

Introduction to Emergency Management

Vimala Nunavath

<Vimala.Nunavath@uia.no>

Outline:

- Why Emergency Management?
- Disaster/Catastrophe/Crisis/Emergency
- Disaster/Crisis/Emergency Management
- Emergency Management phases
- Involved Stakeholders
- Information needs (uses) during Emergency Management
- Role of ICT in EM

Why Emergency Management?

- Since 2006-2017:

Natural disasters:

7029, 1.2 M and 19.2 billion US \$

Man-made disasters:

4613, 140000 and 3.5 billion US \$

People

Economy

Infrastructure

Disaster definition:

- Disaster: “A serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts”.



Disaster Explanation:

- A **social phenomenon**
 - with a natural or human (individual, collective) trigger
- A **disruption**
 - of social routine / order (structure, norms, values)
 - of processes and capacities of societies, organizations and individuals
 - instantaneous or progressive
 - focal or distributed, fixed or moving
 - may be triggered by a material event (maybe not)
 - natural or human-made (intentional, accidental)
- **Severity of a disaster** is **more related to social** than to material (or physical) magnitude

Catastrophe:

- Catastrophe: “any natural or man made incident, including terrorism, that results in extraordinary levels of mass casualties, damage, or disruption severely affecting the population, infrastructure, environment, economy, national morale, and/or government functions”.



Crisis:

- Crisis: “is any event that is expected to lead to, an unstable and dangerous situation affecting an individual, group or community or whole society”.



Emergency:

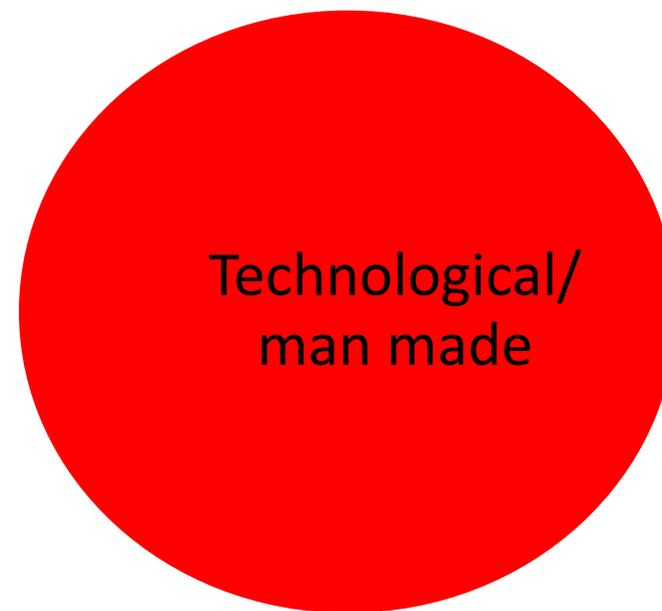
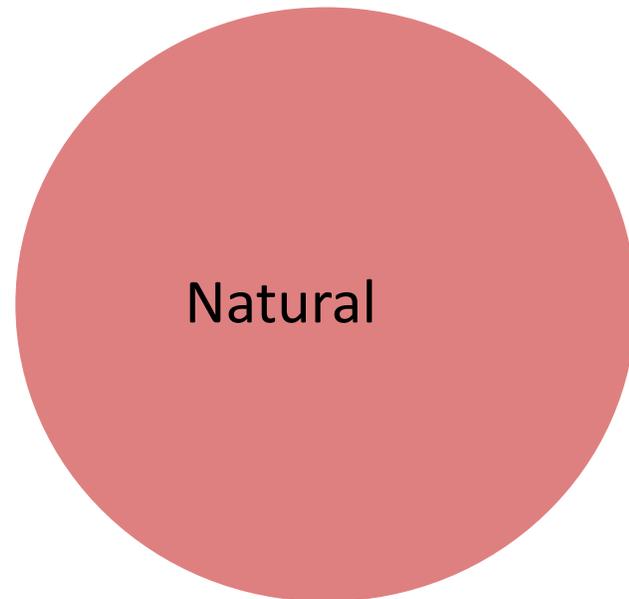
- Emergency: “a state in which normal procedures are suspended and extra-ordinary measures are taken in order to avert a disaster”.



Emergencies, disasters, and crises:

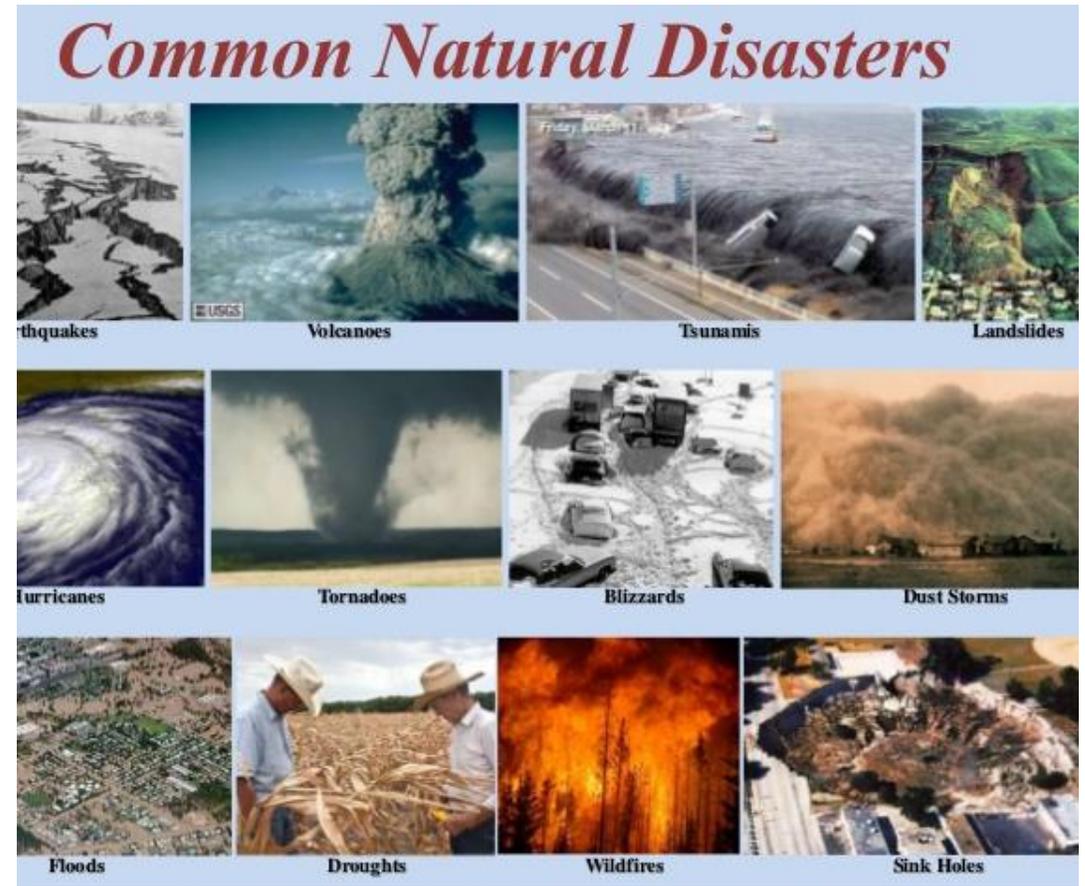
- Emergency (“nødsfall”): – a harmful situation (health, life, property, environment) – usually requiring urgent attention.
- Crisis (“krise”): – a societally unstable situation that may lead to a disaster.
- Disaster (“katastrofe”): – a disruption of social order.
- All are **evolving** and **time-critical**:
 1. an accident triggers police/medial attention (emergency)
 2. the intervention provokes a growing crowd (crisis)
 3. escalating riots eventually disrupt social order (disaster)

Types of Emergencies:



Natural Emergency:

- Natural emergency: “that exist in the natural environment and pose a threat to human populations and communities”.



Man made Emergency:

- Technological and man-made emergency: “a human induced emergency is the result of a failure of human hand or in human-made products”.



Common causes of disasters:

Table 1. Hazard categories and sub-categories.

Category	Sub-category	Examples
Natural	● Meteorological	● tornado, hurricane
	● Hydrological	● flood, landslide
	● Geophysical	● earthquake, volcano
	● Climatological	● wildfire, heat/cold wave
	● <i>Biological (N/A)</i>	● <i>epidemic, infestation</i>
Human-Induced	● Intentional	● shooting, bombing
	● Accidental	● derailment, building collapse

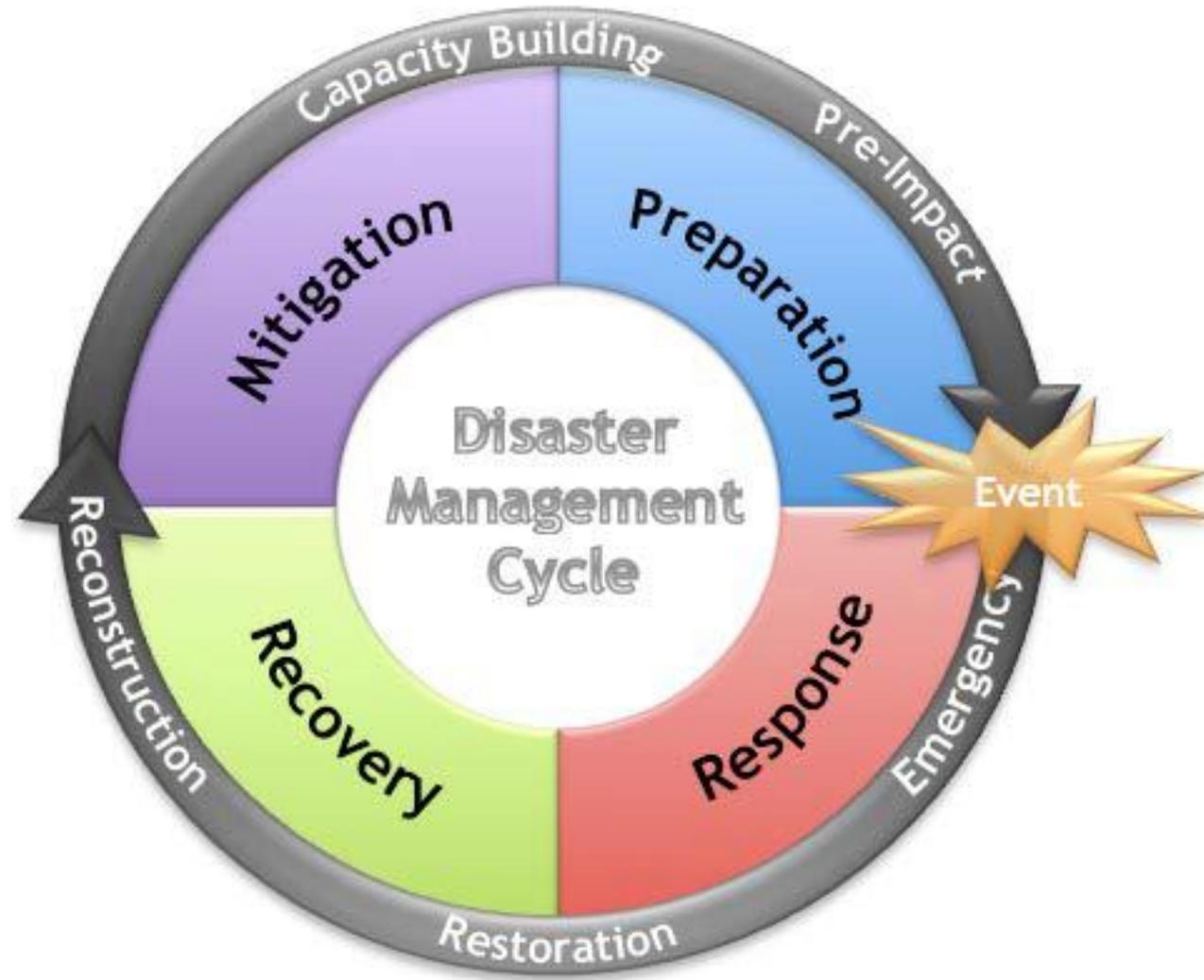
Emergency Management:

- Emergency Management (EM): “the organization and management of resources and responsibilities for addressing all aspects of emergencies, in particular preparedness, response and initial recovery steps”.

OR

- “The managerial function charged with creating the framework within which communities reduce vulnerability to hazards and cope with all kind of emergencies”.
- **The goals of EM** are to:
 - Save lives and prevent injuries
 - Stabilize an incident as soon as possible
 - Protect property and the environment.

EM phases:



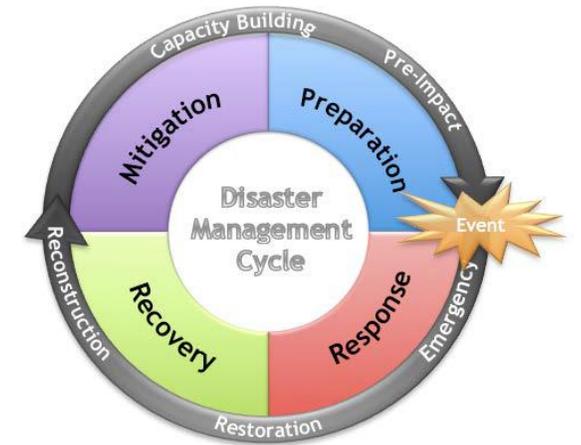
Mitigation:

- Mitigation:

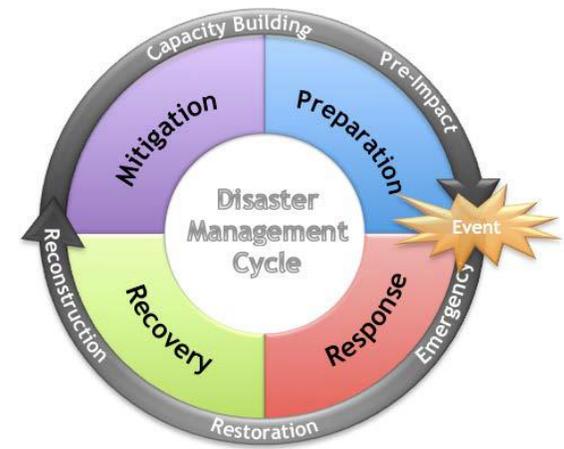
“Activities aimed at reducing or eliminating the long term risks to persons or property from hazards and their effects.”

- “Activities that reduce the effects of emergencies”.

- Tasks: Building codes and zoning; vulnerability analyses, public education, Develop use case scenarios.



Preparedness:



- Preparedness:

“the knowledge and capacities developed by governments, professional response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazard events or conditions”.

- “Activities prior to a emergency”.
- Tasks: Preparedness plans; emergency exercises/training; warning systems.

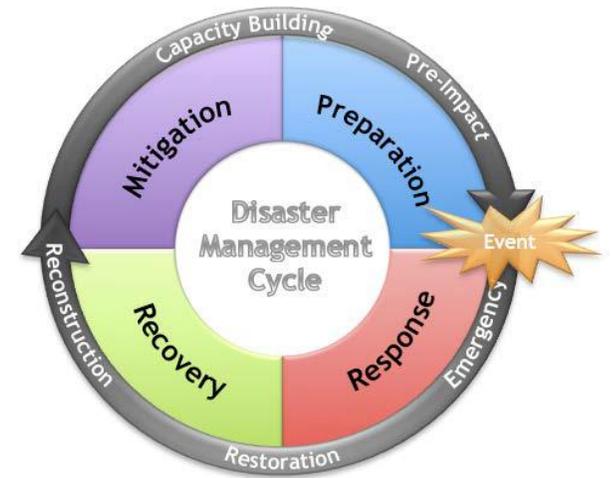
Response:

- Emergency response:

“providing emergency aid and assistance, reducing the probability of secondary damage, and minimizing problems for recovery operations”.

- “Activities during an emergency”.

- Example Tasks: warn, placing emergency personnel and resources, **searching and rescuing**, first-aid victims, placing the victims in temporary shelters or places, evacuation, **reporting**, and **dispatching resources**.



Recovery:

- Recovery phase:

“the restoration, and improvement where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors”.

- “Activities following an emergency”.
- Tasks: temporary housing; restore power and communications, long-term medical care and crisis counselling; damage assessment.



Stakeholders during EM:



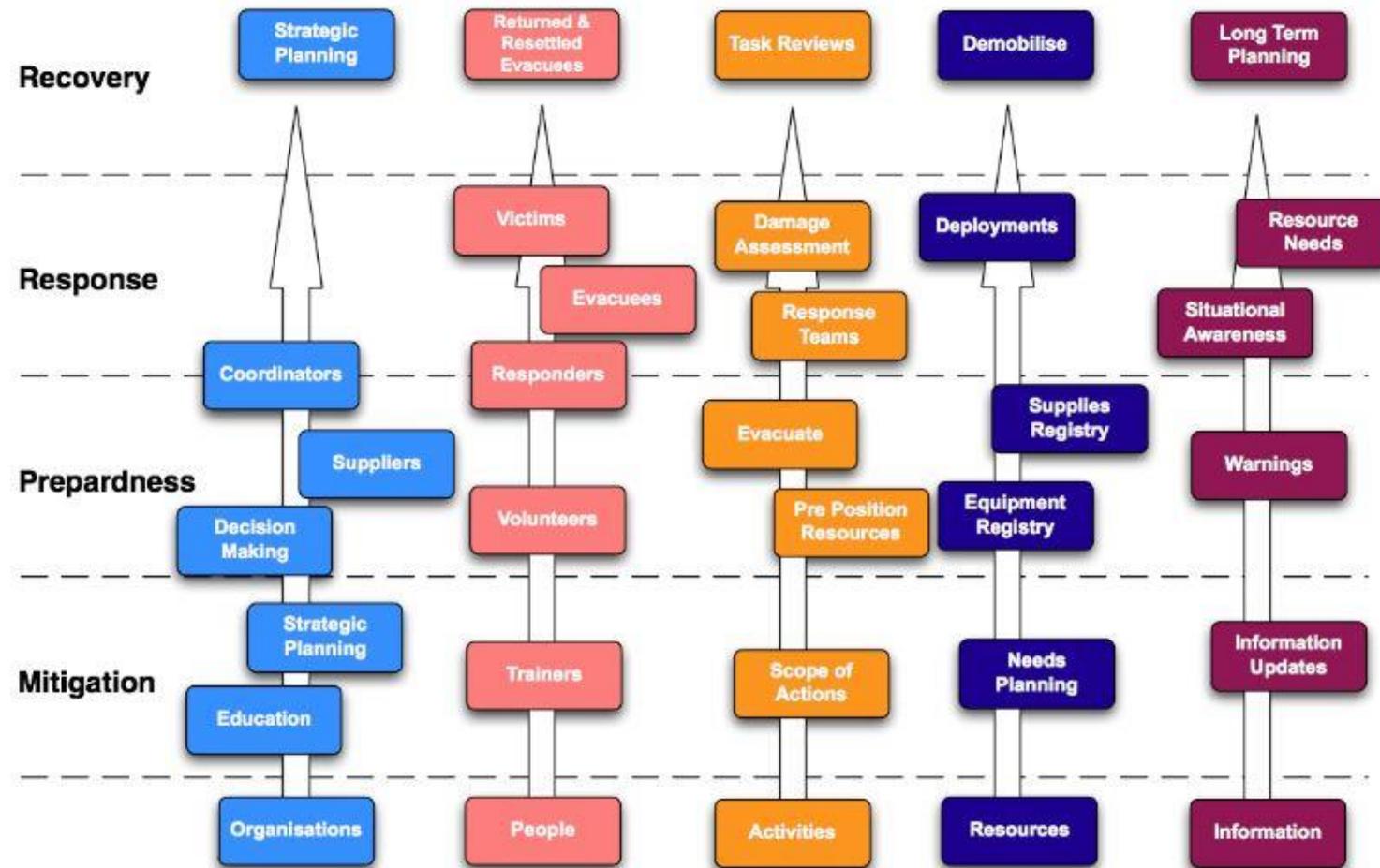
- People affected – directly, indirectly
- People tasked with response and relief operations.
 - Individuals and organizations such as:
 - government, non-government (NGO), private
 - involvement depends on the kind of disaster.



BERGEN KOMMUNE



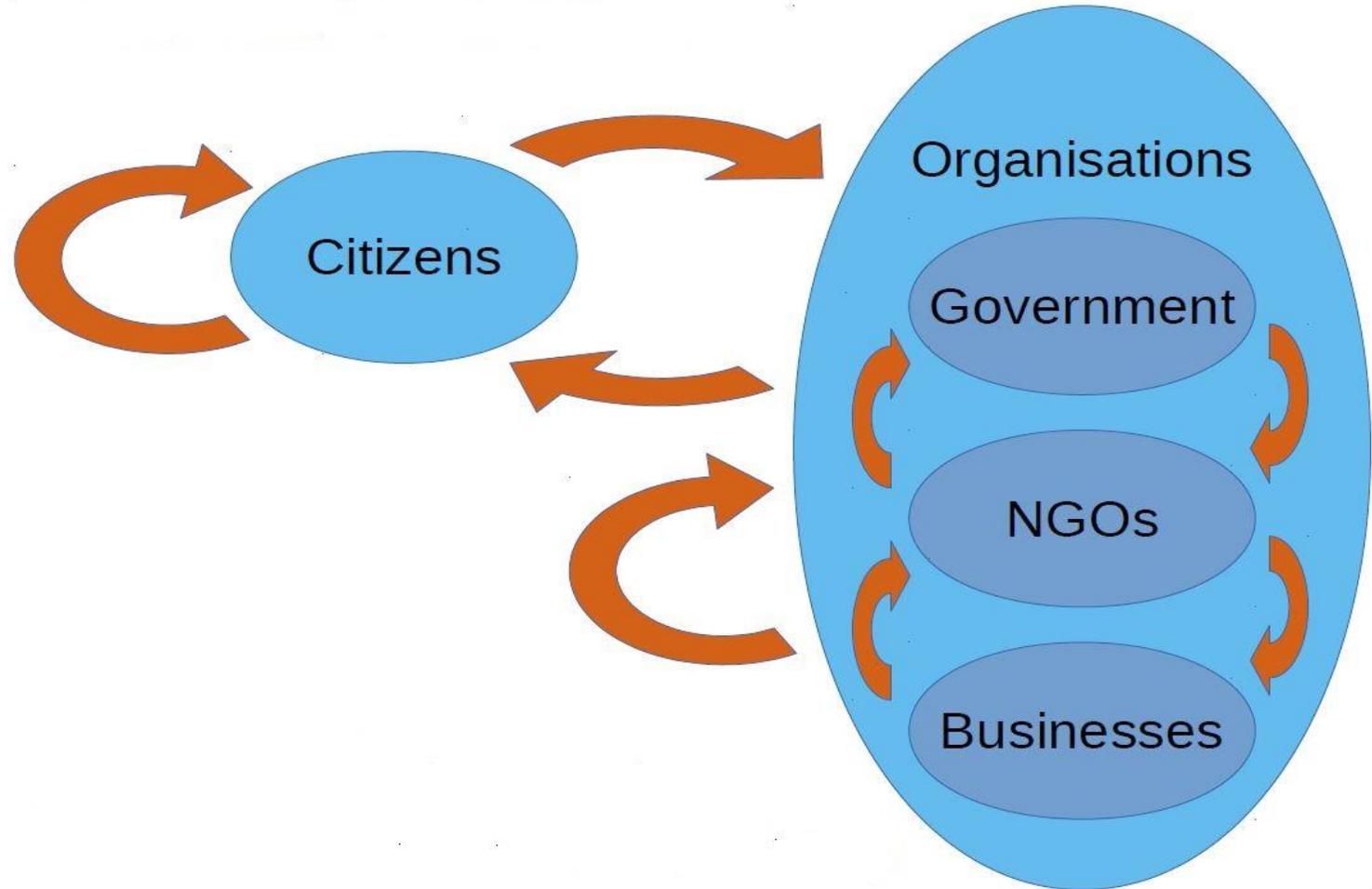
Key entities and roles at different stages



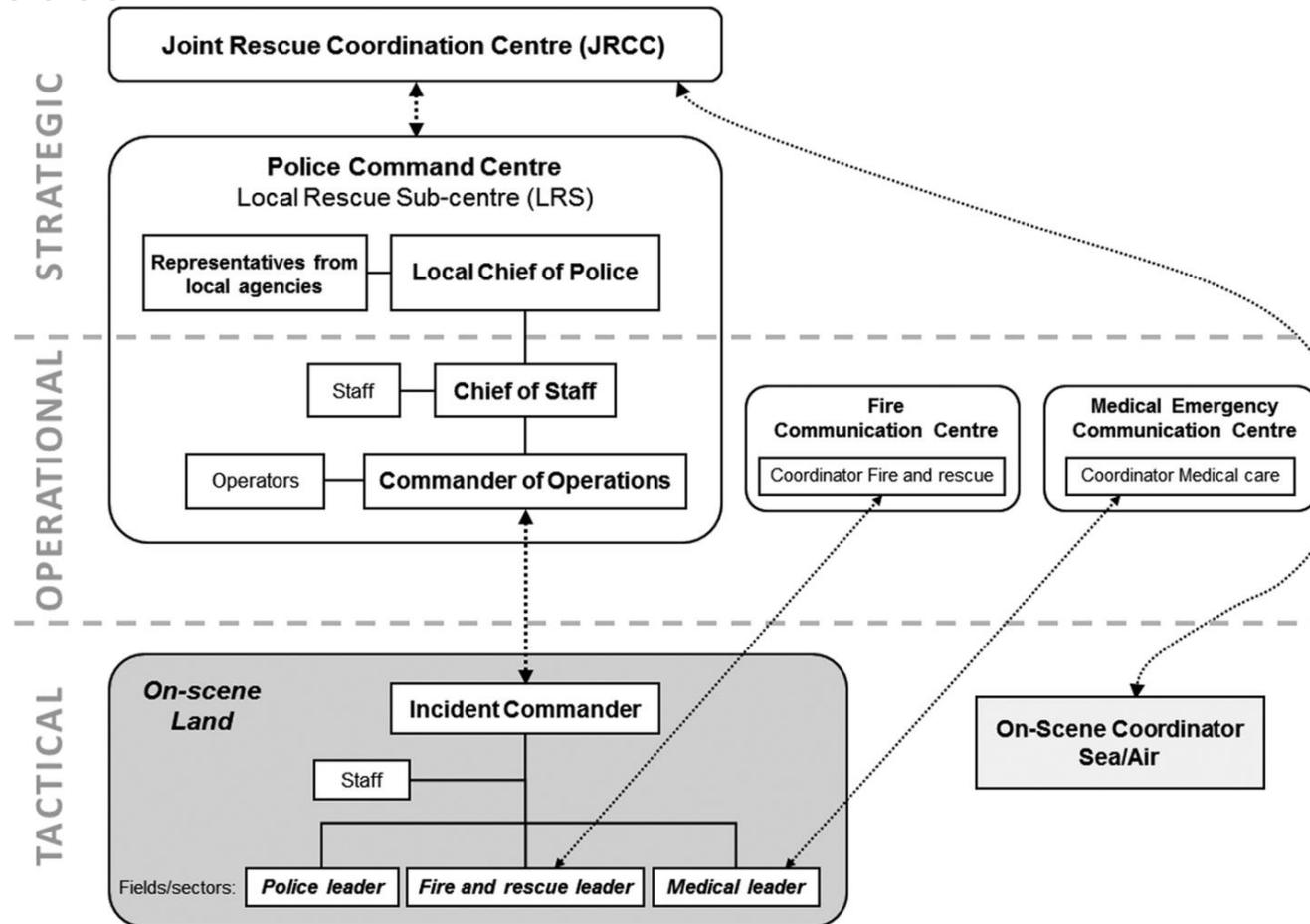
Information sharing during EM:

Information Sharing: “the process of making information available to other individuals, teams, or organizations in the alliance”

Information: “the content of the communication that takes place within the framework of an emergency response”.



Stakeholders' level and information sharing during EM:



Stakeholders' information needs:

Information needs vary with role, level...

- ...and with time:
 - understanding context and scope
 - assess affected populations and damage
 - determining needs for goods and services
 - identifying ground organizations / actors
 - ...and so on

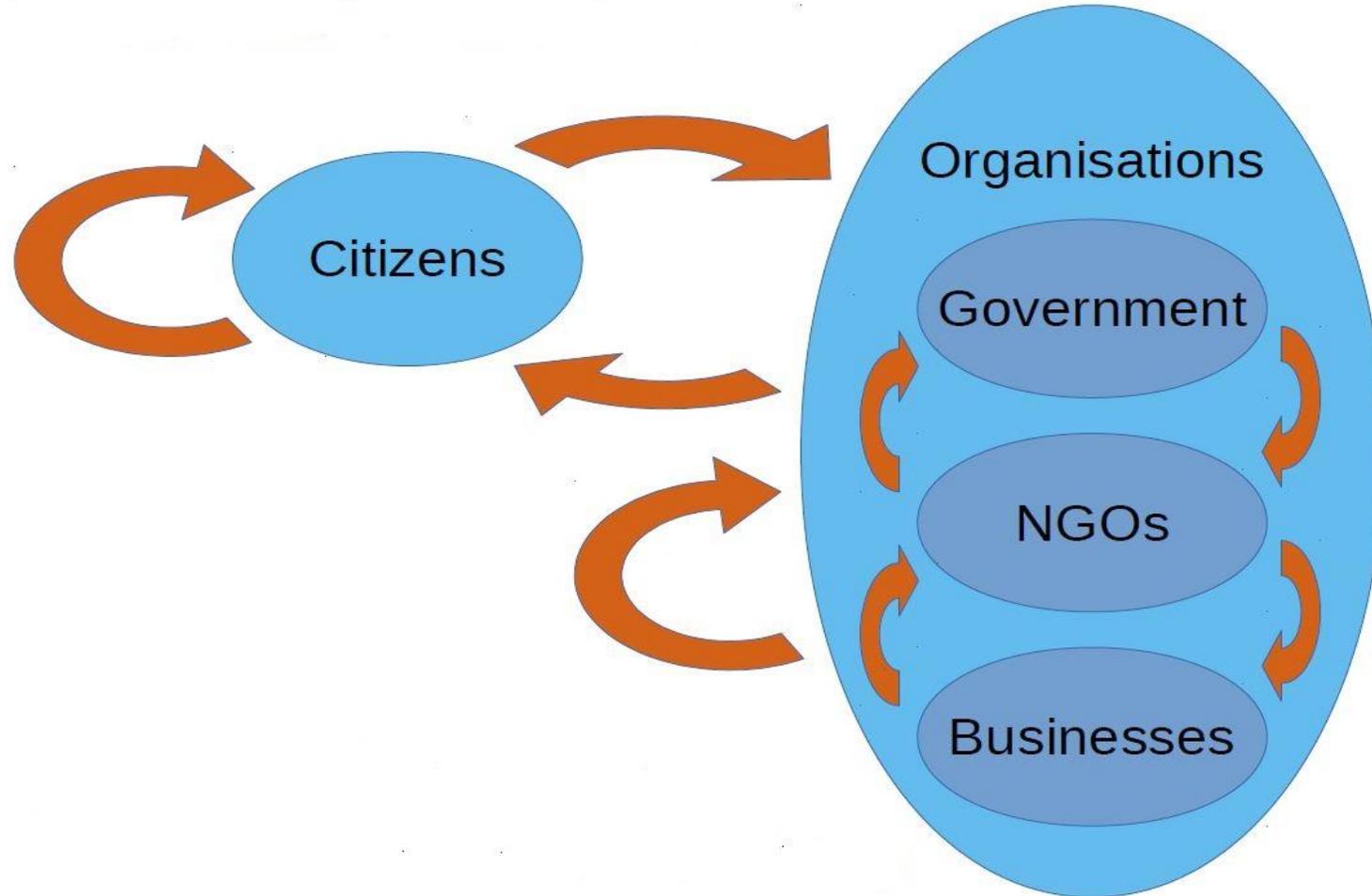
Types of Information:

- Strategic Information:
 - capturing the big picture.
 - resource allocation and mobilization at the onset of a disaster.
 - incomplete information, background knowledge usage for preliminary assessment.
 - example information: estimations of the number of people affected, injured, dead or displaced, infrastructure damage etc..
 - aggregating social media messages
 - speak about the situation as a whole (see the forest, not the trees)
 - estimations of:
 - geographical area, numbers of people affected in various ways, infrastructural damage (public / private)
 - quality is: representativeness, accuracy...

Types of Information (Conti.):

- Tactical Information:
 - capturing actionable insights.
 - EROs need to detect something of interest has happened at a given time, in a given location and having certain characteristics.
 - specific urgent needs
 - individual, fine-grained information
 - quality is: credibility, relevance, timeliness

Information sharing during EM:



Citizen-to-citizen (c2c):

- Individual information gathering in crisis:
 - vicinity, friends / acquaintances, gov. / non-gov. organisations, mass media, phone / text, internet, social media
- People gravitate towards *known/trusted channels*
 - internet users go online
 - social media users go to their favorite *social media*
...depending on culture / nation / group
- Active *before* professional responders arrive
 - emergency services (police, medical, rescuers, fire fighters...), media...
 - content is extremely varied (along all dimensions)

Citizen-to-organization (c2o)

- Volunteering, donations
- Directing attention, requesting help
- Personal communication / interaction through social media is often *public*:
 - facilitates citizen sensing (participatory sensing, crowdsensing).
 - distributed cognition: understanding a situation through information spread through many minds.
 - a form of collective intelligence.
 - can improve situational awareness (how to get home, where is shelter).
 - may need post processing.

Organization-to-citizen (o2c)

- In particular government and NGOs
- Situational awareness:
 - directing attention, providing updates
 - information about relief efforts
 - alerts, communicate risks
 - counter rumors
 - emergency contacts and points
- Informed action:
 - offer advice
 - safety instructions, evacuation orders
 - request donations or volunteers

Official communication (g2c)

- Official communication
 - dominating view is one-way g2c
 - can be problematic:
 - demotivated, disillusioned citizens
 - *how to involve citizens?*
- NGOs and media act as aggregators
- Citizens act as filters and amplifiers:
 - liking/enacting and reposting
 - have expectations about responsiveness
 - requires trusting, agile organizations
 - organizational culture

Usecase study I (Natural emergency): Sandy Hurricane in 2012.

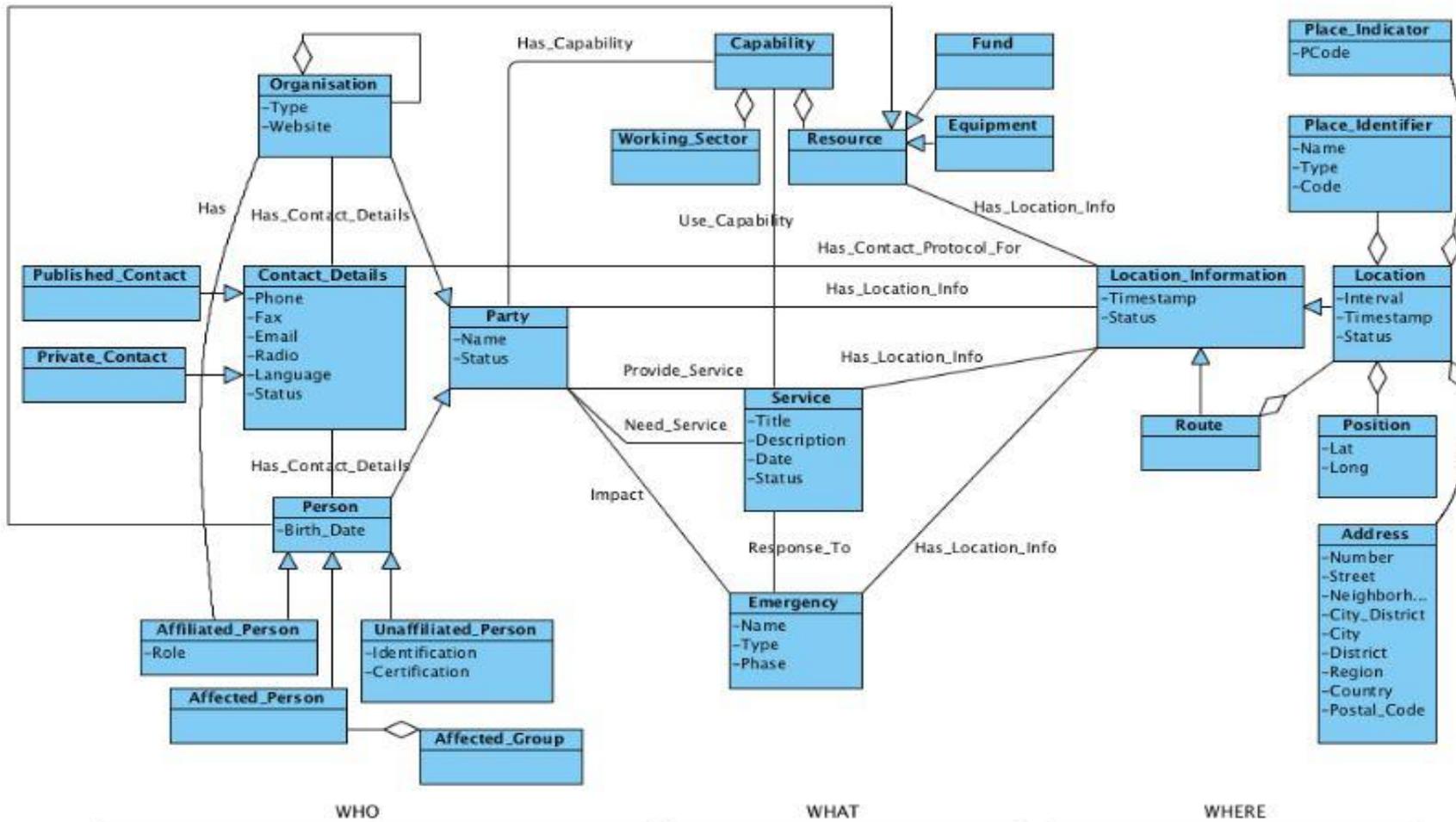


https://youtu.be/bnY1Zwxei_w

Stakeholders in Response Phase:

- Nonprofit partners (Red cross, NGOs)
- State agencies.
- Federal departments and agencies
- Local level departments.
- National weather service
- US department of energy
- Environmental protection agency
- Us department of the interior

Information needs and uses during Response phase:



When

How

Information Sharing:

 **Mike Bloomberg**
643,000 are watching
bit.ly/WRCnd3
Expand ← Rep

 **Mike Bloomberg**
I urge everyone
you have any
[#SandyNYC](https://twitter.com/SandyNYC)
Expand

 **Mike Bloomberg**
There are also
Hudson bridge
Expand

 **Mike Bloomberg**
The 4 East River
people for Thursday
Expand

 **kyle_newman**

#SANDYLOOTCREW #SANDY"

 **Leon Kaiser** @LiteralKa 17m
@kyle_newman @hodgesart HOW
MANY FLOORS IS HER HOUSE
#SANDYLOOTCREW #SANDY

 **Kyle Newman** @kyle_newman 15m
@LiteralKa @hodgesart we on the
first floor. I'm on the deck with my
bazooka. Ocean city

 **Leon Kaiser** @LiteralKa 13m
@kyle_newman @hodgesart BRING
IT ON DAWG WE GOT ASSAULT
RIFLES U AINT GOT SHIT ON US
#SANDYLOOTCREW #SANDY

My tweets w hurricane sandy looters in ocean city pt 1
INFO319, autumn 2019, session 1

 **NYC Mayor's Office** @NYCMayorsOffice 29 Oct
Mayor: We need to keep the roads clear for emergency vehicles. Do
not drive. Stay wherever you are. [#Sandy](https://twitter.com/Sandy)
Expand

Office @NYCMayorsOffice 29 Oct
Now, 911 is receiving 10,000 calls per half hour. Please,
only call 911 for life-threatening emergencies. [#Sandy](https://twitter.com/Sandy)

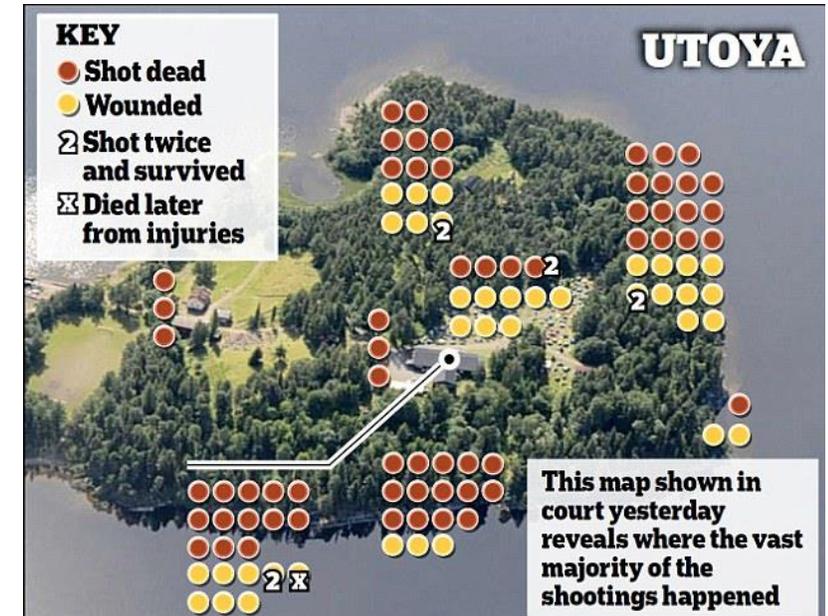
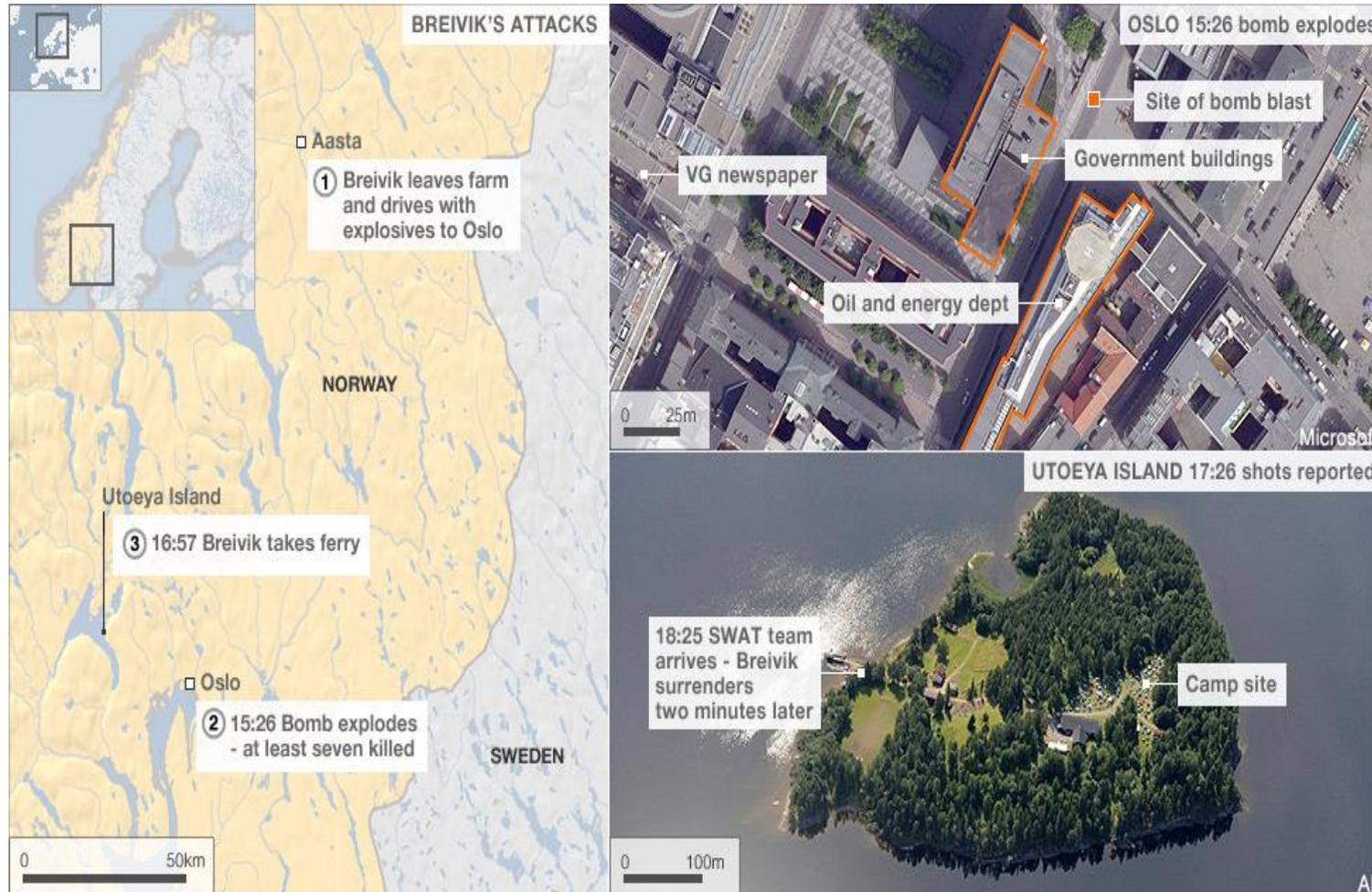
Office @NYCMayorsOffice 29 Oct
Now this was going to be a very dangerous storm. And
it is meeting our expectations. [#Sandy](https://twitter.com/Sandy)

Office @NYCMayorsOffice 29 Oct
I will make a brief statement about [#Sandy](https://twitter.com/Sandy) in about 10

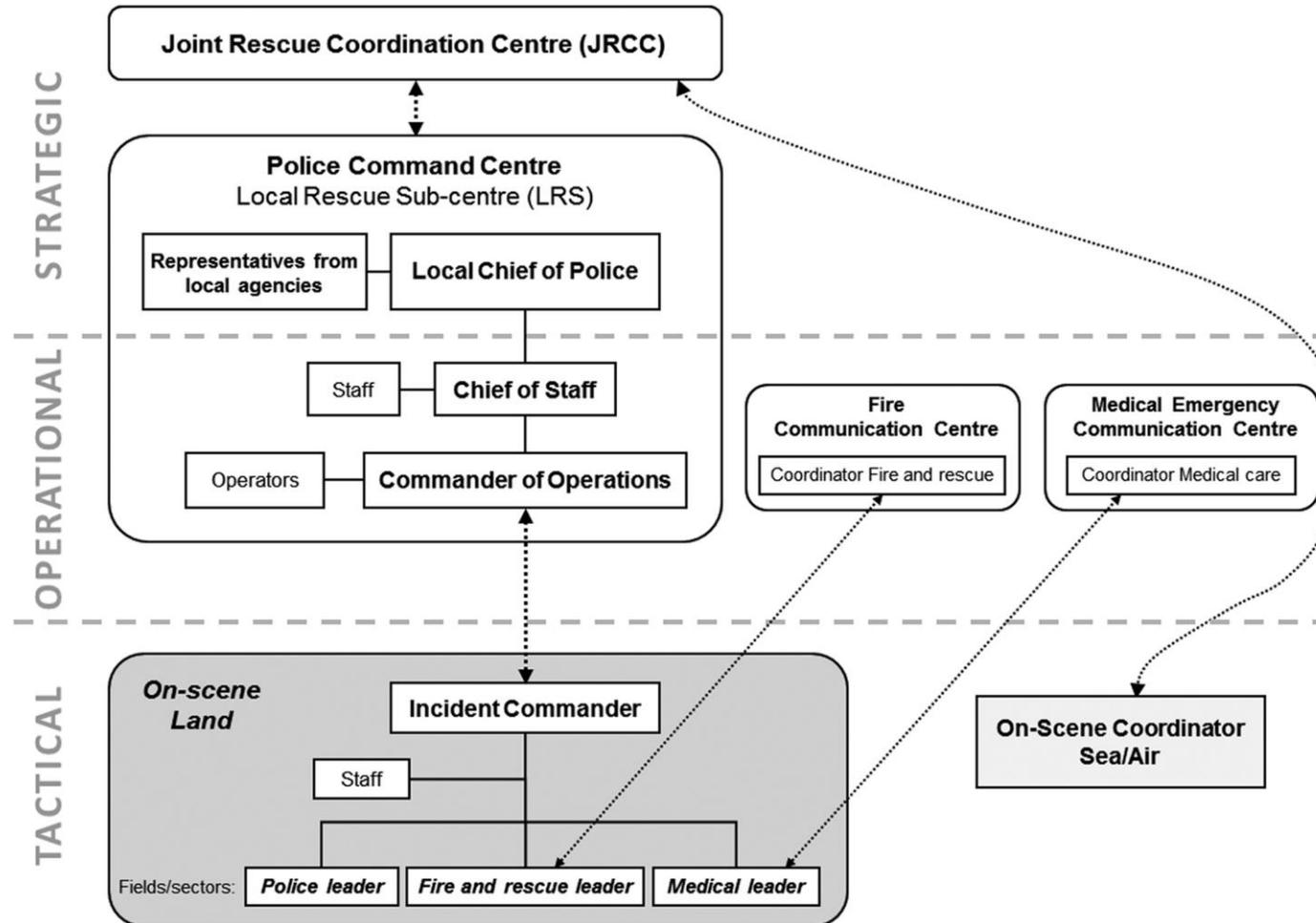
Office @NYCMayorsOffice 29 Oct
Stay inside. Do not go outside. Being outside is
dangerous. [#Sandy](https://twitter.com/Sandy)

Office @NYCMayorsOffice 29 Oct
There are no injuries or people trapped at 92 8th Ave
East, which involved the facade of the structure.

Use case study II (man made emergency): Oslo Shooting and Bombing in 2011.



Stakeholders in Response Phase:



Stakeholders' seven objectives/tasks in Response Phase:

- Personnel (administering response personnel and financial issues),
- Intelligence (gathering and assessing information, carrying out criminal investigations, dealing with the evacuated and their family members),
- Operation (planning and coordinating operative tasks),
- Logistics (managing resources),
- Information (passing on internal information and giving information to the media),
- Juridic (dealing with juridical issues), and situation specific (taking care of other tasks if the predefined six functions are not sufficient in a specific incident).

Information Sharing



NilsPetter N. P. Boland-Hagen
DO NOT CALL acquaintances on Utøya! It can put them in danger. Wait until they call you, even if it is bloody unbearable.
6:21 PM Jul 22nd, 2011 from web

NilsPetter N. P. Boland-Hagen
Message for all: DO NOT CALL acquaintances on Utøya!
6:19 PM Jul 22nd, 2011 from web

NilsPetter N. P. Boland-Hagen
Shooter at Utøya is supposedly wearing a police uniform or something. Has handgun, "shooting wildly" around, it is said.
6:12 PM Jul 22nd, 2011 from web

NilsPetter N. P. Boland-Hagen
Extent of injury so far is "some might be hurt, there is blood"
@Kristiansen
6:06 PM Jul 22nd, 2011 from web

NilsPetter N. P. Boland-Hagen
At least one person – in uniform – is doing the shooting. Several supposed to be shot/wounded!
6:04 PM Jul 22nd, 2011 from web

@NilsPetter
N. P. Boland-Hagen

DO NOT CALL acquaintances on Utøya! It can put them in danger. Wait until they call you, even if it is bloody unbearable.

22 Jul via web
Retweeted by Malinas and 100+ others

Situational Awareness:

- Situational awareness: Situational awareness is defined as “all knowledge that is accessible and can be integrated into a coherent picture, when required, to assess and cope with a situation”.
 - Perceiving, comprehending, predicting
 - a collective intelligence process.

Information for Situational Awareness:

- Example Tweets:
 - *OMG! The fire seems out of control: It's running down the hills!*
 - *Red River at East Grand Forks is 48.70 feet, + 20.7 feet of flood stage, -5.65 feet of 1997 crest. #flood09*
 - *My moms backyard in Hatteras. That dock is usually about 3 feet above water [photo] (from Reddit)*
 - *Sirens going off now!! Take cover ... be safe!*
 - *There is shooting at Utøya, my little sister is there and just called home.*
- Most messages do not contribute new / useful info:
 - repeats, impressions, personal, safety declarations
- Social media offloads other channels (phone, SMS)

Decision Making:

- Decision making: “ a process of taking important decisions by several entities to achieve a common goal by utilizing a combination of resources, information, and management tools”.

The Role of ICT during EM:

- Our focus is social computing:
 - social media, social software, user-generated content
 - blogs, microblogs, question/answer sites, social bookmarking sites, opinion/review sites
 - analysis of *microtext*, mesotext, macrotext
 - big data for triangulation, completion, augmentation
 - semantic technologies as enabler
- Social media for emergency management (SMEM):
 - an emerging ICT field
 - competencies such as: databases, natural-language processing, information retrieval, data mining, machine learning, network analysis, HCI

Organizational challenges

- Organizational culture:
 - focus on: *reliability* versus *innovation*
 - technology, data, access, rules, agility, flexibility
- Policies against social media use:
 - *capacity*: time, staff, skills
 - *data quality*: trustworthiness (representativeness, veracity, timeliness, processing)
 - *operations*: technology, bandwidth, commitment, expectations, responsiveness, monitoring
 - *policy*: individual initiatives hampered by large organizations, social media use is restricted.
- The *data deluge*

Data deluge

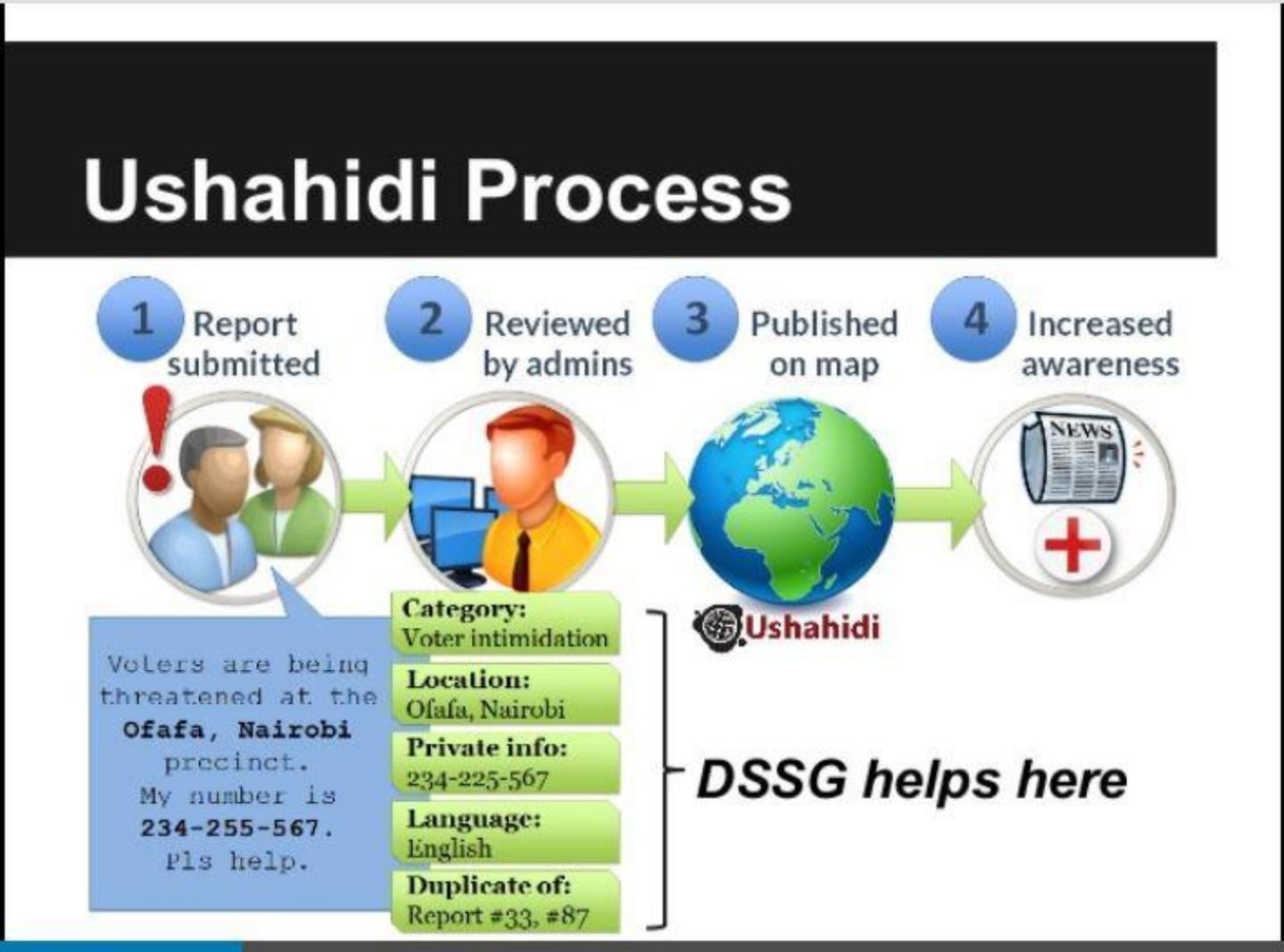
- Emergency responder organizations
 - unprepared for the social-media data deluge:
 - incomplete, real-time, unverified, unknown sources
 - but cannot
 - ignore the wealth of information it provides
 - ignore engaging with the communities behind it
- Information overload:
 - capacity to respond versus capacity to process
 - the latter is a filter failure:
- undefined needs, ineffective retrieval and processing
- Similar challenges on the provider (citizen) side
 - existing media become used in new ways

Practical Session

Ushahidi:

- <https://www.youtube.com/watch?v=EhT3co2qNAA>

Ushahidi Process



Ushahidi Tool

- Go to : <https://info319.usahidi.io/>

Tasks:

- Creating surveys
- Configuring data sources
- Visualization of data

Ushahidi Map: Crisis Mapping Saved Lives in Haiti



Use case:

- Fire accident at UiB
- Reporting to citizens.

*What to do in Two Weeks?
...and in the meantime !!*