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Social Resilience and Wildfires:

CONTINGENCY MODELS OF EFFECTIVE NETWORK STRUCTURES

FIRE CHASERS PROJECT

Advancing the science of adaptive capacity toward more disaster resilient communities

Program of Research

2008 – Investigation into information flow through disaster response networks

2009 – Investigation of factors that affect appropriate management response

2012 - Relational risk assessment and management in networks

2012 - A pre/post disaster investigation of the effect of network capacities on disaster response

2017 – Effective network governance for co-management

www.firechasers.ncsu.edu

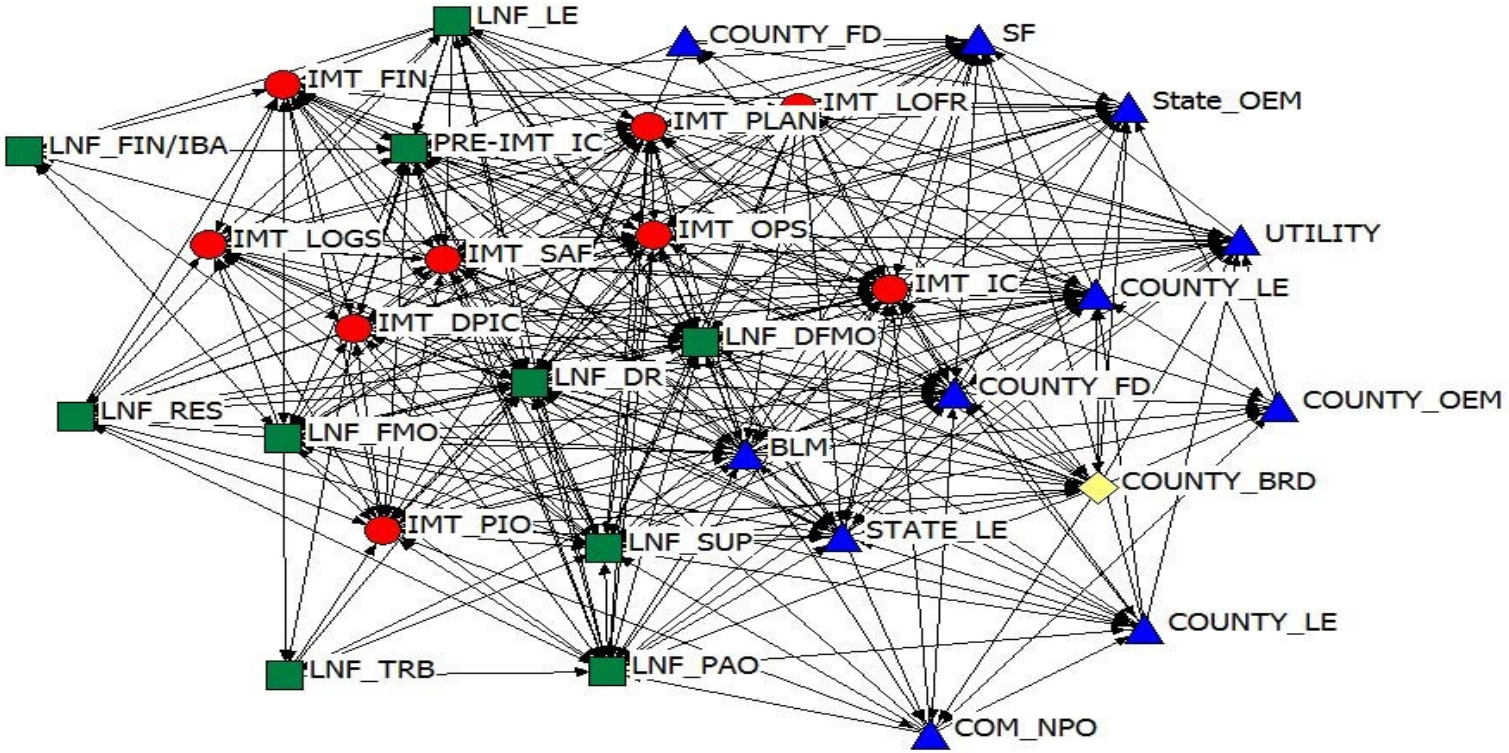
Agenda Today

How do we improve our capacity for governance of complex multi-jurisdictional disasters?

Fire management

Public safety
Public Utilities
Fire management
Tribal affairs
Public Information
Re-entry into evacuated areas
Evacuations
Animal Evacuations
Structure Protection
Road Closures
Politicians
Sheltering & Mass Care

Stag Fire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COUNTY_OEM
LNF_RES
LNF_FMO
BLM
COUNTY_BRD
IMT_PIO
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STATE_LE
COUNTY_LE
LNF_TRB
LNF_PAO
COM_NPO

QUESTIONS IN THE DISCIPLINE

How do we effectively characterize, coordinate and govern action in complex and dynamic networked setting?

Are certain network structures more robust, efficient and effective?

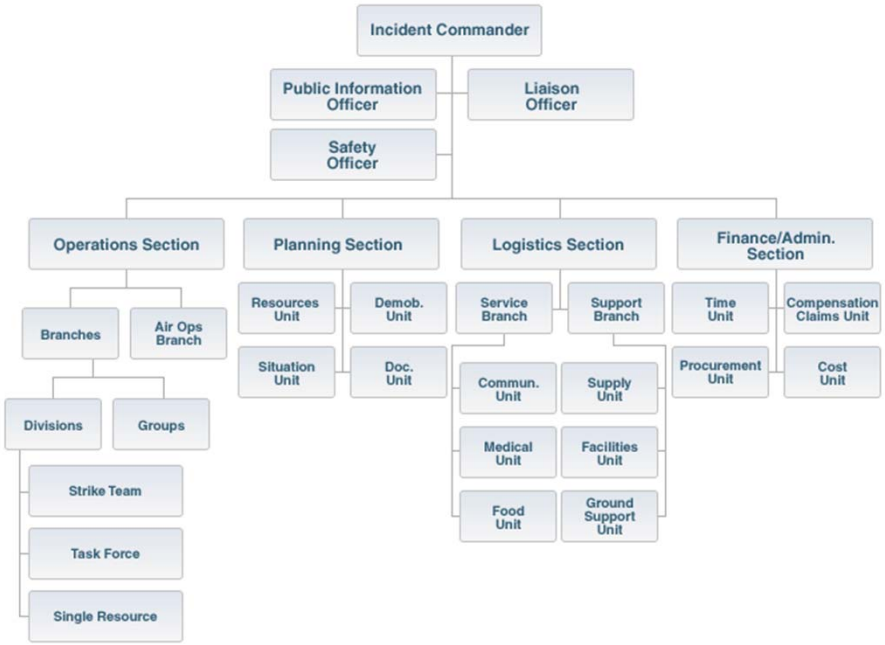
QUESTIONS FROM THE FIELD

Why should I care about social networks? I hate Facebook…

How the heck are we supposed to manage the network if no one is in charge?

Models of Disaster Governance: Hierarchy

COMMAND ORGANIZATIONAL STRUCTURE



REQUISITE CONDITIONS AND LIMITATIONS

- Requires superordinate entity who has authority to delegate or assume command
- Fragmentation of authority built into the very fabric of US governance

Models of Disaster Governance: Hybrids

EXAMPLES

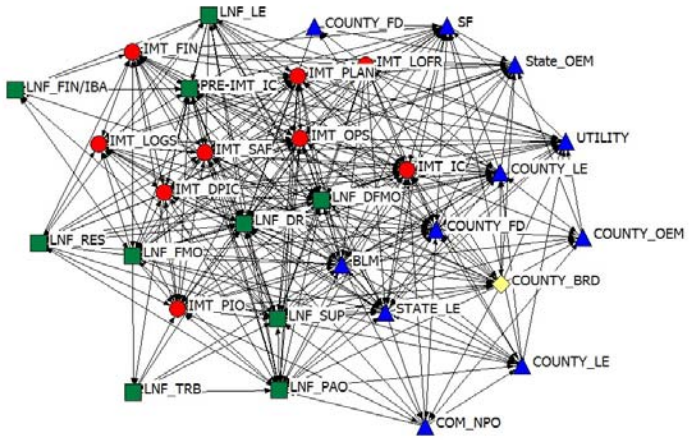
- Unified Command
- Joint Delegations of Authority
- Joint Information Centers
- Multi-Agency Coordinating Centers

REQUISITE CONDITIONS AND LIMITATIONS

- Legal documentation - Requires lead time to set up agreements and some pre-existing agreement framework upon which to base them
- Limitations in scale and scope – you can't get into unified command with EVERYBODY

Models of Disaster Governance: Networks

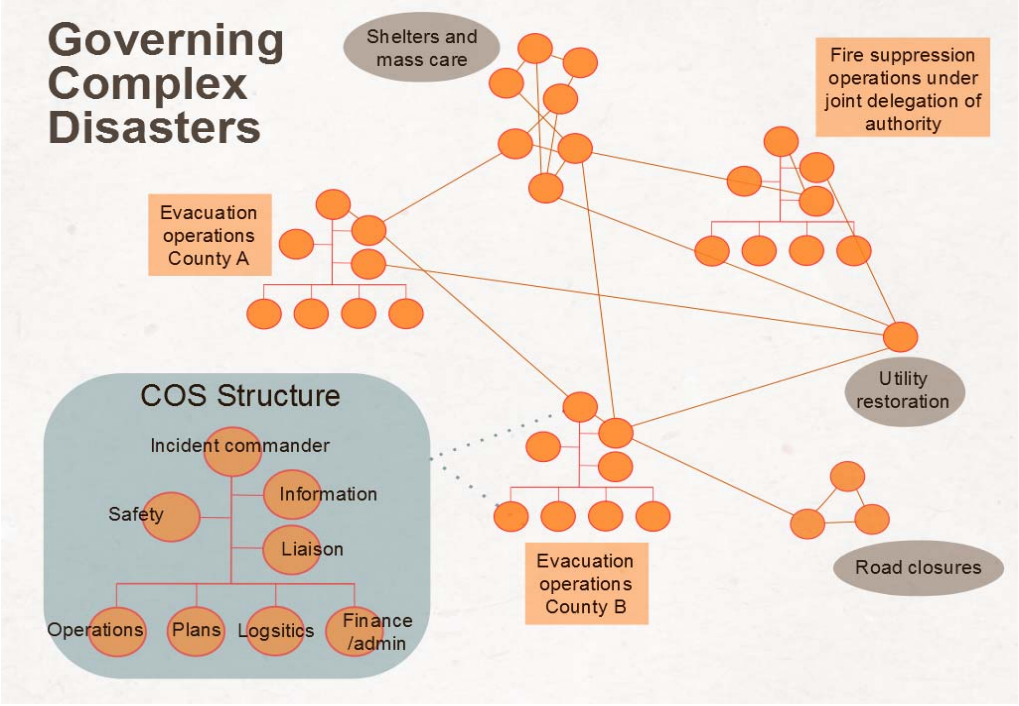
DEFAULT SYSTEM OF GOVERNANCE WHEN LEGAL BUREAUCRATIC AUTHORITY IS ABSENT



REQUISITE CONDITIONS AND LIMITATIONS

- Generally ad hoc and emergent
- Limited sophistication and training in incident response community re: managing networks
- We don't have models for effective structures of network governance

An integrated model of disaster governance



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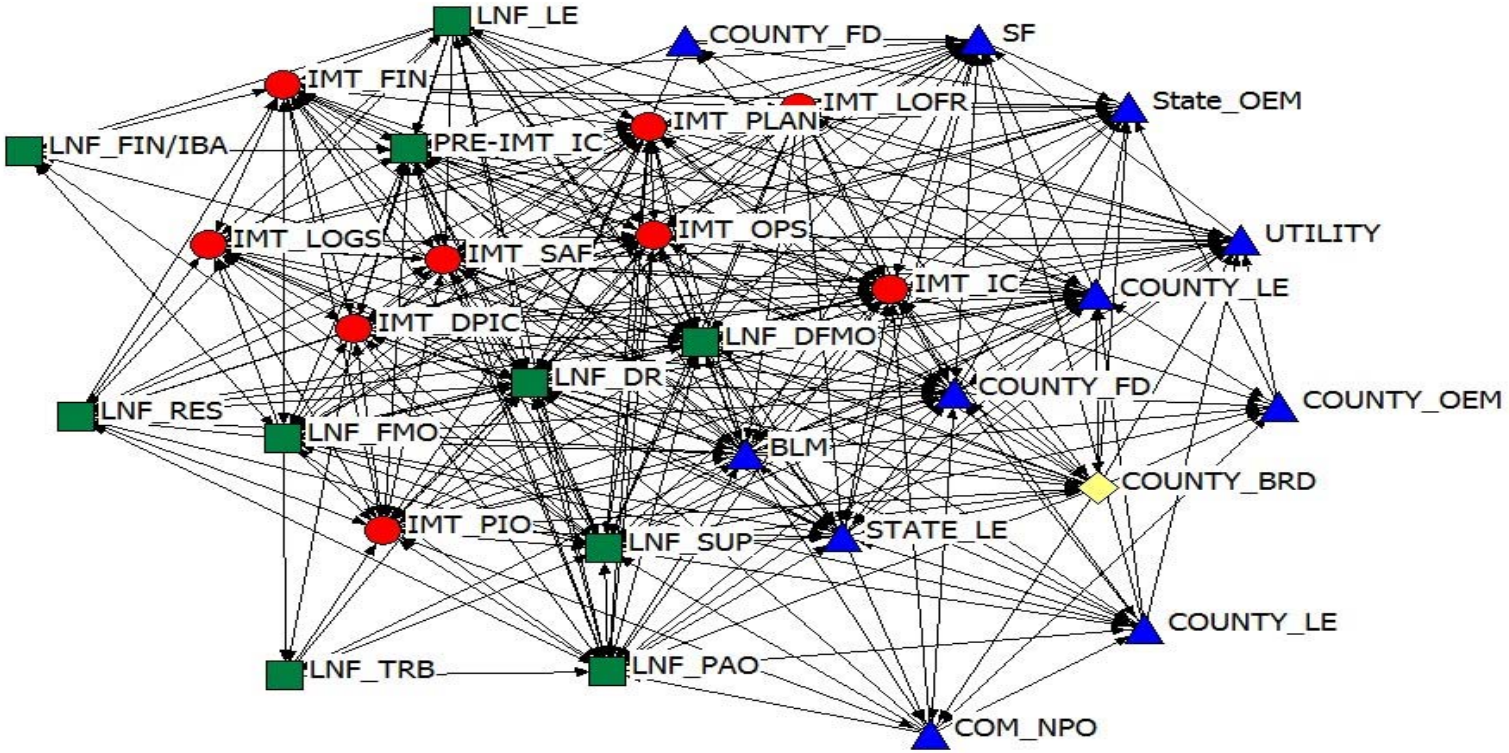
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What network structure leads to greater effectiveness?

Defining functionality of high performing disaster networks

1. ***Rapidly adapt*** to changing conditions on the ground by being able to ***adjust to variations*** in network composition and structure (e.g. Djalante et al. 2013; Kapucu et al. 2012; Comfort 2007).
2. ***Manage distributed information***, ensuring that information is able to rapidly flow from those who have it to those who need it in sufficient time to inform strategic action (e.g. Nowell and Steelman, 2014; Steelman and Nowell, 2014).
3. ***Avoid destructive interference*** that can undermine goal accomplishment (aka stay out of each others' way) by facilitating bilateral coordination between and among responders(Nowell and Steelman, 2012; Edwards, 2009)
4. ***Take collective action*** when an opportunity for collaborative advantage among two or more agencies/organizations presents itself (Gray, 1989; Nowell and Steelman, 2012)

Study context

Complex wildfire events in the wildland urban interface

- involving national Incident Management Teams operating under the Incident Command System

Methods

Step 1 - Identification of the range of network actors (n= ~40) commonly engaged in incident response during complex wildfire

Step 2: Network roster survey of 25 Type 1 incident and deputy incident commanders of National All Hazards Management Team

- - Question: Who needs to be in communication with whom in order for an incident to be managed effectively? Alt: which connections if NOT present indicate high likelihood for problematic coordination to occur to?

Step 3 – aggregation of the 25 cognitive networks into one shared model. Ties represent those ties in which 75% or more of the commanders agreed on its importance

Characteristics: Moderate core-periphery (GFI = .56) with brokered subgroups

Relatively low density (.14)

Moderate centralization (.51)

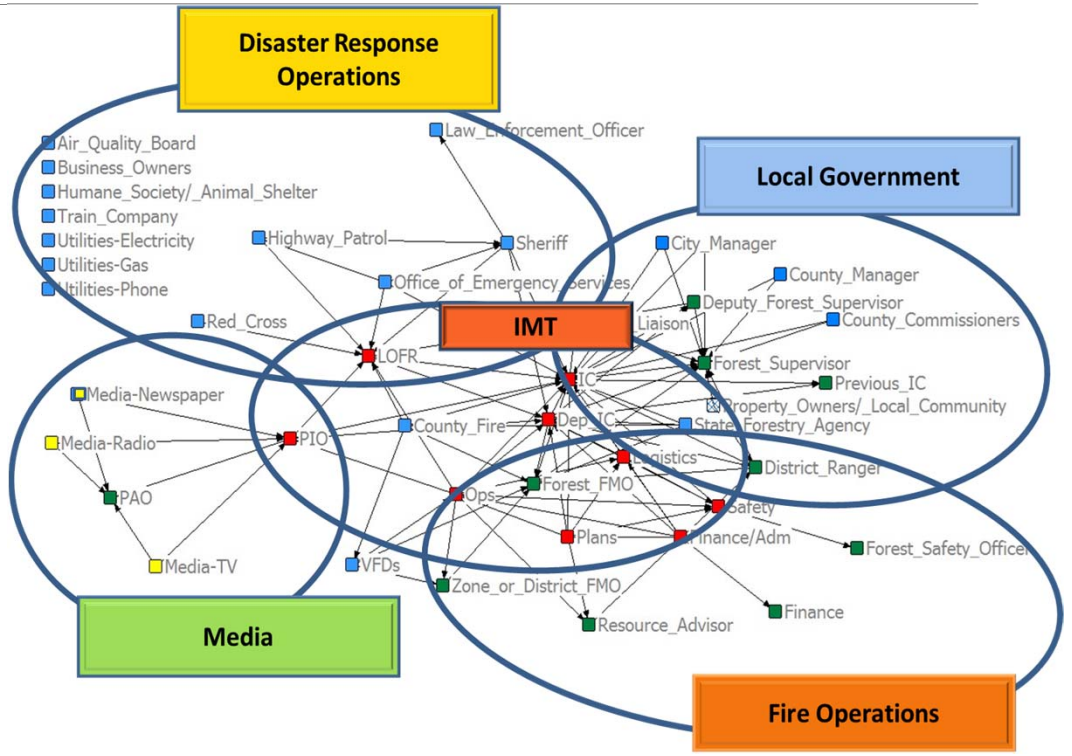
Functional groupings on the periphery

Central core:

- IMT
- HOST – Forest Supervisor
- HOST – Fire Management Officer

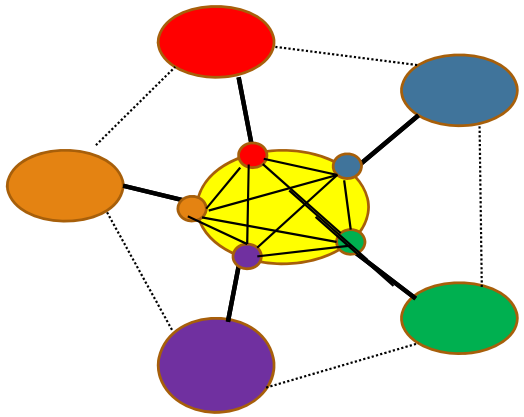
Brokers:

- IMT - Incident Commander (IC)
- IMT - Public information officer (PIO)
- IMT - Deputy Incident Commander (Dep_IC)
- IMT - Liaison Officer (LOFR)
- IMT - Operations
- COUNTY - County Sheriff
- HOST - Forest Supervisor



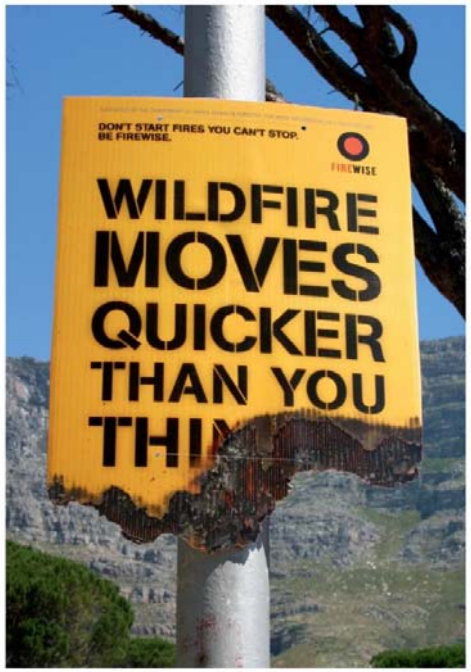
Propositions on the structure of effective incident response governance during transboundary disasters

1. Moderate core-periphery structure
2. Periphery organized into functional sub-group structure– bounded by function, NOT affiliation
3. Core composition not limited to IMT (as suggested in ICS) – includes trusted brokers to all functional areas
4. Dense linkages within the core
5. Redundant linkages between the core and functional sub-groupings
6. Redundant linkages between sub-groups



Concluding propositions

- Building social resilience to complex disasters will necessitate – in part – strengthening capabilities in network governance in NIMS and ICS
- NIMS/ICS needs to clarify the limitations and requisite conditions of different modalities of governance: hierarchical, hybrid, and network
- Developing capabilities to organize around core-periphery structures hold promise as path forward for organizing networks in dynamic settings



This project is directed by

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Research Funding Provided by:

This research is part of a larger initiative funded by the National Science Foundation, Joint Fire Science Program, and the USFS Northern Research Station.

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