Institute *for* Crisis, Disaster *and* Risk Management

THE GEORGE WASHINGTON UNIVERSITY
WASHINGTON DC

Improving Information Management: Supporting Collaborative Decision Making During Extreme Events

Institute of Medicine
Board on Health Science Policy

Workshop on Research Priorities in Emergency Preparedness and Response for Public Health Systems

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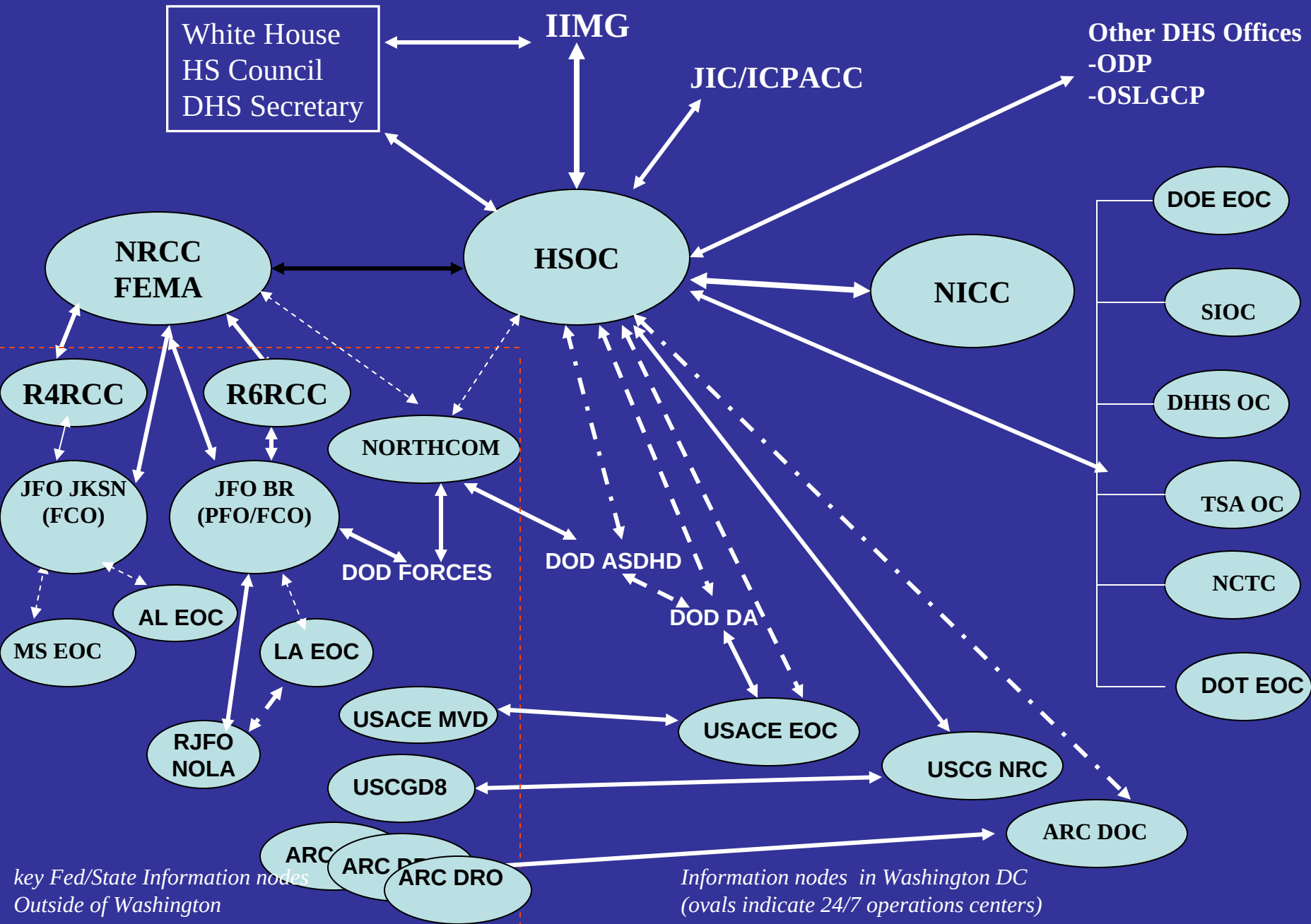
Four Challenges

- Enabling Medical and Health responders to operate as part of emergency management system
- Obtaining and maintaining situational awareness and common operating picture
- Supporting distributed, collaborative, innovative decision making
- Enabling inclusion of critical emergent stakeholders--organizations and individuals—in key decisions/actions

Three Examples of Extreme Events

- 2001--Washington, DC Anthrax attacks—minimal use of technology, ineffective coordination between public health, hospitals, emergency management. Ad hoc coordination emerged.
- 2005—Hurricane Katrina—chaotic conditions, failure of health, medical, and emergency management communications, coordination. Everyone dealing with their own reality.
- 2007—California Wildfires—minimal health and medical impacts, well coordinated, within capability of state, local, and Federal responders. “Dashboard” approach to situational awareness

Did Organizational Structure impede Information Flow during Katrina response??



31 ICT Post Katrina Recommendations Made by White House and DHS IG

- 11 Related to improving situational awareness, the "common operating picture"
- 10 Related to improving resource management and logistics
- 8 Related to incident management and operational communications
- 2 Related to public communications
- 1 Related to simulation and modeling

SITUATION: SOUTHERN CALIFORNIA WILDFIRES

- Major Disaster Declaration: FEMA DR-1731-CA
- Currently 9 active fires continue
- 487,873 acres have burned
- Pasadena JFO operational as of 10/24/07

IMPACTS

Fatalities: 7 confirmed death
Injured: 61 injuries
Property Destroyed: 2,098 structures
Property Damaged: 424 structures
Property Threatened: 21,450 structures
Search and Rescue: On Standby
Food and Water Requirements:
No report at this time.

Source: FEMA NRCC

Displaced Persons and Shelter Requirements:
- 4,512 individuals are being sheltered in 41 shelters

Health Impacts
- Ramona and Lake Arrowhead are on boil-water status
- OSHA/CDC are analyzing health affects from smoke exposure
- State expects requests for mental health support but does not anticipate exceeding current capabilities

Critical Infrastructure:
- FAA reports commercial flight operations in the affected area are normal
- State roads partially closed:
  - SR 18, 138, 173, 189, 330 (SAN BERNARDINO CO)
  - SR 76, 78, 79, 94, 188 (SAN DIEGO CO)
- The following areas are open to residents only: Lake Henshaw, Warner Springs, Ramona, Fallbrook, Rancho Bernardo, Potrero, Rancho Santa Fe, and Valley Center.
- Caltrans reports damage to guardrails, signage, debris, and shoulders. Caltrans anticipates erosion prevention due vegetation loss. Caltrans has issued oversize permits for movement of power poles.
- METRO-LINK will continue to run extra service through Friday.

Power:

As of Thursafternoon, San Diego Gas & Electric reported 23,017 customers out of power

Southern California Edison (SCE) reported 990 customers out of power.

The California Independent System Operator Corporation reported that three “South of SONGS (San Onofre Nuclear Generation System)” 230 kV lines to San Luis Rey are currently out of service.

Strart up may commence when the fires are no longer a concern to the San Onofre nuclear generating unit may be allowed to commence start-up.

Southern California Wildfires

INCIDENT STATUS

9 Fires	Acres	% Contained
Grass Valley	1,100	70
Slide	13,378	15
Witch	197,990	30
Poomacha	39,000	35
Rice	9,000	40
Santiago	27,000	30
Harris	84,300	20
Ranch	58,396	87
Pendleton (Ammo)	19,353	80
Total	**449,517**	

Sedgewick, Buckweed, Canyon, Cornado Hills, Cajon, Magic, McCoy, Meadowridge, Roca, Rosa have all been contained

Source: FEMA NRCC

COMMODITIES/SUPPLIES REQUESTED

- 50 Generators
- 2,000 cots
- 2,000 blankets
- FOSA Cache (ETA 1100 10/26/07)
- 16 Generators
- 1 MHE Kit

COMMODITIES/SUPPLIES EN ROUTE

- Logistics Support
  - 1 each Generator Packs (being prepared for transport)
- JFO Kits (2)

COMMODITIES/SUPPLIES RECEIVED

- March FOSA
  - 42,624 MRE
  - 2.808 Cots
  - 79,620 Ltrs Water
  - 4,450 Blankets
  - 2 Generator Pack
  - 86 generators
- Qualcomm Shelter
  - 16,528 Cots
  - 23,848 Blankets

Southern California Wildfires

NATIONAL RESPONSE

- NRCC Activation: Level 1: 24/7 Operations
  - All ESFs and DoD
- Region IX RRCC: Normal Operations

FEDERAL TEAMS REQUESTED

- 60 USFS Strike Teams
  - 10 Type I
  - 50 Type: III, IV, & VI

FEDERAL TEAMS DEPLOYED

JFO – Unified Coordination Group

FCO: Mike Hall
DCO: Col. Mark Armstrong
SCO: Henry Renteria
Senior Federal Official: Nancy Ward

JFO: 75 N Fair Oaks Ave
Pasadena, CA
(626) 431 – 3000

MACC: 2524 Mulberry St
Riverside, CA 92501
(951) 782 - 4169
(951) 276 - 6721

- ERT-A (Region IX)
- ERT-N Red
- FIRST Atlanta
- Emergency Transportation Center: Atlanta, GA operational
- 5 Modular Airborne Fire Fighting System (MAFFS) (DoD)
- 35 helicopters, to include one Firehawk with bucket teams, 1604 personnel (DoD)
  - CANG: 10,621 personnel
- 9th Civil Support Team
- 146th Air Wing
- 40th Special Troops Battalion
- Military Police Battalion
- 2 ATF, 2 CBP

- ESF 4 has apprx 13,000 firefighter personnel (all agencies)
- 70 ICE Special Agents
- Temporary Power Planning & Resource Team (USACE)
- TAV Team
- Temporary Housing Team (USACE)
- Tiger Team (USACE)
- National Environment Policy Act Specialist
- 3 MDRCs (Pasadena)
- 4 MDRC (Qulcomm)
- 3 MDRC en route to JFO ETA 10/26/07 1100 PDT
- ESF 8: NRCC, NM-1 DMAT & WA-1DMAT (San Diego), IRCT-IX (JFO), CA-1 & CA-4 Log Element (San Diego)
- MERS Denver (MEOV-2, TKU)
- MERS Bothell (MEOV-1, MEOV-2, MRV, IRV)
- MERS Frederick (Communications Personnel)
- Red FOSA Team (Log)

Source: FEMA NRCC

Premise: The major contribution of technology will be to create new capabilities, not to enhance old ones, for all disaster phases.

We are asking:

"How can technology improve our ability to do what we are currently doing within the constraints of our existing policies, procedures and structure?"

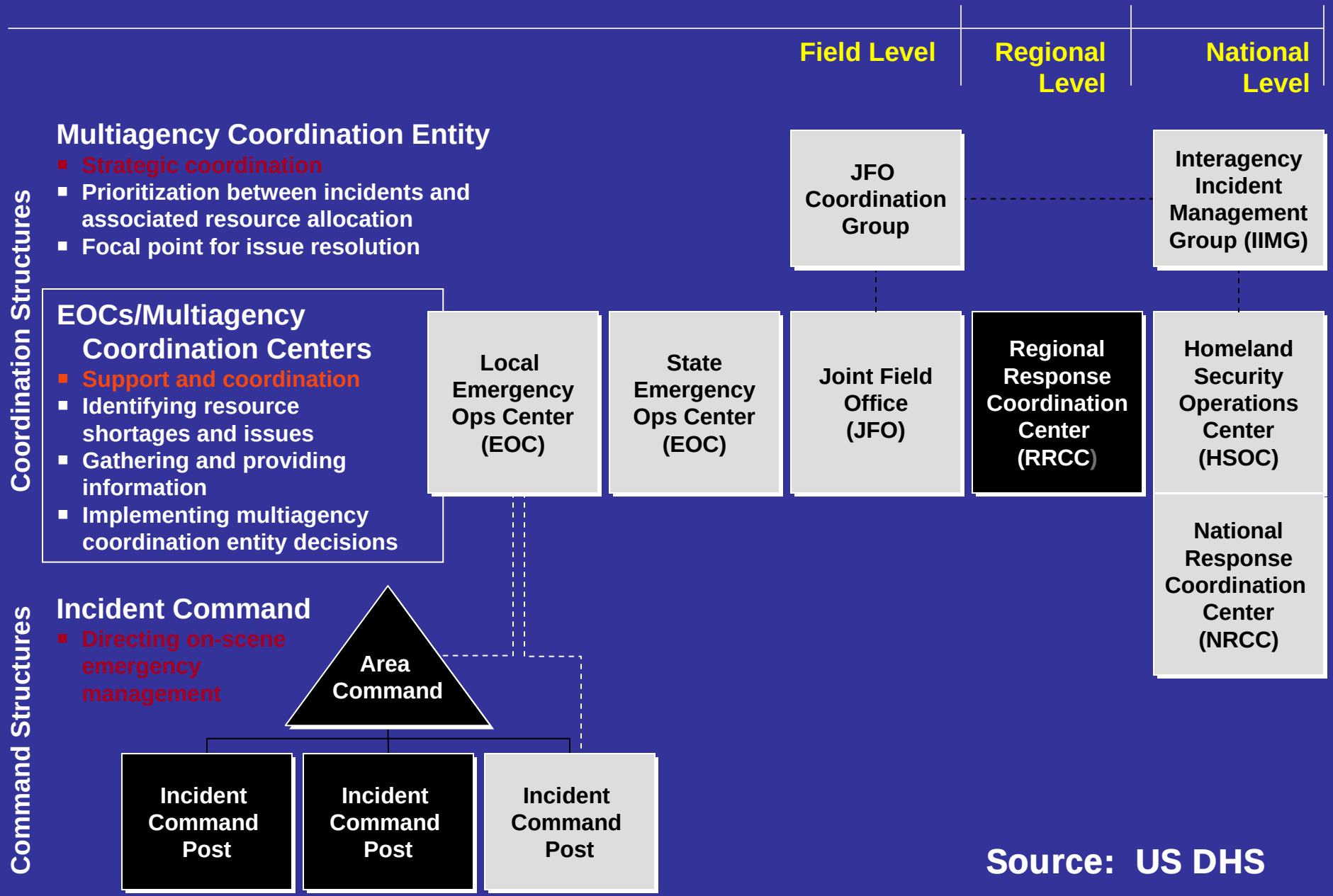
We should be asking:

"What new things can technology enable us to do that will dramatically improve or change processes and will produce better outcomes?"

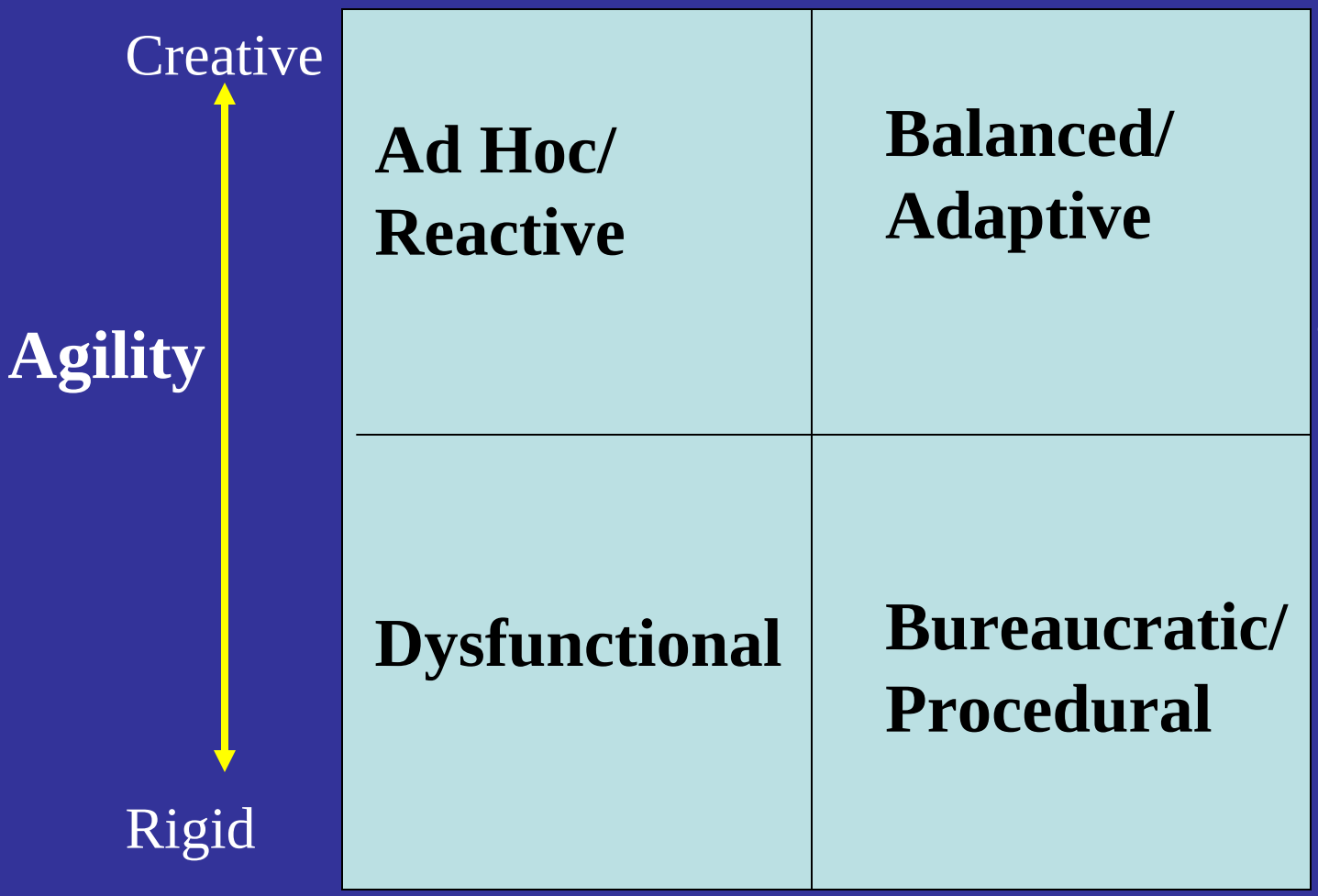
Organizational Context

- Response organizations from different jurisdictions and disciplines will use different organizational structures, strategies, and protocols.
- Organizations will evolve with time, incorporating unexpected partners and dealing with unexpected events
- Technologies used by different organizations will not be inter-operable
- There may be significant differences in political/organizational interests that must be resolved

NIMS Framework



Source: US DHS

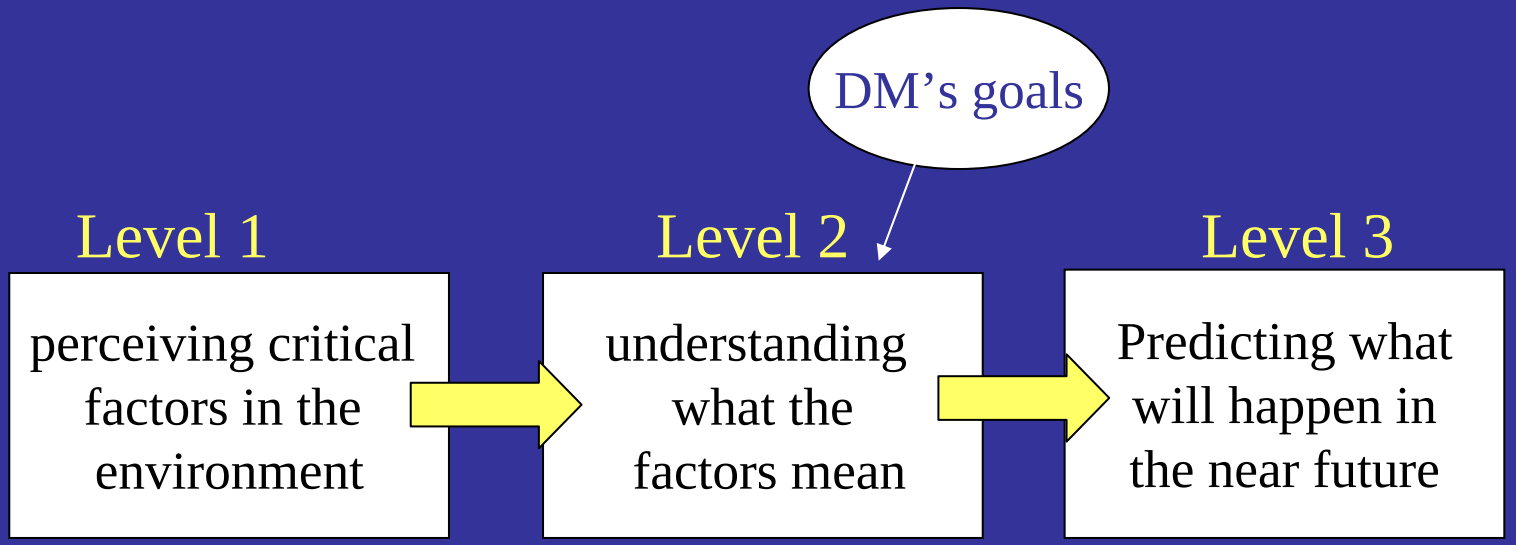


U.S. approach since 9/11 and Katrina has been to define doctrine and impose structure

What is situational awareness?

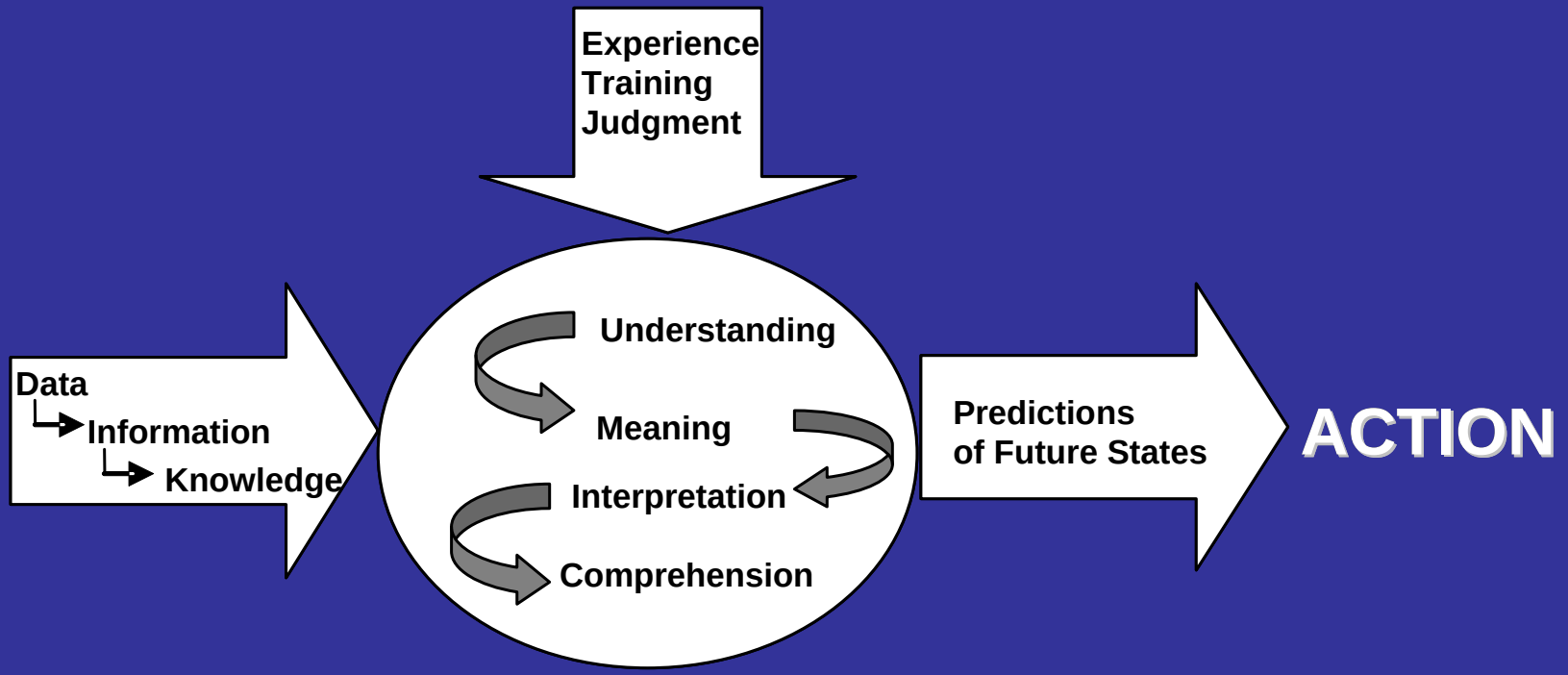
Originally an aviation term used to describe awareness of tactical situations during aerial warfare.

"the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning and the projection of their status in the near future" [Endsley].



Why is it important?

Make the correct decisions
Take the appropriate actions



Transformation of data into action (adapted from Ntuen, 2005)

Flawed Fundamental Assumption

People impacted by extreme event are viewed as immobilized “victims” to be served by specialized response resources

They are not victims, they are also resources:

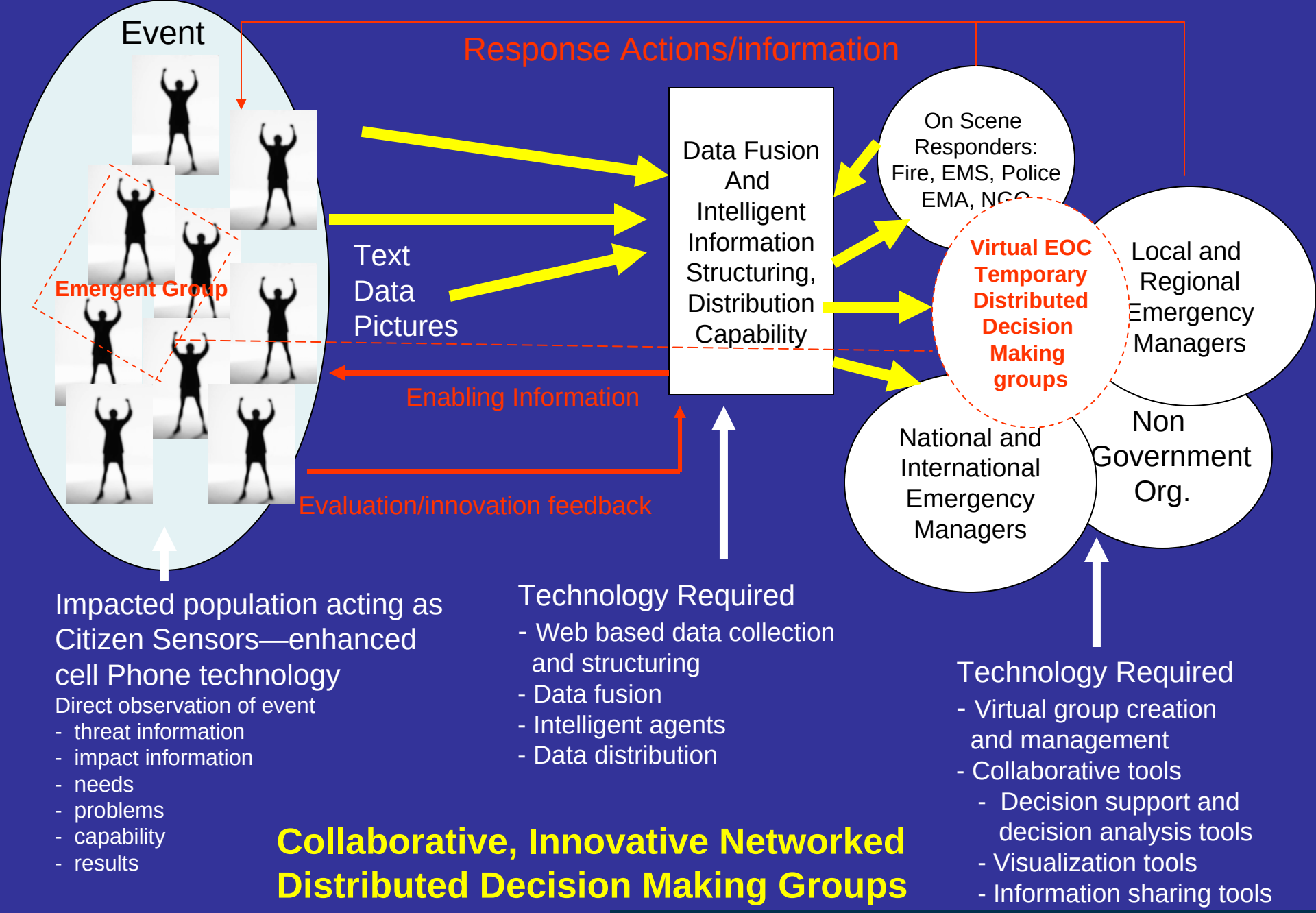
- they know where they are, what is happening to them, what services and resources they need, what problems the see, what they can do to help themselves and who is available to work with them.

- citizens should be viewed as information sources, resources, and evaluators of response actions. They know if response efforts are succeeding or failing

- in order to use this resource, citizens must be connected to and trusted by public sector responders and emergency managers.

Information and Decision Needs

- Impacted people need information to enable their protective and life sustaining behavior.
- Decision makers need to acquire situational awareness, determine citizen needs, identify problems, resource availability and needs
- Response organizations should be able to conduct “needs finding”, not needs assessment
- Virtual decision making groups are formed around problems, functions and issues
- Information and decision needs are dynamic and change as the event evolves.



Impacted population acting as Citizen Sensors—enhanced cell Phone technology

Direct observation of event

- threat information
- impact information
- needs
- problems
- capability
- results

Technology Required

- Web based data collection and structuring
- Data fusion
- Intelligent agents
- Data distribution

Technology Required

- Virtual group creation and management
- Collaborative tools
  - Decision support and decision analysis tools
  - Visualization tools
  - Information sharing tools

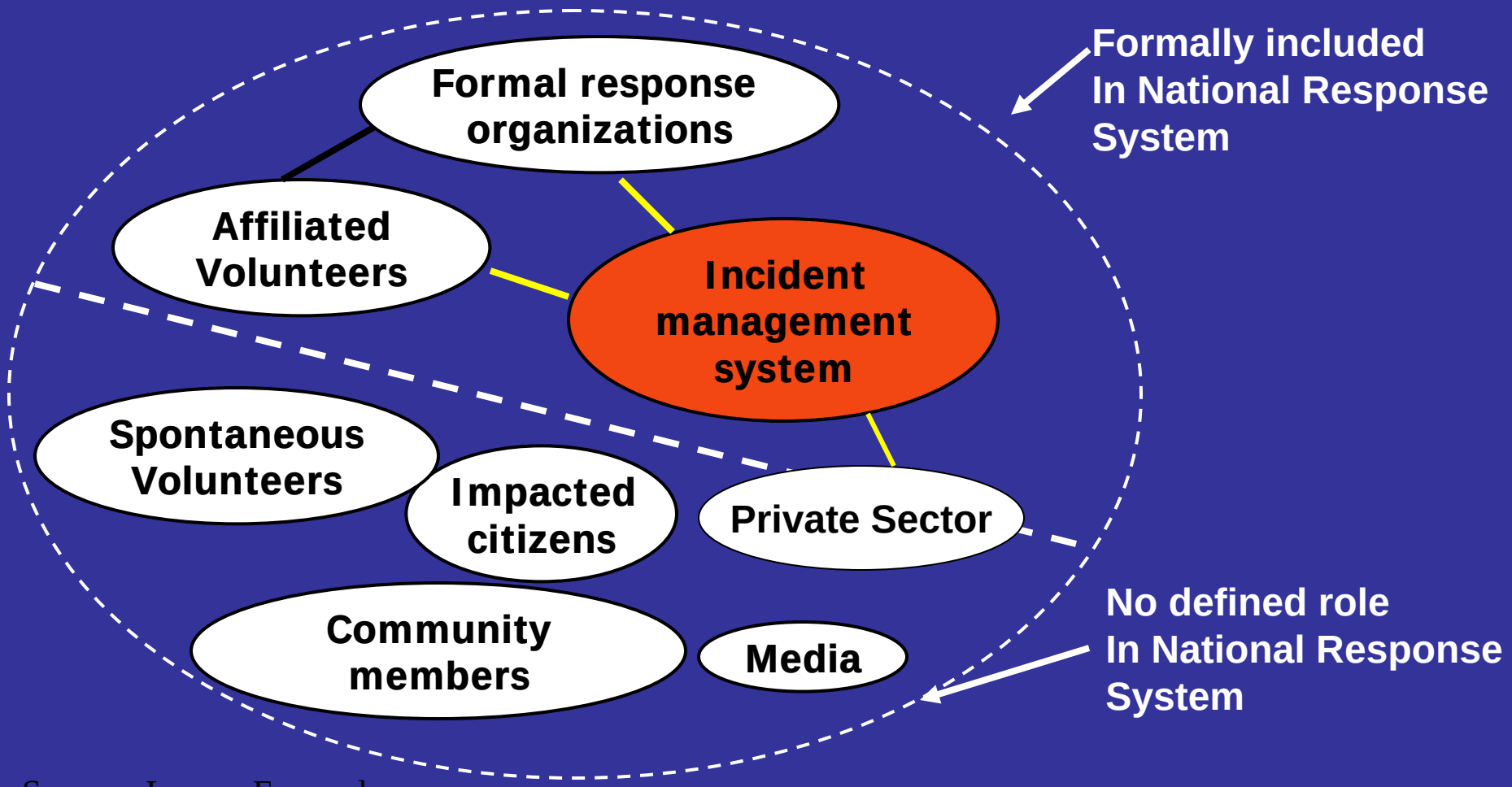
Collaborative, Innovative Networked Distributed Decision Making Groups

Technological Capabilities Required

- Connections between citizens and responders and among responders must be collaborative, scalable, and functionally and technologically interoperable.
- Resulting physical networks should foster, track, and coordinate innovation, adaptability and feedback and should enable the evolution of social networks.
- End result must be managed connectivity, innovation, and creativity leading to more effective and efficient delivery of services

The National Response System: Is it a closed system?

A system is a collection of inter-related components that work together to accomplish a common goal. Where is the system boundary? The national Response System makes it difficult for critical groups to participate.



Source: Lauren Fernandez

Decision Context

- **Decisions require collaboration of distributed, virtual groups**
- **Different phases of disaster present very different decision contexts—time criticality, information availability, connectivity**
- **The actions and decisions required evolve as the event evolves. The information required and the technology required is, therefore, dependent upon the phase of the crisis event**

Phases of a Disaster Response