

NSF I/UCRC Wind Hazard and Infrastructure Performance (WHIP) Center

Center Director's Report

February 1, 2022 – January 31, 2023 (Year 4)

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Introduction

The WHIP Center was established on February 1, 2019. It is completing its fourth year. It is a collaborative Center between the two institutions, Texas Tech University and Florida International University. Florida Institute of Technology is an affiliate institute with Texas Tech.

Out of six companies that were members of the Center during the third year one of them, SCOR, dropped out because of change in direction of emphasis within the company. We had an hour long zoom conversation with SCOR representative to ascertain the reason for leaving WHIP Center. Basically, the new Chief Executive Officer wants to emphasize outreach activities and not research. This change in emphasis is not based on the research results that WHIP had provided.

We were successful in adding federal agency, National Institute of Standards and Technology (NIST) to our membership. During the fourth year membership included:

- Berkshire Hathaway – Specialty Insurance, Boston, MA
- GAF Materials, Parsippany, NJ
- StateFarm – Insurance, Bloomington, IL
- USAA – Insurance, San Antonio, TX
- VERISK (previously AIR) – Boston, MA

The three academic institutions (including one affiliate) and six companies have worked together to pursue industry selected research projects. Of the six memberships, three represent insurance industry, one is risk management company, one is roofing material company, and one is federal agency which is in charge of the federally mandated National Windstorm Impact Reduction Program (NWIRP).

Florida International University has the Wall of Wind (WOW) experimental facility that can test building and components from model to full scale at wind speeds up to 150 mph. This facility is also a part of NSF funded NHERI Infrastructure nationally shared facility. Several projects of WHIP Center have used this facility effectively.

Texas Tech University has conducted wind engineering experimental and analytical research on effects of wind on low buildings since 1970. The research facilities at Texas Tech include VorTECH (simulating tornado), 200-m tower for atmospheric measurement, Stick-net for spatial wind measurement in hurricane, Doppler radars, and debris impact facility. VorTECH is used for a project in Year 4. The Florida Institute of Technology has Wireless Sensor Network for field monitoring of building

pressures induced by hurricane winds, Portable Lidar, and Hurricane Risk modeling system. Some of these facilities obtained field data in Hurricane Ian that impacted Florida in 2022.

The seven projects of Year 3 are completed, and the final reports are archived in the log-in page of the WHIP website www.whipc.org.

Center Operation in the Current Year (Year 4)

The Year 4 annual meeting was held on March 24-25, 2022, on zoom platform. The faculty of the three institutions presented 7 proposals to IAB. Of these, the IAB selected six of them to pursue research during the year. The faculty stayed connected to the volunteer mentors from the company personnel. Mid-annual meeting was held on November 9-10, 2022 in-person at Texas Tech University in Lubbock, TX. This was the first in-person meeting since meeting in Miami, FL in November 2019. Networking dinner on November 9, the first day of the meeting, was attended by most IAB members.

In addition, a two-hour meeting on zoom was held on January 21, 2022, to discuss potential projects and proposals for Year 4. Progress report meeting was held on August 10, 2022. A meeting on December 9, 2022, was held on zoom platform to discuss research portfolio for Year 5 and beyond. These meetings provided continuous interactions between IAB members and PI/Co-PIs of the WHIP Center.

Annual IAB Meeting on March 24 – 25, 2022

This meeting was attended by a total of 23 individuals consisting of 8 from IAB members, 12 from faculty and students from the three institutions, WHIP coordinator, official for commercialization at Texas Tech, and 2 representing NSF.

The meeting agenda included progress reports on the projects of Year 3 since end dates of these projects were extended. In addition, 7 proposals for consideration in Year 4 were presented. The proposals were sent to the IAB members two weeks in advance of the meeting.

The IAB in its executive session on the second day selected 6 research projects for pursuit in Year 4. The IAB members volunteered to act as mentors for the projects of their choice. The projects for Year 4 are:

- WHIP2022-01; PI: Delong Zuo (TTU); Development of Fragility Curves for Tornadic Loading on Low-Rise Buildings; Mentors - Tim Johnson (VERISK), Marc Levitan (NIST), and Tim Doggett (BHI)
- WHIP2022-02; PI: Doug Smith (TTU); Prediction of wind and surge damage to buildings by hurricane; Mentors - Eric Haefli (StateFarm), Tim Doggett (BHI), Karthik Ramanathan and Tim Johnson (VERISK), Erica Sherman (GAF), and Marc Levitan (NIST)
- WHIP2022-03; PIs: Arindam Chowdhury, Ioannis Zisis, and Amal Elawady (FIU); Wind effects on ballasted rooftop photovoltaic systems; Mentors - Erica Sherman (GAF), Tanya Brown (NIST)
- WHIP2022-04; PIs: Ioannis Zisis and S. J. Lee (FIU); Wind-induced loads on irregular shaped buildings; Mentors - Eric Haefli (StateFarm), Tim Johnson (VERISK), and Marc Levitan (NIST)

- WHIP2022-06*; PIs: Nemze Kachouie and Jean-Paul Pinelli (FIT); Integration of field damage, hazard, and exposure data for potential use in risk models; Mentors - Karthik Ramanathan and Tim Johnson (VERISK), and Eric Haefli (StateFarm)
- WHIP2022-07; PIs: Amal Elawady (FIU) and Jean-Paul Pinelli (FIT); Empirical vulnerability model to assess impact of windborne tree debris on low-rise construction; Mentors - Eric Haefli (StateFarm), Tanya Brown-G (NIST), Daniel Diaz (USAA), and Tim Johnson (VERISK)

*number 05 is omitted by design

Other items discussed during the meetings were schedule for Year 5 and going into Phase 2 (years 6 through 10). Tim Doggett from BHI became Chair of IAB and Erica Sherman from GAF was elected to be Vice-Chair. David McClure, Managing Director for Licensing at Texas Tech University discussed Articles F, G, H, I and J of the Membership Agreement that relate to copyright and patent. He answered questions that IAB members raised.

Denis Gray, NSF appointed evaluator commented that the number of companies approached to join WHIP is impressive.

Mid-Annual IAB Meeting on November 9-10, 2022

This meeting was held in-person at Texas Tech University in Lubbock, TX. This is the first meeting held in-person since the lockdown in March 2020 due to COVID-19. Attendance included 8 (3 remotely due to travel restriction) IAB representatives, 17 (6 remotely due to Hurricane Ian) university faculty and students, and 3 invited (20 invitations were issued) guests,

The proceedings at this meeting included presentations by Dr. Tim Doggett, IAB Chair on how WHIP research benefits his industry, comments by Dr. Crystal Leach, the NSF program director on supplemental funds available in the program, presentation by Dr. Erica Sherman, IAB Chair-elect on how visual testing of roof corners can help installers, and progress reports of the six funded projects. In addition, a special one-hour session was held to receive comments from the IAB members and the invited guests on the type of research that can be pursued by the WHIP Center. These comments are used to interact with the companies to attract them to join WHIP Center. The minutes, agenda, participant list, and presentations are posted on the WHIP website www.whipc.org >Minutes > November 9 -10, 2022.

Short Zoom Meetings on February 18, August 10 and December 9, 2022 and January 27, 2023 (planned)

Discussions at these meetings included progress reports on the ongoing projects and questions/comments on the projects. The IAB members took active part in these meetings in asking questions and making comments. Agenda for the mid-annual meeting was also discussed in one of the meetings. December 9 meeting was devoted specifically to potential research in Year 5 as well as translating the WHIP Center in to Phase 2 in 2024. It was noted that in Phase 2 more industry members are required and that the proposal is due in June 2023.

In addition to meetings with IAB members, the Leadership Team of IAB Chair, Center Director and three Site Directors met at an interval of two weeks on zoom starting October 2022 and they plan to continue these dialogues.

Promotional Effort

To publicize the WHIP Center the personnel participated in two conferences. The first one was 14th Americas Conference on Wind Engineering in May 2022. WHIP Center was one of the sponsors of the conference which allowed an Exhibit Table for the 250 participants where they can get information. In addition, a paper on translating research to industry use with WHIP Center was presented. The second conference was at the RAA 2022 Cat Risk Management Conference in Orlando, Florida. As an Exhibitor a table with manned information was provided to more than twenty inquiries.

Two webinars on WHIP Center and its research were offered during the year. The first one was *'Why it makes 'cents' to belong to WHIP Center'* on November 17, 2022. More than 70 companies were given information for the free one-hour webinar. The actual attendance was 15 persons. A second webinar on a research project related to tornado research is planned for January 2023.

In addition, a LinkedIn page for WHIP Center is developed which can provide updates on the Center activities on a continuing basis.

These efforts have paid dividends with a promise of ESDEC Solar Group joining the WHIP Center in year 5. Membership Agreement and invoice/payment are in the process at this time. With this addition of a member research portfolio can be expanded in Year 5 and in the future.

Unanticipated Problems and Solutions

Payment of fees were delayed during this year. One of the delay was due to extra unanticipated paperwork required for the federal agency NIST to join the WHIP Center. The second one was due to misunderstanding within the company on the duration of fees. These delays in fees resulted in delays in starting research for the Year 4. Extension of end dates of each research projects as needed will alleviate the delay. Future invoice and payments dates are advanced to help preventing delays in year 5 and beyond.

Travel restrictions due to COVID-19 are removed. Though the companies, at times, will have some restrictions on travel due to cost. As needed zoom connections will be made available to connect to the meetings. Annual meeting for Year 5 is planned in advance (March 29-30, 2023) at Florida International University in Miami to promote in-person attendance by member company representatives.