TWILLEY, LSU

DHS Coastal Resilience Center
YEAR 4-5 Research Project Work Plan

1. **Project Title.** Integrating CERA-Planning Software to support DHS Modeling and Planning Efforts for more Resilient Communities

2. **Principal Investigator**. Robert R. Twilley, Louisiana Sea Grant/Oceanography & Coastal Science, LSU

3. **Other Research Participants/Partners**.

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4. **Short Project Description**.
   We propose to investigate how some of the skills developed within CERA-Planning can be integrated into some of the flood exposure and damage modeling techniques that have been developed to evaluate impact of natural hazards to improve planning. The approach is to test whether some of the skills that have been developed within CERA/ASGS and incorporated into CERA-Planning to describe flood exposure and impacts can contribute to the existing flood consequence modeling within FEMA and NIST.

5. **Abstract**.

   We propose that the CERA-Planning tool, as a next step innovation to CERA/ASGS, can provide additional skills to existing community resilience tools within NIST and DHS sectors such as Flood Apex and HAZUS FLOOD. The high scale resolution of flood exposure presented in an innovative communication platform may prove to be a valuable tool to innovate design/planning approaches. Communities need clear guidance on exactly which vulnerable infrastructure and populations may be threatened and/or protected (pre-disaster planning and rapid response), and accurate post-event impact in order to make crucial land use and redevelopment decisions during initial stages of recovery. The ability to leverage this type of community-specific data along with fine-scale modeling of flood exposure (in a universal communication platform) provides the opportunity to avoid loss and rebuild for maximum future risk reduction. The proposed LSU partnership with DHS sectors using CERA-Planning builds on the strengths of existing flood hazard and community planning approaches with the innovation of flood modeling developed with CRC. The transformational products proposed will allow vulnerable communities to actively address improved flood prediction, protection, and response.

We will incorporate established modeling outputs into existing consequence models (HAZUS FLOOD) and community resilience guidelines (NIST Community Resilience Program) showing how flood risk (both from storms and SLR) will impact people, industry, and infrastructure. The **Hazus Flood Model** can be used to assess both riverine and coastal flooding and estimates potential damage to buildings, essential facilities, transportation lifelines, utility lifelines, vehicles and agricultural crops. Direct losses are estimated based on physical damage to structures, contents and building interiors; and the model also addresses costs of building debris generation and shelter requirements. The National Institute of Standards and Technology (NIST) manages a multi-faceted program, assisting communities and stakeholders on issues related to buildings and the interdependencies of physical infrastructure systems. The Community Resilience Program, part of NIST's broader disaster resilience work, complements efforts by others in the public and private sectors. NIST focuses on research, community planning and guidance and stakeholder engagement. The development of flood scenarios for these existing consequence models and community resilience guidelines will improve the ability of planners to reduce impact on people, industry, and infrastructure. This much needed information will be used to enhance pre- and post-disaster planning efforts.

These enhancements will focus on the ability of consequence modeling platforms to enable vulnerable communities to plan in areas facing repetitive disturbance. The goals of the program are to migrate technologies developed in the CRC to enhance flood prediction and emergency management to modeling tools and planning toolkits that are designed to protect vulnerable infrastructure and populations, and to reduce repetitive loss by providing accurate potential impact data to community planners. This program focuses on significant reduction in risk with the use of high-fidelity storm surge data and impact scenario viewers useful to post-disaster recovery planning. Together this group will test what skill sets in the CERA/ASGS modeling platform may enhance the following: (1) planning tools that are being developed by NIST Community Resilience program that may help to visualize aggregated risks to include hurricane force winds, storm surge, and inland flooding along with vulnerable populations based on socio-economic status; (2) test and migrate modeling and visualization tools to communicate flood risks during a tropical cyclone event to HAZUS FLOOD to assist in identifying vulnerable populations and structures that are susceptible to storm surge; (3) run comparative tests of CERA- PLANNING with HAZUS FLOOD over test beds associated with Hurricane Isaac in the Gulf of Mexico region; (4) work with Texas A&M/NIST collaboration in testing planning guidance tools to improve resilience based on CERA-Planning tool. The CERA-Planning tool will work with Flood Apex, NIST, and HAZUS FLOOD group to integrate data sets and scenario analysis to inform consequence model results.15