

Connecting the Dots Between NOAA's Hurricane Social Science Efforts:

Early Findings from the Social and Behavioral Science Hurricane Supplemental Projects

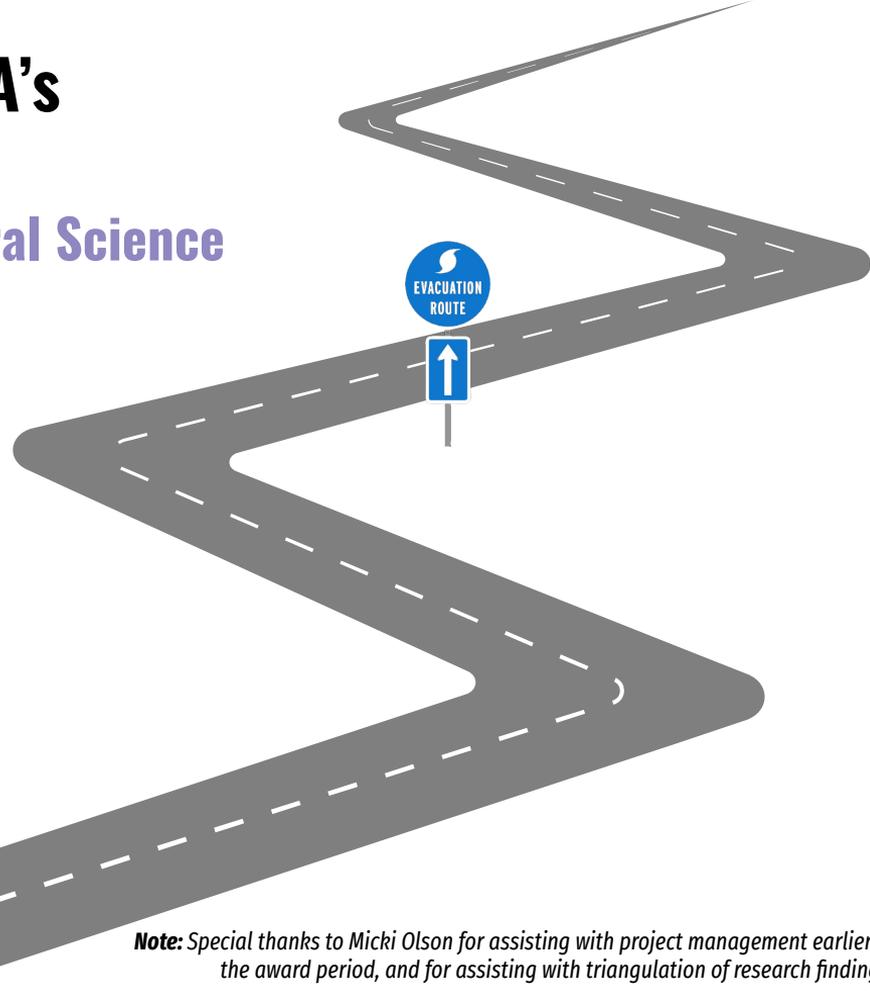
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Note: Special thanks to Micki Olson for assisting with project management earlier in the award period, and for assisting with triangulation of research findings.

Weather Act & Disaster Supplemental Appropriations

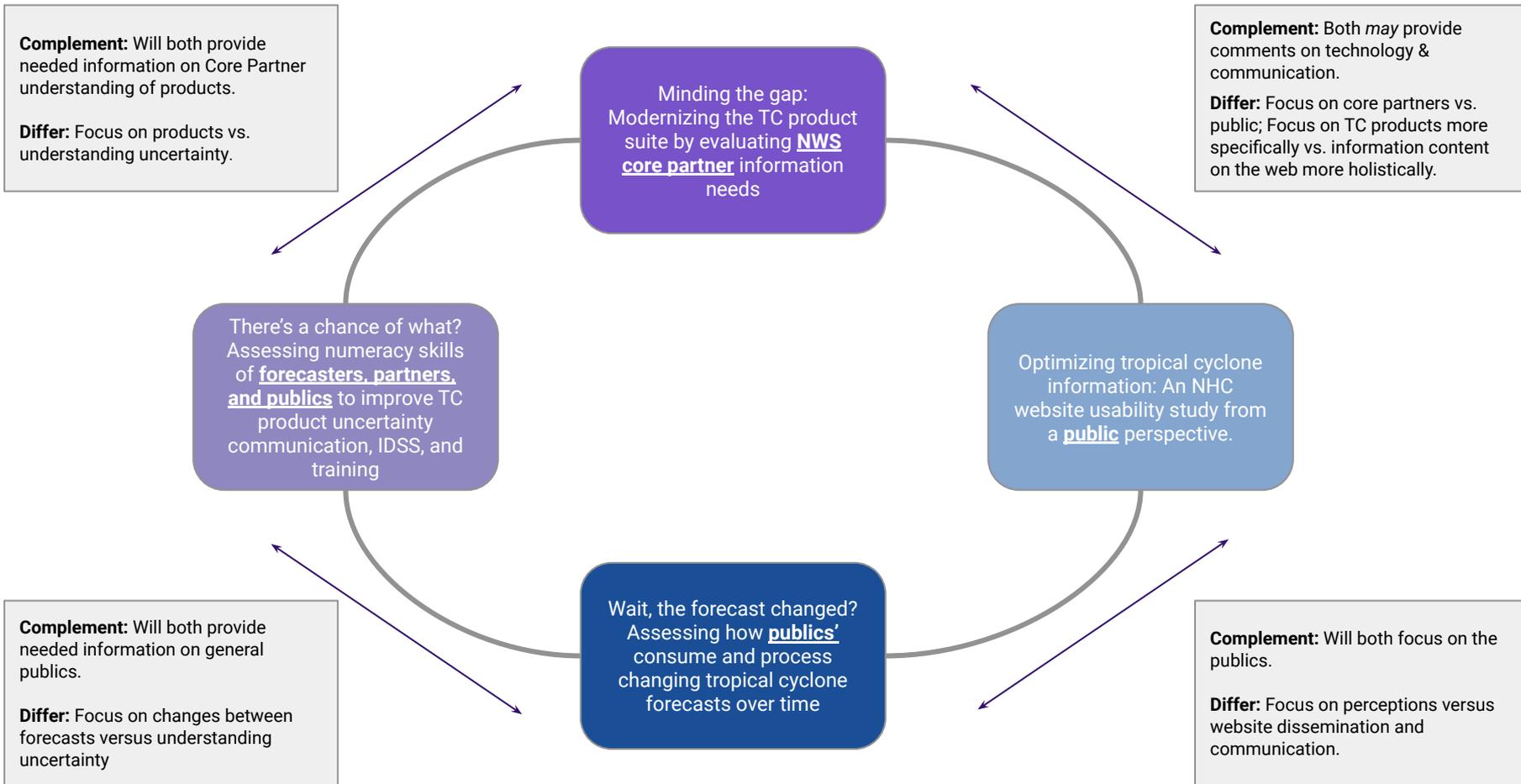
Section 104 of the Weather Research and Forecasting Innovation Act of 2017 (“Weather Act”) and the Bipartisan Budget Act, 2018: Division B - Supplemental Appropriations, Tax Relief, and Medicaid Changes Relating to Certain Disasters and Further Extension of Continuing Appropriations (“Disaster Supplemental Appropriations”) provide NOAA with a unique and important opportunity to integrate the social, behavioral and economic sciences into NOAA’s tropical products, information and services

Further, the Strategic Plan for the Next Phase of HFIP articulates a path forward to incorporate risk communication research into the design and communication of its products:

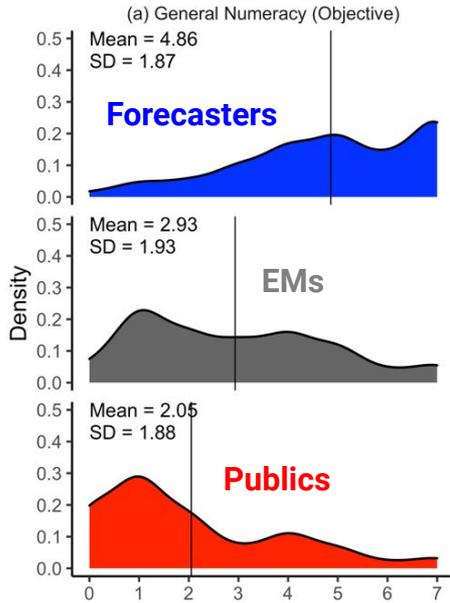
- By 2021 NOAA will complete a baseline understanding of partner and stakeholder needs relating to the TC product suite,
- By 2023, through social and behavioral science research, NOAA intends to improve communicating the forecasted risks by transitioning 2-3 TC hazard guidance products per year and,
- By 2028, modernize all products in the TC product suite.

The following 4 supplemental projects will advance our efforts!

The complementary design behind the projects



There's a Chance of What? Assessing Numeracy Skills of Forecasters, Partners, and Publics



Set of 4 studies that mapped comprehension and communication of probabilistic information by surveying weather forecasters, emergency managers, and the public.



Numeracy Findings

EMs are generally more numerate than members of the public, but they look more like the public than forecasters.



Vague Messages

A majority of forecasters/EMs use vague words and phrases vs. precise numbers to explain probability information.



Strong Messages

Strong messages that include numeric information help the public correctly interpret complex probability information.

Minding the Gap: Modernizing the TC product suite by evaluating NWS partner information needs

Used semi-structured interviews and survey methods to understand how broadcast meteorologists and emergency managers currently use the tropical cyclone product suite.



How can the NWS identify gaps in their TC product suite needed to enhance partner decision-making?

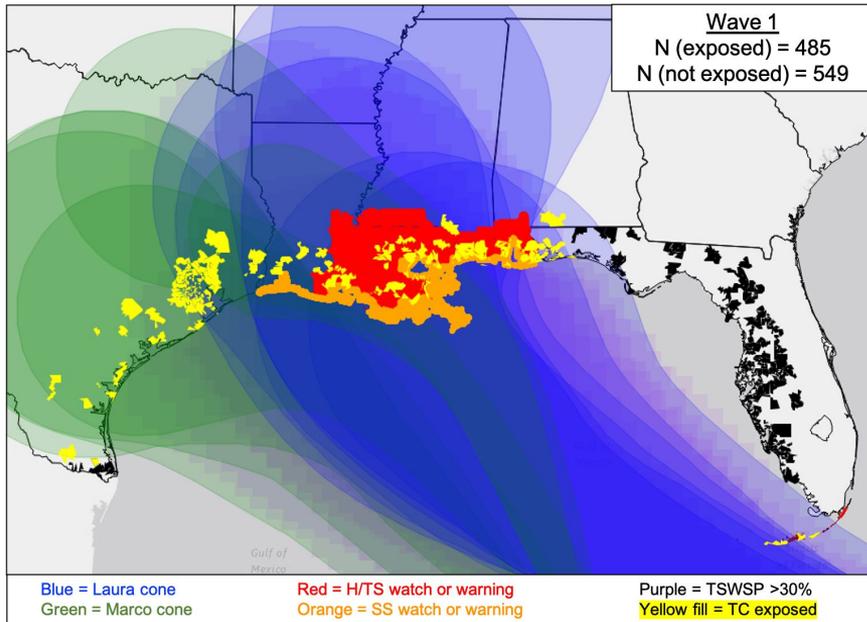


Both broadcast meteorologists and emergency managers find that there is often a mismatch between available TC information and their decision timeline.



There is a need for easily interpretable and localized TC information.

Wait, that forecast changed? Assessing how publics consume and process changing tropical cyclone forecasts over time



Developing a methodological approach to deploy longitudinal surveys before, during, and after tropical cyclone events to measure the public's information-seeking, risk perception, and response in real-time.



Combining Physical & Social

An early concept approach to further integrate both physical science & social science by using TC products to define and categorize TC exposed.



Social Science Observing System

This methodological approach acts similar to a meteorological observing system, but for risk perceptions and responses of people!

Optimizing tropical cyclone information: An NHC web user experience study from a public perspective

Used a variety of usability and user-centered design methodologies (e.g., interviews, heuristic analysis, card sorting, etc.) to identify design opportunities for modernizing the NHC website:



How can NOAA's hurricane web presence be modernized?



Increase Investment in Internal Capacity & Site



Build for Mobile



Adopt Contemporary Visual Design Standards

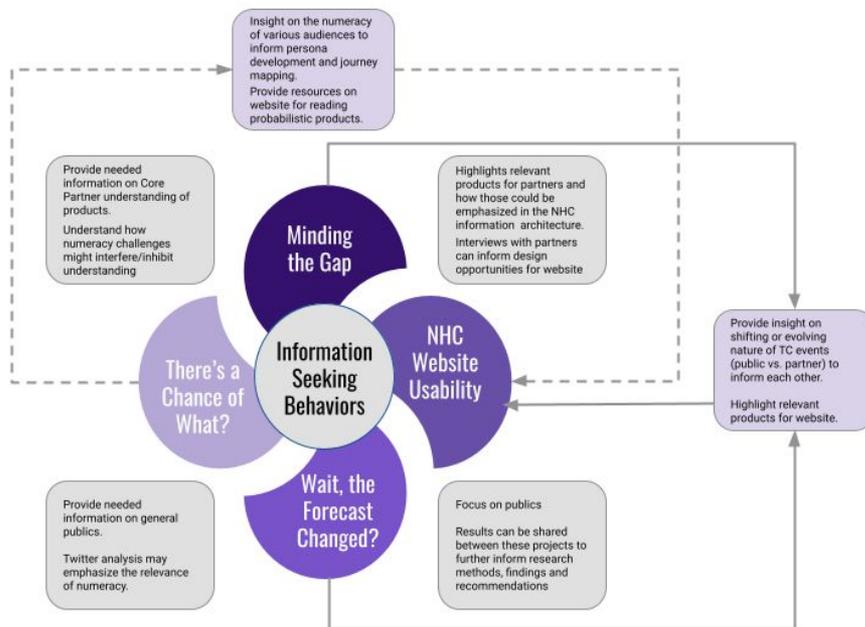


Continue Improving Accessibility for Diverse Audiences

What is Triangulation?

(Triangulation is still ongoing, these are very preliminary findings)

“Triangulation in research is the use of more than one approach to researching a question. The combination of findings from two or more rigorous approaches provides a more comprehensive picture of the results than either approach could do alone.” (Heale and Forbes 2013)



Our Approach to Triangulation



Tiny Triangulation

This was a preliminary analysis to begin understanding the broader themes we would likely see before receiving all of the final reports.



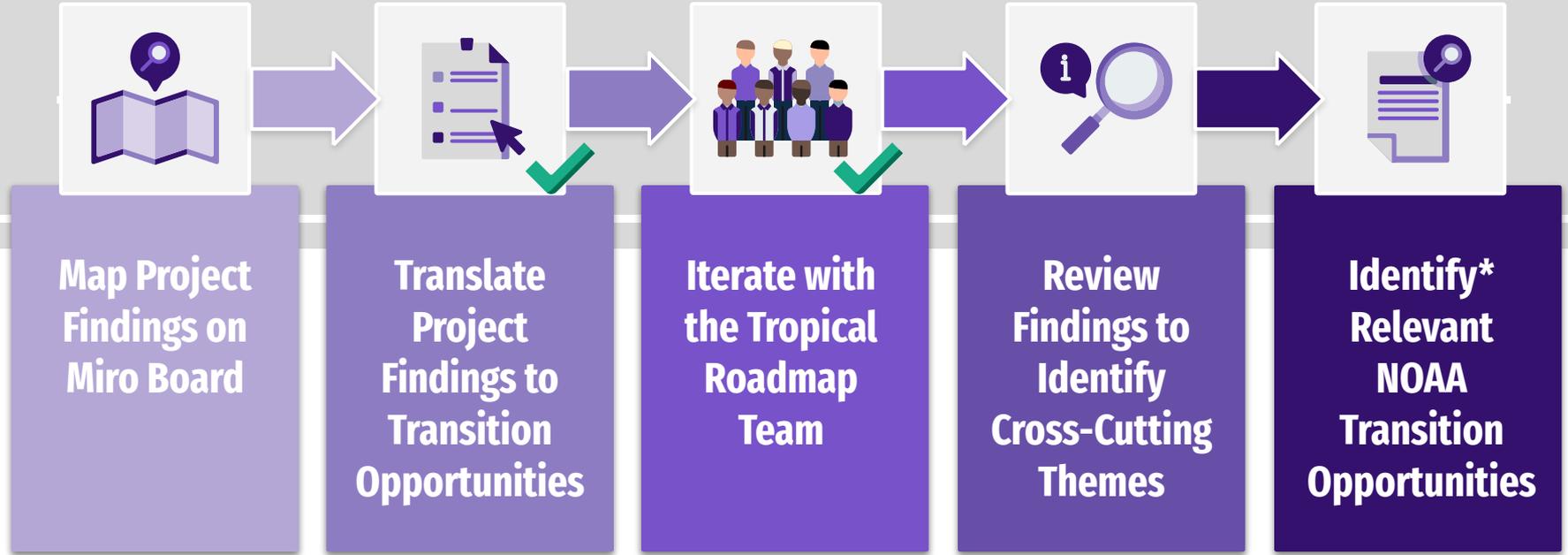
Taller Triangulation

A more detailed analysis with the goal of translating social science findings into actionable recommendations for NOAA research, development, & operations.

(Triangulation is still ongoing, these are [very preliminary findings](#))

What's Different About Taller Triangulation?

It's All About Translation!



***When identifying NOAA transition opportunities, many different NWS operational partners will be consulted and iterated with to assess operational viability in order to put forward relevant and actionable recommendations.**

Big Themes & Takeaways from Tiny Triangulation Efforts



*Generally speaking, broadcast meteorologists, emergency managers, and members of the public find NOAA/NWS' tropical cyclone products and services **useful and important.***

Big Themes & Takeaways from Tiny Triangulation Efforts



Identify ways to localize & personalize TC information



Improve the accessibility of TC products and services.



People search for different types of information during different phases of the lifecycle of a TC threat.



Timing information is critical for decision-making, thus the *timing* of when forecasts are issued is important too.



Uncertainty information is important to communicate, but it is not always communicated well.



Graphical TC products are important, but some need to improve their depiction of risk and/or uncertainty.



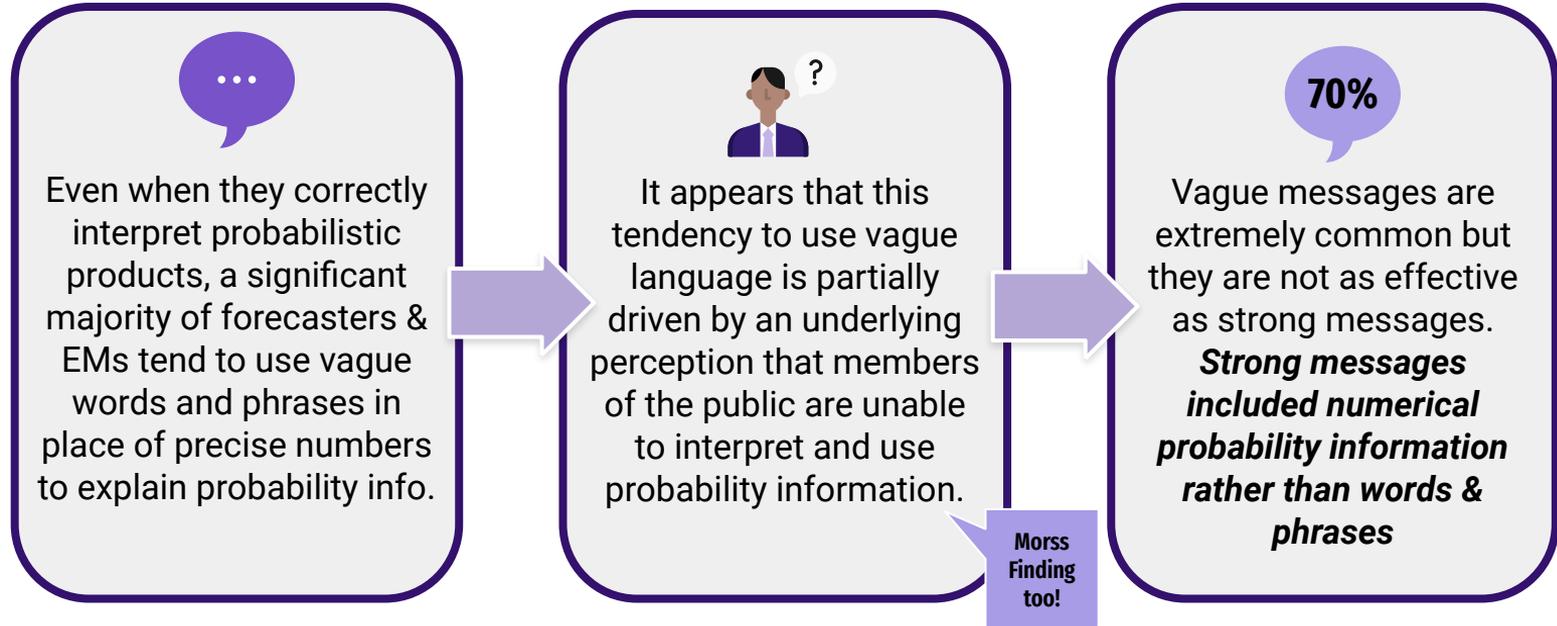
There is a misperception among forecasters & partners that the public does not understand uncertainty info.



There is a misperception that emergency managers are highly numerate like weather forecasters.

End Users Benefit from Probabilities When Making Decisions

Taller Triangulation Translation Opportunity

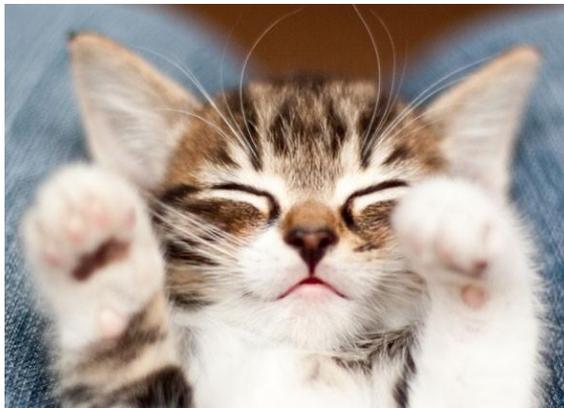


This likely requires a **culture shift & additional training** among forecasters and partners that end users do benefit from probabilistic information when making decisions, and embedding this into NWS products & external communication.

Adding Communication Assist Text (CATs) to Probabilistic Products

Taller Triangulation Translation Opportunity

Recommendation from Ripberger: Forecasters should include a sentence or two explaining how to interpret probability information in graphics when sharing them with end users.



Static CATs (Short-term)

VS.



Dynamic CATs (Long-term)

Adding Communication Assist Text (CATs) to Probabilistic Products

Taller Triangulation Translation Opportunity

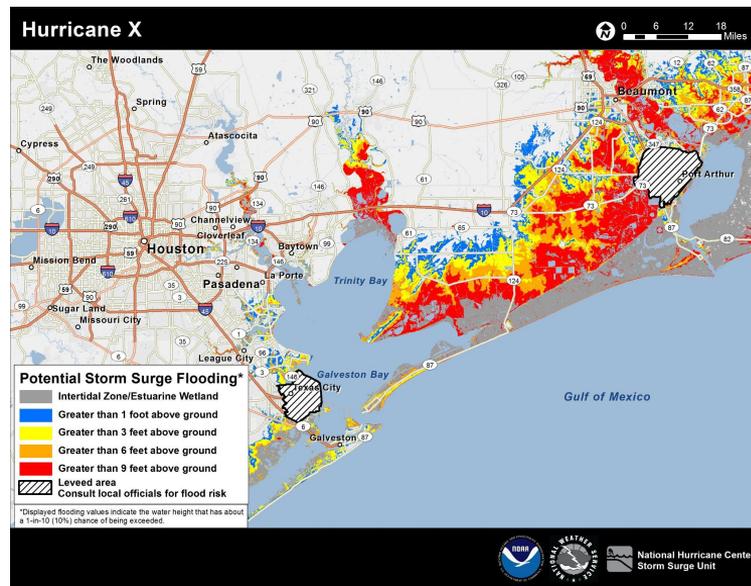
Recommendation from Ripberger & Morss: Forecasters should include a plain-language sentence or two explaining how to interpret probability information in graphics when sharing them with end users.

Static CAT for Potential Storm Surge Flooding Map

This map shows a reasonable worst-case scenario of storm surge flooding that several locations along the coast should prepare for. There is approximately a 1-in-10 (10%) chance that storm surge flooding at any location could be higher than the values shown on the map.



Morss
Finding



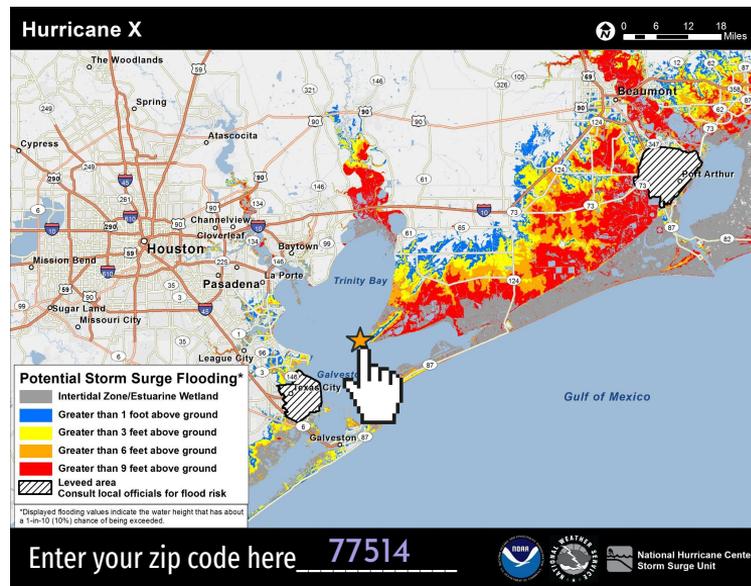
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Dynamic CAT for Potential Storm Surge Flooding Map

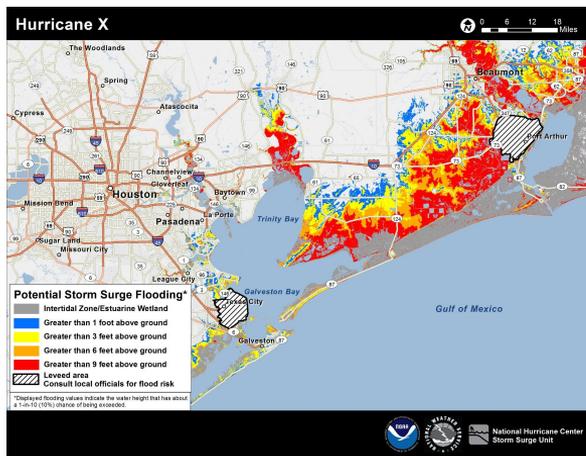
This map shows a reasonable worst-case scenario of storm surge flooding of **greater than 6 feet above ground** that you should prepare for **in Smith Point, TX (77514)**. There is approximately a 1-in-10 (10%) chance that storm surge flooding in **Smith Point, TX** could be higher than the value shown on the map.



New or Updated Graphical Products Should Be Co-produced with End Users

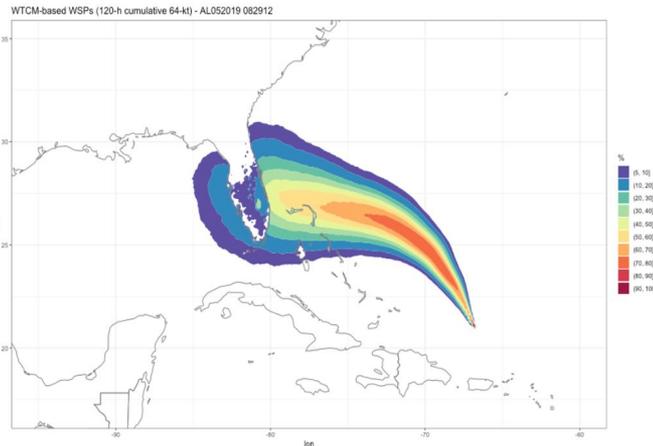
Taller Triangulation Translation Opportunity

Finding from Soden, Ripberger, and Morss: New or reformulated graphical products are more valuable when meteorologists co-produce or co-develop these products alongside partners and relevant end users.



Participated in Co-Development with End Users

Compared
to



Opportunities for Future Co-Development

Use Social Science Research to Inform Physical Science R&D

Taller Triangulation Translation Opportunity

Social science research is often thought of as a mechanism to improve or change policies, products, and services. **However, it can also be used to inspire product development and/or explore potential physical science capabilities.**



What capabilities do we have to provide storm surge information more than 48 hours in advance?



How can the modeling suite inform the development of storm scenarios 72 hours before impacts?



How do our models/post processing give NOAA the ability to provide both onset *and* departure time?

Next Steps - Translating Social Science Findings

Following the Tropical Roadmap Process



Questions?

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