

**National Construction Safety Team
Advisory Committee (NCSTAC) Meeting Summary**

**National Institute of Standards and Technology (NIST)
Gaithersburg, Maryland**

September 06, 2019

Meeting Summary

Advisory Committee Members:

James Harris, Chair	J. R. Harris & Company
Reginald DesRoches, Vice Chair	Rice University
Ross Corotis	University of Colorado, Boulder
William Holmes	Rutherford + Chekene
Gary Klein	Wiss, Janney, Elstner Associates, Inc.
Jeannette Sutton	University of Kentucky

NIST Representatives, Guests, and Contractor Support:

Jason Averill	Chief, Materials & Structural Systems Division
Jason Boehm	Director, Program Coordination Office
Morgan Cain	Technical Writer (<i>FedWriters</i>)
Ben Davis	Designated Federal Officer, NCSTAC
Maria Dillard	Research Social Scientist, Community Resilience Group
Howard Harary	Director, Engineering Lab
Kenneth Harrison	Operations Research Analyst, Community Resilience Group
Jennifer Helgeson	Research Economist, Applied Economics Office
Thomas Kirsch	Director, National Center for Disaster Medicine & Public Health (<i>University Services University</i>)
Erica Kuligowski	Team Lead, Hurricane Maria NCST
Gerard Lemson	Research Scientist, Dept. of Physics & Astronomy (<i>Johns Hopkins University</i>)
Marc Levitan	Research Wind Engineer, Structures Group
Joseph Main	Associate Team Lead, Hurricane Maria NCST
Carmen Martinez	Admin. Specialist, Engineering Lab Data, Security & Technology
Judith Mitrani-Reiser	Director, Disaster & Failure Studies
Andrew Mundy	IT Specialist, Engineering Lab Data, Security & Technology
Long Phan	Leader, Structures Group
Carolyn Rowland	IT Security Officer, Engineering Lab Data, Security & Technology
Alexander Szalay	Professor, Dept. of Physics & Astronomy (<i>Johns Hopkins University</i>)
DongHun Yeo	Research Structural Engineer, Structures Group

Meeting Summary:

I. Opening Remarks, Introduction, and Agenda Review

The Designated Federal Officer, Ben Davis, opened the meeting at 8:30 am EDT. The Committee members and other attendees introduced themselves. Biographies for all the NCST AC members and Hurricane Maria NCST members can, respectively, be found at:

<https://www.nist.gov/topics/disaster-failure-studies/national-construction-safety-team-ncst/advisory-committee-members>

<https://www.nist.gov/topics/disaster-failure-studies/hurricane-maria/hurricane-maria-team>

Following a review of safety procedures, Mr. Davis introduced Dr. Jason Boehm, who provided opening remarks. Dr. Boehm thanked Committee members for their time, commitment and willingness to serve, noting that their contributions make an important difference. Since the last Advisory meeting, he noted that NIST has worked to implement recommendations set out by Committee members. He also said that NIST has been working on a new NCST investigation focused on Hurricane Maria's impacts on Puerto Rico. Dr. Boehm then turned over the meeting to Dr. James Harris.

Dr. Harris, the Chairperson of the Committee, reminded everyone of the previous year's report to Congress, and said they would review their recommendations and NIST's responses to those recommendations. Dr. Harris reviewed the agenda and asked Dr. Howard Harary to provide NIST's responses to the Committee's recommendations included in their FY 2018 report. A copy of this report is available at:

https://www.nist.gov/system/files/documents/2019/02/04/ncstac_2018_report_to_congress.pdf

II. Response to NCST 2018 Report to Congress:

Dr. Harary briefly reviewed the NCST Act and the Advisory Committee's Charter. A copy of his presentation is available at:

https://www.nist.gov/system/files/documents/2019/09/19/01_harary_ncstac_sept2019_response_to_annual_report_final.pdf

Dr. Reginald DesRoches asked about NIST's opportunities to work with the SimCenter. Dr. Mitrani-Reiser responded that the NCST is looking at it from two perspectives, from DFS readiness, and potentially what people could do once they have the data coming out of the investigation. The SimCenter is intended to simulate the impact of natural hazards on structures, lifelines, and communities.

Dr. Ross Corotis asked if a lack of funding could change the way future concerns are addressed. Dr. Mitrani-Reiser and Dr. Harary responded that an evaluation of each event is done independently of the funding need to investigate. After initial scoring of events by NIST staff, NIST may send a team to perform an initial reconnaissance of the event and collect preliminary observations to determine whether NIST should initiate an investigation or take on other

activities. NIST's goal is to be unbiased in their evaluation of an event. There are other statutory authorities that can be used to research disastrous events, such as NIST's Organic Act, the National Windstorm Impact and Reduction Act, and the National Earthquake Hazard Reduction Act. The Disaster and Failure Studies Program includes funds for preliminary reconnaissance activities in their annual program planning. However, when an event is determined to warrant a full NCST investigation, funds must be identified within the allocated NIST budget to support the new effort. To date, NIST has been able to identify and allocate funding for all NCST Investigations.

Dr. Corotis asked whether the Environmental Protection Agency's (EPA) proposed data policy had changed any procedures or caused pressure or concerns for NIST. Dr. Harary responded that NIST has not received any specific instructions related to the EPA proposal.

Dr. Harris asked if there other events that NIST has scored over the past year. Dr. Mitrani-Reiser responded that NIST scores approximately a dozen events per year. In the past year, NIST deployed to about 40% of those events.

Dr. Sutton asked if NIST will discuss the Committee's recommendation #2, which is focused on what local talent will be utilized in the investigation. Dr. Kuligowski responded that this information will be made clear through the presentations that will be provided to the Committee throughout the day.

III. Progress on Implementation of the Joplin Tornado Recommendations and Discussion:

Dr. Long Phan and Dr. Marc Levitan presented on implementation activities related to the Joplin Tornado NCST investigation. A copy of their collective presentation is available at:

https://www.nist.gov/system/files/documents/2019/09/19/02_phan_levitan_ncstac_sept2019_jopl_in_recommendations_update_final.pdf

Mr. William Holmes asked if there has been any controversy about the concept of a larger size facility having greater tornado wind speeds than a smaller facility. Dr. Levitan responded that the likelihood of a building having a large plan area (i.e., footprint) being hit by a tornado is greater than the probability of a building with a smaller area being hit. For any given return period, this translates into buildings with larger plan areas having greater tornado design speeds than smaller buildings. Since this is very different from all other other hazards, it creates a communication challenge, but one the team is in the process of addressing.

Mr. Klein asked about the bifurcation of tornado design for typical buildings that might be designed for an EF-1 and for shelters that have to withstand much more drastic events. Dr. Levitan stated that tornado design is already bifurcated: the International Code Council's ICC 500 Standard governs the design of storm shelters using deterministic maximum considered tornadoes. In the next code cycle, the ICC may consider using the new probabilistic tornado hazard maps, but at longer return periods than proposed for conventional building design.

Dr. Sutton asked if the data used to create the maps are all historical data or if there are any temporal trends? Dr. Levitan responded that historical tornado data are being looked at in terms of temporal trends. Once in the modern era, there are no significant changes over time. In the past, there were no radar networks, spotter networks or cell phones; these additions have caused a major shift in the temporal trends.

IV. Hurricane Maria Program Updates, Part I

Dr. Erica Kuligowski gave a summary of NIST's efforts to investigate and study Hurricane Maria's impacts on Puerto Rico. A copy of her presentation is available at:

https://www.nist.gov/system/files/documents/2019/09/19/03_kuligowski_overview_slides_ncst_sept_6_-_after_occ_final_wo_notes.pdf

Dr. Harris asked the Committee if they had any questions. There were none.

Drs. Judith Mitrani-Reiser, Erica Kuligowski, and Joseph Main presented on the methods being implemented in the Hurricane Maria NCST investigation. A copy of their collective presentation is available at:

https://www.nist.gov/system/files/documents/2019/09/19/04_mitrani_kuligowski_main_ncstac_sept2019_methods_final.pdf

Dr. Harris asked the Committee if they had any questions. There were none.

Mr. Ben Davis gave a summary of the contracts supporting the Hurricane Maria investigation, as well as the overall project management and communication of the Hurricane Maria Program. A copy of his presentation is available at:

https://www.nist.gov/system/files/documents/2019/09/19/05_davis_overview_slides_ncst_sept_6.pdf

Dr. Corotis asked if Strativia is a commercial firm and whether there are any companies or other expertise being explored locally in Puerto Rico. Mr. Davis responded that involving Puerto Ricans is of great importance to the Hurricane Maria Program because they experienced the event and its aftermath. Davis said that NIST is looking into using local firms.

Dr. Mitrani-Reiser, Ms. Carolyn Rowland, and Ms. Carmen Martinez presented on data security and management for the Hurricane Maria NCST investigation and the NIST Disaster and Failure Studies Program. A copy of their collective presentation is available at:

https://www.nist.gov/system/files/documents/2019/09/19/06_mitrani_ncstac_sept2019_data_management_final_with_demo.pdf

Dr. Harris asked the Committee if they had any questions. There were none.

NIST PREP (Professional Research Experience Program) Associates, Drs. Alex Szalay and Gerard Lemson, presented on their work on databases and SciServer, which allows researchers online access to the data and offers scientific data hosting, personal storage, query hosted databases, computational analysis on hosted data, collaboration and sharing as well as API integration. A copy of their collective presentation is available at:

https://www.nist.gov/system/files/documents/2019/09/19/06_lemson_ncst_ac_2019.pdf

Dr. Corotis asked about the relevance of the astronomy work shown in the last few presentations regarding data collection. Dr. Mitrani-Reiser responded that the relevance is that both Dr. Szalay and Dr. Lemson have been hired at NIST via the PREP program to better understand what works in other fields where data sharing advances their science, identify what can be borrowed from those fields, and summarize the options that currently exist in the disaster space regarding data management. Their expertise is applicable to the work being done as a part of the Hurricane Maria investigation, because disaster data that are usable and easily accessible by anyone, will too, advance the disaster science.

Dr. Corotis asked about the maps that were presented showing the topographical speed-up effects, and wanted to know if actual data were used to develop those maps and if so, what were the data sources used to create the detailed map of Puerto Rico. Dr. Main responded that NIST contracted with Applied Research Associates (ARA), who has an existing model for topographic effects. Dr. Main also mentioned that the Team also has plans for wind tunnel testing and computational simulations. No field data has been collected to date.

Dr. DesRoches asked for further explanation on the challenges with data and the issue of liberating data and how this may apply to NIST's domain. Dr. Szalay responded that there is an incredible amount of hype about artificial intelligence (AI), and it is increasingly becoming a commodity as tools are being built by Google, Amazon, and others. The main concern needs to be the quality of the data we are feeding the AI. Dr. Szalay stressed that we need to focus on organizing and cleaning up the data to liberate the data.

Mr. William Holmes asked how wide a net is being cast for the developing database. Dr. Mitrani-Reiser responded that the goal is to liberate data quickly and effectively. Companies are developing architecture and platforms that will allow us to access the required services. Dr. Mitrani-Reiser said that disaster data is still quite siloed, and not being combined and analyzed together with other scientists and practitioners. Dr. Mitrani-Reiser emphasized that we should connect the datasets, but we need the space to do so.

Dr. Sutton asked if it was still necessary to have a survey reviewed for six months by the public before it can be launched. Dr. Mitrani-Reiser responded that the (Paperwork Reduction Act) process is not that long, and it is looking like a couple months rather than the full six-month period. Dr. Kuligowski said that NIST is now determining what data exists and who has it, in order to reduce duplicating efforts. Dr. Kuligowski emphasized that the survey research data collection contract has been a long process. However, she said that the technical evaluation team is trying to anticipate and mitigate obstacles for collecting good data in the field. For example,

they will look for strategies to interview people in a way to help them recall the event to gain more accurate data.

Mr. Gary Klein asked how the data being queried would enhance public safety and wellbeing. Dr. Mitrani-Reiser responded that it's important to have anchors in time and space to tie facts together for respondents. Dr. Kuligowski also responded that NIST is also mapping the hazards and understanding where people were located and what people were getting as far as information and the decisions they were making during the event.

Dr. Harary asked if there is a wiring diagram that demonstrates how all the information would flow between projects. Dr. Kuligowski responded that an internal document was created to show how the outputs from one project leads directly into other projects.

Mr. Gary Klein asked if there was a way to identify preventive measures and whether there is a different use for the data? Dr. Mitrani-Reiser responded in the affirmative to both questions.

V. Hurricane Maria Program Updates, Part II

Dr. DongHun Yeo provided an update on the Hurricane Maria NCST investigation's project focused on hazard characterization. A copy of his presentation is available at:

https://www.nist.gov/system/files/documents/2019/09/19/07_yeo_ncstac_hazardcharacterization_2019-09-05.pdf

Dr. Corotis asked if NIST is collecting data for different wind regimes, e.g., tropical storms versus normal hurricanes. Dr. Yeo responded that NIST is focusing on collecting wind data from three towers in one area. Dr. Yeo explained that hurricane and synoptic wind would probably be considered as identical. He also said that the curvature of the wind is not considered so large-scale wind the direction and speed are taken into more consideration.

Dr. DesRoches asked if there was severe structural damage along the coast from storm surge or was it not recorded. Dr. Levitan said that the observed storm surge was modest in comparison to other storms, i.e., Hurricane Harvey, in the past few seasons.

Drs. Kenneth Harrison and Marc Levitan provided a summary of an NWIRP study, focused on the evaluation of infrastructure support of critical buildings and emergency communications. A copy of their collective presentation is available at:

https://www.nist.gov/system/files/documents/2019/09/19/08_harrison_sept2019_infrastructure_ncstac_090519_final.pdf

Dr. Jennifer Helgeson provided a summary of an NWIRP study, focused on the recovery of businesses and supply chains in Puerto Rico. A copy of her presentation is available at:

https://www.nist.gov/system/files/documents/2019/09/19/08_helgeson_sept2019_ncst.pdf

Dr. James Harris asked for clarification on whether any benchmark data on employment, sales taxes, and transfer taxes is being used to ground the individual interview information. Dr. Helgeson answered yes but said that a lot of the available data for Puerto Rico is from 2002.

Dr. Maria Dillard presented on the recovery of social systems in Puerto Rico, primarily education and healthcare. A copy of her presentation is available at:

https://www.nist.gov/system/files/documents/2019/09/19/08_dillard_sept2019_social_functions_ncstac_090519.pdf

Dr. Corotis asked a question for clarification on the extra interviews being conducted at the first time interval (t1), and whether there is a reason for not spreading them around. Dr. Dillard responded that their contract was designed in such a way that options can be exercised throughout the duration of the contract. Dr. Dillard said that she wanted to focus on getting as many interviews as possible done early on so she could interview the closed institutions; the longer the wait, the more problems will arise in finding individuals with knowledge of that institution.

Dr. Harris then asked if the closures might not always be due to the hurricane. Dr. Dillard confirmed that closures could be a result of more than just the hurricane.

Dr. Corotis was concerned about the preservation of data and willingness of people to talk about it. Dr. Kuligowski responded that they can try to supplement some with data already collected but it's harder to speak with people right after an event. She understands Dr. Corotis's concerns, but with the recovery projects and speaking with officials and people after event, they need to make sure they're using the right techniques to enhance recall of the event.

Dr. Harris asked if there are things NIST can streamline during NCST investigations. Dr. Kuligowski responded that yes, NIST can learn from this event and streamline some processes moving forward. Dr. Mitrani-Reiser expanded on the answer and said as the first investigation of a hurricane by NIST that impacted a large geographic area, NIST needed to carefully scope the projects and appropriately develop sample frames.

Dr. Klein asked if there is a schedule or deadline for the report? He also wanted to know what happens after outreach. Dr. Kuligowski responded that the Team is trying to stay on track with the identified schedule but need to also be flexible. Dr. Kuligowski explained that an NCST investigation is normally 3 years in length, and that the Hurricane Maria NCST investigation will likely require two or three years to complete after data collection starts. Dr. Kuligowski emphasized that outreach will be conducted to establish relationships with government entities to move this forward. After that a draft will go out to federal agencies for review. Investigations and follow-on implementation of resulting recommendations is a potentially ten-year effort.

VI. Disaster and Failure Studies Update

Dr. Mitrani-Reiser summarized activities supported by the NIST Disaster and Failure Studies Program that enhance the readiness of Teams. A copy of her presentation is available at:

https://www.nist.gov/system/files/documents/2019/09/19/09_mitrani_ncstac_sept2019_dfs_update_final.pdf

Mr. Holmes had a question about teams continually going to sites in Paradise, California and what those teams are collecting. Dr. Mitrani-Reiser responded that the NIST staff deployed to California are collaborating with CAL Fire (California Department of Forestry and Fire Protection) to reconstruct the timeline of the Camp Fire. The teams have gone back almost every month to collect data that helps them understand where the fire was as well its severity.

Mr. Klein asked what is their experience with disaster recovery firms working with school districts to speed up the recovery process? Dr. Mitrani-Reiser responded that they don't have enough data to support it as an option and she wants to have data to give a confident answer.

VII: Public Comment Period

There was one public comment from Dr. Kimberly Shoaf on the phone. Her question was directed towards Dr. Dillard. Dr. Shoaf asked about the schools and hospitals and who the intended respondents are for the surveys of these institutions. Dr. Dillard responded that they are looking at methodologies for identifying respondents. This could be one respondent or multiple respondents per institution. For example, the survey could have distinct questions for respondents in particular roles (e.g., facilities manager) in the school or hospital.

VIII: Summary Remarks

Dr. Harary thanked everyone for attending the meeting and advising NIST. He reiterated NIST's appreciation for the Committee's comments and questions. This investigation involves the scope of an entire island, and that has never been done before in an NCST investigation. The questions and comments presented during the meeting will be useful going forward.

IX: NCSTAC Preparation of Annual Report to Congress

The Committee planned and discussed how the NCSTAC Annual Report to Congress should be written.

X: Adjournment

The meeting was adjourned at 5:30 pm EDT.