

# Quantifying Aviation Weather Forecast Benefits



Rick Curtis  
Southwest Airlines  
10/12/11

# Goals

- ▶ Define and implement a process to monitor and compare forecast performance with airline and airport performance results.
- ▶ Develop a process which is portable enough so that it can be used on a variety of forecast sources.
- ▶ Keep the process simple and automated enough – so that it gets done!
- ▶ Use a process to create historical benchmarks on forecast performance.



# Items for Consideration

- ▶ Make results meaningful so that both the provider and the consumer can relate to them from an operational perspective.
- ▶ Separate the terminal and en-route environments as they are two very different problems to evaluate.
- ▶ Allow logic to be portable among both providers and consumers.



# Very tough to Measure

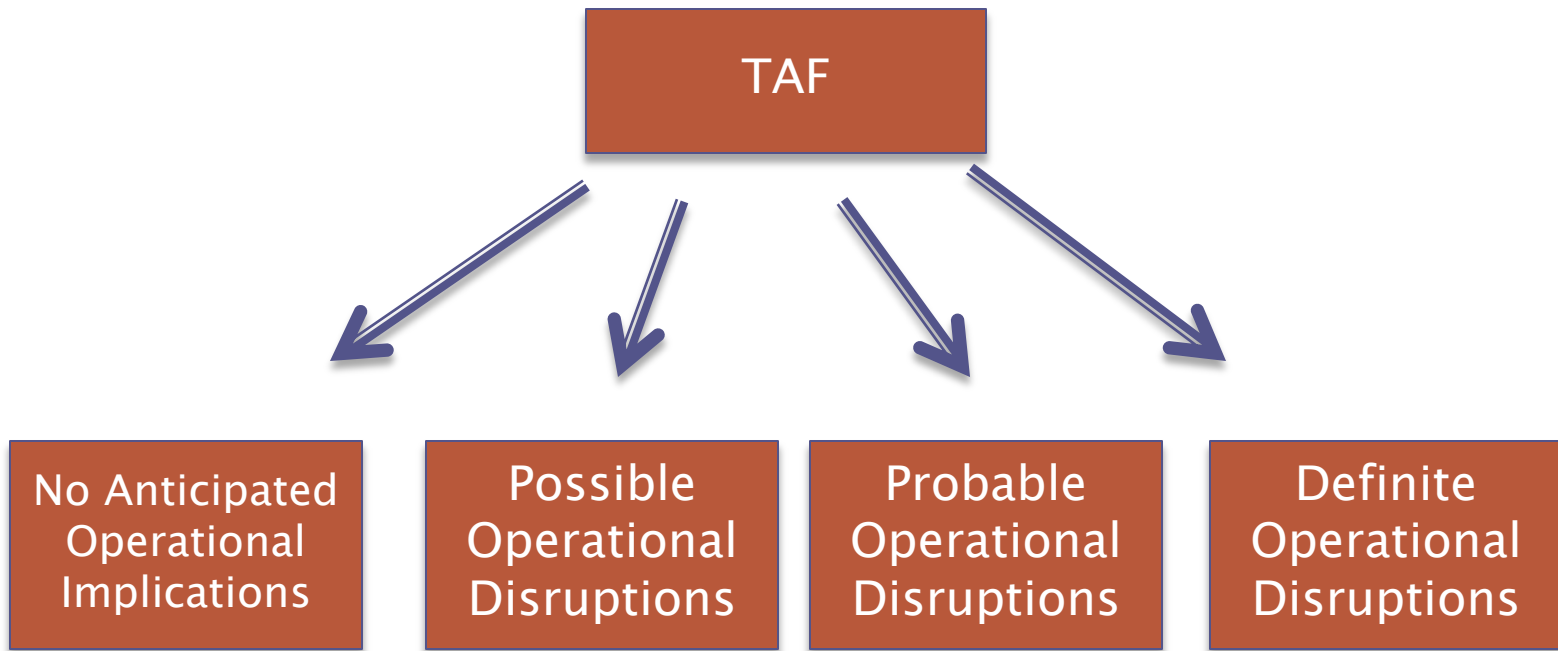
- ▶ Forecasts can be very “squishy”, especially with confidence levels, precipitation coverage, precipitation intensity rates etc.
- ▶ Need to be able to “translate” forecasts to reflect some sort of an operational impact.
- ▶ Airline performance can be impacted by many things (crews, security, airport throughput, ATC, passengers etc.)
- ▶ Need to solely concentrate only on direct weather related airline statistics.



# An approach

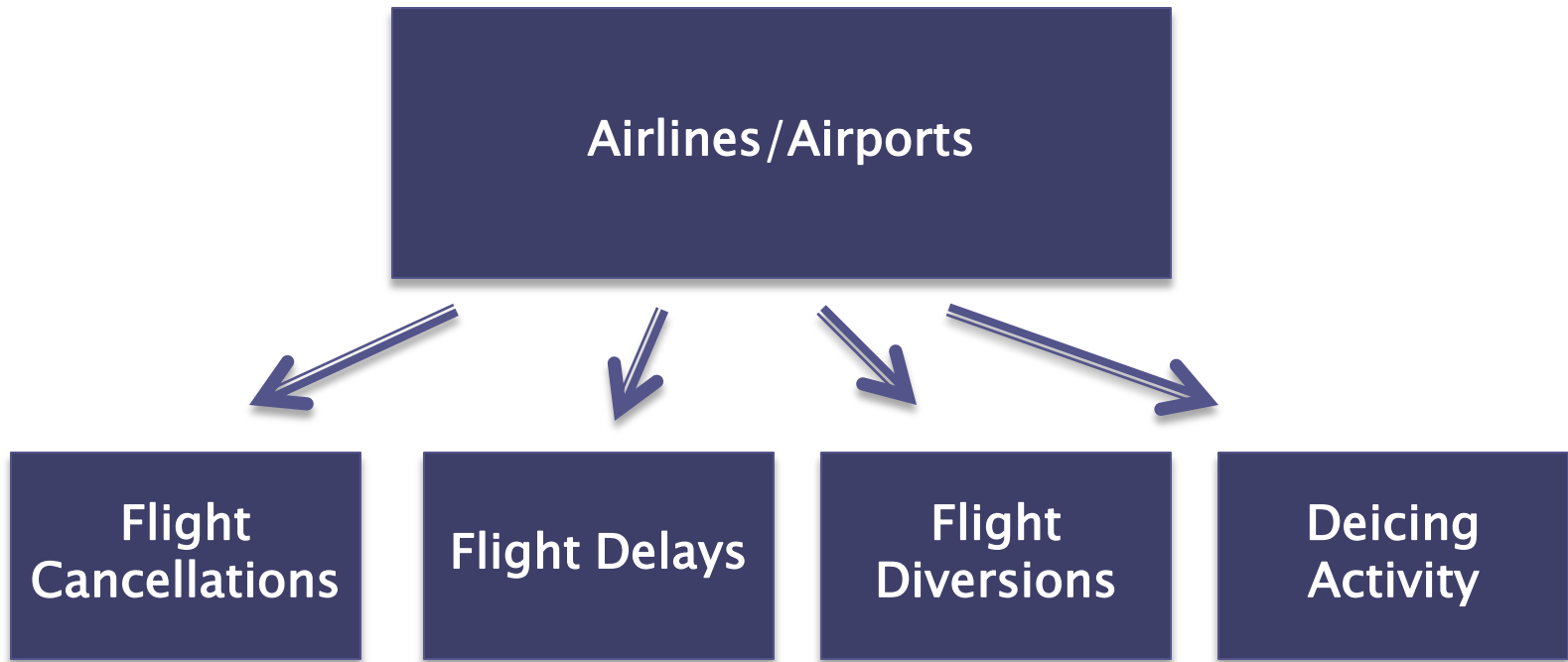
- ▶ Start with the terminal environment.
- ▶ Use NWS TAF products as they are “regulatory”.
- ▶ Define a desired data set of performance information from airlines/airports. (cancellations, diversions, delays etc.)
- ▶ Develop communication mechanisms for NWS and airline/airport data sets to a central database.
- ▶ Execute the process using forecast and airline/airport input.
- ▶ Build historical database that can be used to track results over time.
- ▶ Database can also be used to measure new forecast improvements to help provide a quantitative value of the enhancement.





- Forecast criteria based on airport and airline operational thresholds
- TAF performance scored on airport and airline operational thresholds.
- Both regularly scheduled and TAF amendments will be used, and greater point totals towards a higher score are provided for longer lead time forecasts.
- Significant consideration will be needed relating to differences between “Possible” and “Probable” Operational disruptions





Data above only refers to terminal related activity



## Airline Costs

## Event Forecast Probability

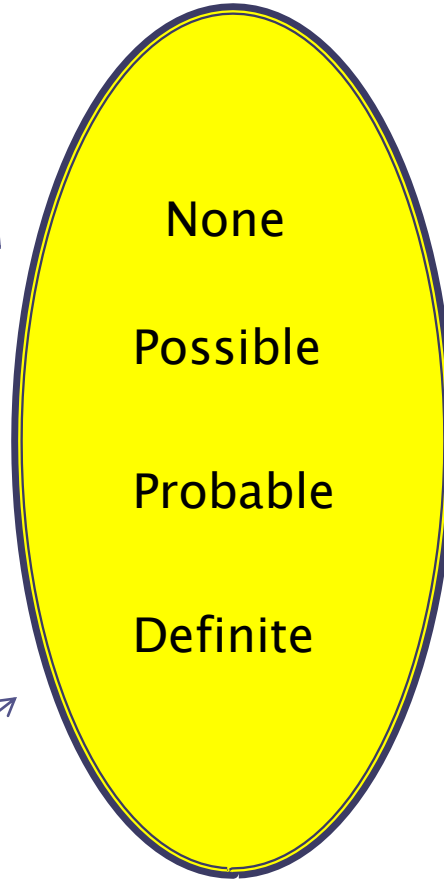
## Forecast Penalty Multiplier

Cancellation Costs

Delay Costs

Diversion Costs

Deicing Costs



None  
100%

Possible  
60%

Probable  
30%

Definite  
0%

Forecast Monetary Impact





# Examples

- ▶ A no operational impact forecast is delivered and a high operational impact is realized; then the monetary impact would be high.
- ▶ A no operational impact forecast is delivered and no operational impact is realized; then the forecast monetary impact would be low.



# Results

- ▶ More closely ties forecast accuracy with operational performance.
- ▶ Helps to quantify the value of weather forecasts.
- ▶ Allows various forecasting sources to be scored similarly.
- ▶ Builds a historical database for TAF and other similar forecast performance.
- ▶ Measures forecast improvements with historical benchmarks to determine effectiveness and improvements.

