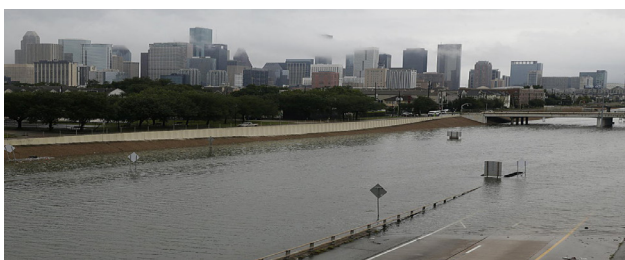


***Rice professors Dr. Philip Bedient, Dr. Jamie Padgett, and Dr. Kathy Ensor, in conjunction with Dr. Nick Fang from the UT -Arlington are developing a radar-based flood information and response system (FIRST) for the City of Houston (COH). This GIS mapping tool is designed to identify flood risk in real time for critical infrastructure, including hospitals, nursing homes, and fire stations in four major watersheds across the region.***

## EXPERIENCE

The Rice-based FIRST team draws on more than 20 years of experience from the Flood Alert System (FAS5) that is designed for the Texas Medical Center (TMC). FAS5 helps guide the TMC on the implementation of emergency protocols, such as closing floodgates and doors across several hospital systems. FAS5 has successfully performed during several major storm events, including Hurricane Harvey and Tropical Storm Imelda. The FIRST team will partner with the City of Houston to focus on critical infrastructures and facilities across the flood-prone areas in the Brays Bayou, Hunting Bayou, Sims Bayou and White Oak Bayou watersheds.



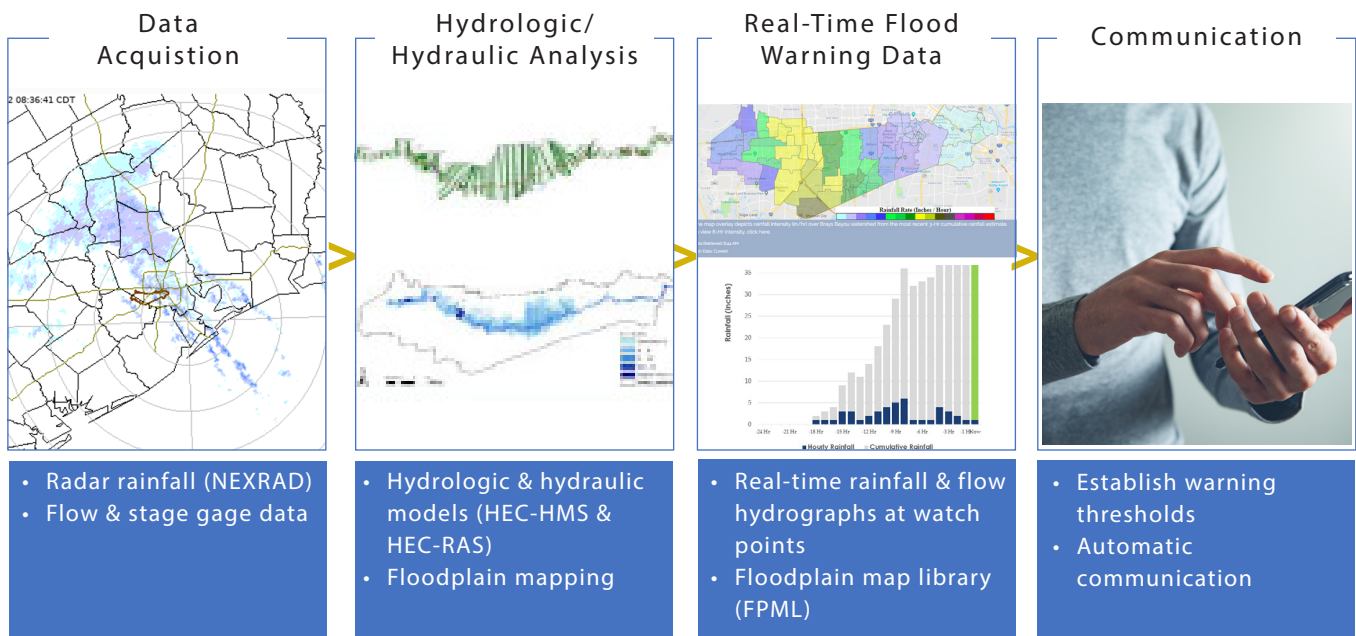
288 to the Texas Medical Center during Harvey

## THE FIRST TEAM WILL...

- Identify Inundation Levels for Critical Facilities
- Coordinate with Health Department and other COH Officials
- Collect Data of radar/LiDAR and Flood Maps
- Develop and Calibrate Hydrologic Models
- Perform Detailed Hydraulic Analyses for the Watersheds
- Develop and Test the Proposed Flood Information System
- Develop Web-Based Flood Information System

# HOW FIRST WORKS

To better support the COH's emergency operations with real-time flood warnings for high-risk and critical neighborhoods and infrastructure during storm events, the FIRST team will work closely with the Department of Environment and Health and the City Public Works. Through this partnership, FIRST will develop and implement a flood information and mapping system using calibrated radar and available gauge rainfall data, LiDAR and other high-resolution spatial datasets, as well as a variety of hydrologic/hydraulic (H/H) models. FIRST will focus on the flood-prone and at-risk communities, such as Kashmere Gardens, Gulfton, and Sunnyside, located in the watersheds of Brays Bayou, Hunting Bayou, Sims Bayou and White Oak Bayou.



## NEXRAD Radar Rainfall

Radar data reflects off of raindrops and is processed and calibrated by Vieux and Assoc., Inc. (VAI). Radar rainfall data is delivered to Rice for subbasins over the four watersheds in 5 minute intervals.

## Flow & Stage Gauge Data

A USGS stream flow gauge at each watershed records the elevation and flow of water in the corresponding bayou. FIRST output is compared with this gauge data for historical events to validate the model performance.

## Hydrologic Models

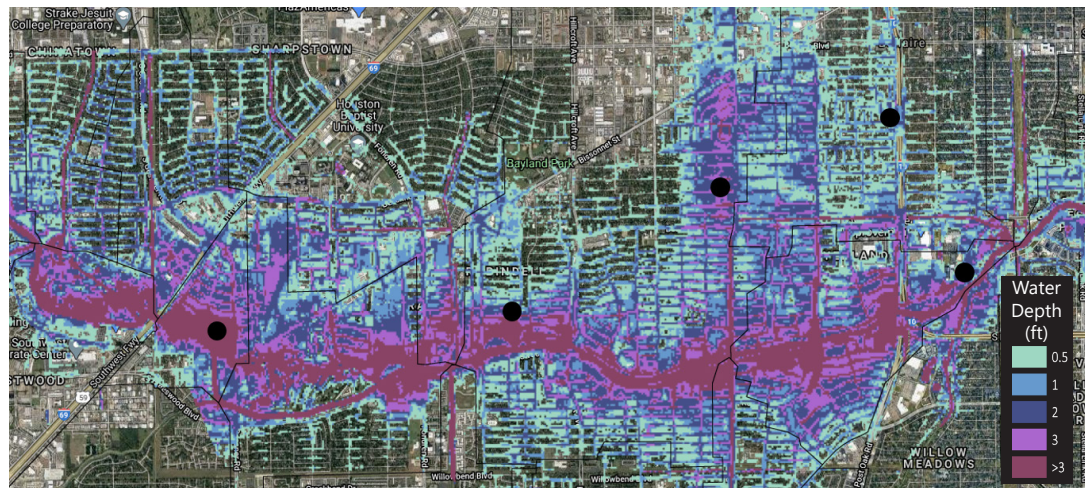
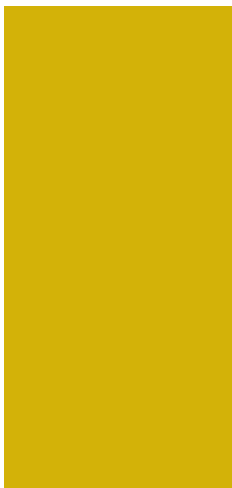
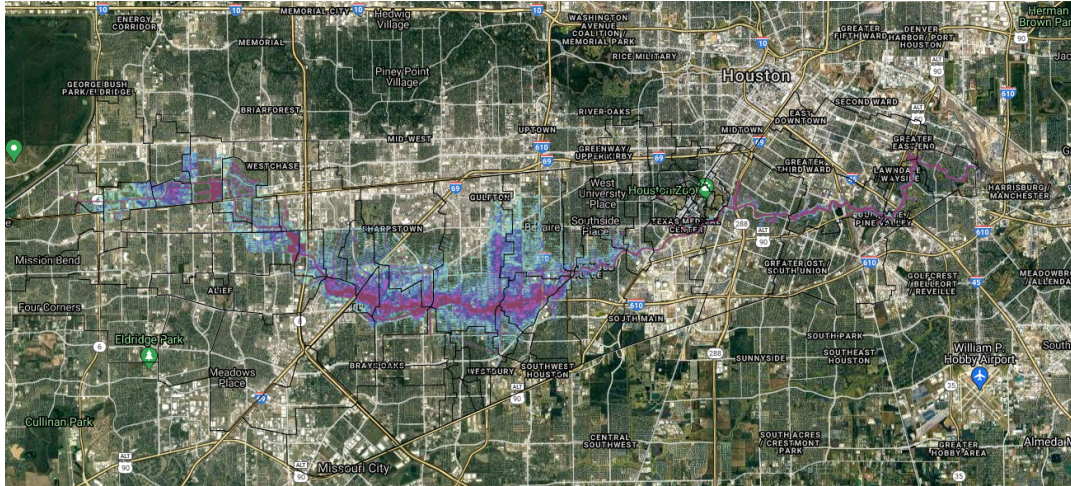
During an event, VAI radar rainfall data is used to select the correct FPML from 60 maps (Page 3).

## Floodplain Maps

SSPEED created a library of floodplain scenarios that are representative of flooding conditions under different rainfall amounts using HMS and RAS. Radar Rainfall data are used to pull the corresponding floodplain during a storm event to give a user the extent of flooding that might be observed through time. Example maps are shown on Page 3.



## EXAMPLE FIRST MAPS



Flood Plain Map of 9 inches in 12 hours over Brays watershed (Top). Example of modeled flood depth at critical locations (Bottom).

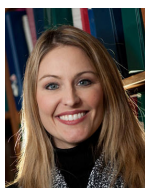
## MEET THE TEAM



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