Accelerating Effective Risk Communication of Warnings:

Early Findings & Transition Opportunities from the Social and Behavioral Science Hurricane Supplemental Projects

Gina Eosco & Castle Williams
Social Science Program
Weather Program Office, NOAA/OAR

Jen Sprague-Hilderbrand
Office of Programming, Planning, and Service Development,
National Weather Service

Valerie Were
Office of Science and Technology Integration
National Weather Service

Jessica Schauer
AFS Marine, Tropical, & Tsunami Services Branch,
National Weather Service

Robbie Berg
National Hurricane Center

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Weather Act & Disaster Supplemental Appropriations

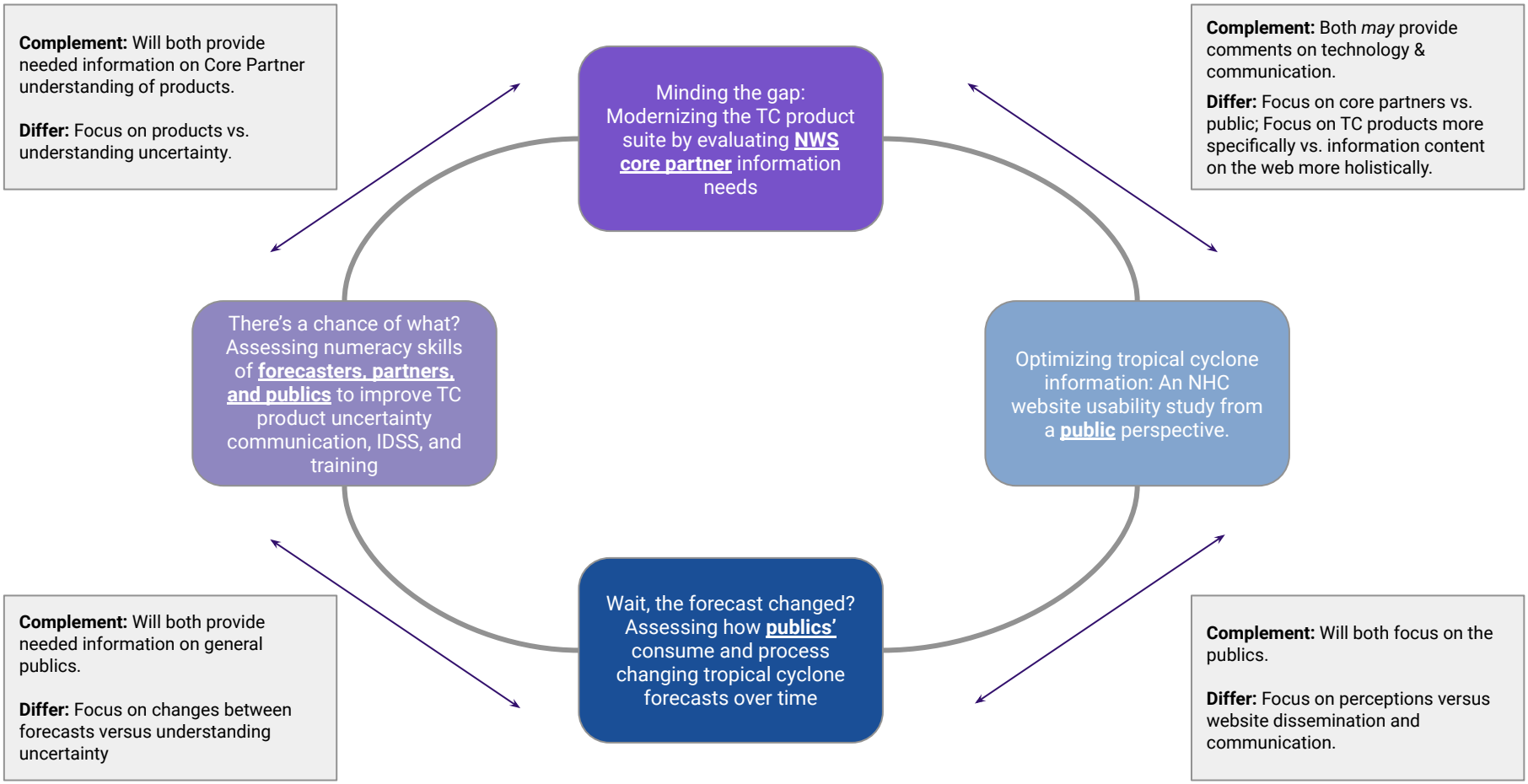
Section 104 of the Weather Research and Forecasting Innovation Act of 2017 (“Weather Act”) and the Bipartisan Budget Act, 2018: Division B - Supplemental Appropriations, Tax Relief, and Medicaid Changes Relating to Certain Disasters and Further Extension of Continuing Appropriations (“Disaster Supplemental 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:

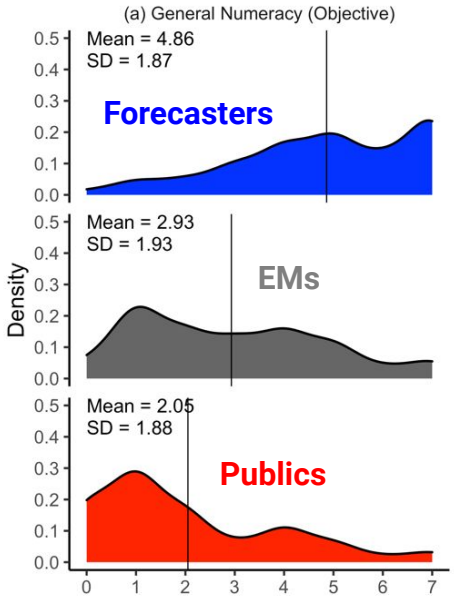
- By 2021 NOAA will complete a baseline understanding of partner and stakeholder needs relating to the TC product suite,
- By 2023, through social and behavioral science research, NOAA intends to improve communicating the forecasted risks by transitioning 2-3 TC hazard guidance products per year and,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

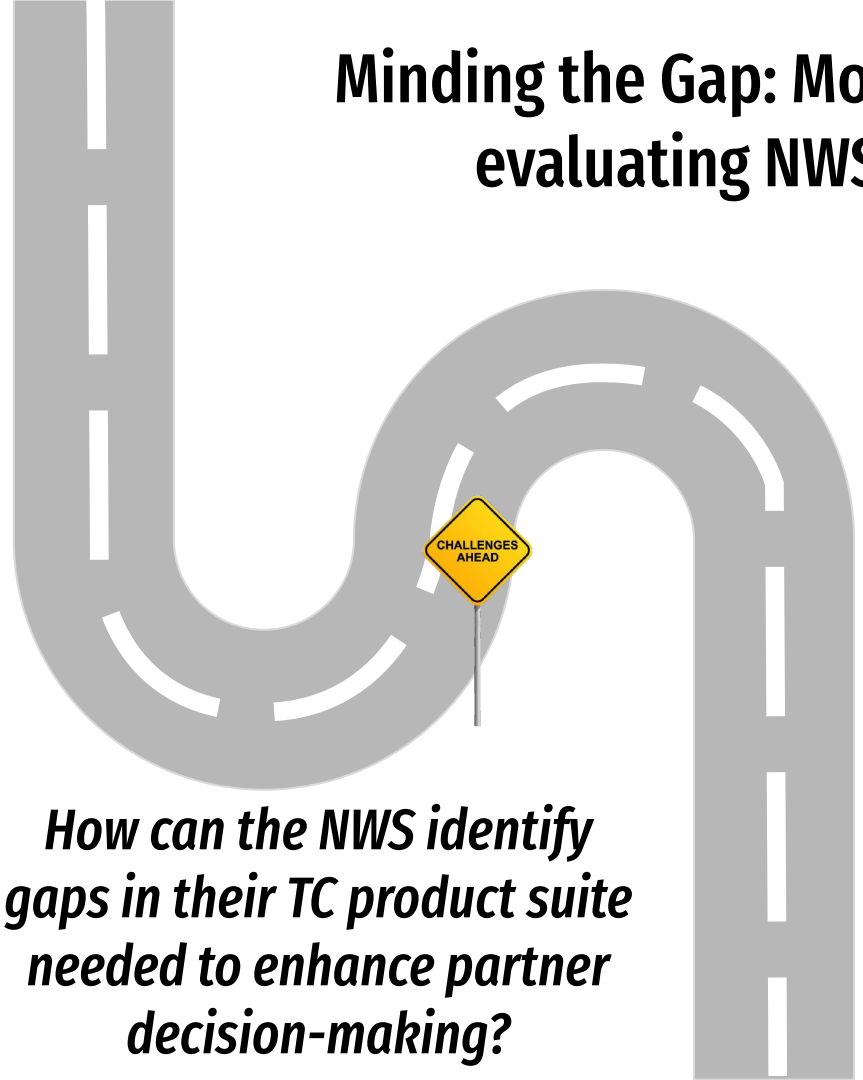
Vague Messages

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

Strong Messages

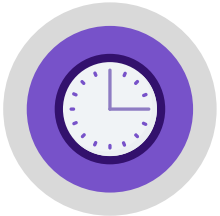
Strong messages that include numeric information help the public correctly interpret complex probability information.

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



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

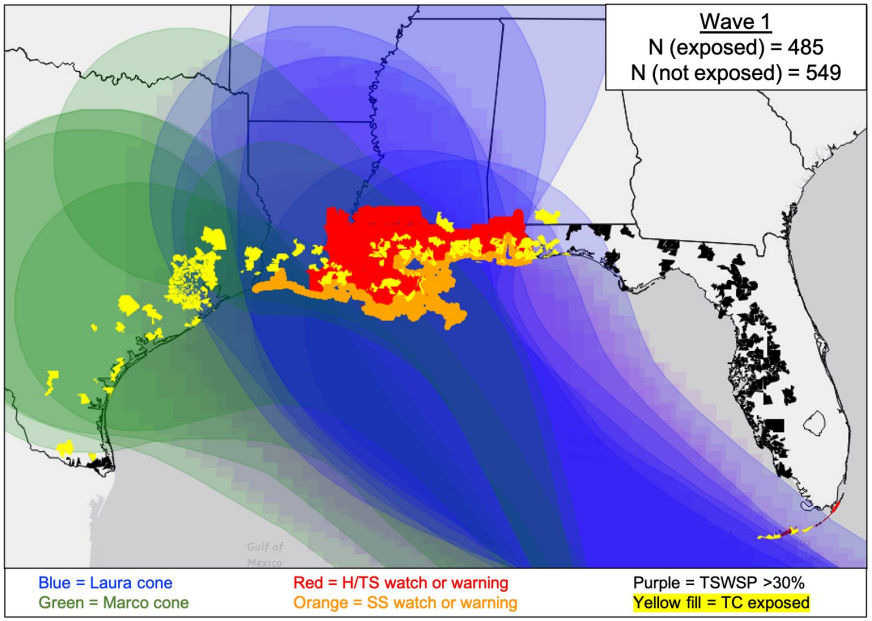
Used semi-structured interviews and survey methods to understand how broadcast meteorologists and emergency managers currently use the tropical cyclone product suite.



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.

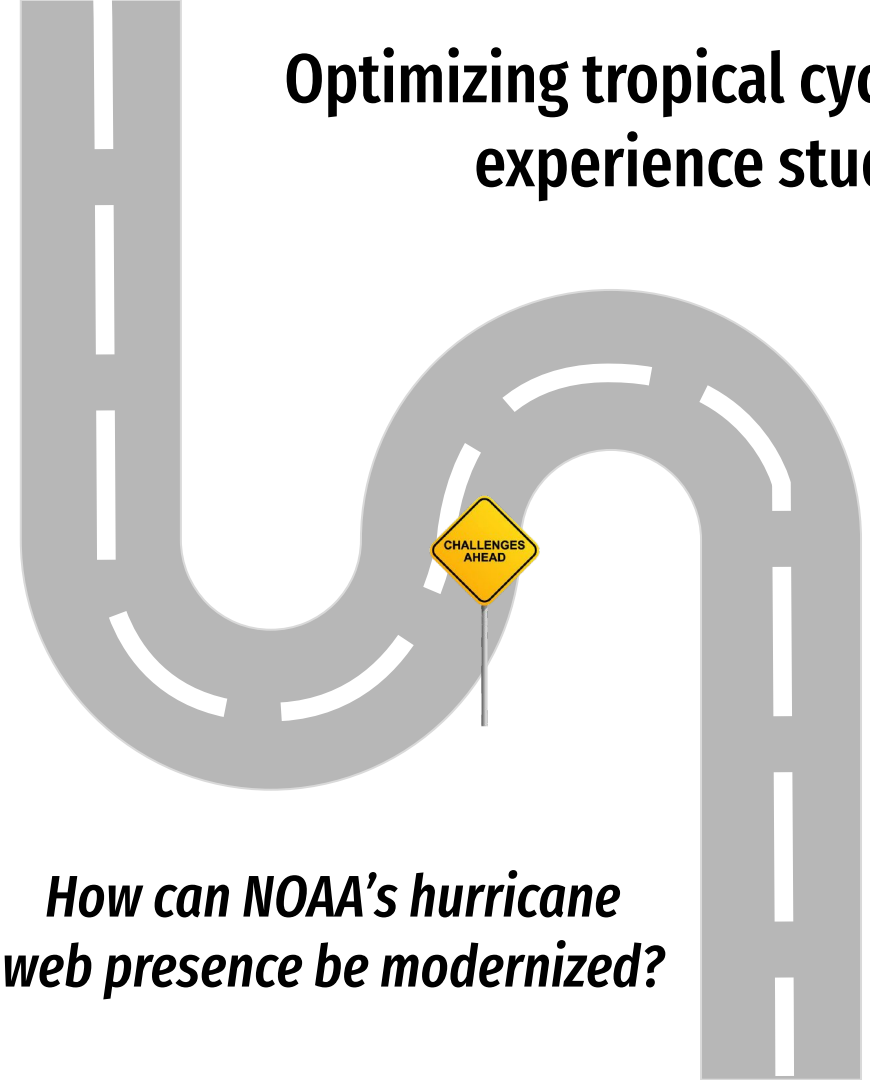
Combining Physical & Social

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



How can NOAA's hurricane web presence be modernized?

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

- Orient User Experience Around Location
- Integration with Regional Forecast Office Websites
- Persona Development & User-Journey Mapping
- Information Architecture Review

Cone of Uncertainty - Social and Behavioral Science Research

Cross-Cutting Themes and Findings from Eastern Research Group

Misinterpretations of the Cone

Non-experts and sector professionals alike have misunderstandings about the cone.

Familiar & Well-known

Most well-known and sometimes the only NOAA hurricane product accessed by users.

Valuable for Decision-Making

Critical to decision-making for international forecasters & sector partners.

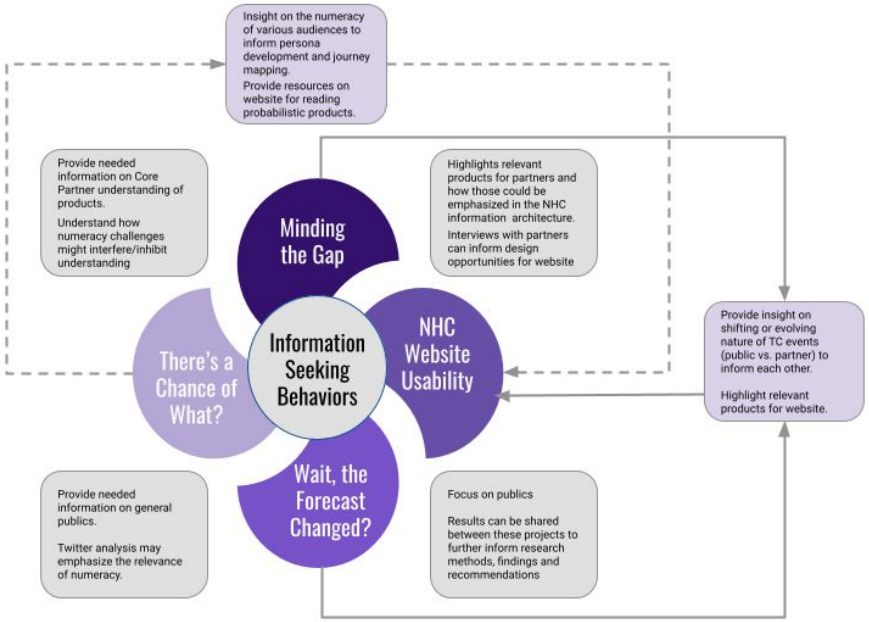
Messaging Paradox

Battle between the cone providing *too much* information, and yet, it does not have *all* the information people want.

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)*



Big Themes & Takeaways from 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 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.

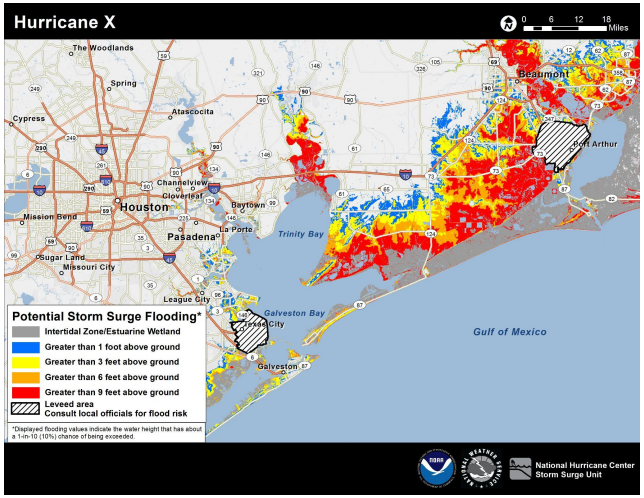
Graphical TC products are important, but some need to improve their depiction of risk and/or uncertainty.

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

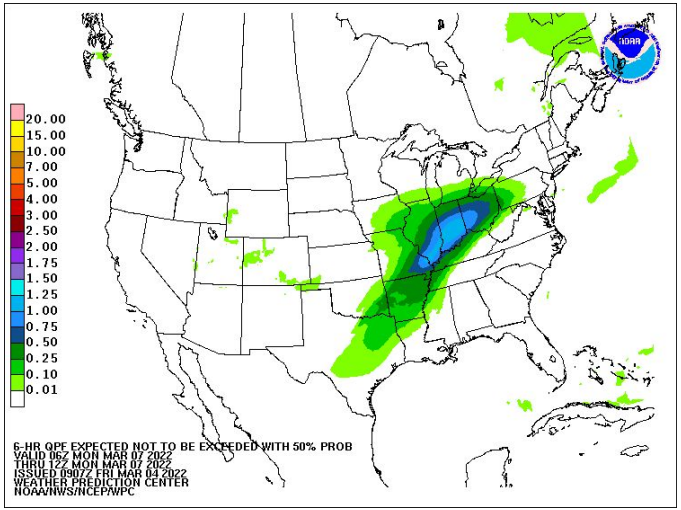
There is a misperception that emergency managers are highly numerate like weather forecasters.

Transition Opportunity: Co-produce Graphical Products with End Users

These projects highlight the value of graphical products for weather risk communication. More importantly, however, findings from these projects reveal that ***graphical products are more valuable when meteorologists co-produce or co-develop these products alongside partners and relevant end users.***



Compared to



Participated in Co-Development with End Users

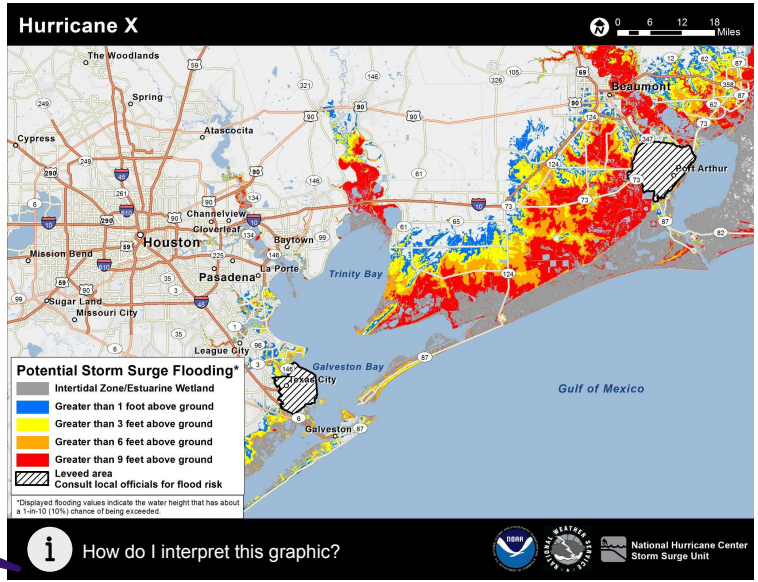
Opportunities for Future Co-Development

Transition Opportunity: Provide Probabilistic Help Messages

The communication of uncertainty and probabilistic information can be improved by ***providing brief help messages that explain to end users how to interpret the probability information being conveyed in graphical products.***

How to interpret this graphic:

The Potential Storm Surge Flooding Map represents the storm surge heights that a person should prepare for before a storm, given the uncertainties in the meteorological forecast. The map shows a reasonable worst–case scenario (i.e., a reasonable upper bound) of the flooding at particular locations due to storm surge. **There is approximately a 1-in-10 (10%) chance that storm surge flooding at any particular location could be higher than the values shown on the map.**



Transition Opportunity: Use AR to Communicate Local Impacts

Leverage COMET's Augmented Reality Storm Surge App to make locally-relevant videos that ***show impacts to local landmarks, include other locally-specific information, and can be used to help explain potential impacts at a local level.*** *This pilot project is currently being pursued by the Tropical Roadmap Team, and has a proposed FY23 Training Requirement associated with it.*

Use Social Science Research to Inform Physical Science R&D

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 physical science capabilities.***

Does NOAA have the capability to provide hyperlocal weather forecast information that is both accurate and reliable?

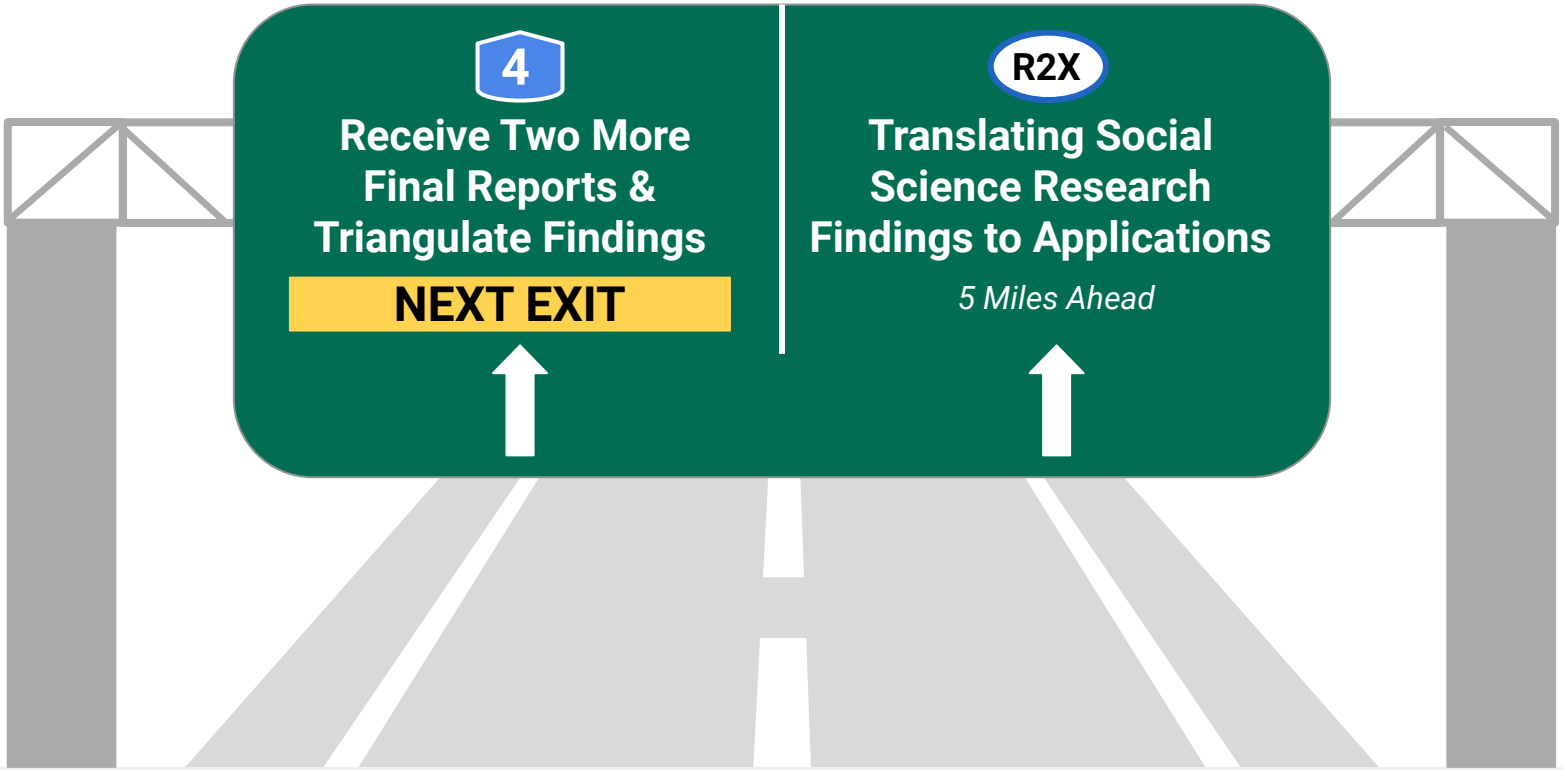
Does NOAA have the capability to transmit graphical products and services to TV vendors and other sectors?

This might require more social science R&D too!

Does NOAA have the capability to provide both onset and departure time graphical products to partners and end users?

Next Steps - Translating Social Science Findings

Following the Tropical Roadmap Process



Questions?

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Office of Oceanic & Atmospheric Research (OAR)

Weather Program Office

Social Science Program

Dr. Gina Eosco

Dr. Castle Williams

National Weather Service (NWS)

Social Science Program

Jennifer Sprague-Hilderbrand

OSTI

Dr. Valerie Were

National Weather Service (NWS)

Tropical Services Program

AFS26

Jessica Schauer

NHC

Robbie Berg