

# Assessing Stakeholder Needs for a Short-Term Great Lakes Ice Forecast

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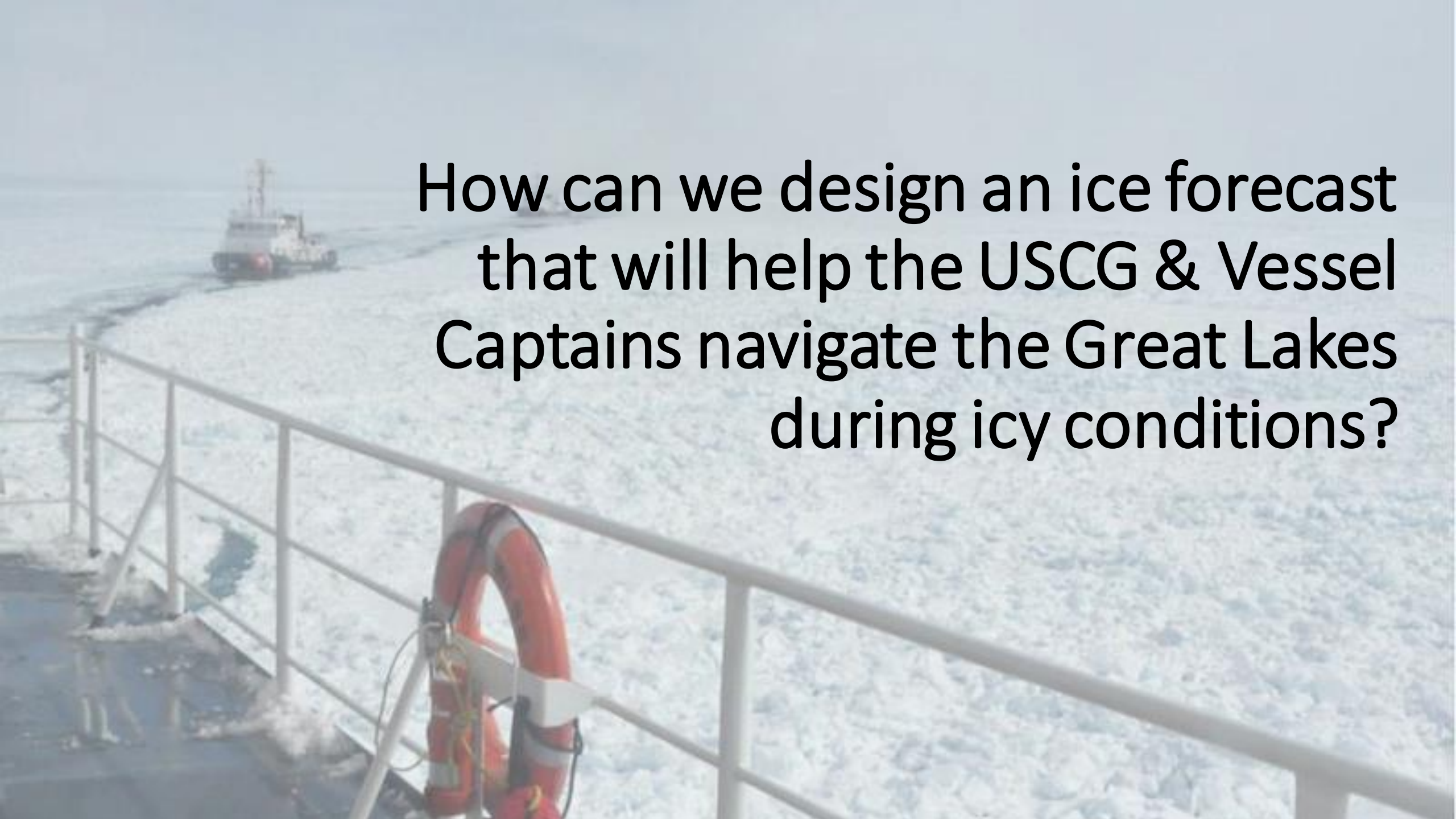
# Partners

Maria Lemos  
*GLISA, U of M*

Eric Anderson  
*NOAA GLERL*

Tom Rayburn  
*Lake Carriers Association*





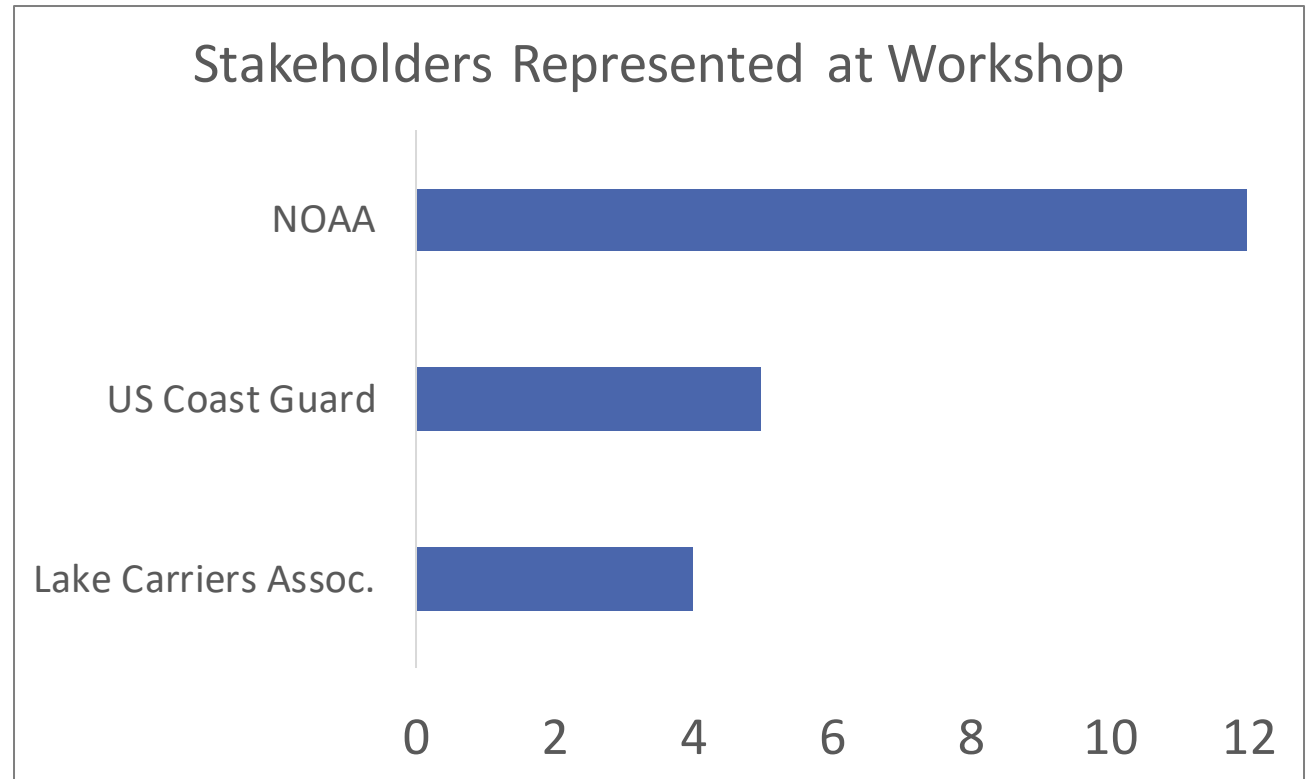
How can we design an ice forecast  
that will help the USCG & Vessel  
Captains navigate the Great Lakes  
during icy conditions?

# Needs Assessment Research Questions

1. What decisions do stakeholders make using ice information?
2. What information do stakeholders use to support decision-making?
3. What are stakeholders usability requirements for a short-term Great Lakes ice forecast?

# Methods: Workshop & Qualitative Analysis

- 3 hr workshop in Cleveland, OH
- Facilitated discussions led by semi-structured responsive interview guide
- Presentations of Ice Forecast research by Dr. Fujisake-Manome
- **21** participants were invited, identified with support from key contacts
- Transcription and inductive coding using NVivo



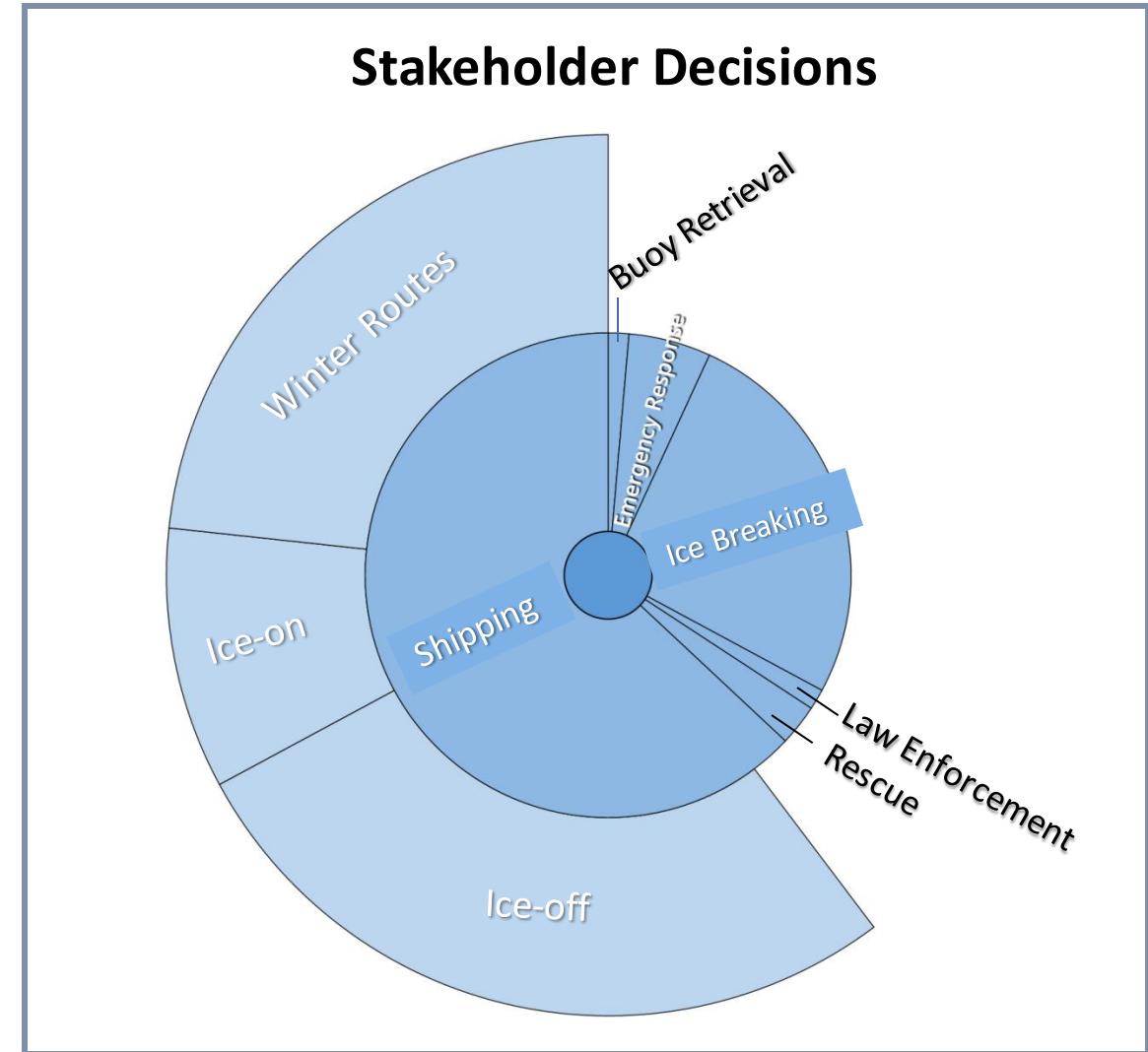
# Results: What decisions do stakeholders make using ice info?

## Findings:

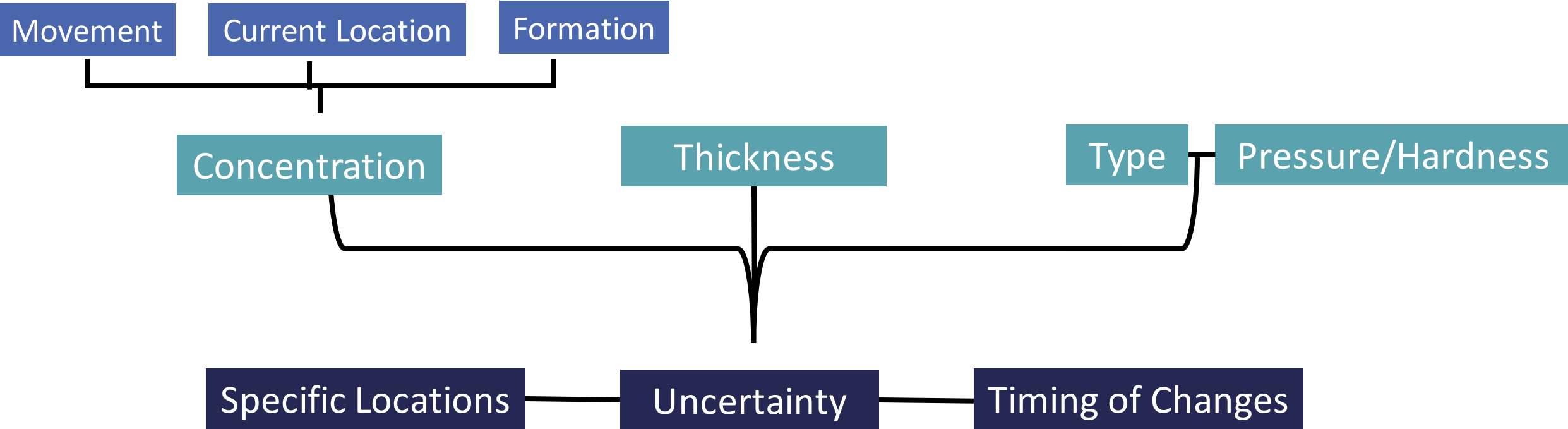
- When to plan shipping activities; which routes to take
- When/where to focus ice breaking efforts
- Support with Emergency Response; Law Enforcement; Rescue missions
- When to retrieve buoys

*“There are two times of year when we’re really looking at ice forecasting: the lay-up time in December and the fit-out time....We’re looking to see how fast it’s developing and where....”*

- Participant



# Results: What ice information do stakeholders use to support that decision-making?



## Findings:

Available—Thickness & Concentration

Missing—Ice Movement, Type, Pressure

# Results: What ice info do stakeholders use to support decision-making?

## Additional Findings

- During ice-on/off, long-term forecasts and info about bays/harbors become more useful
- During navigation season, short-term and lake-view forecasts become more useful
- Ice pressure may be useful, but difficult to understand
- Given high risk of decision-making, metrics for info uncertainty are desired



*“We’re a risk adverse company, so we’re looking at forecasts to figure out when we’re deploying our fleet. It affects our customer’s business if we lay-up sooner than expected. You’ve only got from point A to point B to make as many trips as you can....”* - Participant

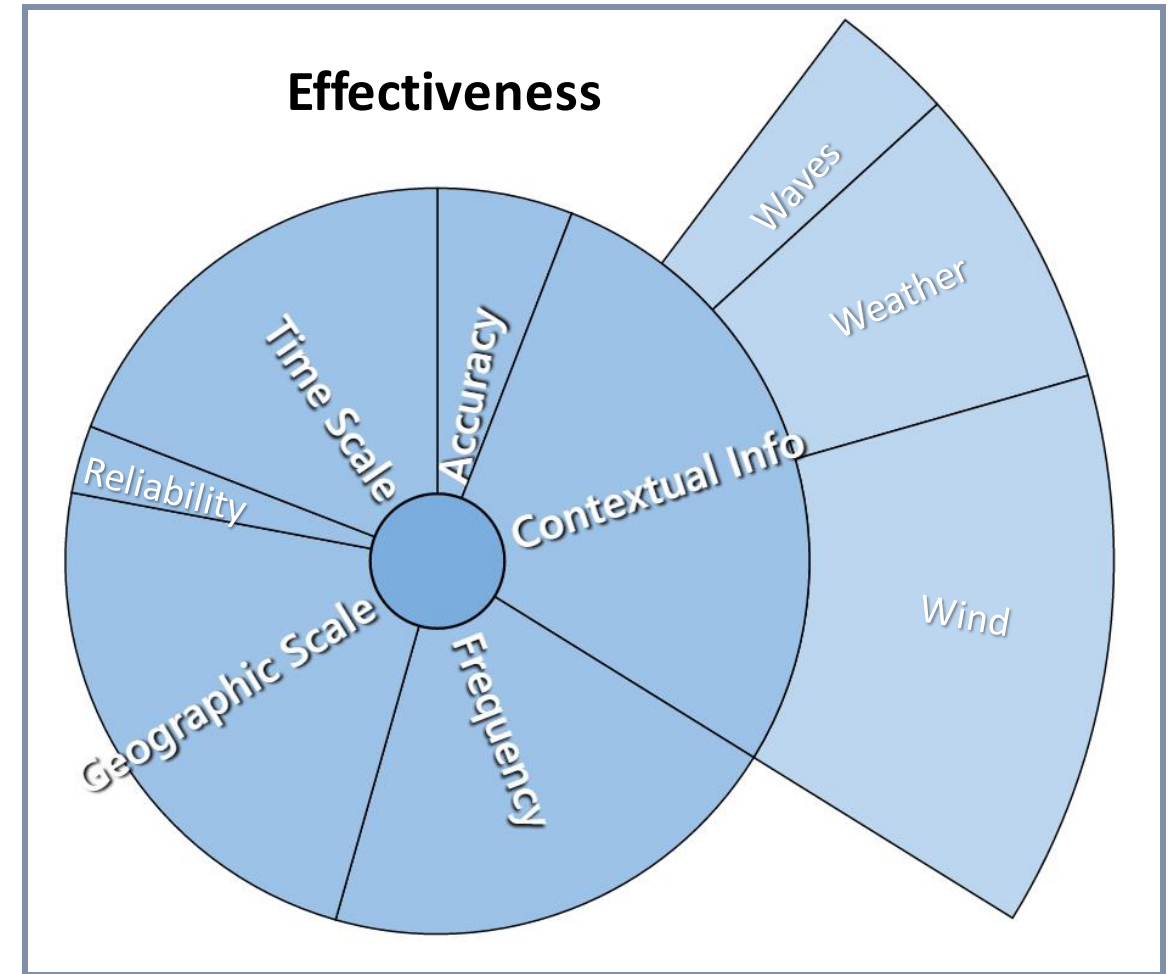


# Results: What are usability requirements for a short-term Great Lakes ice forecast?

To be usable, forecasts must be effective, efficient, and satisfying.

## Findings

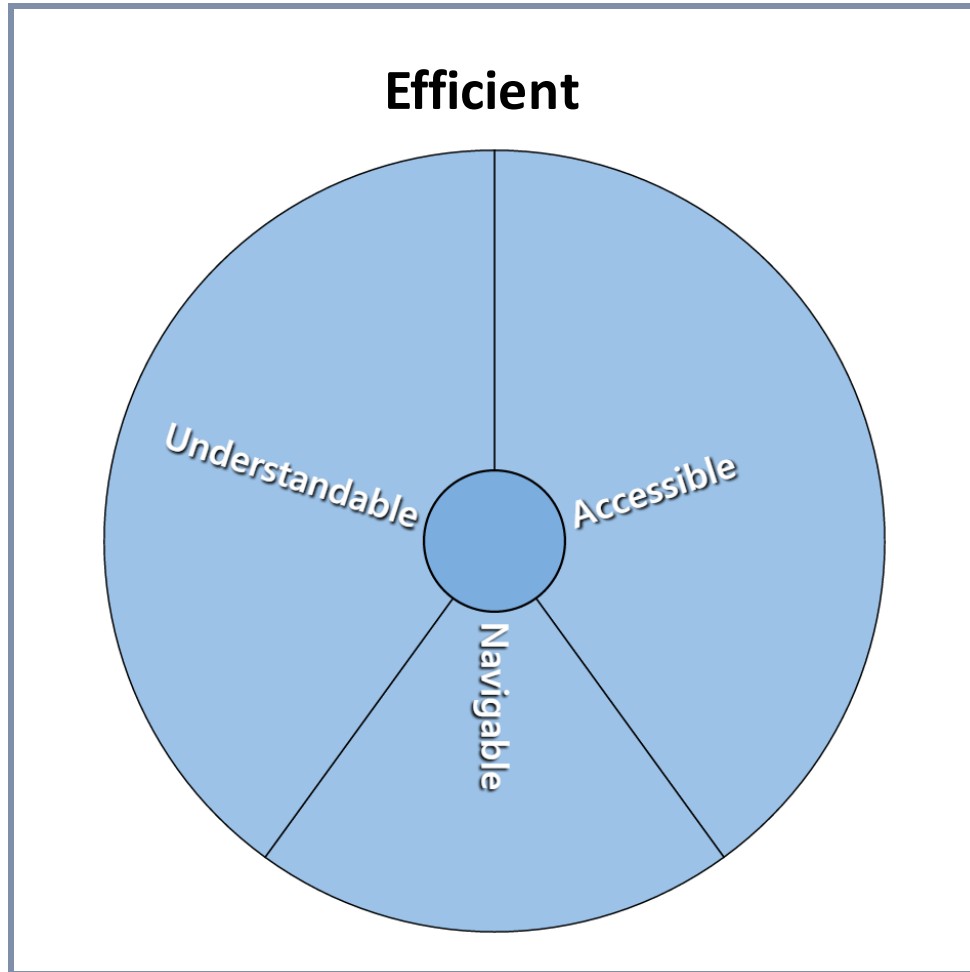
- *Forecasts should include contextual info to be more useful: wind, current, wave conditions*
- *Mismatch between forecasts and user needs with geographic/time scales*
  - *High resolution*
  - *Near real-time*
- *Long-term forecasts are inaccurate*
- *Forecasts initialized by satellite imagery are unreliable*



*“Connecting waterways are among the most challenging. You need reports more than once per day on what is actually happening. You get several different types of ice moving through all in one day.” - Participant*

# Results: What are usability requirements for a short-term Great Lakes ice forecast?

To be usable, forecasts must be effective, efficient, and satisfying.



## Findings

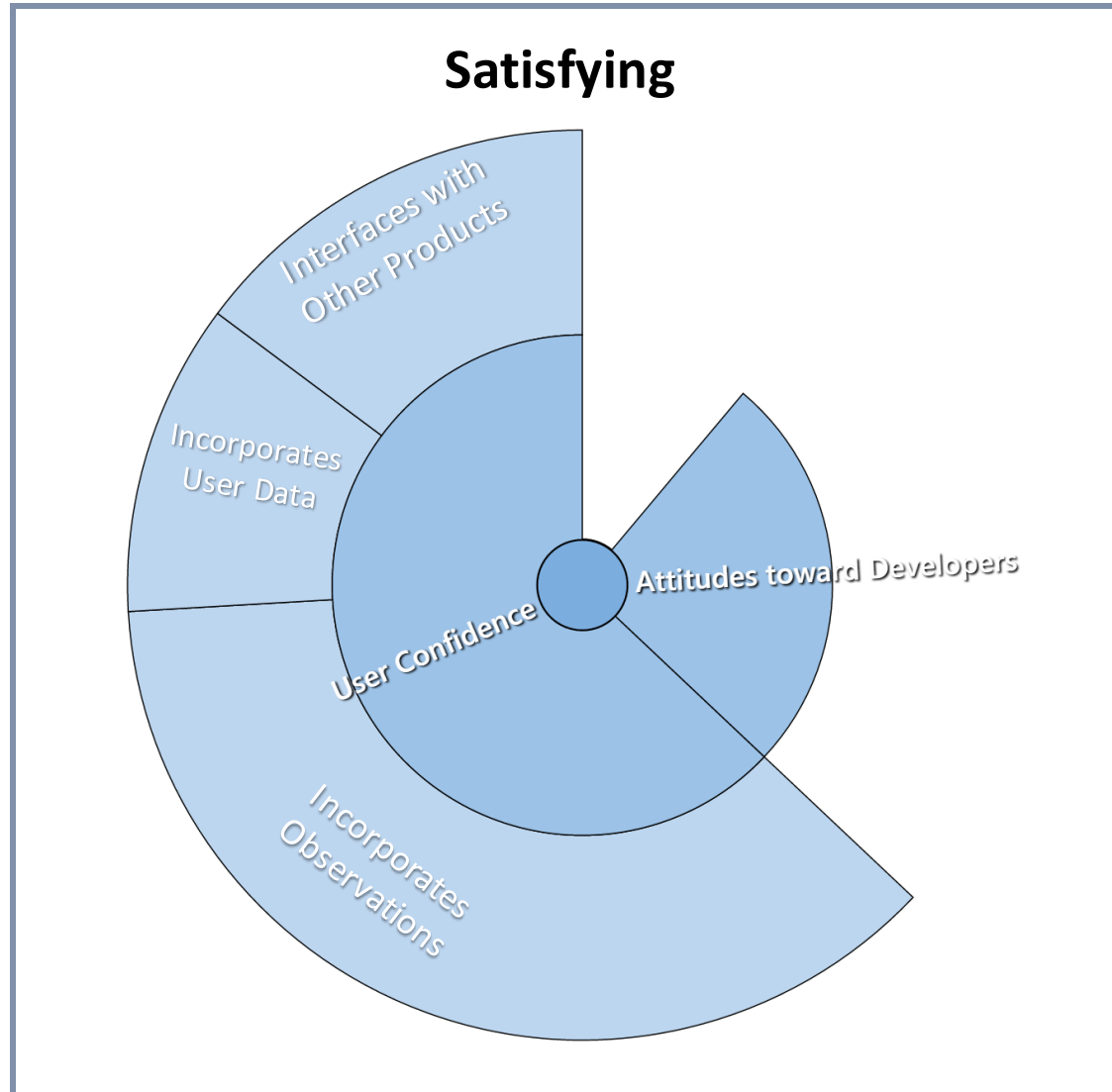
- Accessibility: Limited bandwidth capacity
- Navigable: Intuitive & interactive design
- Understandable: Interpret pressure information

*"We have a number of products that require high bandwidth, and they're just not used at all."*

- Participant

# Results: What are usability requirements for a short-term Great Lakes ice forecast?

To be usable, forecasts must be effective, efficient, and satisfying.



## Findings

- Support for outreach & collaboration
- Because forecasts do not incorporate observed data, they may not be trust-worthy
- Users share observations with each other to confirm forecasts/reports
- Integrate new forecast with existing ice products (i.e. Daily Ice Briefs)

# Needs Assessment Recommendations

## 1. To increase Effectiveness....

Contextual Info	Geographic Scale	Time Scale	Frequency	Accuracy	Reliability
Include weather/water conditions that inform forecast	Offer regional and localized views of data	Shorten forecast time period to 6 hours	Provide forecast updates at least 4 times/day, like the GLCFS	Identify best measurement for uncertainty (hindcast skill assessment, ensemble forecast, verbal)	To increase reliability, seek to use new sensors/sources not impeded by cloud cover

# Needs Assessment Recommendations

## 2. To increase Efficiency....

Accessible	Navigable	Understandable
Support mobile phone access & low bandwidth	Minimize clicks/swipes to access info	Use easy to interpret color scales
Integrate into existing products (i.e. Daily Ice Brief)	Zoom and point/click functions	Dynamic/animated images
Access current, future, past conditions	Display multiple variables for comparison	Offer different unit/metric options
Ensure continued operation during shutdowns		Interpret ice pressure information

# Needs Assessment Recommendations

## 3. To increase Satisfaction....

Attitude towards Researchers	User Confidence in Forecast
Continue to communicate & collaborate	Continue hindcast skill assessments to improve accuracy of short-term and near-shore forecasts
Illustrate responsiveness to stakeholders information needs by adopting recommendations	Explore opportunities to incorporate observed data & user data into forecast

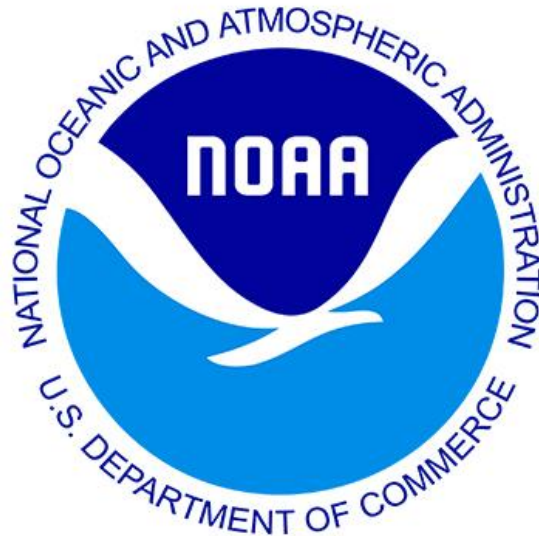
# Conclusions

## **Stakeholder engagement improved our research by...**

- Identifying decisions that target stakeholders make during icy conditions
- Describing the information stakeholders need to make those decisions
- Recommending how to provide this information so that it is most useable to stakeholders

# Expansion of the Usability Study

Coming in 2020!!!





# Thank you! Questions?



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