Providing Forecasts of Dangerous Thunderstorms to Operators of Outdoor Concert Venues

**Introduction/Business Problem**

According to the National Oceanic and Atmospheric Administration (NOAA)--which the U.S. government agency in charge of issuing public weather forecasts and hazardous weather warnings--around 50 people are killed and hundreds are injured from lightning strikes each year in the U.S.

Outdoor music festivals and concerts in the U.S. are attended by hundreds of thousands of people each year. According to the website <https://www.statista.com/chart/17757/total-attendance-of-music-festivals/> a total of 770,000 people attended Summerfest in Milwaukee, Wisconsin and 430,000 people attended Lollapalooza in Chicago, Illinois in 2018.

Imagine you are head of operations for one of these venues and ultimately responsible for the safety of everyone attending an outdoor music event. There are two hundred thousand people enjoying music on a warm, humid evening and lightning from an approaching thunderstorm is seen in the distance and thunder rumbles overhead—loud enough to be heard over the sound system and singing fans. In addition, this approaching thunderstorm is causing wind gusts over 50 mph (80 kph) that can turn unsecured objects into deadly projectiles. You have an evacuation plan in case of this scenario, but the plan only goes into action upon hearing thunder. Not good enough. You must get two hundred thousand people to safety and it could take 1 hour to accomplish this. You need to know if thunderstorms and the potential hazards are a risk days ahead of time so you can be prepared well in advance of a hazardous weather event.

On August 13, 2011 at the Indiana State Fairgrounds in Indianapolis, Indiana, country music group Sugarland was getting ready to perform when a severe thunderstorm moved over the venue. A strong gust of wind from the thunderstorm caused part of the stage to collapse onto people that were near the stage. Seven (7) people were killed and dozens more were injured. In total, 18 defendants of a class action lawsuit that was filed had to pay out a total of $39 million U.S. dollars to the plaintiffs. As head of operations of an outdoor concert venue, this is likely your worst nightmare and you have no advanced forecast notification. This is a problem, but one which has a solution.