

Workshop on Flood Risk Information

Smart and Connected Communities:

Improving Community Engagement in Flood Mitigation Using Enhanced Risk Assessment Metrics and Science-Based Tools

Planning Grant Sponsored by National Science Foundation
in preparation of a future Integrative Research Proposal

Overall Objective of our Project:

Empower stakeholders in flood-prone communities to better understand flood risks and engage in formulating and supporting effective flood mitigation strategies.

Award #: SCC-PG
2125472



LOUISIANA WATERSHED
FLOOD CENTER

HISTORY, GEOGRAPHY, &
PHILOSOPHY

KATHLEEN BABINEAUX BLANCO
PUBLIC POLICY CENTER

CIVIL ENGINEERING

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Our research questions during this planning phase

- What are the current knowledge gaps in the community about:
 - Reasons for flooding (what is the problem),
 - Degree of risk (how big is the problem),
 - Expected benefits of proposed mitigation projects (what is the solution), and
 - Changes in current and future watershed conditions (future projections)
- What are the most effective metrics for communicating flood risk in ways that resonate most with different stakeholder groups?
- What are the most effective ways for addressing common misperceptions of binary flood risk?
- What kind of social-economic analyses, modeling, and visualization technologies that can alleviate conflicting views of flood risk and provide pathways to shared visions of potential solutions?

Next Steps after this planning phase

- **What we are doing now:**

- We conducted a set of **focus groups** to identify current gaps and preferences within our community on flood risk.
- We are now conducting a set of **workshops** to illustrate and collect feedback on some existing (external) and new tools (preliminary developed by UL) for communicating flood risk

- **Our next steps:**

- This is a planning grant; next, we will apply for a full research grant from NSF to develop and deploy technological tools that meet the needs of the community.

What did we learn in the focus groups?

- The 2016 flooding acted as a focusing event for how people measure and perceive floods in the region
- The changes to perception of risk centered on 3 main topics
 - Major role of increased development
 - Inadequate infrastructure to address flooding
 - Changes in impervious surfaces impact flooding near people
- 26 times attendees mentioned that they had little/no idea about their own flood risk, but would like to know more
- There is a huge gap in the tools routinely used versus potential options
 - Attendees mentioned FEMA flood maps, and few other tools (e.g., NOAA)

Workshop Objectives and Format:

Part 1: Communication of flood risk & mitigation using interactive tools

Illustrate some tools for communicating flood risk

- Preliminary tools and risk metrics that UL team has developed for this planning grant
- Tools that exist nationally or in other state

Gather your feedback on:

- What features do you find most useful?
- What features or capabilities are missing?
- Would you continue to use these tools and for what purposes?
- How do you envision these, or similar tools could improve the communication of existing or new flood risk or mitigation information?
- Barriers you face in understanding flood risk to communities
- Barriers you face in communicating flood risk with citizens, decision makers and other stakeholders and in your community

Part 1a: Demos of UL new (preliminary) tools

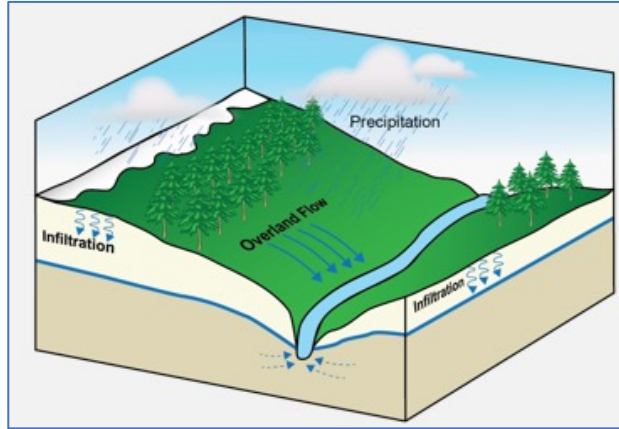
- Developed locally by our UL team for illustration purposes only
- Communicate impacts of floods for example storms (e.g., 500-year)
- Two Tools:
 - **Lafayette Parish:** Flood damages for individual buildings and aggregated at census block scale
 - **Lafayette Parish:** Impact on drivability and access to evacuation and emergency facilities
- Developed for certain areas and storms, but can be expanded to cover other areas, storms, watershed conditions, future climate, projected changes in the land use, mitigation scenarios

How did we develop these tools?

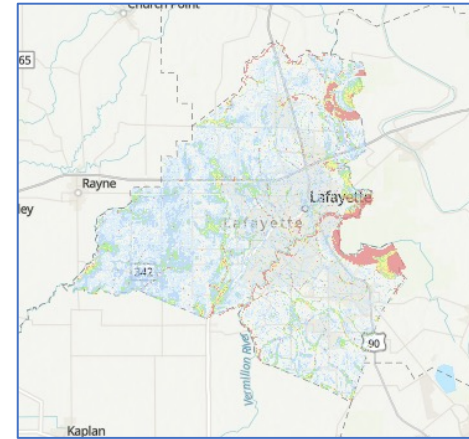
1) Develop 500-year storm based on NOAA Atlas



2) Run H&H models to estimate flows and flood depths



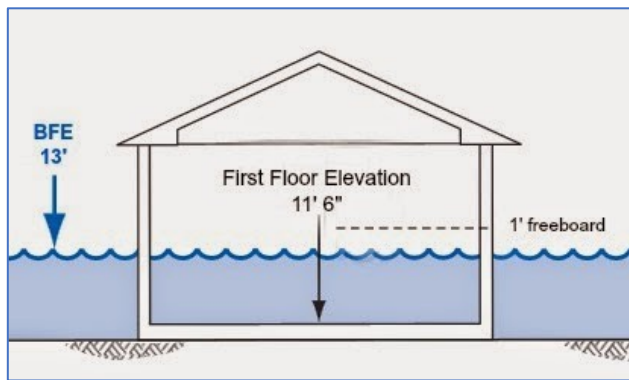
3) Generate 500-year flood map (extent, depth, duration)



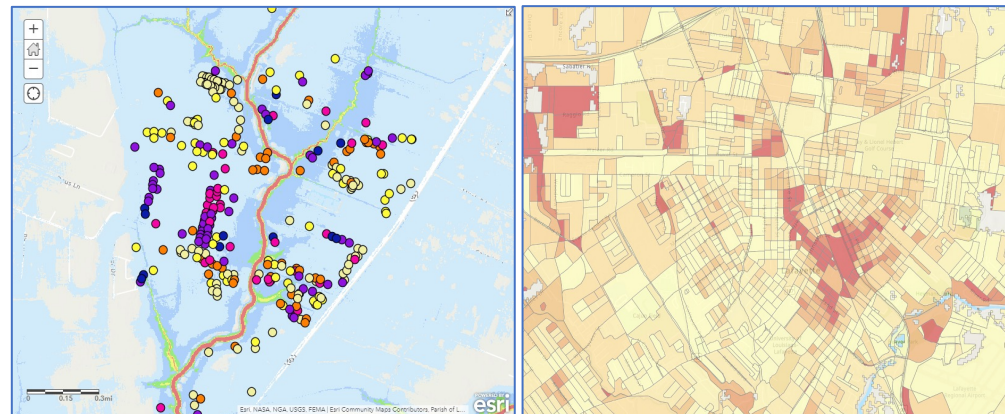
4) Flood depth is intersected with buildings and roads



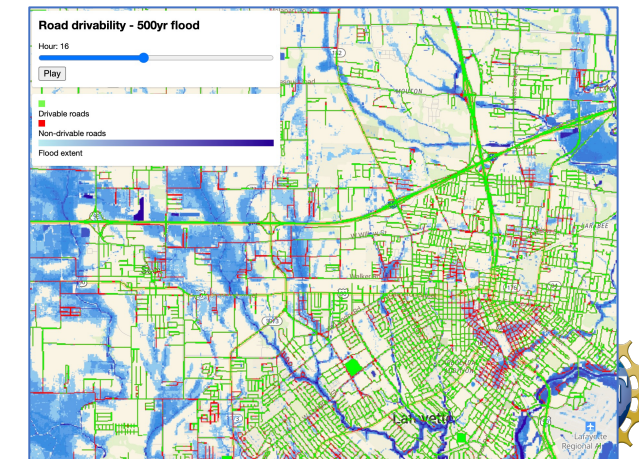
5) Calculate losses for individual structures



6) Display losses per building (left) or aggregated to census block level (right)



7) Examine impacts on drivability and access to emergency facilities evacuation routes



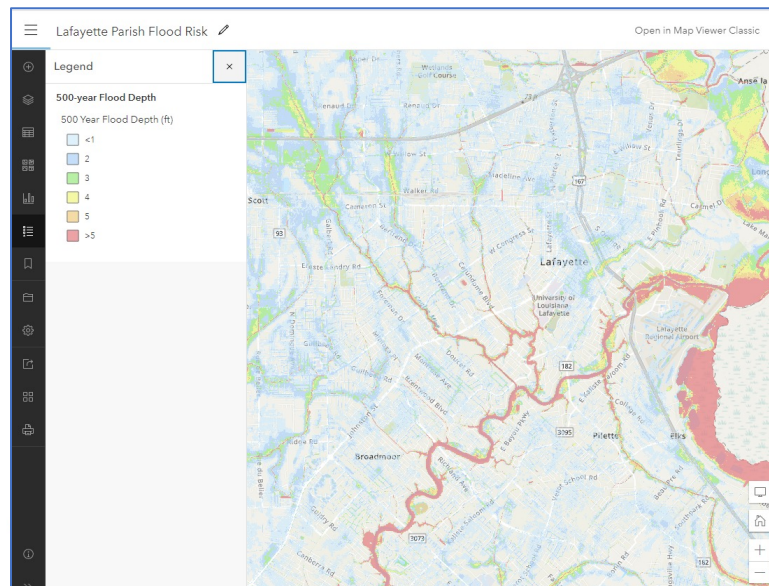
UL Tool 1: Flood structure damage over Lafayette Parish

<https://tinyurl.com/ullnsfsc2>

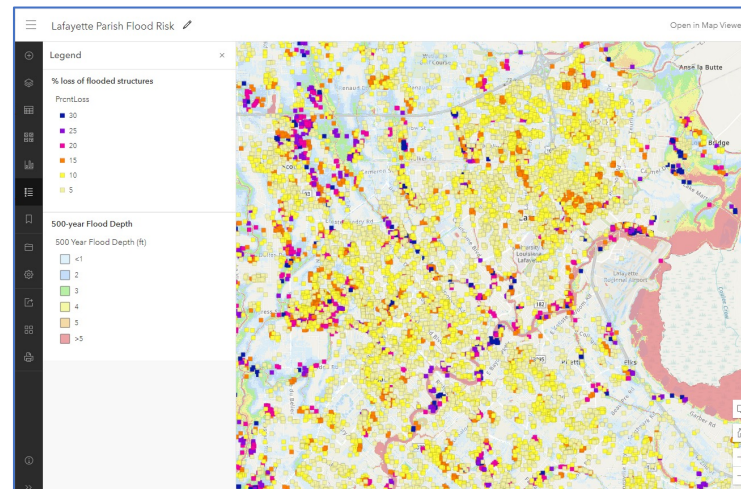
In this app, you should be able to identify the following:

- If a property is located within the 500-year inundation area and what the flood depth is at that location.
- Loss in structure value (%) at individual structures
- Percentage of number of structures flooded in each census block.
- Loss of structure value (%) in each census block.
- Distinguish between losses to residential versus non-residential structures.

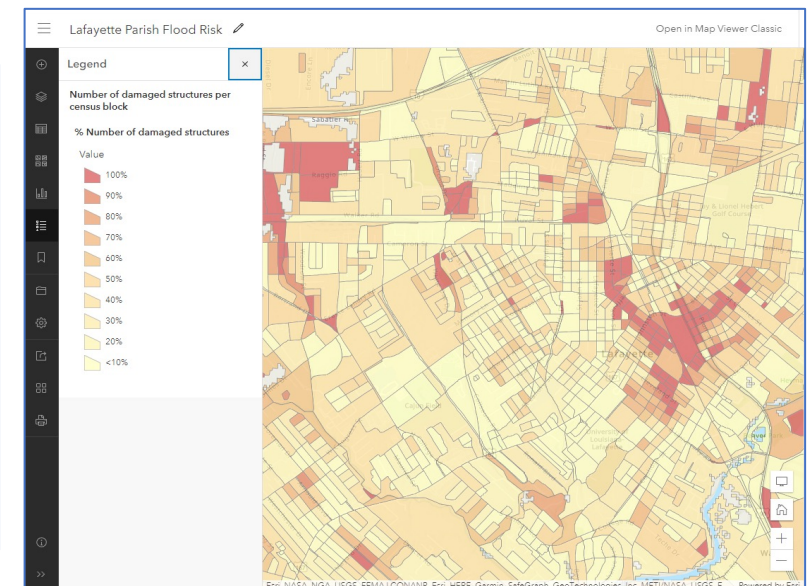
Examine flood depth (500-year flood)



Examine losses (%) for each flooded structure



Examine losses for each census block



UL Tool 1: Time to interact with the tool

1. Inundation Extent:

- Navigate to your location of interest to check if it's within the 500-year flood inundation extent. (hint: use address search)

2. Individual Structure Damage:

- Click on the layers tab and activate layer "% loss value per flooded structure" to examine percent loss in value of flooded buildings.

3. Losses per census block:

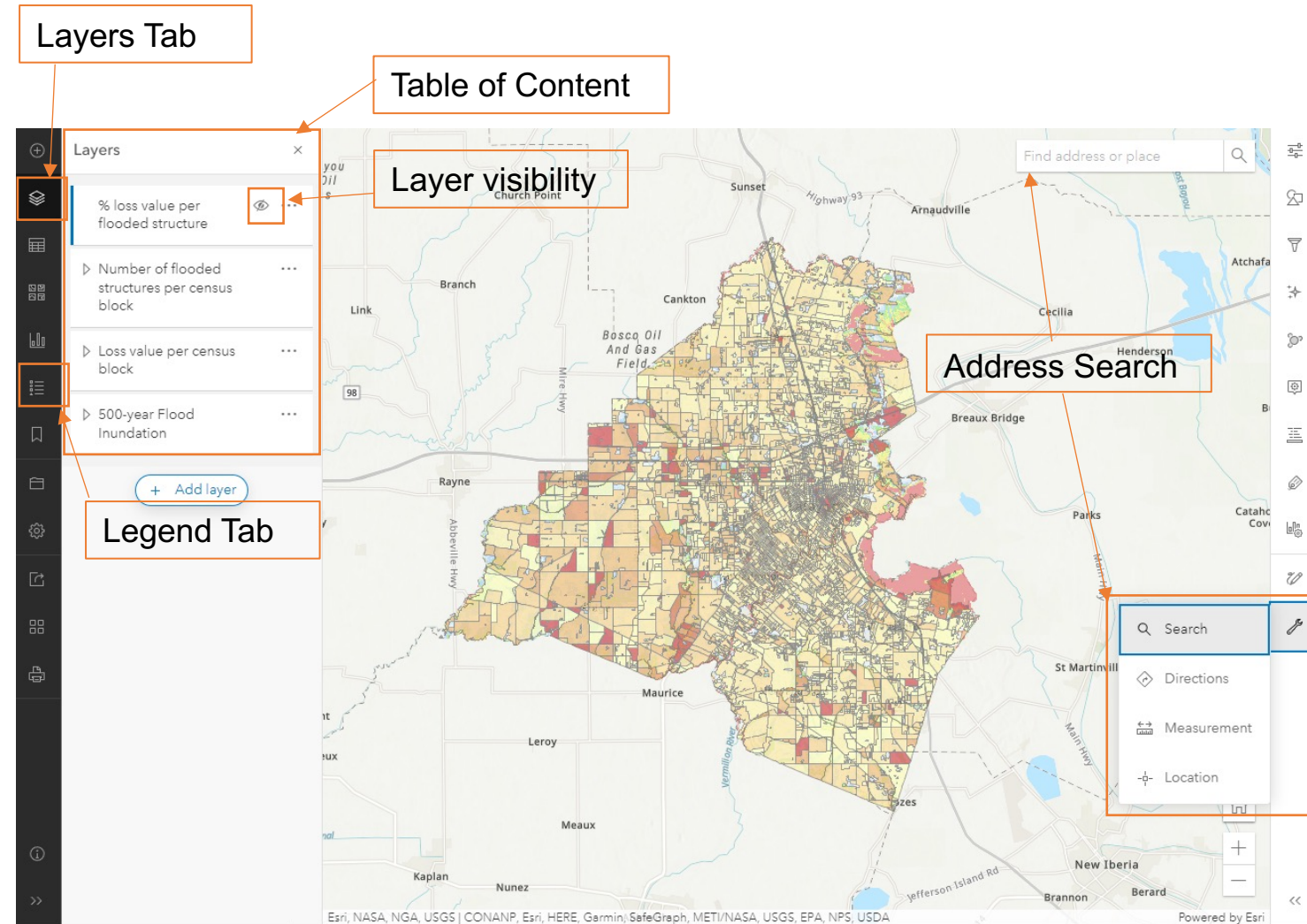
- Interact with the layers under the drop-down menu: Number of damaged structures per census block.
- Interact with the layers under the drop-down menu: Loss value per census block drop-down menu.

4. Residential vs. non-residential losses:

- Examine losses for residential vs. Non-residential structures

5. Questions to answer:

- Does this information change your views on your own flood risk?
- Does this information match your perception on loss of services in your community during flood events?
- Which flood loss reduction strategy is most suitable for your location? Please explain.



Feedback on UL demo tool 1

Respond to poll questions at
pollev.com/jennybyrd841

- Poll Questions:
 - What features did you find most useful in this preliminary app?
 - What features or capabilities are missing that you want to see added to this app to make it more useful for you and the overall community?
- Discussion Items:
 - How do you envision that this app or similar tools could improve the communication of existing or new flood risk or mitigation information?
 - Could you see yourself using this app or a similar tool in the future?

Feedback on UL demo tools (additional slide if needed)

- Ideas for expanding and further development of these tools
 - Include more storm scenarios (5, 10, 25, 100-year)
 - Include historical storms that the community is familiar with (e.g., 2016 flood; Laura; Barry)
 - Simulate existing conditions and proposed (general) mitigation scenarios (e.g., dredging, detention)
 - Simulate projected changes in land use and climate change
 - Include additional flood risk metrics for individuals and community

UL Tool 2: Flood Impact on Drivability and Emergency Access

Drivability: Can I drive on a particular road?

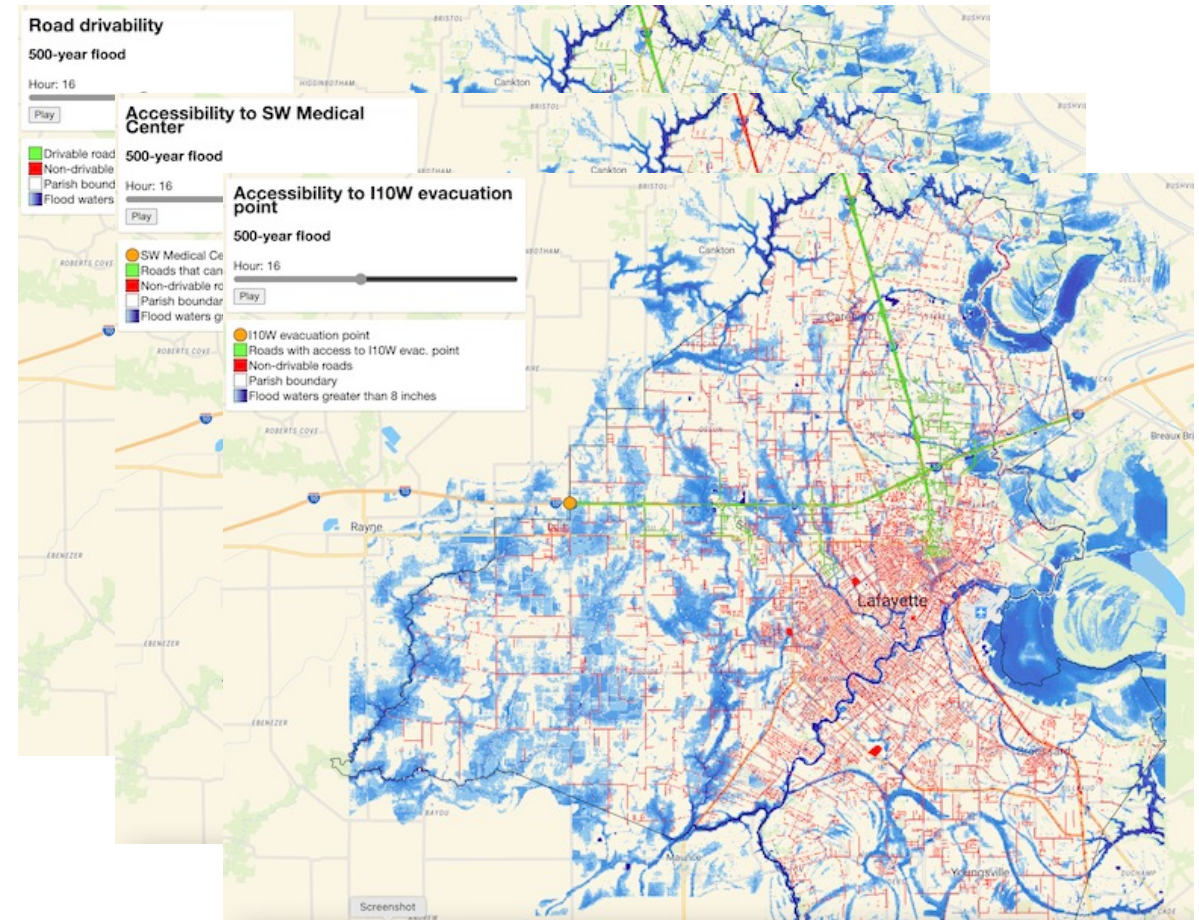
<https://bit.ly/lft-drive>

Accessibility 1: Can I drive to SW Medical Center?

<https://bit.ly/lft-acc-med>

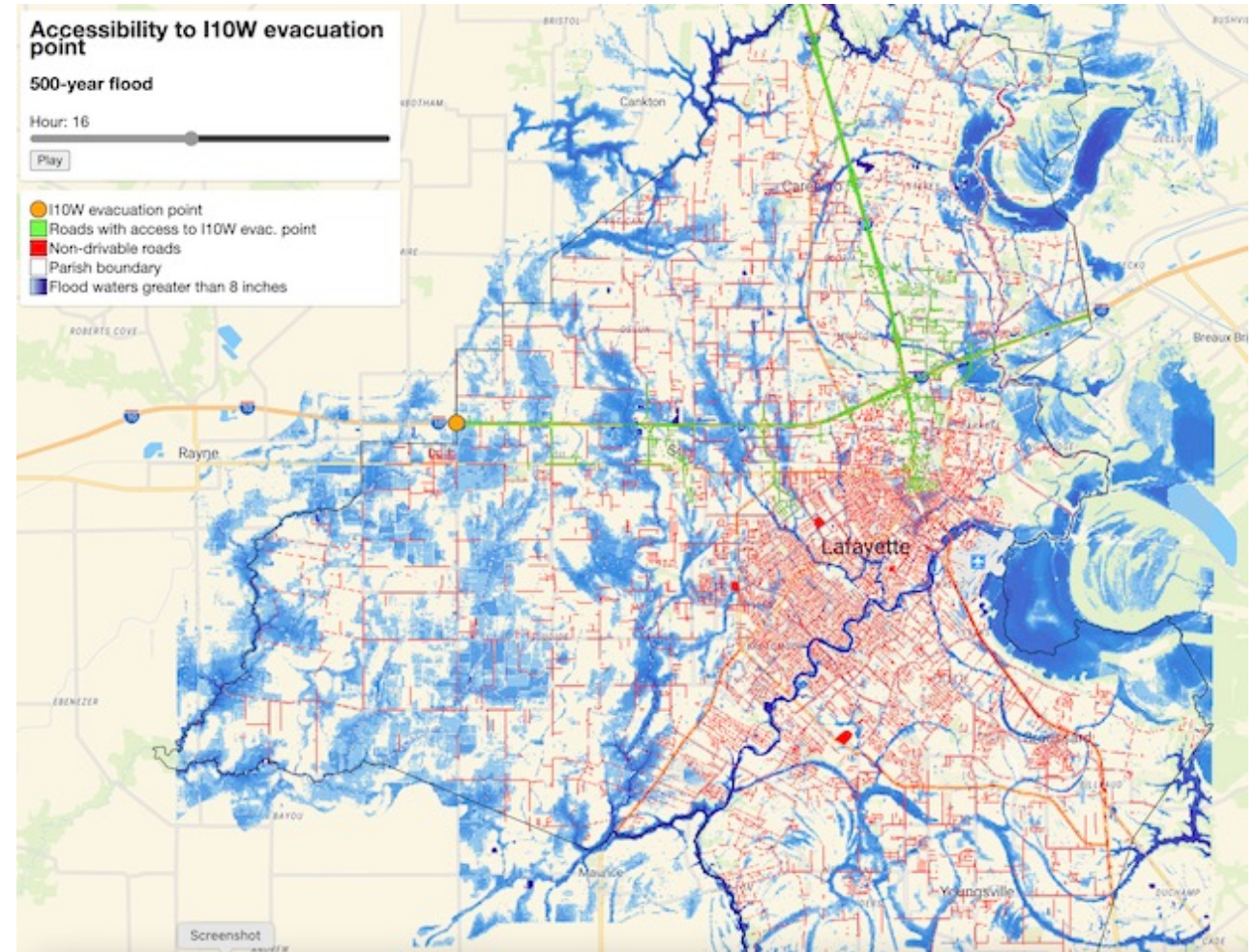
Accessibility 2: Can I evacuate via I-10W?

<https://bit.ly/lft-acc-i10w>



UL Tool 2: Time to interact with the tool

1. Choose one of the three tools to work with (Drivability, Accessibility to SW med. Center, Accessibility to I-10W evac point)
2. Click "Play" and let the 500-year flood simulation cycle once or twice from hours 0-36
3. Observe how the transportation network changes during the simulation (i.e., changes from green to red areas)
4. Questions to answer:
 - At what hour does the flood seem to have the largest effects on the road network?
 - Does the road network return to more-or-less normal conditions within 36-hours?
 - Zooming in to an area you are very familiar with, does the road drivability/accessibility that you see match your experiences during floods in these areas?



Feedback on UL demo tool 2

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pollev.com/jennybyrd841

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Community Risk Assessment: 500-year flood

Impacts to Schools:

21 public schools 

 10,950 students

\$147 million repair costs

Impacts to Fuel Supply:

23.2% of gas stations 

 Flooding boosts demand
Potential shortages

Impacts to Healthcare:

2 hospitals 

 2,160 Medicaid providers

21,400 Medicaid recipients 

Regional Impacts:

22.9% of Workforce



Risk of business closure: 38.5% of businesses impacted in previous event closed permanently



Feedback on Community Risk Assessment

Respond to poll questions at
pollev.com/jennybyrd841

- Poll Question:
 - What other community risk assessment metrics you would like to see in our analysis?

Part 1b: Demos of external tools

- Tool 1: Flood Factor (national scale)
- Tool 2: Texas Coastal Atlas

External Tool 1: Flood Factor

<https://floodfactor.com>

1. Enter your address
2. What is your FEMA flood zone?
3. What sectors (e.g., residential, road, commercial, infrastructure, or social) have lowest and highest flood risk in your neighborhood/city?
4. Why do you think flood risk might vary across sectors?
5. Why do you think flood risk might vary from your neighborhood to your entire city?
6. What building components would be damaged in each of these flooding scenarios?
7. Given the degree of flooding your home is likely to receive, what flood protection solutions should you or your landlord undertake?

FEMA flood zone

FLOOD DEPTH EXPLAINED

Even a little flooding can damage a building. ①

It may not seem like a lot, but just an inch of flooding can cause major damage to a property and belongings and spur mold growth. <6 in. of flooding reaching this home's first floor would cause \$600 - \$3,200 in damage.

Building component damage

<6 in	6 in - 1 ft	1 - 2 ft	2 - 3 ft	3+ ft
 Wood floors, carpets	 Drywall, exposed insulation, wallpaper	 Yard		
				
 Wood cars unable to drive	 Electrical outlets	 1-3 ft Furniture, HVAC systems		
 Cars float	 Large appliances	 Water supply, sewage, and plumbing		

Flood risks vary by depth and likelihood

Major flood events are less likely to occur than smaller, more frequent events, but have a greater capacity for damage. If water reaches a building, the amount of damage, if any, will depend on the building's elevation and foundation.

Current and future risk

This year In 10 years In 20 years

Select a projected flood risk for 2022:

	0.2%	1%	5%	20%
Flooded	0.2%	1%	5%	20%
Water to building	0.2%	0.5%	0.5%	0.5%

— higher depth of flooding

In 2022, there is a 0.2% likely that 0.2m of water will reach the bottom building on this property.

Depth of flooding (metres)

0 0.5 1 2 3m

While this local community has proximity to water, this property has a high risk of flooding.

While this property is likely safe from flooding, the local community is at risk.

This property has a **Minimal Flood Factor®**. Because of differences in elevation and proximity to water, even adjacent neighbors can have very different levels of risk. 36% of properties are at risk of flooding in Lafayette Parish.

Flood risk in this:

Neighborhood ZIP City County

Sector flood risks

Overall risk level

Minimal Minor Moderate Major Severe Extreme

Lafayette Parish has a major risk of flooding over the next 35 years. [View more details and compare the areas.](#)

Category	Risk Level	Trend
Residential	Moderate	Increasing
Road	Major	Increasing
Commercial	Moderate	Increasing
Infrastructure	Major	Increasing
Social	Moderate	Increasing

COMMUNITY RISK

Explore community flood risks

Overall, **Lafayette Parish** has a **major risk of flooding** over the next 30 years, which means flooding is likely to impact day to day life within the community. In addition to damage on residential properties, flooding can also cut off a community's utilities, emergency services, transportation, and may impact the overall economic well-being of an area.

Explore the maps below to learn more about the homes, businesses, roads, and services at risk nearby.

Community risk

ZIP

City

County

Map View:

Overall Risk

Compare areas

Points on map

Filter by levels:

All

Minimal

Minor

Moderate

Major

Severe

Extreme

PERSONAL SOLUTIONS

There are solutions to protect your property.

Just an inch of flooding can cost **\$25,000** or more, yet typical homeowners insurance does not cover flood damage. [Learn more about solutions](#) to protect your home, business, and community.

Flood protection solutions

	\$	\$5	\$55	\$555
 Cleared gutters				
 Contact city officials				
 Coatings and Sealants				
 Nonporous Flooring				
 Sandbags				
 Rain barrels				
 Regraded property				

Feedback on existing tools: Flood Factor

Respond to poll questions at
pollev.com/jennybyrd841

Poll Question:

- What did you like about this tool and what features do you find most useful?
- What information or capabilities are missing from the Flood Factor site?

Discussion Questions

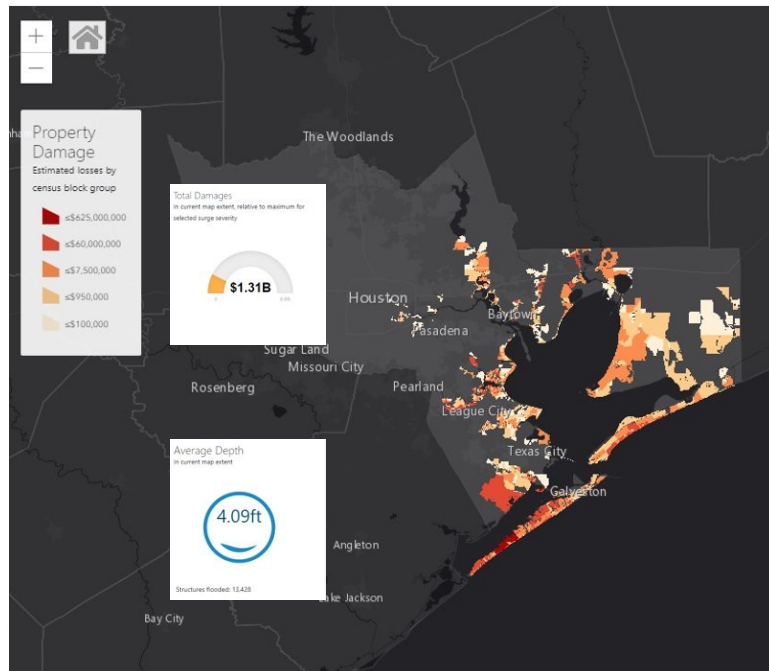
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- How do you envision this app, or similar tools, could improve the communication of existing or new flood risk or mitigation information?

External Tool 2: Texas Coastal Atlas

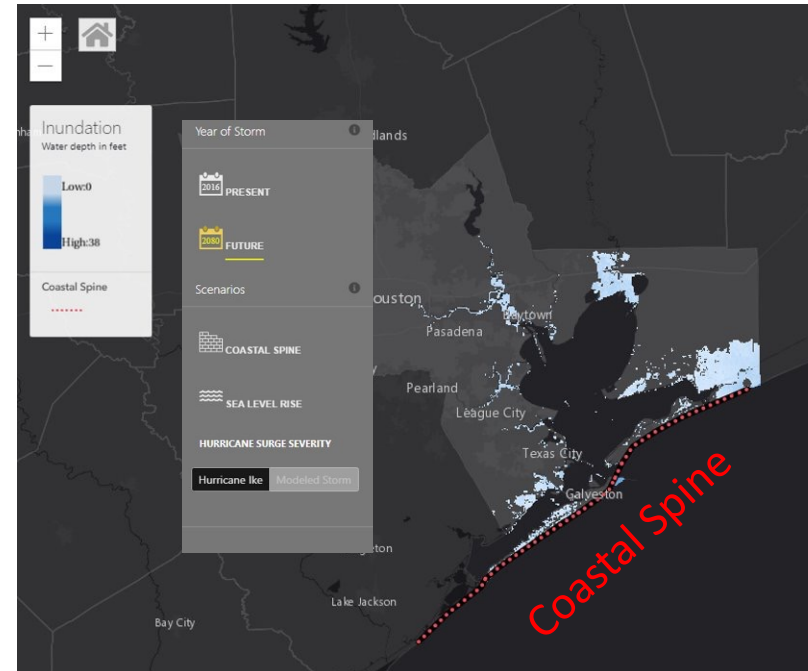
<https://bit.ly/ul-txcosp>

- Look over "Local Directions" instructions in the lower right of the screen
- How much property damage is likely over the entire study area due to a storm like Hurricane Ike taking place in 2080 given the Sea Level Rise scenario alone?
- How much would this likely property damage be reduced if the Coastal Spine were to be built?
- Zoom into a census block group where flood risk would not be greatly reduced by building the Coastal Spine
- Why do you think these areas would still be vulnerable in 2080 if the Coastal Spine were to be built?

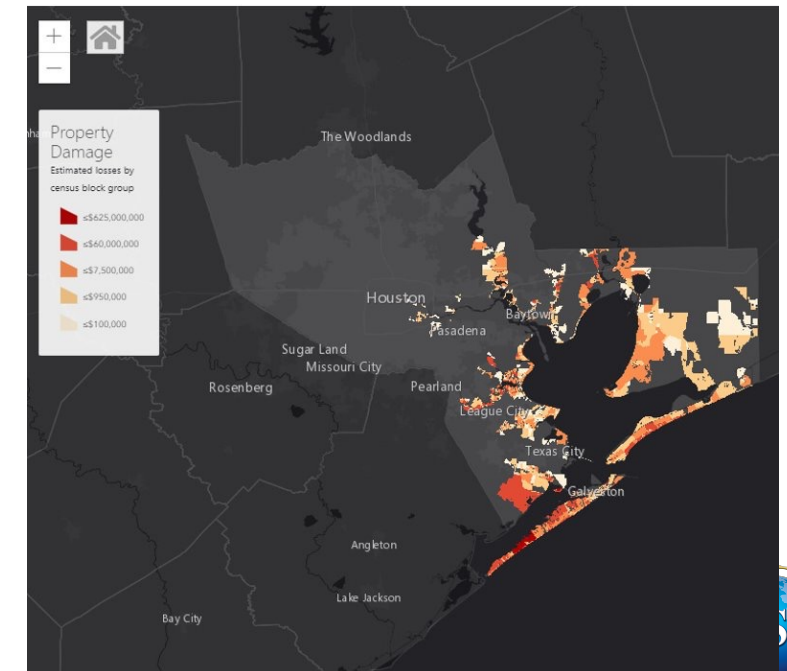
Estimated total damage



Estimated future damage



Estimated inundation depth



Feedback on existing tools: Texas Coastal Spine

Discussion Questions

- What features do you find most useful?
- What features or capabilities are missing?
- If this portal were to be available in your community, what would you like to know about flood risk that is missing from Texas Coastal Atlas?

Workshop Part II: Summary and next steps

- Closing thoughts
 - What flood risk and mitigation information do you wish to see communicated that is not currently available?
 - What other tools or technologies could help to address flood challenges you and your community see?
 - Are there any “big-picture” items that our project is missing?

Are you interested in partnering with us in our next grant to NSF?

What does a partnership mean?

- Participate in a beta-user group to test and inform the design of our apps (e.g., purpose, content, functionality)
- Share relevant data that can be used to develop the apps
- Help us connect with your stakeholders (e.g., citizens, officials) to participate in testing and informing the design of our apps
- If applies, use the apps that we will develop in your own operation.
- Offering letter of support stating involvement with the project if funded



Our Conceptual Tool (app)

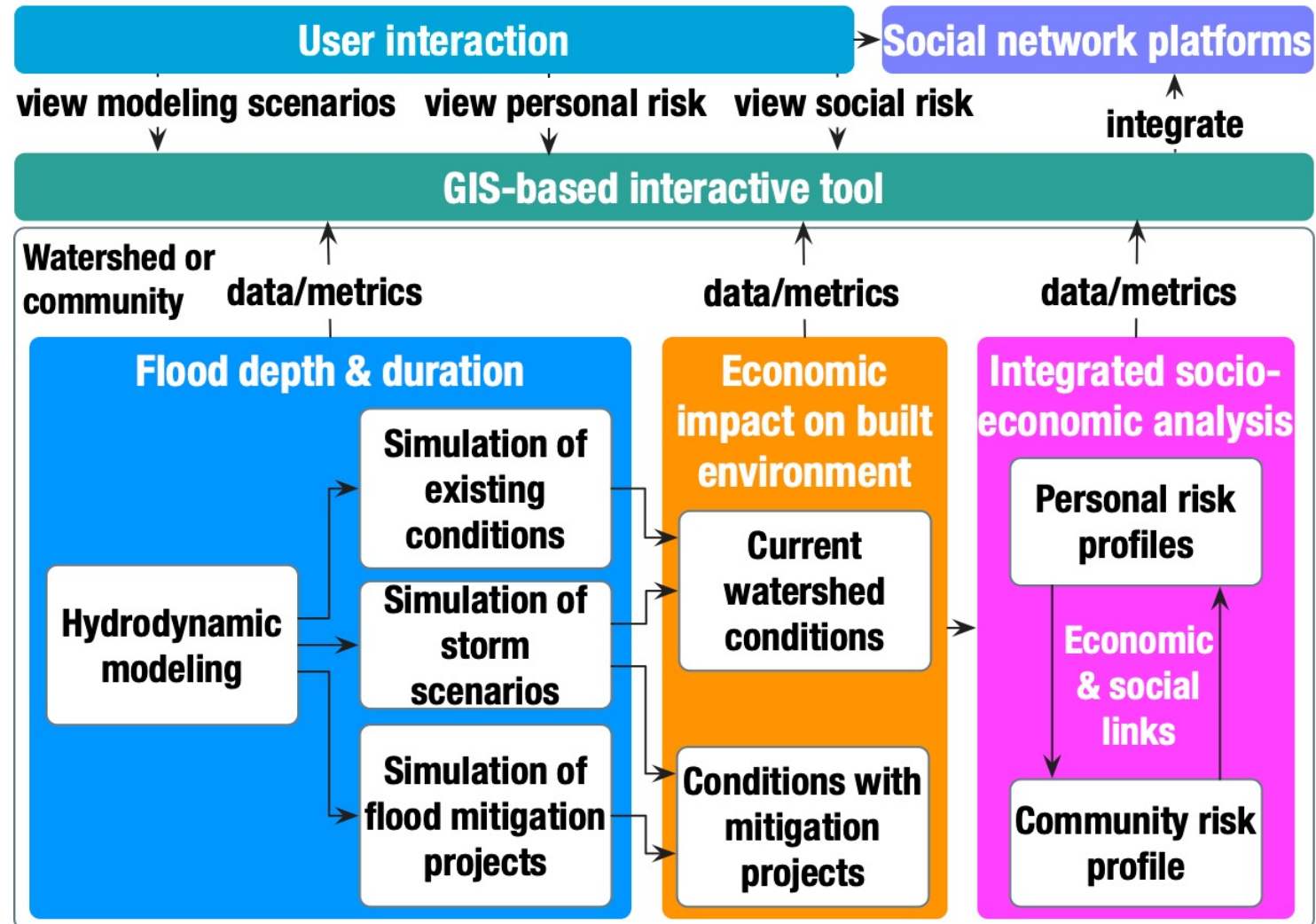


Figure 1: Integrated Web-Based Hydrodynamic and Socioeconomic Modeling Environment

Thank you!