



The Bureau  
of Meteorology

# Mixed Messages, Critical Choices: The last mile decision dilemma

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# What's the ideal outcome – perfectly verifying forecasts or good decision making based on forecasts?

Evolving the National Weather Service to Build a Weather-Ready Nation: Connecting Observations, Forecasts, and Warnings to Decision-Makers through Impact-Based Decision Support Services

Louis W. Uccellini and John E. Ten Hoeve

Print Publication:

01 Oct 2019

DOI:

<https://doi.org/10.1175/BAMS-D-18-0159.1>

Characteristics	3–4 Apr 1974	27–28 Apr 2011
<b>Summary</b>	150 tornadoes across 13 states	~200 tornadoes across 16 states
<b>No. and strength</b>	6 F5 and 24 F4 tornadoes	4 EF5 and 11 EF4 tornadoes
<b>Tornado track length</b>	~2,500 miles	~2,500 miles
<b>Duration of outbreak</b>	~50 h	~50 h
<b>Outbreak forecast</b>	“Indications” provided night before Watches issued based on 1200 UTC radiosondes	Outlooks issued 4–6 days prior Extreme threat recognized 30 h in advance Watches issued based on a wide range of data and updated regularly Warnings based on Doppler radar
<b>Warning lead time</b>	Warnings issued when tornadoes were spotted	~24 min
<b>Fatalities</b>	314	316



## The information needed to make a good decision: Five considerations



**Current  
Situation**



**Forecast**



**Certainty  
in the  
forecast**



**Reliability**

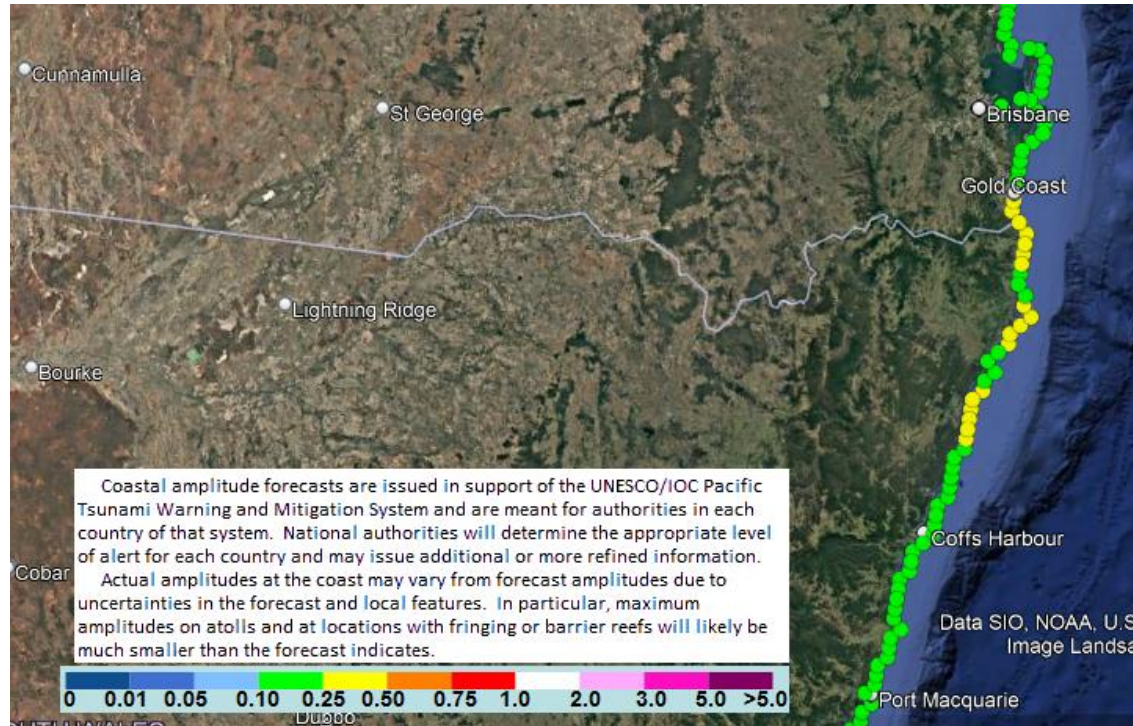


**Context of  
the situation/  
forecast**

Provide such information that is **easily understood**  
through the right channels at the right time to prompt  
the right response

# What happens when there is inconsistency in the information?

## Eg: 30<sup>th</sup> July 2025 Pacific Ocean Tsunami



### ...PTWC TSUNAMI THREAT MESSAGE...

#### TSUNAMI THREAT FORECAST

\* TSUNAMI WAVES REACHING MORE THAN 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

ECUADOR... NORTHWESTERN HAWAIIAN ISLANDS... AND RUSSIA.

\* TSUNAMI WAVES REACHING 1 TO 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

CHILE... COSTA RICA... FRENCH  
POLYNESIA... HAWAII... JAPAN... JARVIS ISLAND...  
JOHNSTON ATOLL... KIRIBATI... MIDWAY ISLAND... PALMYRA  
ISLAND... PERU... SAMOA... AND SOLOMON ISLANDS.

\* TSUNAMI WAVES REACHING 0.3 TO 1 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE FOR SOME COASTS OF

ANTARCTICA... AUSTRALIA... CHUUK... COLOMBIA... COOK  
ISLANDS... EL SALVADOR... FIJI... GUATEMALA... HOWLAND AND  
BAKER... INDONESIA... KERMADec ISLANDS... KOSRAE...  
MARSHALL ISLANDS... MEXICO... NAURU... NEW CALEDONIA...  
NEW ZEALAND... Etc





# What happens when there is inconsistency in the information?

## Eg: 30<sup>th</sup> July 2025 Pacific Ocean Tsunami

### Key Considerations

- Australian No Threat issued and was actively monitored for approximately 13.5 hours.
- **Conflicting public advice of Marine Threat from PTWC made communication of No Threat more difficult.**
  - Confusion with Emergency Management – who to trust
  - Confusion with media – educate about where the authority sits during an event creates issues
  - Other sectors such as local government...
- Request for PTWC to consider changes to public facing products to avoid this in the future.



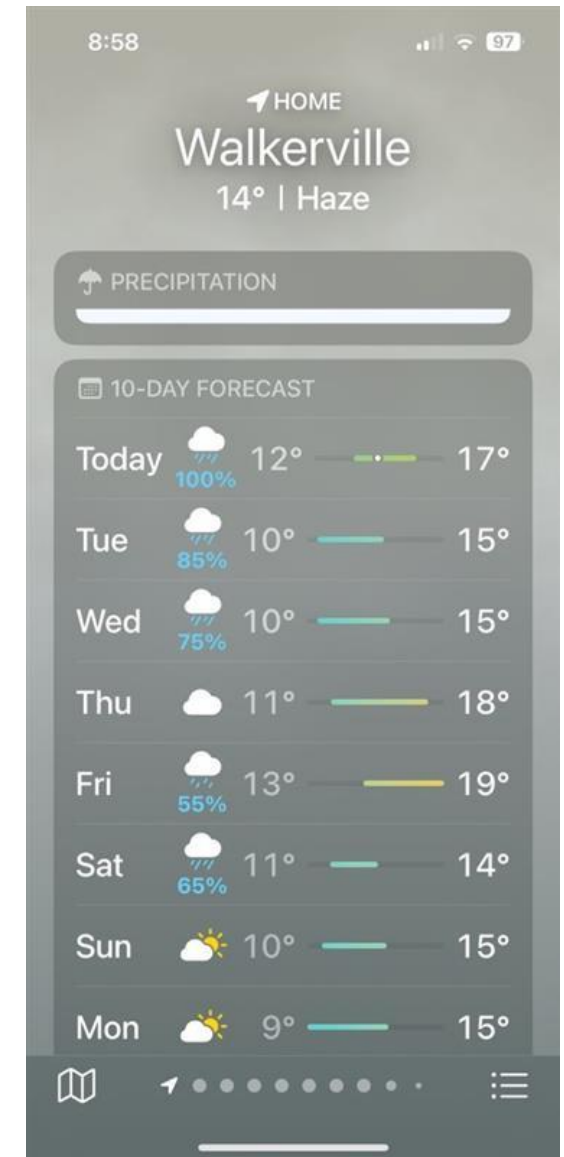
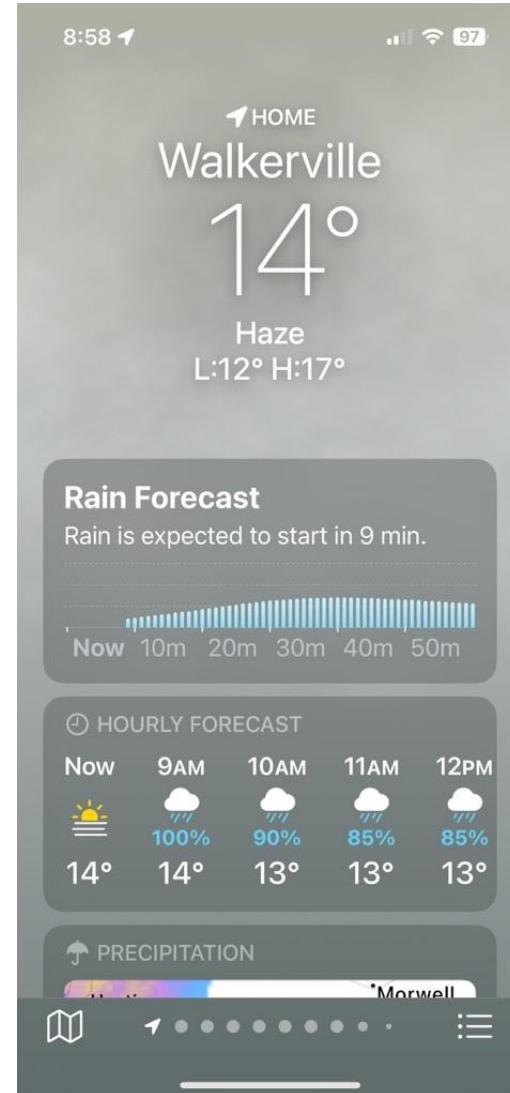
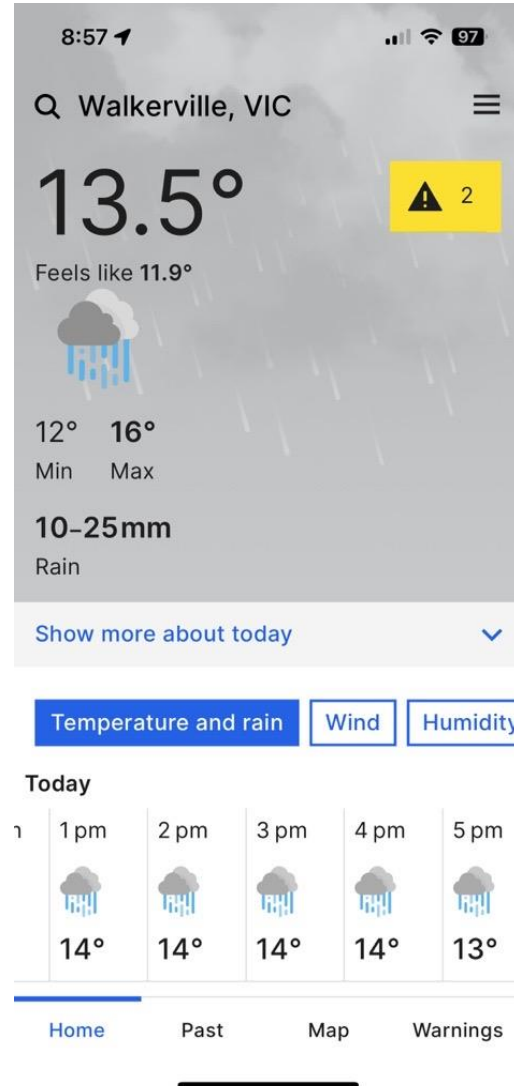
**Bureau of Meteorology, Australia** @BOM\_au · Jul 30

No #tsunami threat to Australia from magnitude 8.7 #earthquake near OFF EAST COAST OF KAMCHATKA. Latest advice at [bom.gov.au/tsunami](https://bom.gov.au/tsunami).





# What happens when there is overlap with the information? Eg: Apps on Phones – Bureau/iOS



# What happens when there is overlap with the information?

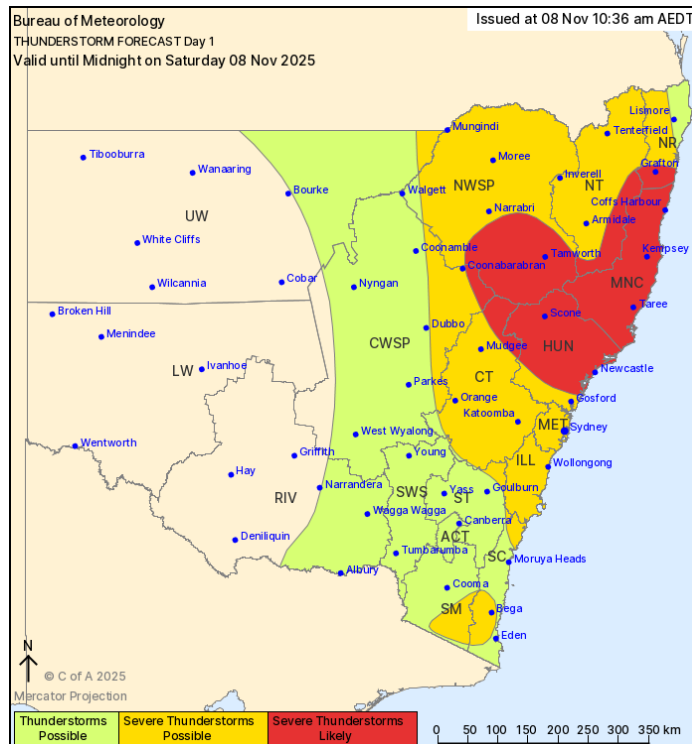
## Eg: Other sources of info

Bureau Products (Website & Emergency Management product):

### Armidale

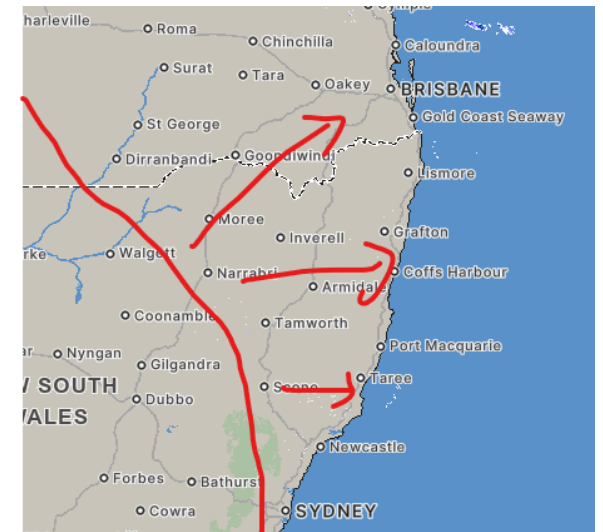
Partly cloudy. Medium chance of showers in the afternoon and early evening. A thunderstorm likely in the afternoon and early evening, possibly severe with damaging winds and large hail. Winds northwesterly 20 to 30 km/h.

 **Moderate** Fire danger rating



### Style of 3rd Party Info:

*"SEQId&NENSW: Heaps of storms later, some severe with a few supercells possible"*



# Is AI/ML likely to increase the overlap with Bureau Services?

Hi Copilot, can the Bureau of Meteorology expect that there will be an increase of 3rd party forecast products that overlaps the Bureau's services due to Machine Learning and AI capabilities?

**Yes — the Bureau of Meteorology (BoM) can expect increasing overlap from third-party forecast products driven by Machine Learning and AI.** Startups and tech companies are already offering localized, AI-powered forecasts that claim to outperform BoM in certain contexts, and this trend is likely to expand as AI models become faster, cheaper, and more accurate ABC +1.

Thanks, so is there potential for decision makers to be confused by the multiple sources of forecasts?

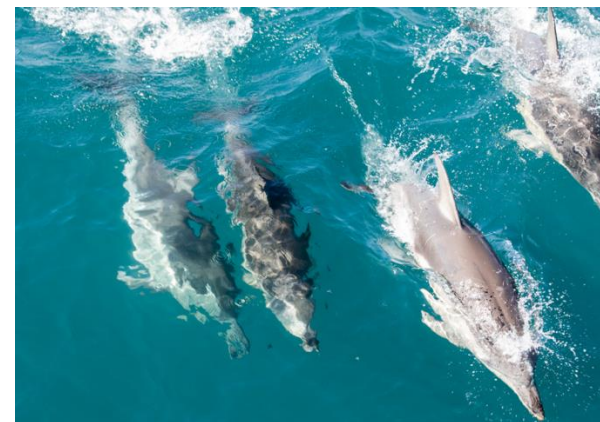
**Absolutely — there is real potential for decision makers to be confused by multiple overlapping forecast sources** as AI-driven products proliferate. This is a well-documented challenge in meteorology and risk management.





## An example aimed at reducing risk of mixed messages

- **Consultation:** Understand the customer decisions: jobs, pains and gains
- **Development Plan:** Collaboratively discuss where there is overlap of services.
- **Research Phase:** Collaborative approach to experimental product development
- **Experimental Product:** Ideally Clearly labelled experimental products with access restricted to key stakeholders
- **Noteworthy considerations for Bureau Product Owner looking to operationalise a product:**
  - Evidence of increased value for customers
  - Confidence of efficiency gain
  - Cost, schedule and ease of delivery
  - An appropriate funding source secured
  - Noting: delivery dependencies on other priorities





Questions?

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