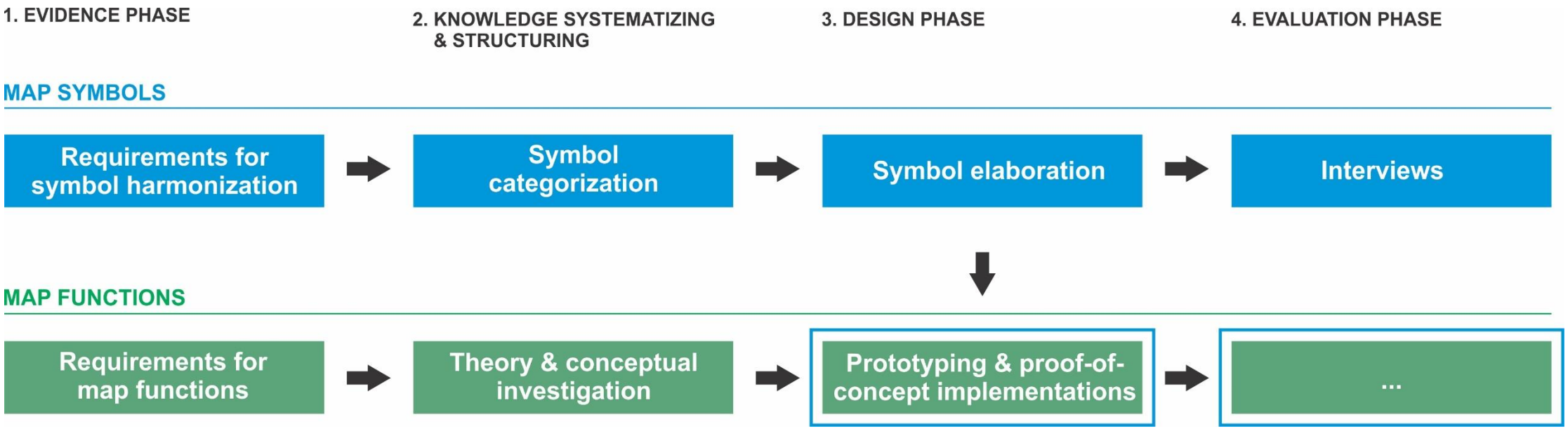
WP4 Workflow



Requirements for symbol harmonization

Collected evidence	Period
Investigation of symbols used in map support tools	2019-2020
Meetings with emergency responders	2019-2020
Interviews with software producers	2019

Starting point of the research

Coast and fishing			
Anchorage	Diving service	Lifeboat	Man overboard
Shipwrecks	Wharf		
Cultural monuments			
Ancient heritage	Cultural heritage	Protected buildings	Sami cultural heritage
Nature			
Drinking water sources	Habitat biotope	Strong wind E	Strong wind N
Strong wind NE	Strong wind NW	Strong wind S	Strong wind SE
Strong wind SW	Strong wind W		
Other			
Arrow little activity	Arrow medium activity	Arrow greater activity	Arrow greatest activity
Checkpoint	Checkpoint 2	Checkpoint operational	Civil defense
Health sports facilities outside	Other resources		
Outdoor activities			
Campfire	Snowmobile		
Population			
Communication installation	Doctor	Health sports facilities inside	Information
Medical boat	Medical car	Pharmacy	Sports hall
Trace finds			
Social security			
Alarm signal	Alarm signal priority 0	Alarm signal priority 1	Alarm signal priority 2
Alarm signal priority 3	Ambulance aircraft	Ambulance car	Ambulance check
Ambulance station	AED	Chemical diving	Plain-clothed police officer
Communication mobile	Communication stationary	Danger	Dangerous cargo
Dangerous cargo 2	Emergency call center 110	Emergency call center 112	Emergency call center 113
Event	Explosives	Explosives 2	Fire
Fire service	Firefighting vessel	Fire station	Fire engine
First aid station	Flood	Gas station for helicopters	Ground hydrant
Helicopter	Helicopter base	Heliport	Hospital
Turntable ladder	Landslide	Medical office	Military
Military camp	Military unit	Operational manager command post	Origin marking
Origin marking from fixed location	Police	Policeman	Police boat
Police car	Policeman with bicycle	Mounted police	Police station
Police team	Policeman with dog	Policeman with motorcycle	Public gathering
Radioactive	Civil defense rescue dog	Small cabin	
Transport			
Airport	Depot	Fire hydrant	Gathering place
Meeting place	Parking space	Petrol / fuel	Roadblock human activity
Roadblock natural causes	Waiting place		

GEONORGE

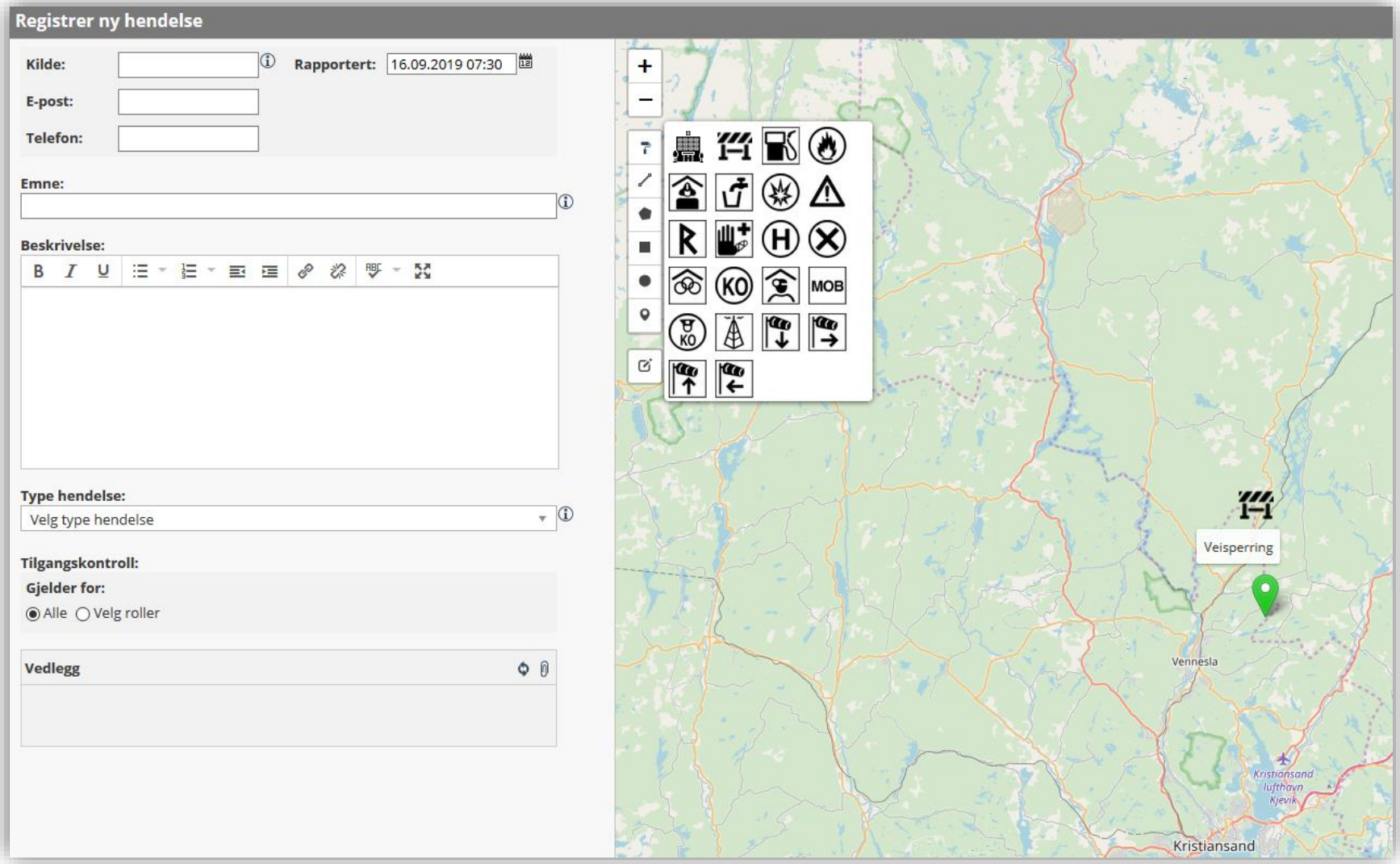
Geonorge ▸ Registrene ▸ Symbol

Beredskapssymboler

Antall symboler i pakke: 110
Eier: Kartverket
Tema: Samfunnssikkerhet
Offisiell symbolpakke: ☑

Detaljert informasjon

CIM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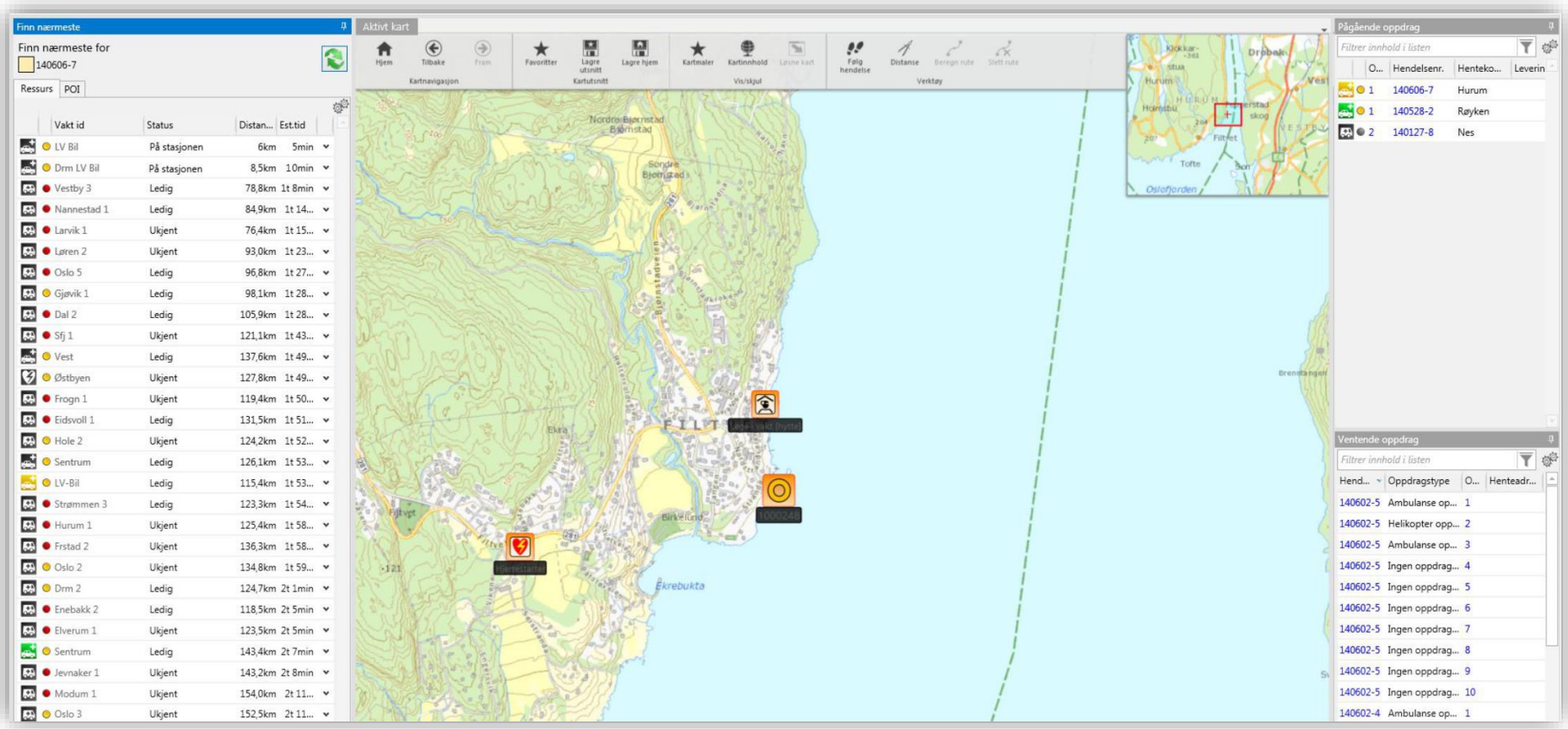
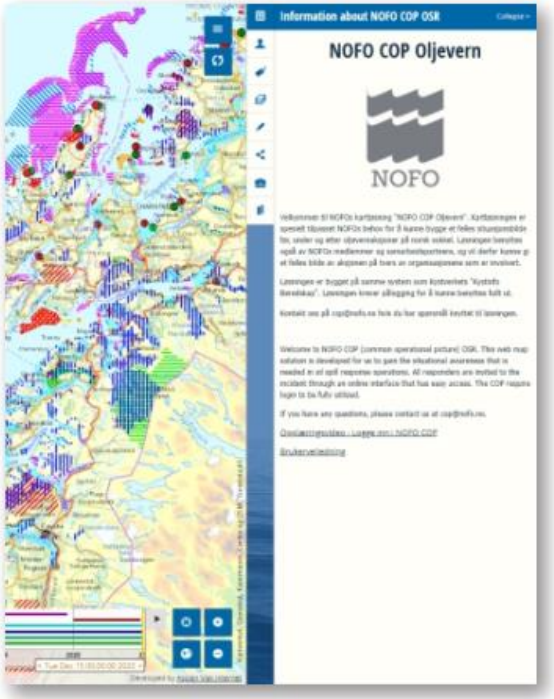
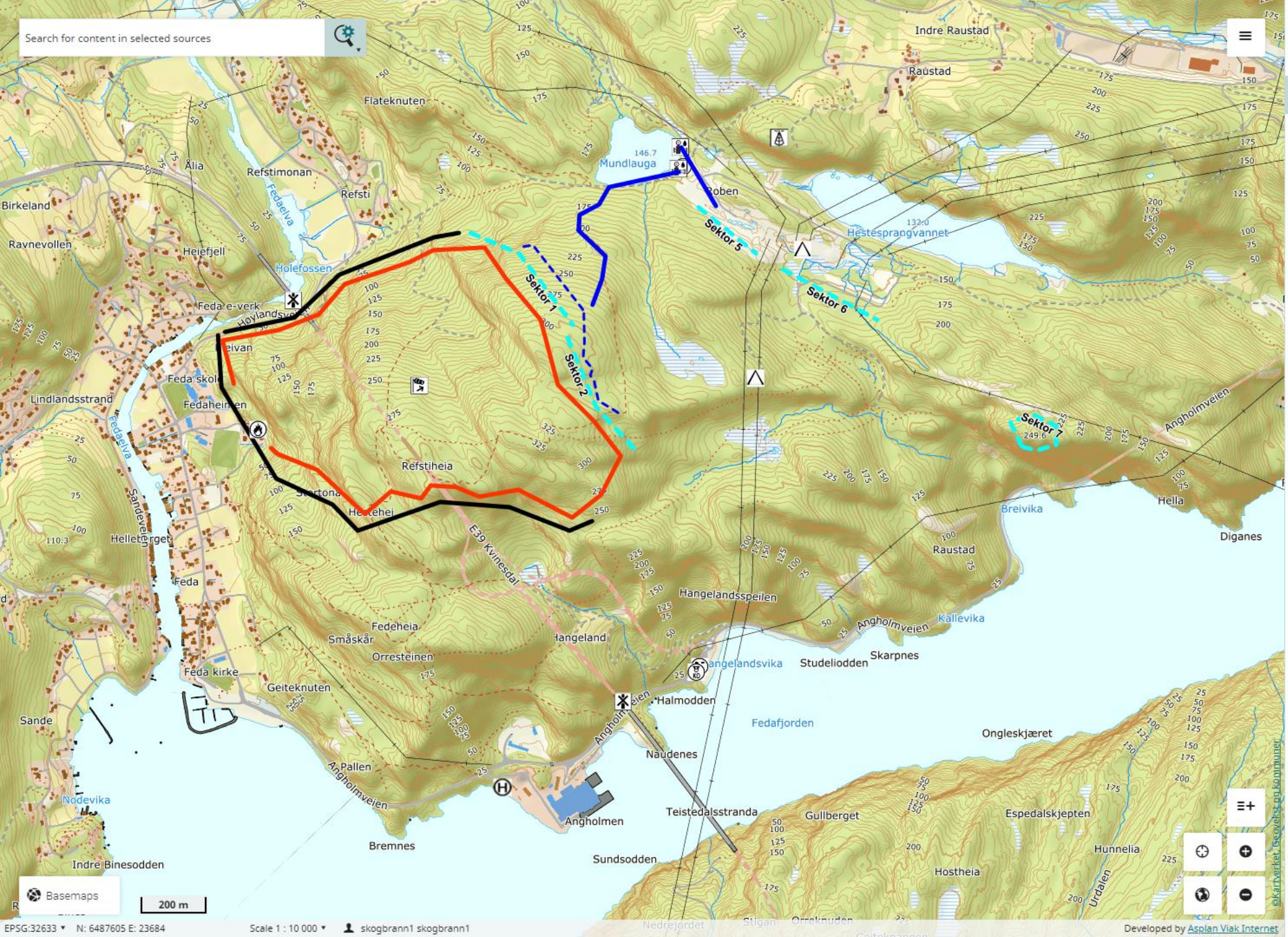
Locus Public Safety





Asplan Viak Internet AVINET



Layer Manager Pro

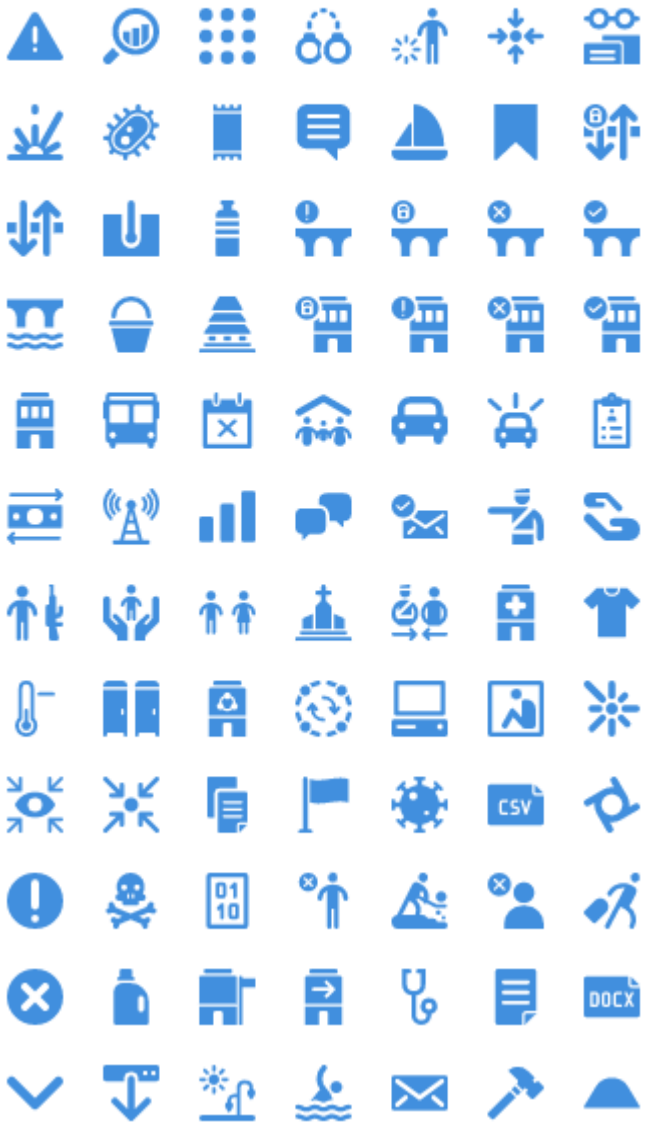
Collapse >

All layers | Sort layers

- Nødnett hendelser
- Skogbrann #1
- Skogbrann reg/nasj
- Sivilforsvaret
- Brann og brannvesen
- Beredskap
- Dekningskart Nødnett
- DSB
- Naturrisiko
- Infrastruktur
- Sårbare objekter
- Norsk sokkel og sjøgrenser
- Transport farlig gods på vei
- Transport farlig gods på jernbane
- Diverse datasett
- Høydedata

Examples of symbols used by AVINET

UN OCHA - United Nations Office for the Coordination of Humanitarian Affairs



ESRI

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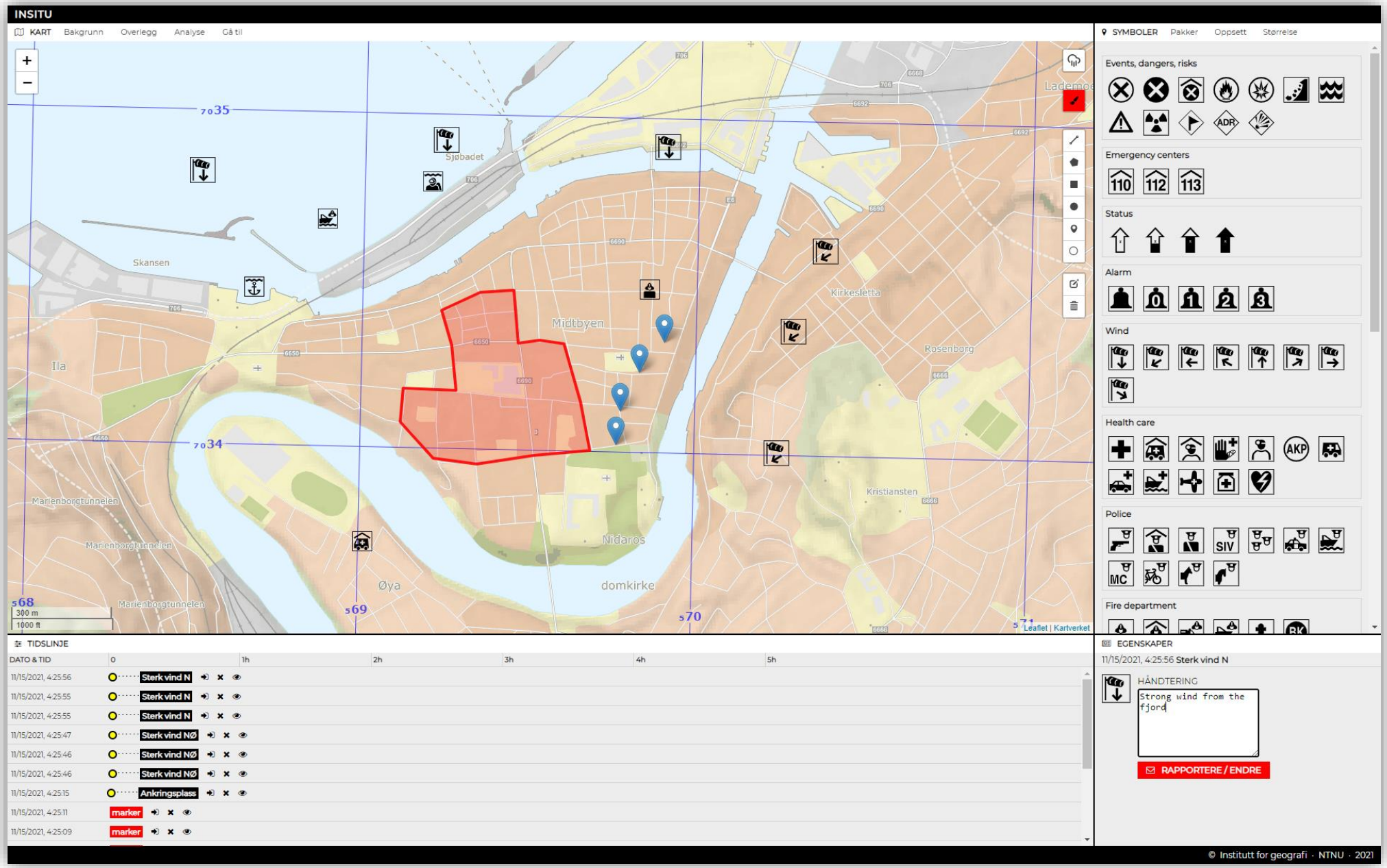
INSITU
KART
Bakgrunn
Overlegg
Analyse
Gå til
SYMBOLER
Pakker
Oppsett
Størrelse
Events, dangers, risks
Emergency centers
Status
Alarm
Wind
Health care
Police
Fire department
Sjøbadet
Skansen
Ila
Midtbyen
Kirkesletta
Rosenborg
Kristiansten
Nidaros
domkirke
Øya
Marienborgtunnelen
300 m
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Leaflet | Kartverket
TIDSLINJE
DATO & TID
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11/15/2021, 4:25:15 Ankringsplass
11/15/2021, 4:25:11 marker
11/15/2021, 4:25:09 marker
EGENSKAPER
11/15/2021, 4:25:56 Sterk vind N
HÅNDTERING
Strong wind from the fjord
RAPPORTERE / ENDRE
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Map-based Interfaces for Common Operational Picture

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ABSTRACT

Common operational picture (COP) map-based interfaces display operational information to support integration of emergency responders. Such interfaces integrate different subsystems and present the resulting information into an overview for enabling situation awareness. Literature shows that they are often developed from non-user-centric perspectives and are defined in technological terms that are not adequately capturing the users' needs. Therefore, the aim of this particular work in progress is to get insight into the features and the role of COP map-based interfaces currently being used in Norway to (1) examine their content, functionality, and design; and (2) to understand how such displays are incorporated into the service context. This study structures the knowledge on map displays that constitute part of the COP services. Using workshop and interviews with the developers and users of existing COP map services, we identify requirements for a common operational symbology and common operational functionality to improve such map services and make them interoperable.

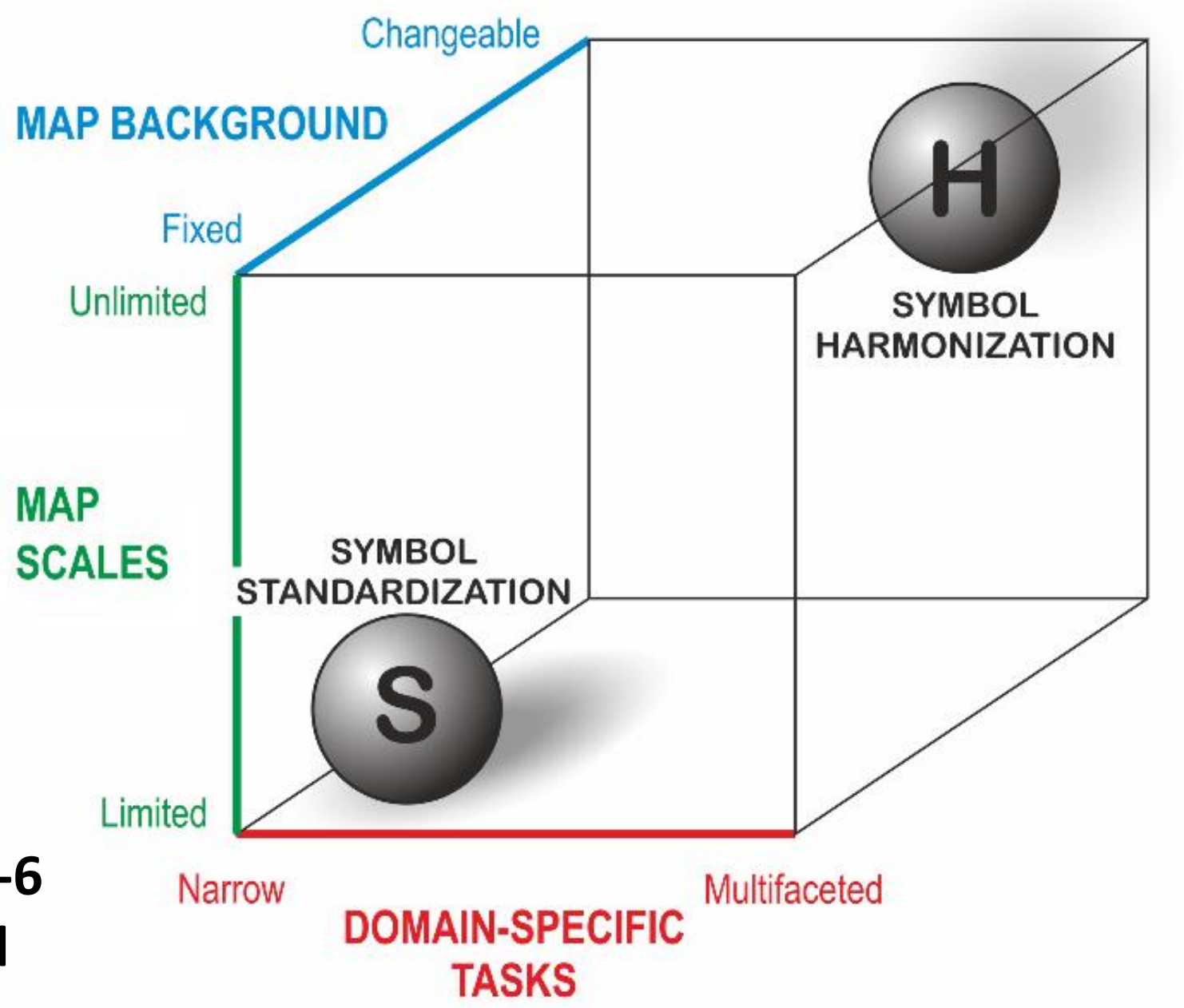
Keywords

Common Operational Picture, Situational Awareness, Map-based Interface, Cartographic Design, Cartographic Symbolization.

INTRODUCTION

Complex emergency operations typically require collaboration within a single command as well as between multiple actors such as police, fire department, and health department. In the management of emergency operations, engaged actors need to display operational information such as position and status of own emergency units as well as position and status of resources administrated by other emergency responders (Chmielewski and Gałka, 2009). Moreover, within specific actors, various tasks are assigned differently, to their command posts, operational leaders, as well as to their particular field teams (Björkbom et al., 2013). Additionally, various actors have different structures and are administrated differently; they also need to follow different symbol standards (Chmielewski and Gałka, 2009). All those aspects influence the way, in which information needs to be provided visually by means of common operational picture (COP) map-based interfaces.

The main task of COP tools is to combine data from different subsystems and present the resulting information into an overview for enabling situation awareness of a variety of actors during emergency operations (Björkbom et al., 2013). In 2006, McNeese et al. concluded that COPs are typically developed from non-user-centric perspectives and are defined in technological terms that are not always in the best interests of users. They identified



NATO APP-6 standard

Coast and fishing			
Anchorage	Diving service	Lifeboat	Man overboard
Shipwrecks	Wharf		
Cultural monuments			
Ancient heritage	Cultural heritage	Protected buildings	Sami cultural heritage
Nature			
Drinking water sources	Habitat biotope	Strong wind E	Strong wind N
Strong wind NE	Strong wind NW	Strong wind S	Strong wind SE
Strong wind SW	Strong wind W		
Other			
Arrow little activity	Arrow medium activity	Arrow greater activity	Arrow greatest activity
Checkpoint	Checkpoint 2	Checkpoint operational	Civil defense
Health sports facilities outside	Other resources		
Outdoor activities			
Campfire	Snowmobile		
Population			
Communication installation	Doctor	Health sports facilities inside	Information
Medical boat	Medical car	Pharmacy	Sports hall
Trace finds			
Social security			
Alarm signal	Alarm signal priority 0	Alarm signal priority 1	Alarm signal priority 2
Alarm signal priority 3	Ambulance aircraft	Ambulance car	Ambulance check
Ambulance station	AED	Chemical diving	Plain-clothed police officer
Communication mobile	Communication stationary	Danger	Dangerous cargo
Dangerous cargo 2	Emergency call center 110	Emergency call center 112	Emergency call center 113
Event	Explosives	Explosives 2	Fire
Fire service	Firefighting vessel	Fire station	Fire engine
First aid station	Flood	Gas station for helicopters	Ground hydrant
Helicopter	Helicopter base	Heliport	Hospital
Turntable ladder	Landslide	Medical office	Military
Military camp	Military unit	Operational manager command post	Origin marking
Origin marking from fixed location	Police	Policeman	Police boat
Police car	Policeman with bicycle	Mounted police	Police station
Police team	Policeman with dog	Policeman with motorcycle	Public gathering
Radioactive	Civil defense rescue dog	Small cabin	
Transport			
Airport	Depot	Fire hydrant	Gathering place
Meeting place	Parking space	Petrol / fuel	Roadblock human activity
Roadblock natural causes	Waiting place		

GEONORGE

Geonorge ▸ Registrene ▸ Symbol

Beredskapssymboler

Antall symboler i pakke: 110
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Offisiell symbolpakke: ☑

Detaljert informasjon

Inspiration from:
Federal Geographic Data Committee - Homeland Security Working Group

Figure 1: Examples of map symbols from each of the four major categories included in the ANSI standard (complete set viewable at www.fgdc.gov/hswg/)

Suggested modifications

Group name	Subgroup / theme		Symbols		
			Default set	Added	Modified
Rapportering og kontekst	Hendelser		6	10	3
	Risikoer		5	–	2
	Naturkatastrofer		2	2	–
	Vind		8	–	8
Operasjoner	Nødetat	Helse	12	1	7
		Brann	7	4	2
		Politi	12	2	3
		Militær	3	2	2
		Sivilforsvar	2	1	1
	Operasjonell informasjon		14	8	6
	Nødmeldesentraler		3	–	3
	Alarmsignaler		5	–	5
	Pil		4	–	–
Infrastruktur	Telekommunikasjon		3	–	2
	Verneområder		5	–	1
	Turisme og idrett		6	–	2
	Tjenester		2	3	–
	Transport	Land	2	2	–
		Vann	4	2	–
		Luft	5	2	3

Reporting and context

Events

DEFAULT	ADDED	MODIFIED	CONCEPT (SYMBOL NAME)
			Origin marking
			Origin marking at fixed location
			Event
			Event at fixed location
			Fire
			Fire at fixed location
			Explosives 2 → Explosion
			Explosion at fixed location
			Chemical accident
			Chemical accident at fixed location
			Forest fire
			Rail accident
			Car accident
			Aviation accident
			Ship accident
MOB		MOB	Man overboard

Risks

DEFAULT	ADDED	MODIFIED	CONCEPT (SYMBOL NAME)
			Danger
			Dangerous cargo
ADR			Dangerous cargo 2 → ADR
			Explosives
			Radioactive

Natural disasters

DEFAULT	ADDED	MODIFIED	CONCEPT (SYMBOL NAME)
			Landslide
			Flood
			Freezing rain
			Heavy snowfall

Wind

DEFAULT	ADDED	MODIFIED	CONCEPT (SYMBOL NAME)
			Strong wind E
			Strong wind NE
			Strong wind N
			Strong wind NW
			Strong wind W
			Strong wind SW
			Strong wind S
			Strong wind SE

Operations

Emergency services – Medical service

DEFAULT	ADDED	MODIFIED	CONCEPT (SYMBOL NAME)
			Hospital
			Ambulance station
			Medical office
			First aid station
			Ambulance checkpoint
			Ambulance car
			Medical car
			Medical boat
			Ambulance aircraft
			Ambulance helicopter
			Doctor
			Pharmacy
			AED

Emergency services – Fire service

DEFAULT	ADDED	MODIFIED	CONCEPT (SYMBOL NAME)
			Fire service
			Fire station
			Fire engine
			Turntable ladder
			Firefighting vessel
			Firefighting aircraft
			Firefighting helicopter
			Firefighter
			Fire hydrant
			Ground hydrant
			Firefighter team

Emergency services – Police

DEFAULT	ADDED	MODIFIED	CONCEPT (SYMBOL NAME)
			Police
			Police station
			Police car
			Police boat
			Police helicopter
			Policeman
			Police team
			Plain-clothed police officer
			Armed policeman
			Policeman with motorcycle
			Policeman with bicycle
			Mounted police
			Policeman with dog
			Snowmobile → Policeman with snowmobile

Emergency services – Military

DEFAULT	ADDED	MODIFIED	CONCEPT (SYMBOL NAME)
			Military
			Military camp
			Soldier
			Military unit
			Military equipment

Emergency services – Civil defense

DEFAULT	ADDED	MODIFIED	CONCEPT (SYMBOL NAME)
			Civil defense
			Civil defense staff
			Civil defense rescue dog

Operational information

DEFAULT	ADDED	MODIFIED	CONCEPT (SYMBOL NAME)
			Roadblock natural causes
			Roadblock human activity
			Checkpoint
			Checkpoint 2
			Command post
			Operational manager command post
			Meeting place
			Waiting place
			Gathering place
			Public gathering
			Information
			Depot
			Other resources
			Trace finds
			Crisis accommodation
			Distribution of water and food
			Survivor
			Damaged building
			Damaged road
			Damaged railroad
			Damaged water infrastructure
			Damaged power infrastructure

Emergency call centers

DEFAULT	ADDED	MODIFIED	CONCEPT (SYMBOL NAME)
			Emergency call center 110
			Emergency call center 112
			Emergency call center 113

Alarm signals

DEFAULT	ADDED	MODIFIED	CONCEPT (SYMBOL NAME)
			Alarm signal
			Alarm signal priority 0
			Alarm signal priority 1
			Alarm signal priority 2
			Alarm signal priority 3

Status

DEFAULT	ADDED	MODIFIED	CONCEPT (SYMBOL NAME)
			Arrow low activity
			Arrow medium activity
			Arrow high activity
			Arrow highest activity

Infrastructure

Telecommunication

DEFAULT	ADDED	MODIFIED	CONCEPT (SYMBOL NAME)
			Communication installation
			Communication stationary
			Communication mobile

Protected areas

DEFAULT	ADDED	MODIFIED	CONCEPT (SYMBOL NAME)
			Sami cultural heritage
			Cultural heritage
			Protected buildings
			Ancient heritage
			Habitat biotope

Tourism and sport

DEFAULT	ADDED	MODIFIED	CONCEPT (SYMBOL NAME)
			Drinking water sources
			Small cabin
			Campfire
			Health sports facilities outside
			Health sports facilities inside
			Sports hall

Services

DEFAULT	ADDED	MODIFIED	CONCEPT (SYMBOL NAME)
			Diving service
			Chemical diving
			Workshop
			Plumber
			Electrician

Transport – Land

DEFAULT	ADDED	MODIFIED	CONCEPT (SYMBOL NAME)
			Gas / fuel
			Parking lot
			Train station
			Snowmobile

Transport – Water

DEFAULT	ADDED	MODIFIED	CONCEPT (SYMBOL NAME)
			Wharf
			Lifeboat
			Anchorage
			Shipwrecks
			Car ferry
			Passenger ship

Transport – Air

DEFAULT	ADDED	MODIFIED	CONCEPT (SYMBOL NAME)
			Helicopter
			Helicopter base
			Gas station for helicopters
			Heliport
			Airport
			Aircraft
			Seaplane landing

Questions of the interviews with representatives of emergency responders

Q1 Grouping of emergency symbols

Q2 Number of symbols

Q3 Symbol modifications

Q4 Symbol differentiation

CARTOGRAPHY AND GEOGRAPHIC INFORMATION SCIENCE
https://doi.org/10.1080/15230406.2021.1994469

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A user-centric optimization of emergency map symbols to facilitate common operational picture

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Q2 Department of Geography, Norwegian University of Science and Technology, Trondheim, Norway

ABSTRACT

Common operational understanding among engaged emergency responders is facilitated through shared operational pictures during crisis situations. Sharing is typically achieved through interactive tools, either desktop or web-based, in which map displays play an essential role. That role can be further strengthened if (1) agreed emergency symbols that are used in map-based interactive tools are sufficient to encode multifaceted operational information visually; and (2) the symbols are legible and meaningful for the diverse users of those tools. The authors revisited official emergency map symbols in use in Norway and reconsidered them against current requirements. To this end, they first conducted several meetings with stakeholders to elicit adequate revision requirements. Next, the reconsideration included the extension of the symbol set, symbol modification, and grouping. After the reconsideration, emergency management officers and specialists were interviewed. The interviews confirmed the agreement with the symbol categorization, extension of the symbols, and their modifications. The interviewees also made numerous suggestions to be considered in a follow-up study. Moreover, two concepts – symbol standardization and symbol harmonization – were proposed.

ARTICLE HISTORY
Received 20 April 2021
Accepted 13 October 2021

KEYWORDS
Emergency map symbols; cartographic symbolization; symbol standardization; symbol harmonization; user study; cartographic design

1. Introduction

Interaction between agents involved in a crisis operation is facilitated by a common operational understanding (Björkbom et al., 2013). The creation of a common perception along with a comprehensive insight into a hazardous event needs adequate decision-support tools. Map-based interfaces used to build common operational pictures (COPs) can be used as decision-support. Map-based COPs employ emergency map symbols to encode operational information visually and thus support coordination and information exchange during interagency operations (Chmielewski & Gałka, 2009).

Conceptually and technically, map-based COPs integrate different georeferenced datasets and present an overview of the information to enable situation awareness (Björkbom et al., 2013). However, the integration is difficult to achieve because emergency responders have different task-specific needs and habits regarding the use of map symbols (Kuveždić Divjak et al., 2020). These aspects along with a broad range of mapping scales make emergency map symbols difficult to design (Robinson et al., 2011). It also happens that emergency maps are used by third-party actors such as media or local administration that want to see what is going on. As a result, secondary requirements appear, to have symbols legible also for non-specialists. Literature shows that emergency map symbols are often developed from non-user-centric perspectives and are defined in technological terms that do not adequately capture the users' needs (McNeese et al., 2006). Therefore, although much effort has already been made to design emergency map symbols (Akella, 2009; Kostelnick & Hoeniges, 2019; Marinova, 2018; Robinson et al., 2012, 2011), there is still a need for studies of symbols to be used as a common repository (Robinson et al., 2013).

This study is part of a project with an overarching goal to enhance information sharing for common situational understanding in interagency operations (Authors, 2019). The long-term ambition is to determine a set of concepts to be symbolized, to elaborate the details in symbol design, and ultimately to propose an operational map symbol package to be used in map-based COPs in Norway. As this ambition extends the scope of a single study, we narrow it down to a specific task. Therefore, the aim of this study is to revisit the emergency map symbols provided by the Norwegian Mapping Authority (NMA) to address current demands regarding information sharing for common operational understanding and thus, to enhance the symbols' role in

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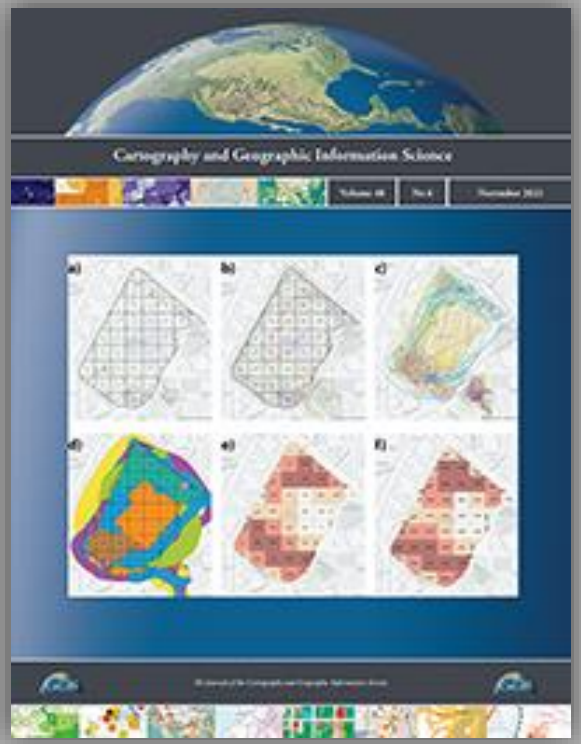
Supplemental data for this article can be accessed here.



1. Reporting and context

1.1 Events			1.1.10 Chemical accident at fixed location		1.2.4 Explosives		1.4.4 Strong wind NW
	1.1.1 Origin marking		1.1.11 Railroad accident		1.2.5 Radioactive		1.4.5 Strong wind W
	1.1.2 Origin marking at fixed location		1.1.12 Car accident	**1.3 Natural disasters**			1.4.6 Strong wind SW
	1.1.3 Event		1.1.13 Aviation accident		1.3.1 Landslide		1.4.7 Strong wind S
	1.1.4 Event at fixed location		1.1.14 Ship accident		1.3.2 Flood		1.4.8 Strong wind SE
	1.1.5 Fire	MOB	1.1.15 Man overboard		1.3.3 Avalanche	**1.5 Visibility**	
	1.1.6 Fire at fixed location	**1.2 Risks**		**1.4 Wind**			1.5.1 Moderate visibility
	1.1.7 Explosion		1.2.1 Danger		1.4.1 Strong wind E		1.5.2 Poor visibility
	1.1.8 Explosion at fixed location		1.2.2 Dangerous cargo		1.4.2 Strong wind NE		1.5.3 Very poor visibility
	1.1.9 Chemical accident	ADR	1.2.3 ADR (Dangerous cargo 2)		1.4.3 Strong wind N		

2. Operations

2.1 Operational information

- 2.1.1 Checkpoint
- 2.1.2 Checkpoint 2
- 2.1.3 Command post
- 2.1.4 Operational manager command post
- 2.1.5 Waiting place
- 2.1.6 Meeting place
- 2.1.7 Survivor
- 2.1.8 Gathering place
- 2.1.9 Public gathering
- 2.1.10 Evacuated relatives center
- 2.1.11 Information
- 2.1.12 Depot
- 2.1.13 Other resources
- 2.1.14 Crisis accommodation
- 2.1.15 Distribution of water and food
- 2.1.16 Roadblock natural causes
- 2.1.17 Roadblock human activity
- 2.1.18 Damaged building
- 2.1.19 Damaged road
- 2.1.20 Damaged railroad
- 2.1.21 Damaged water infrastructure
- 2.1.22 Damaged power infrastructure
- 2.1.23 Damaged fiber-optic infrastructure

2.2 PES* – Police

- 2.2.1 Police
- 2.2.2 Police station
- 2.2.3 Police car
- 2.2.4 Police boat
- 2.2.5 Police helicopter
- 2.2.6 Policeman
- 2.2.7 Police team
- 2.2.8 Plain-clothed police officer
- 2.2.9 Armed policeman
- 2.2.10 Policeman with motorcycle
- 2.2.11 Policeman with bicycle
- 2.2.12 Mounted police
- 2.2.13 Policeman with dog
- 2.2.14 Policeman with snowmobile

2.3 PES* – Fire service

- 2.3.1 Fire service
- 2.3.2 Fire station
- 2.3.3 Fire engine
- 2.3.4 Turntable ladder
- 2.3.5 Firefighting vessel
- 2.3.6 Firefighting aircraft
- 2.3.7 Firefighting helicopter
- 2.3.8 Firefighter
- 2.3.9 Firefighter team
- 2.3.10 Fire hydrant
- 2.3.11 Ground hydrant
- 2.3.12 Water pump

2.4 PES* – Medical service

- 2.4.1 Hospital
- 2.4.2 First aid station
- 2.4.3 Medical office
- 2.4.4 Ambulance station
- 2.4.5 Ambulance checkpoint
- 2.4.6 Ambulance car
- 2.4.7 Medical car
- 2.4.8 Medical boat
- 2.4.9 Ambulance aircraft
- 2.4.10 Ambulance helicopter
- 2.4.11 Doctor
- 2.4.12 Pharmacy
- 2.4.13 AED

2.5 SES** – Civil defense

- 2.5.1 Civil defense
- 2.5.2 Civil defense staff
- 2.5.3 Civil defense rescue dog

2.6 SES** – Military

- 2.6.1 Military
- 2.6.2 Military camp
- 2.6.3 Soldier
- 2.6.4 Military unit
- 2.6.5 Military equipment

3. Infrastructure

3.1 Telecommunication		**3.3 Transport – Land**			3.4.6 Passenger ship		3.6.4 Drinking water sources
	3.1.1 Communication installation		3.3.1 Train station	**3.5 Transport – Air**			3.6.5 Small cabin
	3.1.2 Communication stationary		3.3.2 Gas / fuel		3.5.1 Airport	**3.7 Protected areas**	
	3.1.3 Communication mobile		3.3.3 Parking lot		3.5.2 Heliport		3.7.1 Sami cultural heritage
3.2 Services		**3.4 Transport – Water**			3.5.3 Helicopter base		3.7.2 Cultural heritage
	3.2.1 Diving service		3.4.1 Wharf		3.5.4 Gas station for helicopters		3.7.3 Protected buildings
	3.2.2 Chemical diving		3.4.2 Lifeboat	**3.6 Tourism and sport**			3.7.4 Ancient heritage
	3.2.3 Workshop		3.4.3 Anchorage		3.6.1 Health sports facilities outside		3.7.5 Habitat biotope
	3.2.4 Plumbier		3.4.4 Shipwrecks		3.6.2 Health sports facilities inside		
	3.2.5 Electrician		3.4.5 Car ferry		3.6.3 Sports hall		

Homeland Security Working Group

Symbology Reference

Update (July 2012): DHS S&T has been working with the Pennsylvania State University's GeoVISTA Center to promote standardization and sharing of map symbology throughout DHS components and the public safety community. The following two prototype capabilities have been developed out of this effort:

1. A distributed, collaborative web based process and toolset that allow users to:

- Review their existing symbology
- Identify missing, redundant, ambiguous symbols
- Identify poor symbol labels and definitions
- Develop logical symbol categories

2. A web-based Symbology service (Symbol Store) that allows users to:

- Find relevant symbols using keyword search (The prototype Symbol Store will initially be populated with ANSI 415-2006 (FGDC HSWG), HSIP, FEMA, and DHS NPPD symbols)
- Review available symbols along with metadata such as: symbol name and description; where they are used (what organizations); are they part of a standard; etc.
- Preview symbols on different scale maps
- Select and download symbols
- Publish symbols and symbol libraries to the Symbol Store

The prototype Symbol Store is currently hosted by Penn State for evaluation at http://symbolstore.org. Based on initial feedback, the Symbol Store capability would be useful across a broad variety of users and communities.

Notice: To the extent that any information/material contained herein is a Government work, it is not subject to copyright protection, and may be published/disseminated without restriction(s).

Symbol Availability - The information contained herein is the work of the FGDC Homeland Security Working Group including Federal, State, and local agencies. The

Incidents Symbology Reference

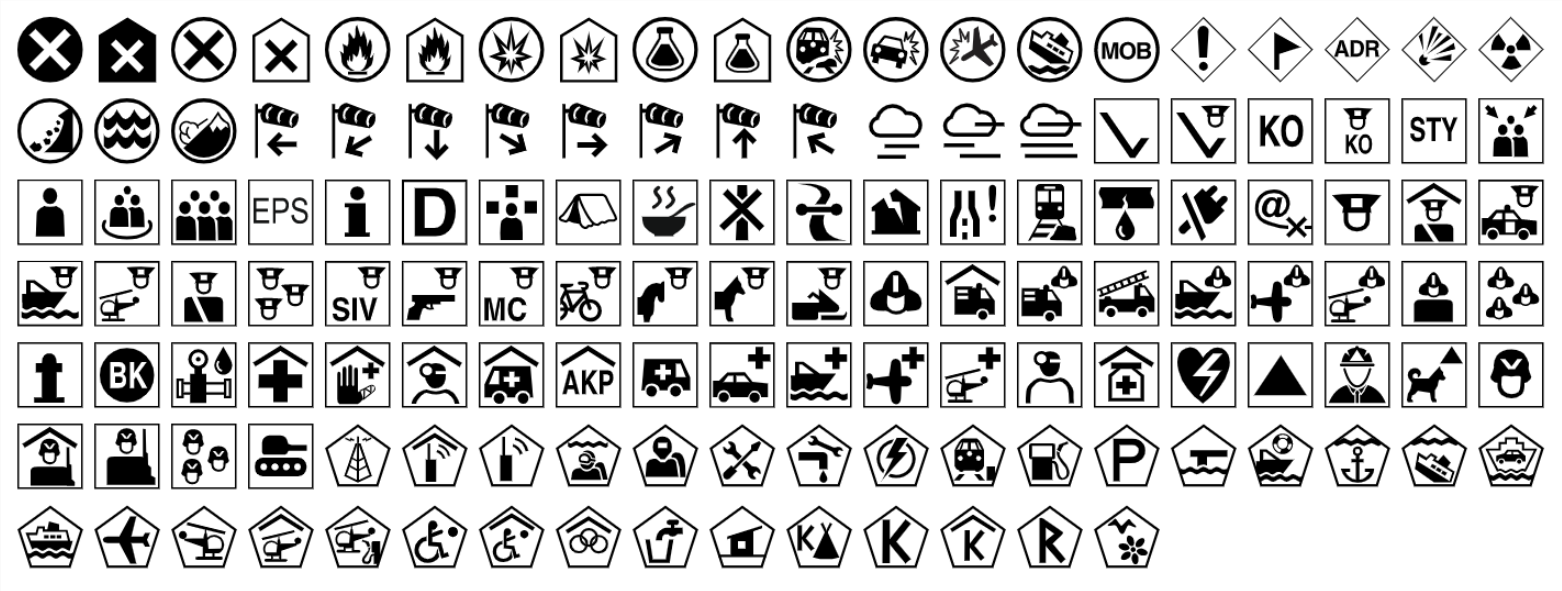
(Version 2.20, Released: September 14, 2005)

Incidents - Category of eight Themes and forty-two Features that symbolize a "cause of action" or "source of disaster."

Use this page to cross-reference the Incidents symbols with their definitions.

Changed or New symbols are marked by an asterisk (*) and have a light yellow or green background, respectively.
Printable List of All Changes

Symbol Types	Symbol Image	Key Stroke	Symbol Terms and Definitions
1.) **Incidents Background Symbol** (Background)		!	*Incidents Background Symbol (Background)* - The background fill shape for the Incidents symbol.
2.) **Incidents Frame Symbol** (Frame)		#	*Incidents Frame Symbol (Frame)* - The frame shape for the Incidents symbol.
*3.) **Civil Disturbance Incident** (Theme)		A	*Civil Disturbance Incident (Theme)* - Human activities resulting in the disrupting of services or requiring varying levels of support, law enforcement or attention.
*4.) **Civil Demonstrations** (Civil DisturbanceFeature)		B	*Civil Demonstrations (Civil Disturbance)* - A public display of group feelings toward a person or cause. (Source: Merriam-Webster Online Dictionary definition)
*5.) **Civil Displaced Population** (Civil DisturbanceFeature)		C	*Civil Displaced Population (Civil Disturbance)* - Persons or groups of person who have been forced or obliged to flee or to leave their homes or places of habitual residence, in particular as a result of or in order to avoid the effects of armed conflict, violations of human rights, or natural or human-made disasters. (Source: United Nations Guiding Principles on Internally Displaced Persons, 1998)
*6.) **Civil Rioting** (Civil DisturbanceFeature)		D	*Civil Rioting (Civil Disturbance)* - A public disturbance involving (1) an act or acts of violence by one or more persons part of an assemblage of three or more persons, which act or acts shall constitute a clear and present danger of, or shall result in, damage or injury to the property of any other person or to the person of any other individual or (2) a threat or threats of the commission of an act or acts of violence by one or more persons part of an assemblage of three or more persons having, individually or collectively, the ability of immediate execution of such threat or threats, where the performance of the threatened act or acts of violence would constitute a clear and present danger of, or would result in, damage or injury to the property of any other person or to the person of any other individual. (Source: 18 USC Section 2102)
7.) **Criminal Activity Incident** (Theme)		E	*Criminal Activity Incident (Theme)* - An unlawful pursuit or action in which an individual participates. (Source: www.dictionary.com; combined definitions of "criminal" and "activity")
*8.) **Bomb Threat** (Criminal ActivityFeature)		F	*Bomb Threat (Criminal Activity)* - A warning of the of the possible presence of a bomb or expression of the intention to detonate a bomb.
*9.) **Bomb** (Criminal ActivityFeature)		G	*Bomb (Criminal Activity)* - An explosive device fused to detonate under specific conditions. (Source: International military definition)
*10.) **Bomb Explosion** (Criminal ActivityFeature)		H	*Bomb Explosion (Criminal Activity)* - A violent outburst resulting from detonation of a chemical or nuclear explosive or from the loss of a high pressure vessel's integrity.
11.) **Looting** (Criminal ActivityFeature)		I	*Looting (Criminal Activity)* - Burglary committed within an affected area during an emergency. (Source: PeaceOfficers.com Glossary)
12.) **Poisoning** (Criminal ActivityFeature)		J	*Poisoning (Criminal Activity)* - Use of a poisonous substance to injure or kill (Source: Adapted from Merriam-Webster Online Dictionary definition)
13.) **Shooting** (Criminal ActivityFeature)		K	*Shooting (Criminal Activity)* - Use of a firearm to kill or injure or to damage property (Source: Condensed from Merriam-Webster Online Dictionary definition)
14.) **Fire Incident**			*Fire Incident (Theme)* - The destructive act of something burning; caused either by electrical or technological malfunction, lightning, arson, human error or human negligence



Beredskapssymboler

Her vises arkivet over harmoniserte kartsymboler for krisehåndtering utarbeidet av INSITU prosjektet. Arkivet inneholder 135 kartsymboler. Noen symboler er nye, men mange symboler er modifikasjoner eller lik dem som er tilgjengelig fra Kartverkets beredskapssymboler. Arbeidet med harmoniseringen vil bli publisert i tidsskriftet *Cartography and Geographic Information Science*.

1 Rapportering og kontekst
- 1.1 Hendelser
- 1.2 Risikoer
- 1.3 Naturkatastrofer
- 1.4 Vind
- 1.5 Sikt

2 Operasjoner
- 2.1 Operasjonell informasjon
- 2.2 Primær nødetat - Politi
- 2.3 Primær nødetat - Brann
- 2.4 Primær nødetat - Helse
- 2.5 Sekundær nødetat - Sivilforsvar
- 2.6 Sekundær nødetat - Militær

3 Infrastruktur
- 3.1 Telekommunikasjon
- 3.2 Tjenester
- 3.3 Transport - Land
- 3.4 Transport - Vann
- 3.5 Transport - Luft
- 3.6 Turisme og idrett
- 3.7 Verneområder

LAST NED ALLE SYMBOLER

1 Rapportering og kontekst

1.1 Hendelser

30px 50px	1.1.1	**Opprinnelsesmarkering** - Origin marking
30px 50px	1.1.2	**Opprinnelsesmarkering, stedbunden** - Origin marking at fixed location
30px 50px	1.1.3	**Hendelse** - Event
30px 50px	1.1.4	**Hendelse, stedbunden** - Event at fixed location

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INSITU Beredskapsymboler 2.0

Is research needed?

Gap between academics and practitioners

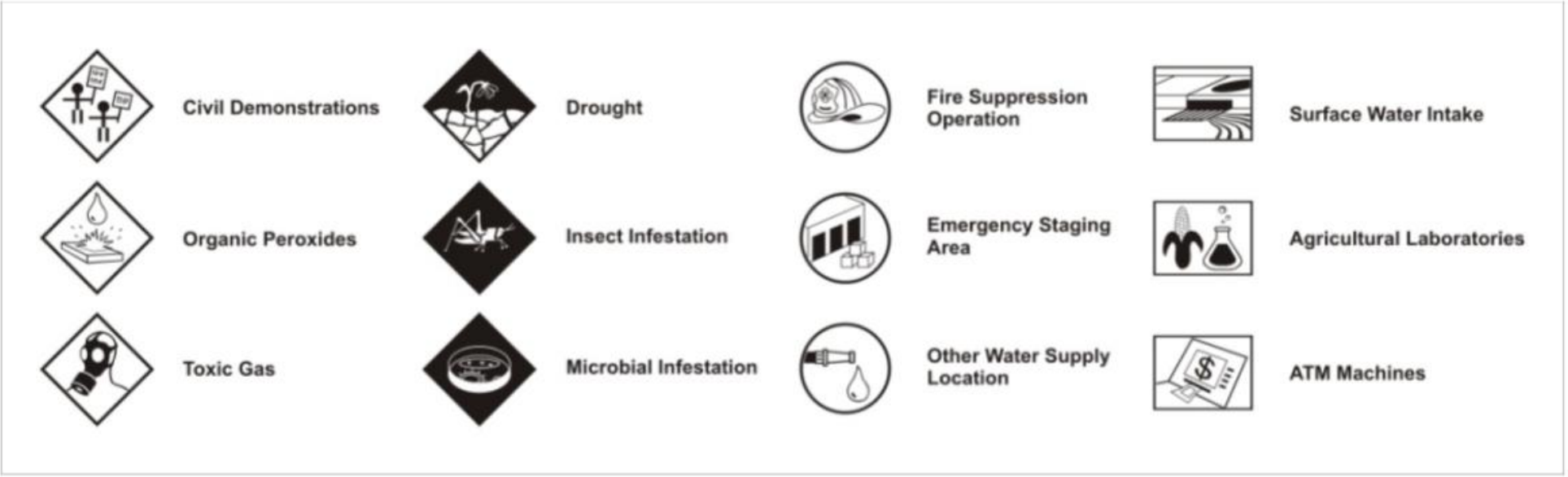

Figure 3: Examples of symbols from each ANSI category that participants identified as graphically complex.

Should the symbols be transformed into abstract forms like in Diercke Weltatlas?

Mineralische Rohstoffe								Fossile Rohstoffe (Energie-rohstoffe, Rohstoffe für die chemische Industrie)
Metallische Erze						Salze	Gesteine und sonstige Minerale	
Schwermetalle					Leichtmetalle			
	Stahlveredler	weitere Buntmetalle	Edelmetalle	Energierohstoff				
Eisen	Chrom	Antimon	Gold	Uran	Aluminium-rohstoffe (z. B. Bauxit)	Kalisalz	Asbest	Steinkohle
	Kobalt	Blei, Zink	Platin		Magnesium (Magnesit)	Phosphate	Diamanten	Braunkohle
	Mangan	Kupfer	Silber			Pottasche	Graphit	Erdöl
	Molybdän	Zinn				Steinsalz	Kalkstein	Erdgas
	Nickel						Kaolin	
	Vanadium (Vanadin)	Quecksilber			Titan		Kies	
	Wolfram						Schwefel	