematic illustration of a possible system configuration with redundant servers and geographically distributed clients

5 Functionality

Intergraph Planning & Response covers all the requirements of strategic, tactical, and operational command, making it an ideal adjunct of the planning and preparation of planning, of the command and control of operations, and post-processing.

5.1 Portal

From the central access portal users access the organisation according to their functional area and personalised application environment. Links to frequently used applications can be made available, giving one-click access to the users' familiar tasks. The portal gives users a single overview of the current operational activities and links to essential applications all in one place.

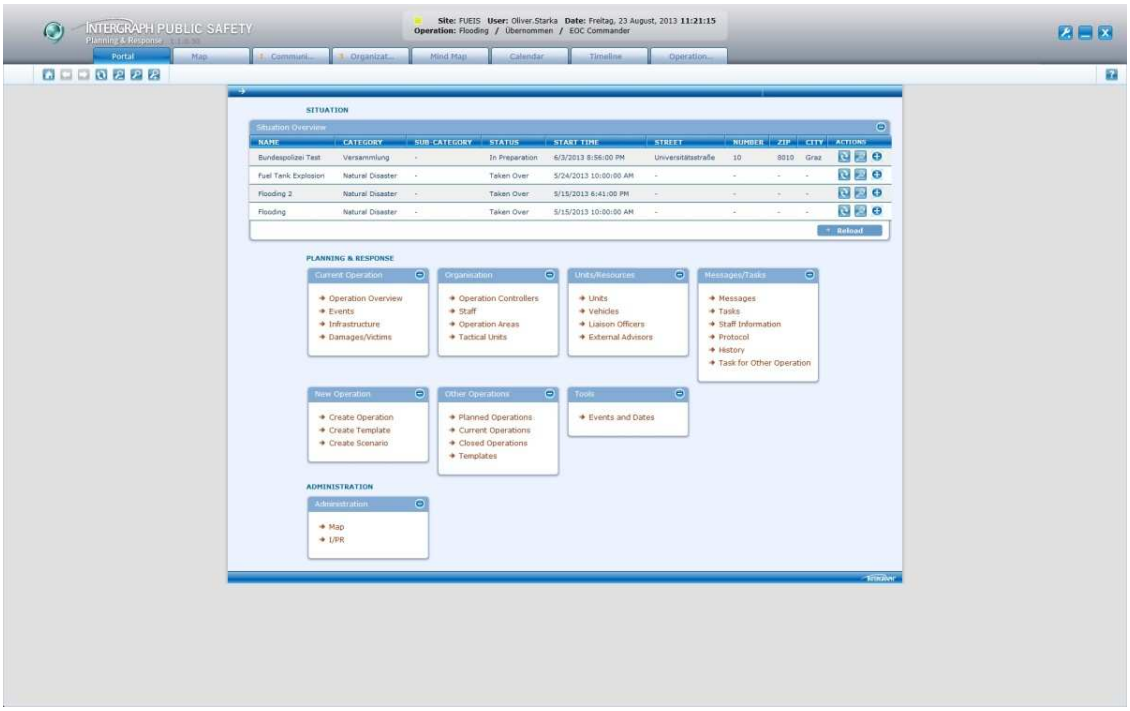


Figure 5: Possible Portal configuration

5.2 Planning of operations

Reusable templates, which already contain prepared organisational structures, policies, catalogues etc., provide support for operation preparations and can be used as a basis for the conduct of an operation. Application templates can be linked to respective types of operations so that, when an operation is drawn up, the specific corresponding template is automatically used.

Site-plans etc. may be held in a catalogue and automatically attached to operations of a particular type at creation time. Planned events (e.g. football matches, parades, carnivals, sporting events such as street marathons, religious festivals) may be prepared in advance and scheduled for a pre-defined time, to be activated automatically by the system.

5.3 Mind Map

The Mind Map module integrated into Intergraph Planning & Response offers the user the opportunity to organise process-orientated procedures and present them clearly with graphic tools. Any number of twigs and branches can be inserted into the mind map and processed or deleted again. Actions can

be defined within the individual nodes (e.g. attach documents, edit texts or generate reports) so that the target work stages can be managed and completed correctly. In order to guarantee as clear a view as possible for every purpose the mind map on all of the nodes can be expanded or closed.

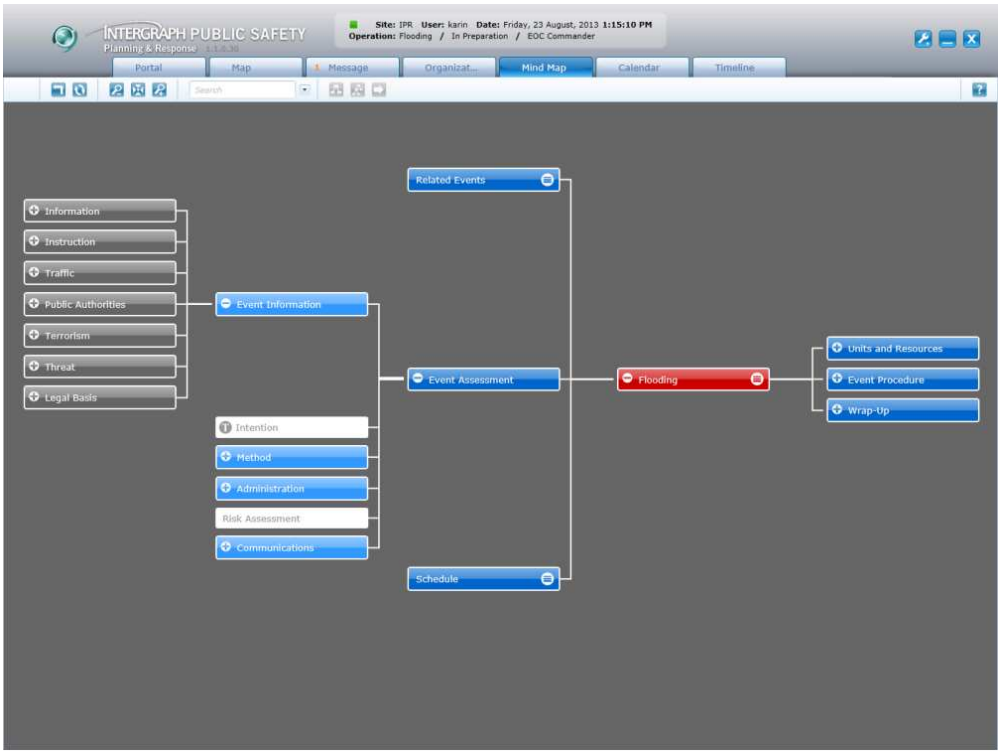


Figure 6: Mind Map for planning complex, process-orientated procedures

5.4 Management Organisation

The structure of the management organisation can be built up using the organisation chart module. This enables you to capture and display all the relevant information about the levels of management (strategic-tactical-operational command structure, subjects, sections, etc.) in an interactive, printable representation. From this, more detailed information may be obtained or work processes started. Multiple agencies may be represented. If the operations are linked to one another, the agencies involved in an operation can, thus, be connected to one another via the organisational chart in their true relationships (multidimensional, hierarchical organisation).

Organisational structure may change during the situation, for example by the addition of a new section. The user may add this new section interactively clicking on the organisation chart and selecting from the personnel database, those personnel assigned to the section. All necessary information will be automatically populated, e.g. contact details, telephone number, email address, pager number, etc.

The organisation chart / organigram is also the communication plan, i.e. the contact information of the persons involved is visible on the chart. Messages may be generated directly from the organisation chart, for example clicking on a telephone number to cause it to be dialed, or an email by clicking on an email hyperlink.

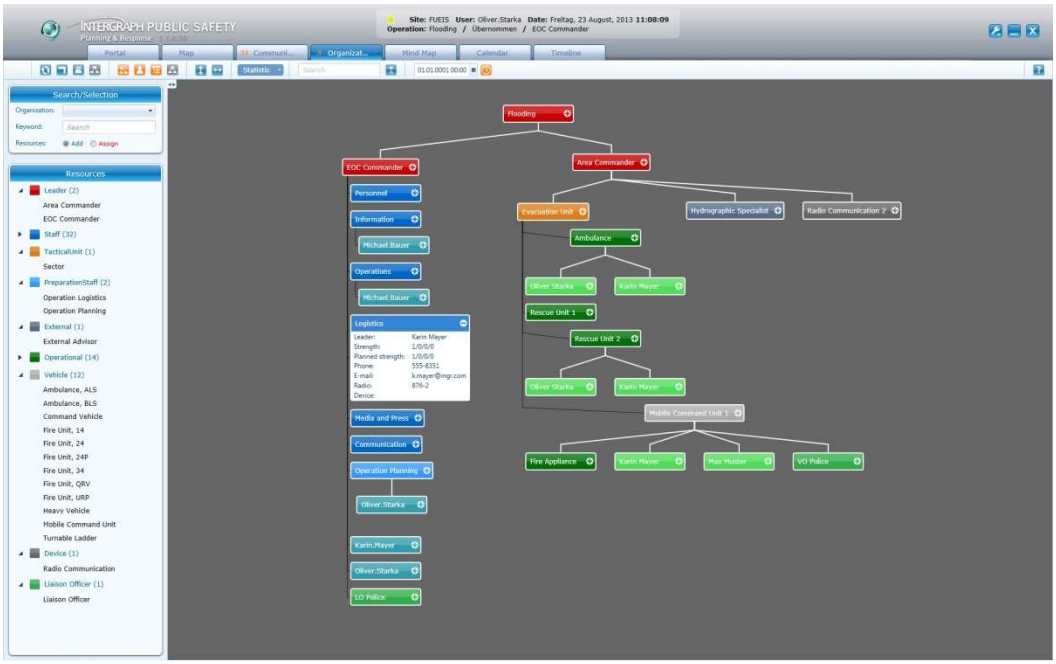


Figure 7: Interactive, dynamic organigram with some open deployment section windows

In order to be able to work better with the more complex organigrams associated with major events there is a statistic for the objects included in the organigram. Furthermore, filtered tree views can be produced via a search field in order to visually highlight the objects being searched for.

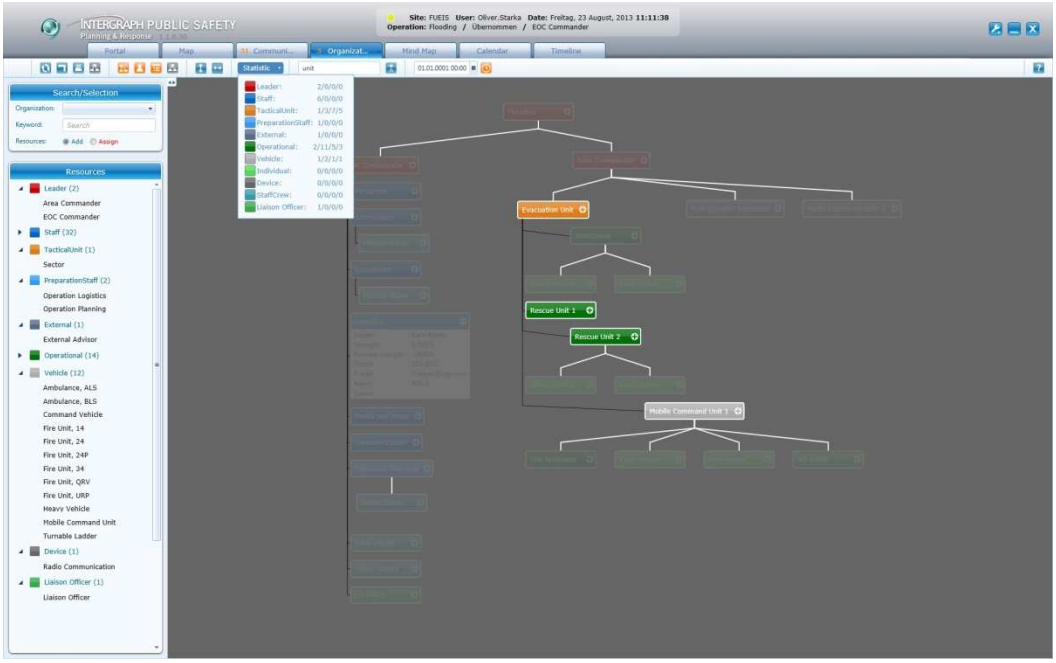


Figure 8: Organigram with expanded statistic and filtered view

5.5 Standard Operating Procedures*

An essential aspect of strategic, tactical, and operational command for major events is a predefined catalogue of actions – known as a standard operating procedure, or emergency / crisis plan. Once

stored in the catalogue, predefined actions are automatically added to the operation, assuring that essential actions will be carried out in the proper sequence and none missed. Ad hoc actions may be added during the operation. Actions are recorded in an audit log as they are completed. Some actions may refer to external systems, such as opening a manual or an information system containing detailed plans.

5.6 Messages Summary

Key to a successful operation is the targeted distribution of information. The core element of the distribution of information in Intergraph Planning & Response is the central message overview.

The overview shows a concurrent display of messages to and from individuals, as well as those from external systems (e.g. weather reports), and a separate chat window. Messages – from external systems (e.g. a command and control system), or generated by other users – are delivered in real time to the desired recipients and automatically registered in the message list displays. The message list displays may be filtered by status. Message groups may be defined via the organisation chart automatically based on defined ranks, for example. Messages may be automatically generated from item in the workflow, and will be delivered without delay to the appropriate recipient group. For each recipient, all activities (Receive, Read, task complete) are recorded in an audit log.

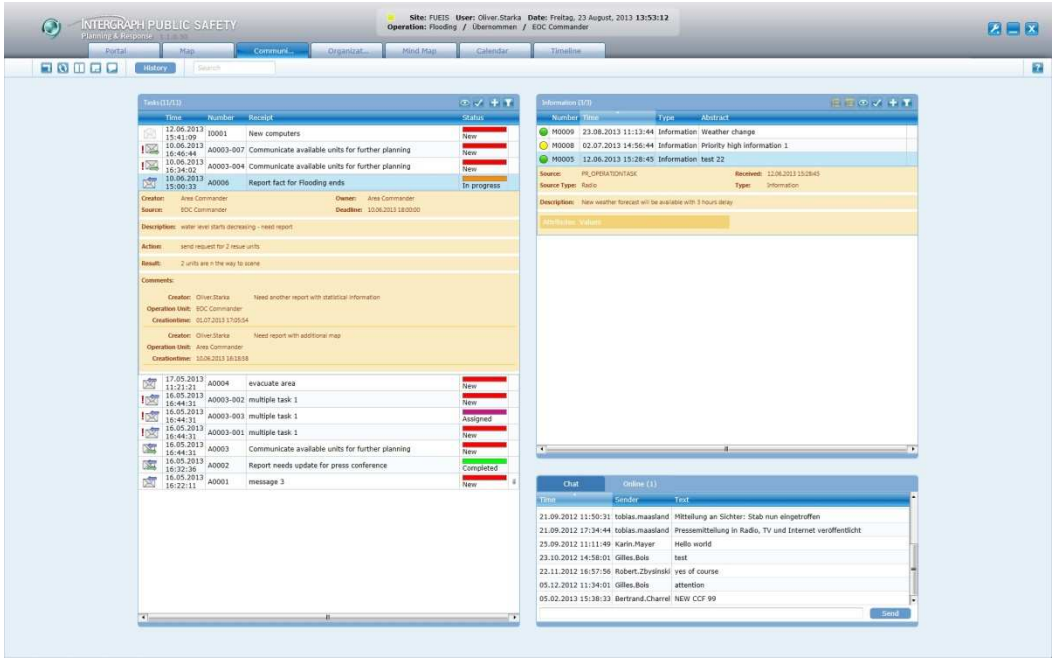


Figure 9: Dialogue form for order and information/message capture (record)

Messages and orders related to the major event / situation can be provided with completion targets or scheduled for resubmission. By monitoring deadlines it is ensured that these targets are checked and brought to the attention of the user concerned by visual messages in the user interface. Outgoing messages are strictly sent via the internal information distribution system. They can however also be distributed via email as long as a valid email address for the addressee concerned is set up in the user master data.

All relevant information can be entered into the form for order generation. Mandatory fields are marked accordingly and ensure the presence of the minimum required information which is necessary for the proper execution of the order.

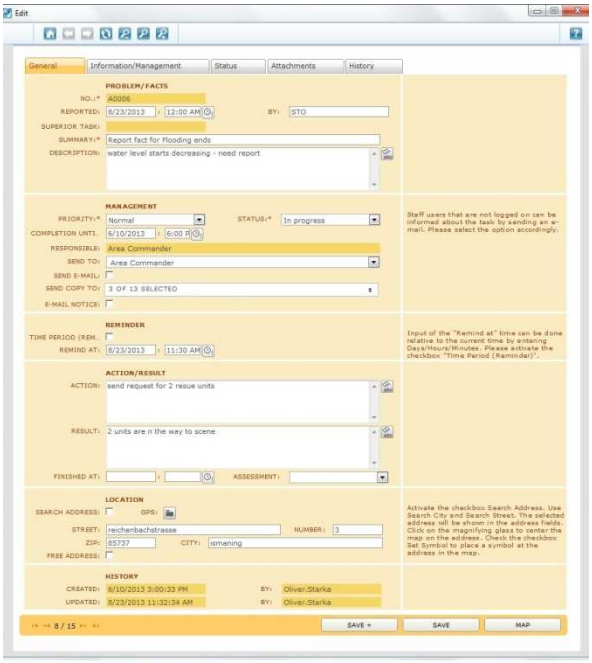


Figure 10: Dialog form for ordering and collection period (document)

5.7 Resource Management

The resource management module provides a real-time view of the available action units, operational resources and means used. The resources are either maintained within the system or may come from third-party systems (e.g. command and control system, personnel database). The process of resource planning starts with mapping the requirement for intra-agency and external resources. After the resource needs are identified, resources may be allocated from the organisation's own pool, or external resources (e.g. from other organisations) may be requested through a defined workflow. Resource requirements can also drive the workflows for catering/provisions, accommodation etc.

Operational resource positions can be linked to the organisational chart, including their location, either by address, coordinates or by interactive placement on the map.

The resource module provides a quick and secure overview of the strength, position and status of resources. Relevant times (working hours, travel time, rest periods covered) may be monitored, and warnings generated for non-compliance with time limits (e.g. statutory rest break requirements).

During or after a major event the persons affected require a wide range of assistance from the relief units. These might be injured or missing persons or fatalities. It is of great importance for the relief units to receive rapid and clear information about the current situation at all times. For this purpose, an overview display was integrated into the system (management of persons affected/patients and hospital bed management), which summarises on just a few pages (tabs) all of the relevant information regarding “persons affected on location”, “hospital allocation of patients”, “hospital bed capacities” and “number of persons currently missing and fatalities”.

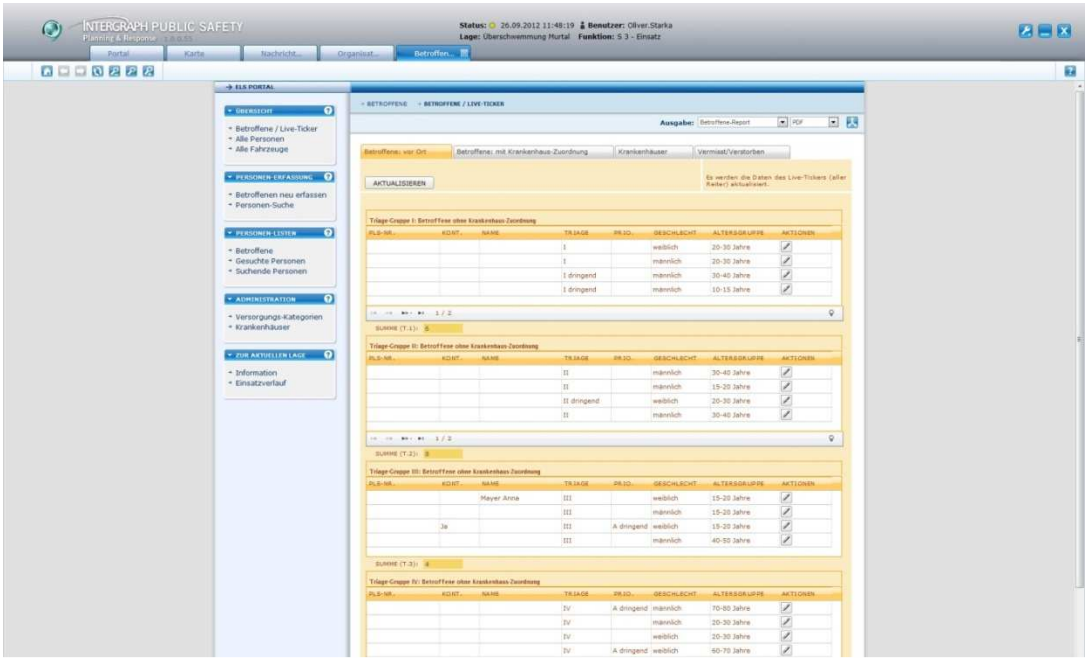


Figure 11: Summary of all important information regarding persons affected, patients and hospital beds

Intergraph Planning & Response provides the facility to record these persons affected in the situation using various criteria and to integrate and manage potential search enquiries from relatives or friends. The system provides simple, interactive matching to trigger search enquiries using the characteristics entered in the system (comparison between the characteristics of the persons affected/patients and the information from the persons looking for them).

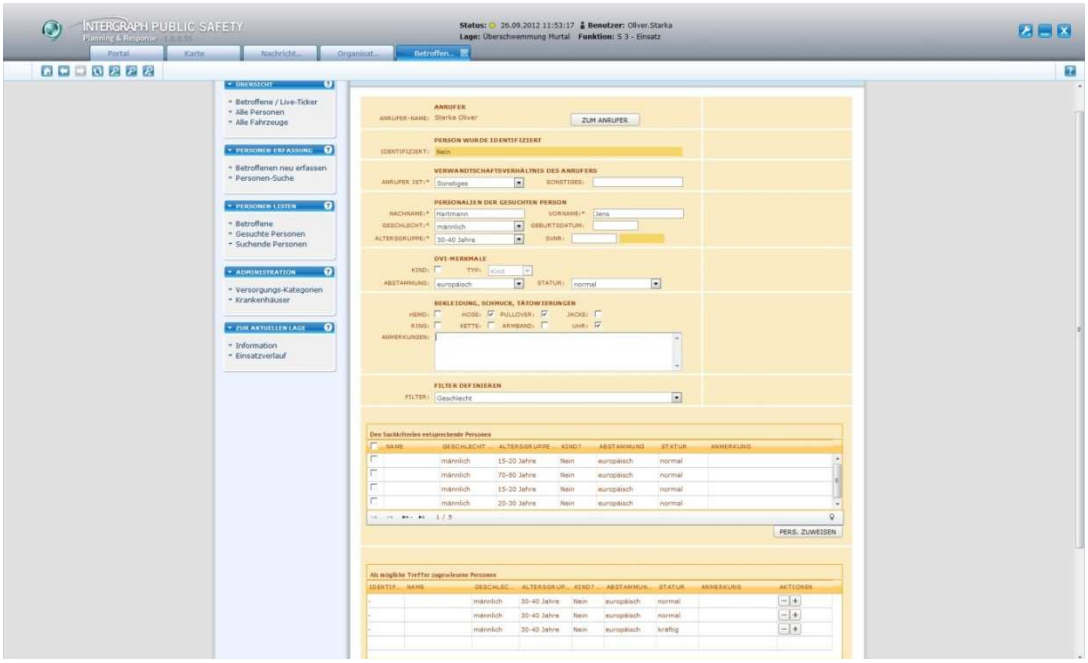


Figure 12: Matching between details of person affected – person looking for them

5.8 Interactive Timeline

Using the interactive timeline view the user sees a continuous time-based display of the operations. Any data with a time reference (operations, messages, orders, milestones, resource status changes, etc.) are represented along the navigable timeline (drag or scroll) in the appropriate scale. Clicking the elements shown in the timeline opens alphanumeric and geographic detail information or starts available functions or work processes. By filtering (e.g. use, organisation, section, use of organisation, object type) the essential information may be distilled from the overall picture. The timeline provides an excellent overview of the developments in the situation by showing elements in their correct temporal relationship.

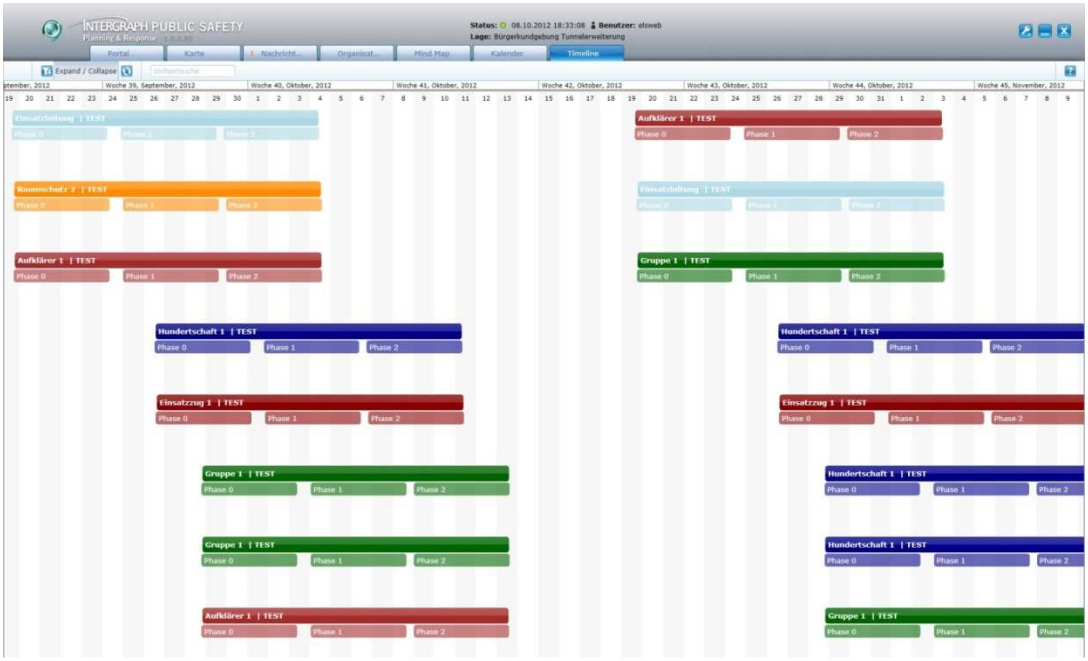


Figure 13: Interactive timeline

A calendar control allows the user to switch quickly between daily, weekly and monthly views and thus allows tracking of both short-term and longer-term developments.

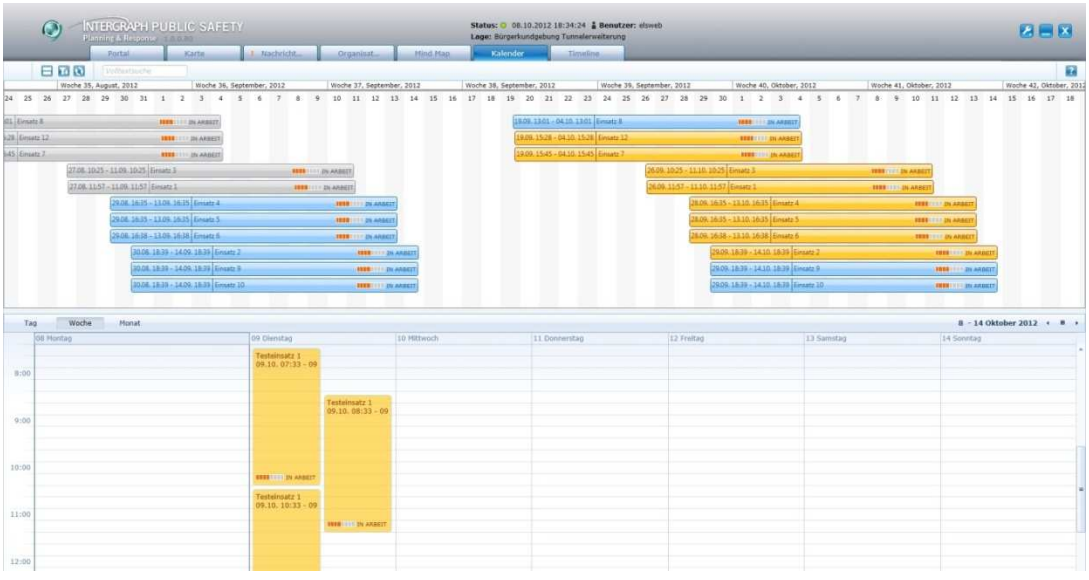


Figure 14: Interactive calendar view

5.9 GIS and Situation Map

The GIS (Geographic Information System) provides a spatial view of the respective layers of operational data (area of operations, resources, events/incidents, etc.) and master data (road networks, buildings, aerial photos, etc.) via the interactive map display. Work processes and detailed information are available by interacting with the map. Data from external systems (command and control systems or other interfaced applications) may also be overlaid simultaneously. So the command staff / Special Operations Room gets a Common Operational Picture.

The strategic, tactical, and operational command resp. the management of the situation with using (easy to generate) icon-based tactical symbols in accordance with – if applicable – applied local/national regulations is performed intuitively via drag & drop. Symbol size is optimised to the view scale to ensure the most user-friendly display at all times. In addition to positioning of symbols, operation areas can be determined and action units can be respectively assigned. All changes are audit logged.

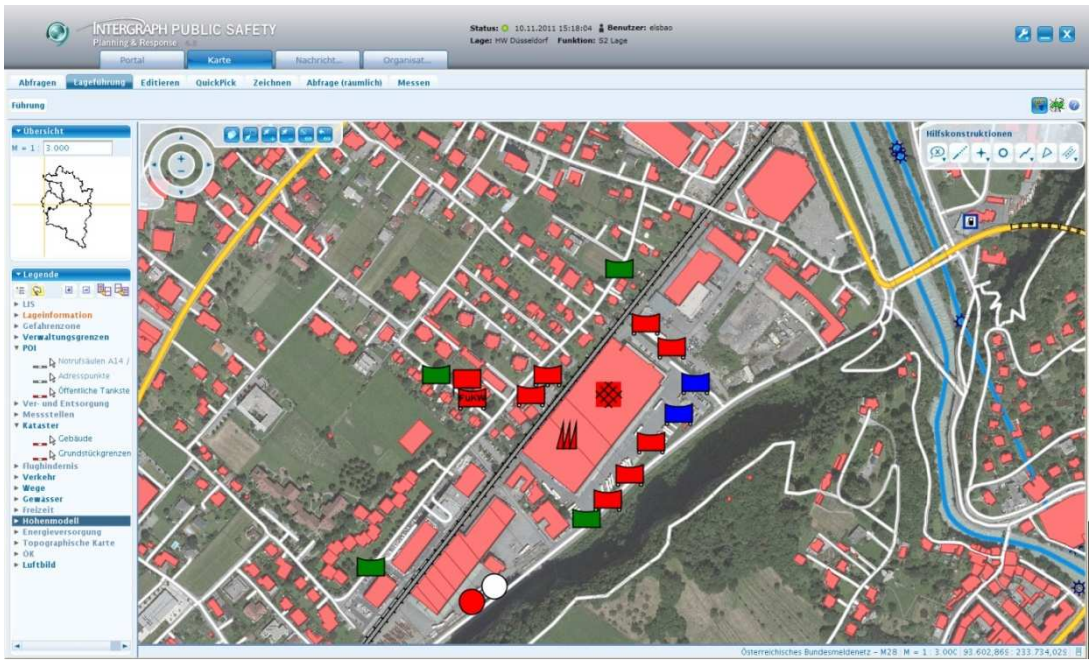


Figure 15: Map with tactical symbols in the Geographic Information System

The map display uses Intergraph's globally-deployed GIS products allowing seamless integration of all spatial data be it county, state, national or EU-wide in a single uniform display. Data can be consumed in all the most popular formats available on the market in native format.

Extensive analysis tools from simple address query, to spatial queries and the ability to create high-quality reports offer the maximum strategic, tactical, and operational benefits from existing location data. For example in a bomb threat it is possible to identify the number of affected residents needing evacuation by a defined radius around the location to determine within a request and ensure that measures such as food, accommodation etc. to take targeted procurement.

The situation overview may be customised at any time by selecting the layers displayed (e.g. for passing on to the politicians or the media). For post-event analysis, it is also possible to replay the map view based on the situation at a particular time ("What was the situation map at 10 a.m.?") or to review the operational activities and events via the logged situation chronology (see below). All common map functions are available for time slices.

The data base can store information in a variety of formats from different vendors as well as incorporating data from external geospatial services – using OGC standards such as WMS (Web Map

Service), WFS (Web Feature Service), GML, Google (KML), etc. The prevailing specifications of the European Spatial Data Infrastructure (SDI) known as INSPIRE are also complied with (http://inspire.jrc.ec.europa.eu).

In addition to static information and master data, GPS tracking information of operation resources or data from external simulation systems (e.g. chemical plumes or cloud dispersion, flood or fire simulation) can be integrated, displayed and analysed in the situation. Based on a flood forecast, the number of buildings affected by the flood for a period of time in the future can be determined by a mouse click, which allows for planning and executing measures and countermeasures (e.g. evacuation).

There are various input and search options for positioning in the map. If the user has GPS coordinates for positioning or locating objects in the map these can be entered directly into the forms or into a search mask in various notations. The system then automatically converts them into the defined project coordinate system (e.g. UTM 33N)

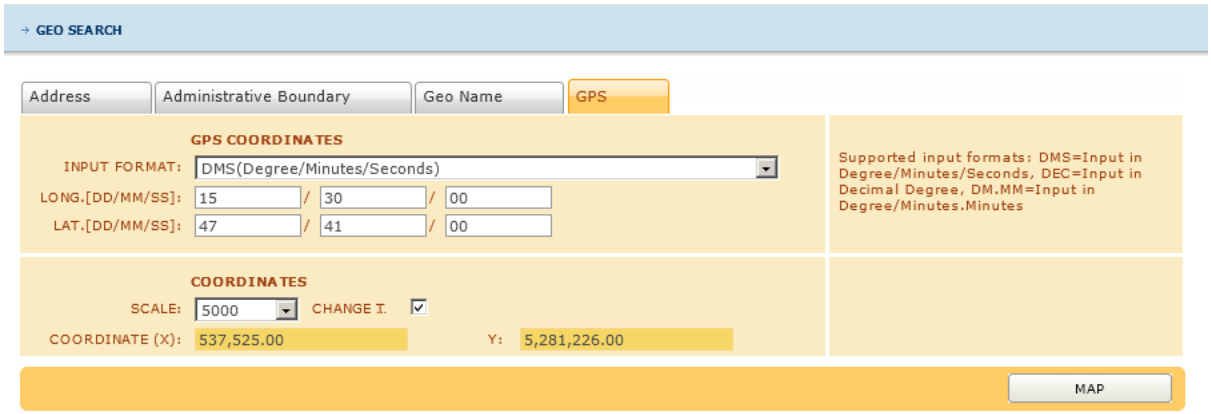


Figure 16: Positioning in the map by entering GPS coordinates

If spatially-located address data is available for the area of operations this can be used as a reference for positioning and locating objects in the map using another version of the geo search.

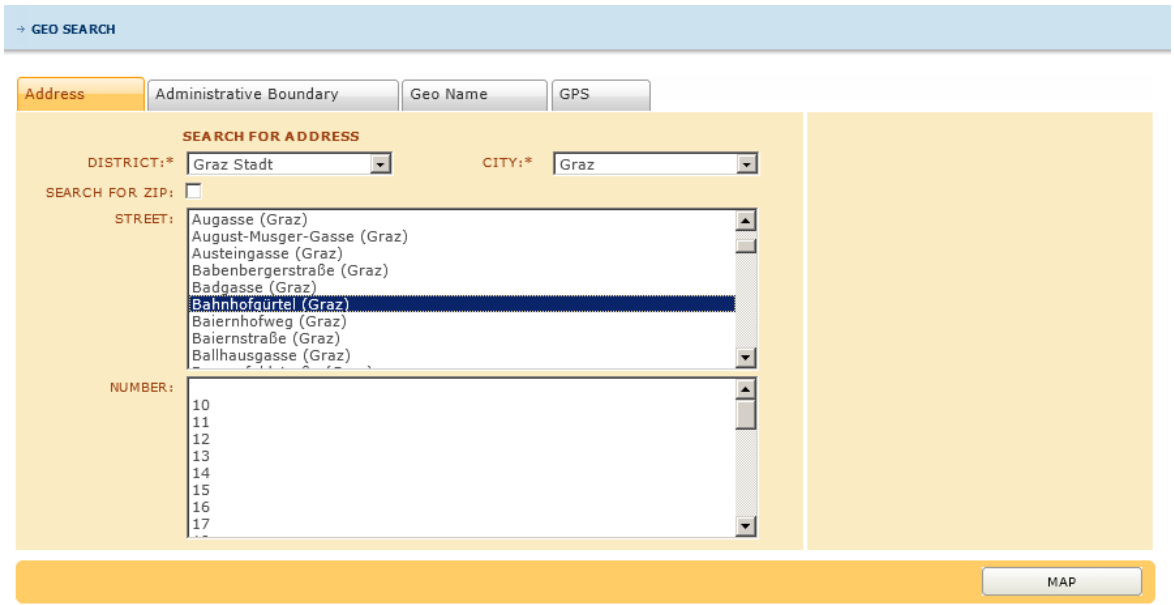


Figure 17: Positioning on the map by selecting spatially-located address data

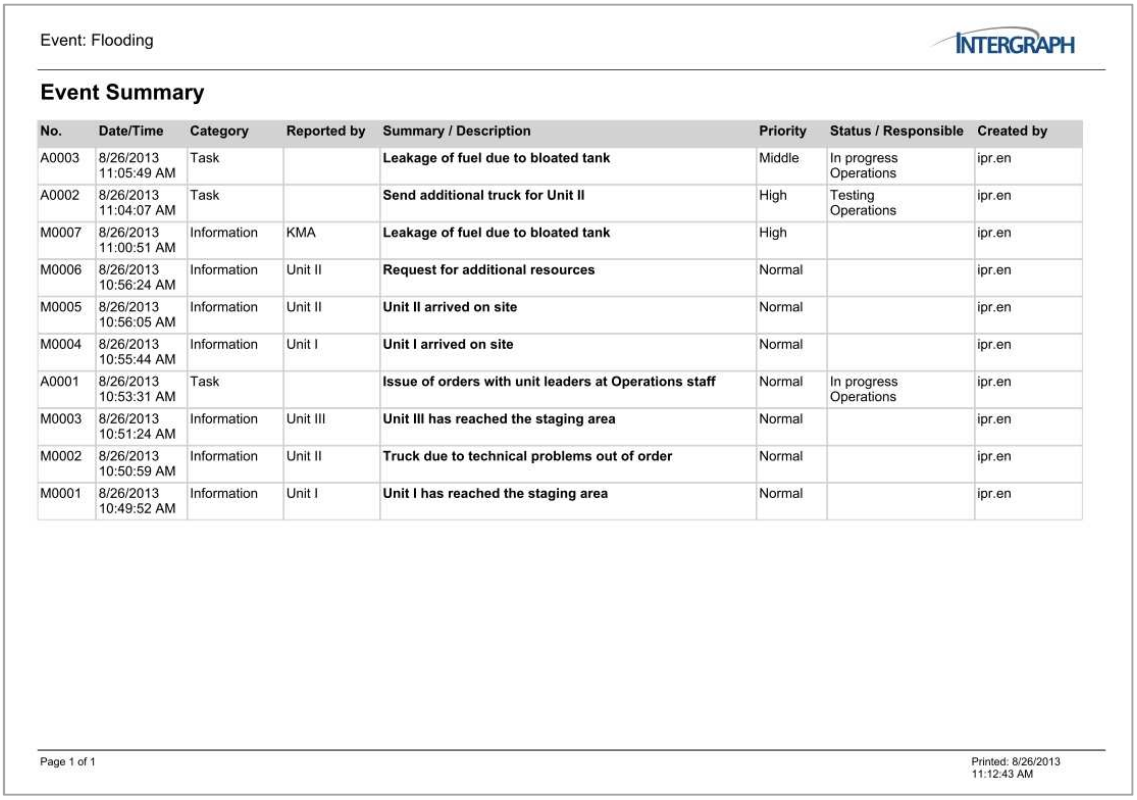
5.10 Documentation of Operations / Application Logging

All user and system activities are recorded in structured audit logs in the database. Each log entry fundamentally includes a time stamp, information on the operator and on the event-related action. The logging is the basis for reports and evaluations, as well as for the logged situation chronology.

Users may set milestones (bookmarks) in the log at points of special importance in the incident management process (e.g. flood levels peaked) including a description and a time defining the milestone. Milestones can be used as selection criteria for reports, evaluations, and the situation replay resp. the logged situation chronology.

5.11 Reporting

Since data within the system may be used for many different purposes, it is important to ensure that users only have access to information for which they are authorised. Information may be tagged for a particular purpose, for example for certain reports (e.g. press releases, local or state-wide situation reports). The report will then display only the relevant information. This simplifies and enhances the security of the production of reports. Filter criteria such as time intervals, organisation, etc. may also be applied. The data can then be selected and displayed as the desired report quickly. Export to popular formats such as PDF or Microsoft Word is available via a single button click. Report templates are configurable and can be adapted to customer requirements.



Event: Flooding

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Event Summary

No.	Date/Time	Category	Reported by	Summary / Description	Priority	Status / Responsible	Created by
A0003	8/26/2013 11:05:49 AM	Task		**Leakage of fuel due to bloated tank**	Middle	In progress Operations	ipr.en
A0002	8/26/2013 11:04:07 AM	Task		**Send additional truck for Unit II**	High	Testing Operations	ipr.en
M0007	8/26/2013 11:00:51 AM	Information	KMA	**Leakage of fuel due to bloated tank**	High		ipr.en
M0006	8/26/2013 10:56:24 AM	Information	Unit II	**Request for additional resources**	Normal		ipr.en
M0005	8/26/2013 10:56:05 AM	Information	Unit II	**Unit II arrived on site**	Normal		ipr.en
M0004	8/26/2013 10:55:44 AM	Information	Unit I	**Unit I arrived on site**	Normal		ipr.en
A0001	8/26/2013 10:53:31 AM	Task		**Issue of orders with unit leaders at Operations staff**	Normal	In progress Operations	ipr.en
M0003	8/26/2013 10:51:24 AM	Information	Unit III	**Unit III has reached the staging area**	Normal		ipr.en
M0002	8/26/2013 10:50:59 AM	Information	Unit II	**Truck due to technical problems out of order**	Normal		ipr.en
M0001	8/26/2013 10:49:52 AM	Information	Unit I	**Unit I has reached the staging area**	Normal		ipr.en

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Figure 18: An example of an Operations Diary, compiled and created in Intergraph Planning & Response

5.12 Logged Situation Chronology

All changes in location map are logged with a time stamp, allowing a situation replay of all the spatial changes of an operation. The situation chronology will display events according to defined intervals, based on milestones or on all (logged) activities. During the replay, access to detailed information about the situation may be retrieved based on time or location.

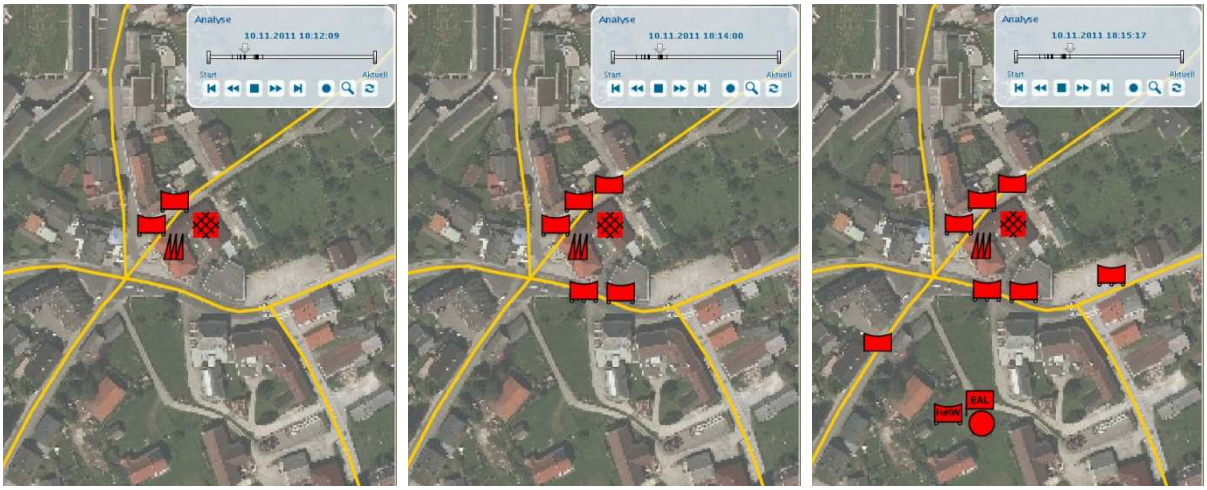

Figure 19: Logged Situation Chronology in Intergraph Planning & Response

5.13 Search

The fast and easy retrieval of information is crucial for effective strategic, tactical, and operational command. Easy-to-use search and retrieval functions such as a full-text search* of file attachments (Word, PDF) allow quick reference to the appropriate situation documentation.

The search can be targeted to locations, sections, reports, orders, attachments, etc. This allows ad-hoc requests for information from the public, the press or internally to be answered quickly and reliably.

5.14 Scenarios

For training purposes or for testing (e.g. load tests), scenarios can be generated or created from ongoing or completed operations. Scenarios can be edited and used as a simulation of an operation.

6 Adaptation of the Application

In order to meet different customer-specific detail requirements quickly and easily, Intergraph Planning & Response is highly configurable. Forms and workflows are easily configured by the Intergraph standard products "Workflow Manager" and "Form Generator". Here, too, Intergraph uses a standard (XML).

The Workflow Manager provides automatic guidance of the user through the creation and modification of workflows. Context-sensitive menus provide a simple and intuitive environment. The end-user is only offered the functions or operations that are appropriate to the current workflow step.

The Form Generator defines required data attributes and in which way the respective user may gather or edit them. This ultimately makes it possible to create forms by means of configuration.

7 Interfaces

A variety of interfaces ensures the seamless integration of Intergraph Planning & Response in existing work processes. The following peripheral systems can be connected:

- Third-Party Command and Control Systems *(by project-specific implementation)*

  Exchange of operations and resources with command and control systems of other vendors' systems.

- Communications Systems

  Send and receive information via email, and *(by project-specific implementation)* SMS, trunked radio, digital radio, pagers

- Active Directory

  Access to users from the Active Directory

- Personnel Database

  Access to users from the personnel databases

- Shift planning *(by project-specific implementation)*

  Access to data from shift planning systems

- Geospatial Data

  Live access or import of geospatial data from all major Geographic Information Systems

- Simulation data

  Live access or import of geospatial simulation results (e.g. plumes)

- GPS Tracking

  Live display of tracking information (e.g. AVLS / APLS data)

- Video *(by project-specific implementation)*

  Links to video or CCTV from the map

- …

8 Summary – IT-supported Strategic, Tactical, and Operational Command at the Highest Level

- Real time

  Intergraph Planning & Response uses active server-based message and news delivery in real time (push system) since a simple HTTP message retrieval process from the client would not be sufficient during a major event.

- High Availability

  The system can be designed for high availability. All server functions can be configured to be redundant so that so-called Single Points of Failure (SPOF) are avoided.

- Scalability

  The system is highly scalable. Database and application server are scalable by adding hardware resources (scaling up) and by addition of further servers (scaling out).

- Security

  The system guarantees the security of the stored and transmitted information. The underlying optional database management systems (Oracle, SQL-Server) have appropriate security mechanisms (snapshots, replication, etc.). The exchange of data across the open internet is encrypted.

- Flexibility

  The system is configured flexibly to the greatest possible extent. All dialogue fields, forms and workflows can be configured on the basis of open standards (using XML schemata). The architecture can be extended flexibly and is based on modern Microsoft technologies such as Windows Presentation Foundation, Windows Communication Foundation, Windows Workflow Foundation, Microsoft Sync Framework, etc.

- Openness

  The system is based on open standards to allow easy links to other systems. In addition, the system has an open interface (web service), which third-party systems, like command and control systems, can use to send messages.

9 System Requirements

Intergraph Planning & Response client will run on all commercial PCs and notebooks. The following minimum requirements define a client workstation.

- Intel Pentium 4 (1 GHz) or equivalent
- RAM: 1 GB
- Hard disk capacity: without Geocache (for offline operation) 50 MB, with Geocache, dependent on the volume of data (for example, about 2 GB for the Geocache of the Federal State of Vorarlberg / Austria)
- Meaningful work requires a monitor resolution of 1280 x 1024 at 32bit colour depth, higher resolutions are supported
- Internet connection (for online mode) on the application server
- Operation system: Microsoft Windows XP, Vista or Windows 7
- Internet Explorer 9 or later
- JSE2 (Java Standard Edition, SUN VM) from 1.7.xx.xx
- .Net Framework 4.0 incl. an up-to-date .Net Language Pack

The configurations and requirements for application and database servers are dependent on the number and functionality of the client positions as well as the quantity of geospatial data. Individual systems will require customer-specific proposals.

Intergraph is the leading global provider of engineering and geospatial software that enables customers to visualize complex data. Businesses and governments in more than 60 countries rely on Intergraph's industry-specific software to organize vast amounts of data to make processes and infrastructure better, safer and smarter. The company's software and services empower customers to build and operate more efficient plants and ships, create intelligent maps, and protect critical infrastructure and millions of people around the world.

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