DHS Summit- The Role of Transportation in Community and Individual-level Resilience
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William Wallace: Transportation and the Social Resilience of a Community
Primary
Resilient social infrastructures are key to a resilient community
Hospitals, banks, financial institutions and etc.
Social systems can be thought of as infrastructures
Civil and social infrastructures are deeply intertwined as neither can function without support from the other.
Dependency: social←→civil
Interdependency: social←→social, civil←→civil
Transportation serves as an interface between physical civil and social infrastructures
Community resilience is the ability of a community to withstand and recover from shocks-civil and social infrastructures are foundation of community resilience
Social infrastructure - service that is provided by people and supported by physical facilities→ crit. Infrastructure ex. Ag. And food, baking and finance, commercial facilities, Health care
Transportation is fundamental (civil infrastructure) for physical infrastructure such as power and wastewater, you may have a generator but lack the transportation capability to get fuel to the generator
Human resources that staff the civil and physical infrastructure need to use transportation to access the civil and social infrastructure they staff

Secondary
Civil infrastructure is infrastructure where service is provided by phys. Infrastructure but people manage the service
Physical infrastructure may oftentimes be the easier fix while social infrastructures may take considerably longer

MUNICIPAL: Multi-network civil infrastructure program for the analysis of lifelines
- tool to take into account the interdependencies between social and civil infrastructures
- Uses GIS Interface to model vulnerability and optimizes the civil and social infrastructure available for response

Social infrastructures nodes, (ex. Hospital) oftentimes serve more than one demand
Always a need to prioritize the demands→ life, safety, and emergency

Primary question: how to optimize the restoration of civil infra to minimize social infra and vice versa?

Thomas Montz: Integration of household decision making with dynamic transportation modeling to evaluate hurricane evaluation

Primary

Dynamic hurricane response: different hurricane scenarios will induce different evacuation demands, evacuees choose different routes as different storms approach

Goal is to model different types of scenarios using evacuation simulation with household decision making

Household decision making models: Will people evacuate, when will they evacuate, where will they evacuate to

To answer these questions: logit model, gravity model, intervening opportunities model

Individual evacuation decision making, focusing on the three primary questions notes that the context specific evacuation routes during Katrina were affected by several factor including, wind speed, direction of the storm, proximity of the city in the model

Evacuation simulation: model of New Orleans evacuation demand under different storm types

Problem: need to combination behavioral model and simulation model

Method: tested the use of decision models in simulation context, use Household decision model to predict evacuation , Hurricane Floyd

Evacuation departure time: based on logit model, four variables determine when they will leave→ time of day, evacuation order (mandatory or voluntary), hurricane wind speed, time to landfall

Increasing wind speed in model affects the human decisions to leave earlier, similar effect to increasing proximity of hurricane

Destination choice: logit model, assigns destination a probability based on : distance from origin, safety from storm, population size, and ethnicity proportions, 14 destinations were chosen

Depending on where the storm lands this will affect the decision making of people for destination centers

Dynamic transportation model based on TRANSIMS platform

Combined Model Process

Results: Departure Time

Traffic volume: model indicated where the heaviest traffic went, particularly the West

Conclusion: logit models and corresponding simulation yielded results accurate from evacuation planning perspective

Methodology has potential to recreate storms but can also see what the impact of the traffic will be

How will historical events influence traffic model?

-Other individual’s behavior will influence peoples evacuation decision making behavior

How will other individual's decision making affect the evacuation decision making behavior particularly social media technologies such as twitter?
How can technology be used to help evacuation decision making, such as allowing dynamic evacuation response advice to individual with the technologies available

Dr. Brian Sauser: Modeling the Influence of Zeroth Responders on the Resilience of a Maritime Enterprises

Primary

Collective effort and shared responsibility have focused the need to model and understand the effects of multiple actors and stakeholders
Neighbor to neighbor assistance needed to decrease the burden on the first responders
ZEROTH responders→ individual(s) acting spontaneously prior to the arrival of coordinated response group
Where does the zeroth responder fit into the resilience response?
How does the Zeroth responder move the resilience response closer to the disruption event and so the stable response closer to the resilience response

Zeroth responders and their role in a small vessel security strategy

-small vessel owners have a specific cultural aspect that is independence and a focus on autonomy
-Using the systemigram of small vessel security under the DHS Small vessel security strategy, zeroth responders can play a role in a number of nodes, specifically under maritime governance, where the small vessel community has limited interaction with the maritime security partners

- -Though they should work together they do not actually work together, but the paradox is that the solution is the problem because of the cultural aspects of the small vessel community

-Rudimentary model shows that zeroth responders in a small vessel security situation have a positive impact

Secondary

Need for a balance between vigilantism and effective zeroth response efforts
Need to characterize and create a typology for the before first responders
Primary questions

- Do zeroth responder strategies improve resilience of maritime supply chain?
- Are zeroth responder strategies cost effective? Are there better alternatives?
- In which part of the system state do the z responders provide a better impact?

Resilience modeling→ created a definition of resilience adaptive capacity of systems to meet and achieve priorities and goal to absorb or limit disruption while retaining continuity
-Goal is to address the paradox of small vessel community becoming part of the solution as opposed to part of the problem

What percentage of zeroth responders do you need to be beneficial to the response situation? Will you get that percentage in some places and not in other places?

-Social media plays into mobilizing zeroth responders in places where they may be needed but absent.
-The fear is that perhaps we may give out too much information and create a detrimental effect from too many zeroth responders
-The need for understanding context dependent situations for zeroth responders, which is why there is a need for specificity in modeling a zeroth responder model for context dependent situation

Geographic dependence, cultural dependence, social dependence, and myriad others