Disaster & Failure Studies Updates on Enhancing the Readiness of Teams

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NIST's Disaster and Failure Studies Program

Statutory Thrust

- Evaluate hazard events against deployment criteria
- Manage identification, vetting, and onboarding of NCSTAC members
- Develop agenda, manage logistics, and set frequency for NCSTAC meetings
- Create annual NCST reports to Congress
- Coordinate statutory activities across programs related to disasters.
- Conduct field studies under various authorities

Procedures Thrust

- DFS Standard Operating Procedures
- HOT Team membership, training, and credentials
- Field and safety protocols
- Human subjects protocols
- Manage equipment for disaster metrology and personnel protection
- Data preservation, security, and management
- Field tools (NDA's, permissions, survey instruments)
- MOUs with other agencies, academics, and others
- NIST Disaster Working Group

Research Thrust

- Research program focused on disaster metrology, including structural performance and social sciences
- Coordinate research activities with NIST EL Groups, disaster statutory programs, NIST EL Divisions, and other NIST Labs
- Coordination with the Center of Excellence of Risk-Based Community Resilience Planning on field studies
- NSF/NIST Disaster Resilience Research Grants Program
- Outreach and dissemination

*NIST deployed a team

Disasters Scored Sept 2019- June 2020

Date	Event	Event Consequence Score (max=5.0)	Evacuation & Response Score (max=5.0)
09/01/19	Hurricane Dorian (Bahamas)	3.0	5.0
09/10/19	Sioux Falls Tornados (South Dakota)	3.0	3.0
10/12/19	Hard Rock Hotel (Louisiana)	4.3	3.0
10/23/19	Kincade Fire (California)	2.5	1.0
12/17/19	Southeastern US Tornadoes (Louisiana, Mississippi, Alabama, Georgia)	2.8	1.0
01/07/20	Indios Earthquake Sequence (Puerto Rico)	3.9	3.0
01/10/20	Australian Firestorm (Australia)	4.5	3.0
01/15/20	Building Collapse (Washington, DC)	1.8	1.0
01/24/20	Doganyol Earthquake (Turkey)	3.5	4.0
01/24/20	Houston Plant Explosion (Texas)	4.0	1.0
01/28/20	Lucea Earthquake (Jamaica)	1.2	1.0

*NIST deployed a team

Disasters Scored Sept 2019- June 2020, Continued

Date	Event	Event Consequence Score (max=5.0)	Evacuation & Response Score (max=5.0)
03/03/20	Tennessee Tornadoes (Tennessee)	3.3	3.0
03/18/20	Magna Earthquake (Utah)	3.0	2.0
03/24/20	Tishomingo Tornado (Mississippi)	1.8	1.0
03/28/20	Jonesboro Tornado (Arkansas)	2.2	2.0
04/13/20	Multi-state Tornado Outbreak (Texas, Louisiana, Mississippi, Alabama, Florida, Georgia, Tennessee, South Carolina, North Carolina, Maryland)	3.4	3.0
05/02/20	Indios Earthquake Sequence (Puerto Rico)	2.7	2.0
05/15/20	Tonopah Earthquake (Nevada)	1.7	1.0
05/16/20	Los Angeles Building Explosion (California)	2.8	5.0

Updates to the Standard Operating Procedures

- Decision Process for Hot Team Membership
  - The “Hot Team” was created to readily expedite the deployment of “Active” staff into the field to conduct disaster and failure studies and to identify “Advisory” senior staff members, such as Division Chiefs and Lab Directors, who will not be in hazardous situations and largely interact at field offices or perimeter areas.
  - New process helps to ensure appropriate expertise along with commitment at various levels (individual, supervisor, DFS Director)
- Process and Training for Obtaining Data
  - Supports team members in determining when a formal agreement is necessary (e.g., FEMA MOUs)
  - Identifies key data privacy issues
  - Addresses data use
- Institutional Review Board (IRB) submissions for NCST Investigations
  - Language to distinguish investigations from research has been developed for Hurricane Maria
  - Content can be used for all future NCST IRB submissions
- New *Handling of Data and Information* contract clauses for NCST Investigations
  - Distinguishes evidence from data *created by a contractor* (modeling results, etc.)
  - Clarifies how National Construction Safety Team (NCST) Act (Public Law 107-231, codified at 15 U.S.C. 7301 et seq.) applies to each of these items

Updated Protocols for Pandemics

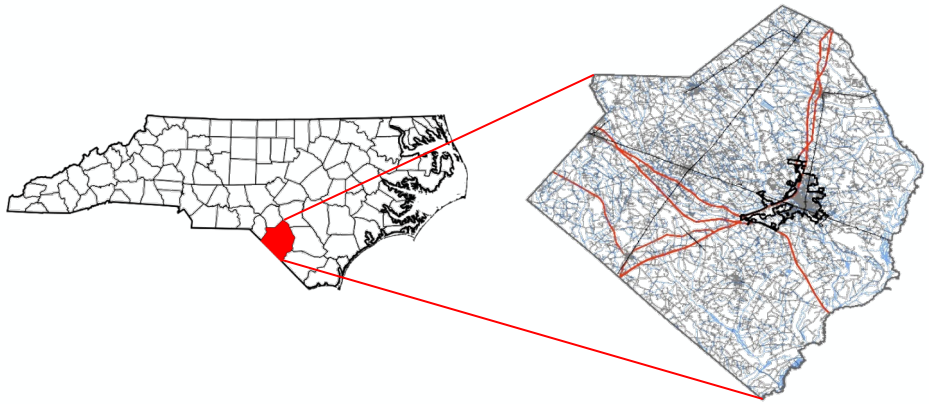
- DFS has updated the *Field Deployment First Level Hazard Review* to include COVID-19 with input from experts across NIST (e.g., Office of Safety, Health, and Environment, Health Unit)
- A new hazard scenario that uses COVID-19 as an example has been added to the *Field Deployment Incident and Emergency Response Plan*
- Within the DFS Standard Operating Procedures, the field deployment safety protocols are being updated to include "Pandemic (and other disease outbreak) considerations"

NIST SciServer

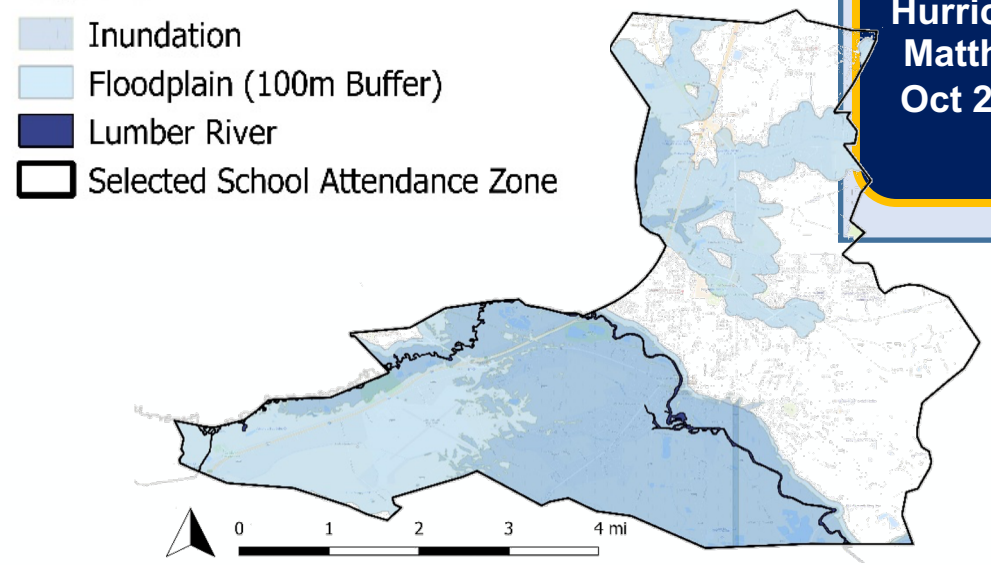
- SciServer is a system allowing Science Researchers across multiple domains to host and share their datasets and provide query and analysis tools for collaborative research.
- SciServer was deployed on NIST's Amazon Web Services (AWS) area, using Kubernetes installation
- The prototype aims to allow members of Hurricane Maria (HM) and other DFS projects to investigate its features
- Configured with dedicated storage on both file system and relational database servers

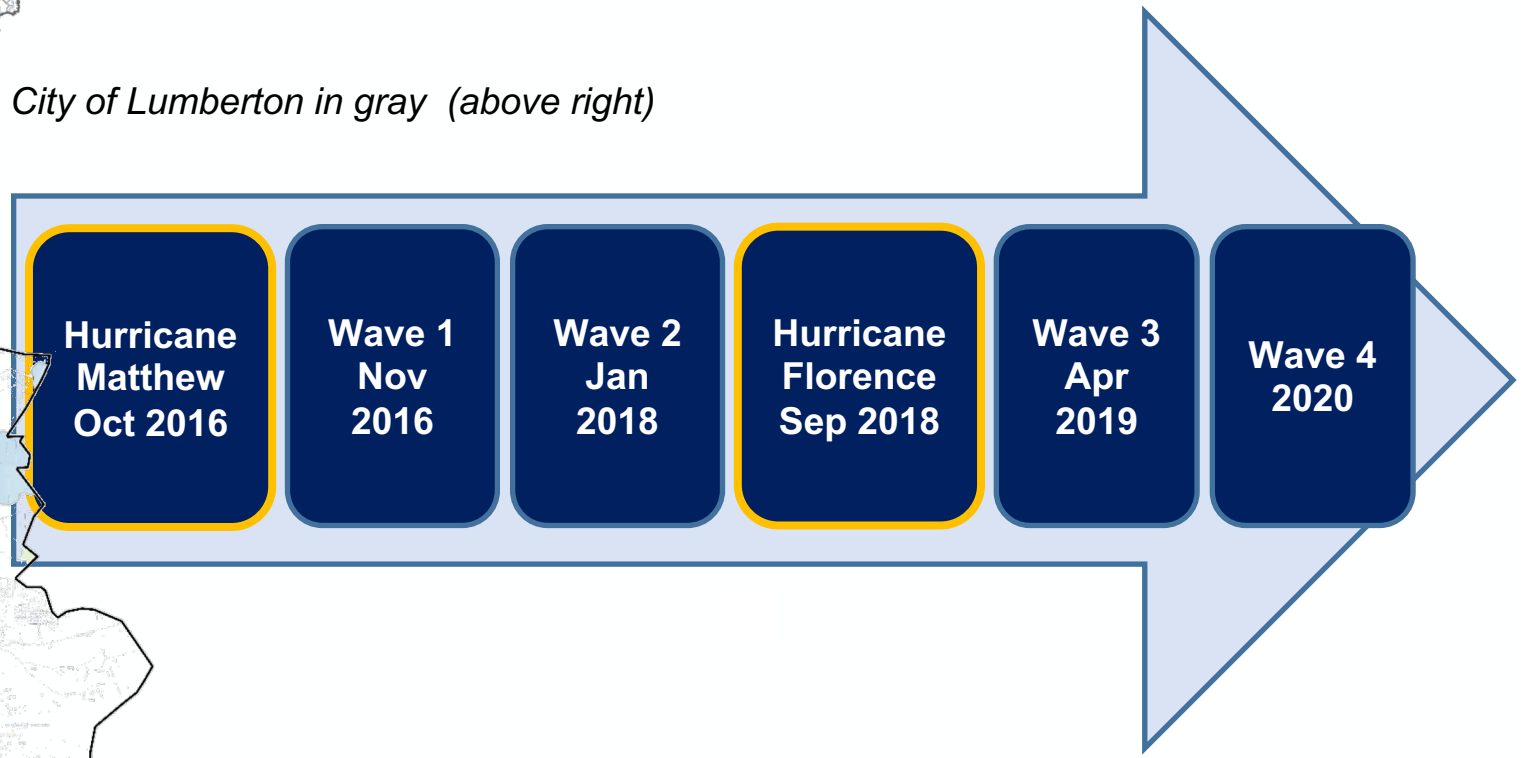
- Specific uses of SciServer currently being explored include:
  - Automated download of tabular and spatial data from US Census Bureau to support a range of investigations and field studies
  - Applications to support NIST systems modeling work for the Hurricane Matthew Longitudinal Field Study in Lumberton, NC

Collaborative Field Study in Lumberton, North Carolina

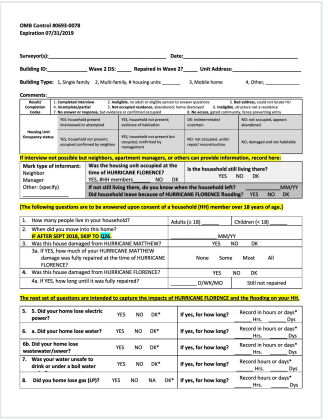


North Carolina (above left); Robeson County with City of Lumberton in gray (above right)
Lumberton Study Area (below)





New Recovery Instruments to Measure Multi-Dimensional Housing Recovery



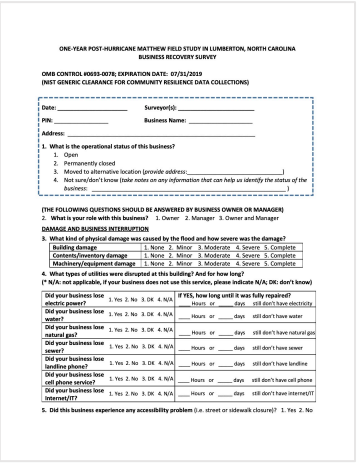
Housing Recovery State	Description
RS1: Repaired	All major repairs have been completed although minor repair work may remain.
RS2: Re-Occupied	The residential unit is re-occupied.
RS3: Restored Stability	The household plans to remain in the home at least one year.
RS4: Restored Accessibility	The household has the same or better access to community services as it did before the event.

Predictors of recovery outcome:

Damage, financial resources (insurance, government aid, and NGO assistance), income, race-ethnicity, housing tenure

New Recovery Instruments to Measure Multi-Dimensional Business Recovery

Business Recovery State (structure)	Business Recovery (firm's operating capacity)
RS1: Still in survival/response mode (but *will* recover)	Estimated **Δ** % capacity
RS2: Recovering	Revenue change
RS3: Mostly Recovered	Estimated **Δ** profitability
RS4: Fully Recovered	Estimate **Δ** # customer



ONE-YEAR POST-HURRICANE MATTHEW FIELD STUDY IN LUMBERTON, NORTH CAROLINA
BUSINESS RECOVERY SURVEY

OMB CONTROL #0693-0078; EXPIRATION DATE: 07/31/2019
(NIST GENERIC CLEARANCE FOR COMMUNITY RESILIENCE DATA COLLECTIONS)

Date: _____ Surveyor(s): _____
PIN: _____ Business Name: _____
Address: _____

1. What is the operational status of this business?
   1. Open
   2. Permanently closed
   3. Moved to alternative location (*provide address:* _____)
   4. Not sure/don't know (*take notes on any information that can help us identify the status of the business:* _____)

(THE FOLLOWING QUESTIONS SHOULD BE ANSWERED BY BUSINESS OWNER OR MANAGER)
2. What is your role with this business? 1. Owner 2. Manager 3. Owner and Manager

DAMAGE AND BUSINESS INTERRUPTION

3. What kind of physical damage was caused by the flood and how severe was the damage?

Building damage	1. None 2. Minor 3. Moderate 4. Severe 5. Complete
Contents/inventory damage	1. None 2. Minor 3. Moderate 4. Severe 5. Complete
Machinery/equipment damage	1. None 2. Minor 3. Moderate 4. Severe 5. Complete

4. What types of utilities were disrupted at this building? And for how long?
(* N/A: not applicable, if your business does not use this service, please indicate N/A; DK: don't know)

Did your business lose electric power?	1. Yes 2. No 3. DK 4. N/A	If YES, how long until it was fully repaired? ___ Hours or ___ days still don't have electricity
Did your business lose water?	1. Yes 2. No 3. DK 4. N/A	___ Hours or ___ days still don't have water
Did your business lose natural gas?	1. Yes 2. No 3. DK 4. N/A	___ Hours or ___ days still don't have natural gas
Did your business lose sewer?	1. Yes 2. No 3. DK 4. N/A	___ Hours or ___ days still don't have sewer
Did your business lose landline phone?	1. Yes 2. No 3. DK 4. N/A	___ Hours or ___ days still don't have landline
Did your business lose cell phone service?	1. Yes 2. No 3. DK 4. N/A	___ Hours or ___ days still don't have cell phone
Did your business lose internet/IT?	1. Yes 2. No 3. DK 4. N/A	___ Hours or ___ days still don't have internet/IT

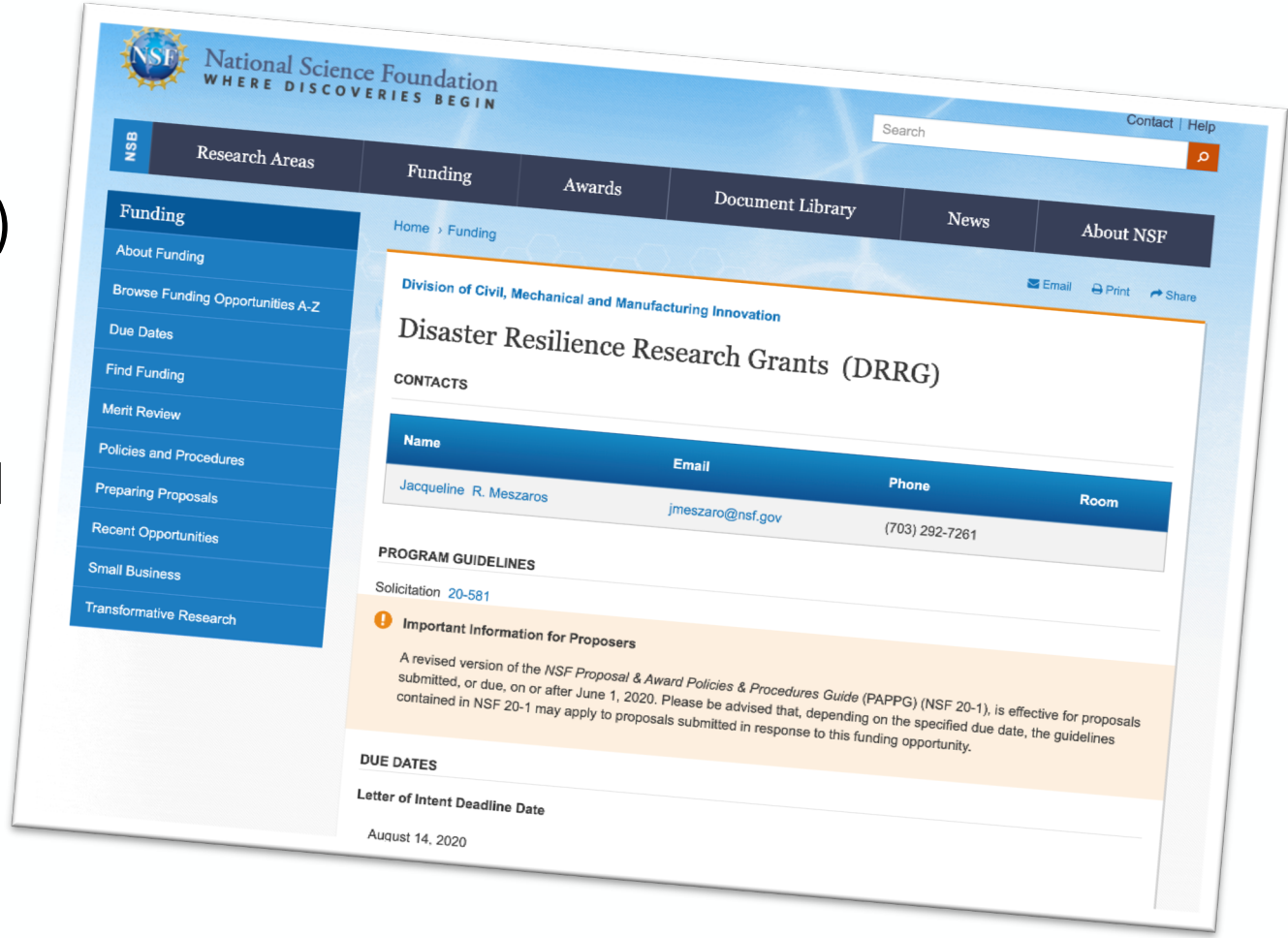
5. Did this business experience any accessibility problem (i.e. street or sidewalk closure)? 1. Yes 2. No

Predictors of recovery outcome (P fully recovered [1|0]):

Damage (building, contents), accessibility, customer loss, owner demographics, financial resources, employee issues

Disaster Resilience Research Grants

- In 2019, NIST made 12 awards totaling $6.6 million.
- **Program Solicitation:** With this joint solicitation, the NSF and the U.S Department of Commerce (DOC) National Institute for Standards and Technology (NIST) call for research proposals to advance fundamental knowledge related to disaster resilience. Advances in scientific and engineering methods and tools relevant to resilience are also of interest.
- **Letter of Intent Deadline Date** August 14, 2020
- **Full Proposal Deadline Date** September 15, 2020



Thank you

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