

# 1 Problem

Step 1. Define the Problem		
<b>What</b>	Problem(s)	High number of severe tornados; 530+ deaths
<b>When</b>	Date	2011
	Different, unusual, unique	Number and severity of tornados
<b>Where</b>	State, city	U.S.
<b>Impact to the Goals</b>		
	<b>Safety</b>	Potential death / injury
	<b>Property</b>	Property destruction / damage

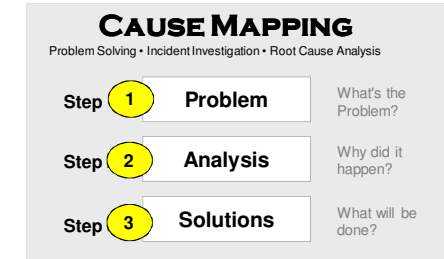
# TORNADO SEASON OF 2011

## Worst Ever?

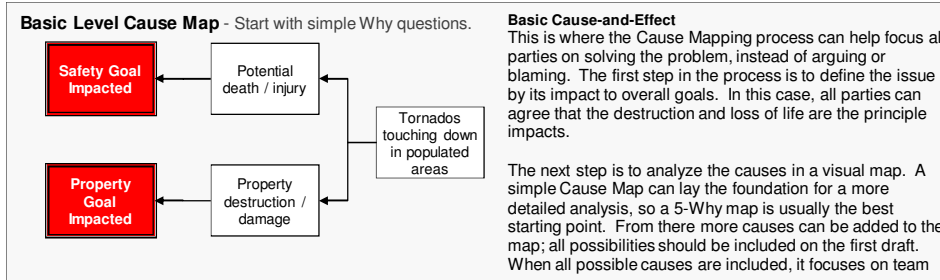
2011 is on pace to be the worst tornado season since record keeping began in 1950. Communities nationwide have been affected this year, not just those in "Tornado Alley" where twisters are most commonly found. The marked increase has many wondering just what is going on. Is it simply greater media attention? Or perhaps just bad luck this year? Or maybe this is all because of global warming...

## Cause Map

Cause Mapping is a Root Cause Analysis method that captures basic cause-and-effect relationships supported with evidence.



# 2 Analysis



## More Detailed Cause-and-Effect

Let's take a closer look at why so many tornados have hit densely populated areas. There are primary four reasons identified in the Cause Map. First, there have been more tornados. This could be because more are being counted, due to better weather tracking capabilities, or because there simply are more occurring. Second, there are more forceful tornados than usual. This could be related to more supercell thunderstorms, since most tornados spring from these types of weather systems. Because this isn't known for sure, a question mark indicates that more evidence is needed to support or disprove this hypothesis. Likewise, it's possible more strong weather systems are being caused by global warming.

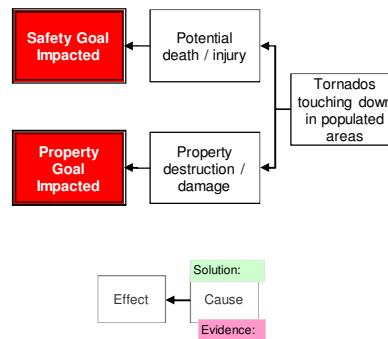
Instead of stopping the analysis to debate global warming, it's most productive to continue exploring why tornados are touching down in population centers. It's not simply a function of the tornados. There also happen to be more people near where tornados are, and there are more structures which are susceptible to tornado damage.

More people are near where the tornados are because there are more people. While this is straightforward, it's often overlooked in the debate and precisely a reason why more people would perish in a tornado. People might also be in the area because they have little time to evacuate or take appropriate shelter, unlike in a hurricane. Advance warning averages just 11 minutes.

Despite many advances in Doppler radar technology and satellite data, tornados are still generally detected the old fashioned way. Today, a web of 290,000 trained volunteers, called SKYWARN, provide severe weather alert information to the National Weather Service. Since its inception in the 1970s, SKYWARN has helped the NWS to issue more timely and accurate severe weather warnings. The NOAA's National Severe Storms Lab is looking to improve that advanced warning time to 20 minutes, so this might be a possible solution to reducing the number of deaths and injuries caused by tornados.

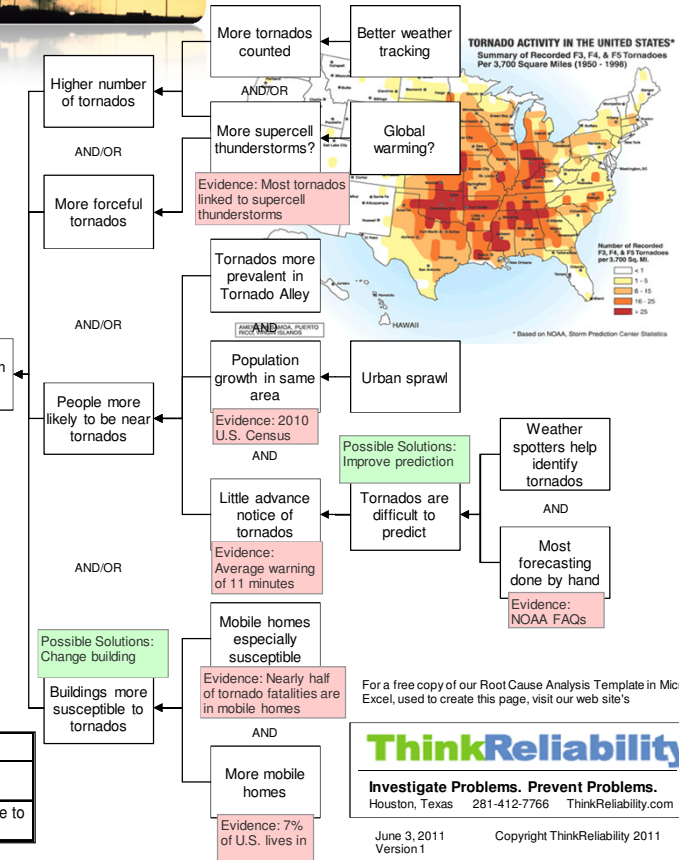
The fourth factor is that people tend to be located in buildings which are highly susceptible to tornado damage. More Americans are living in manufactured or modular homes than in previous decades. As of 2009, there were 8.7 million mobile homes in the United States. Mobile homes account for nearly half of tornado fatalities. When other factors are normalized, the data shows unequivocally that mobile homes are more likely to sustain catastrophic damage during tornados. Some states have begun to take steps to improve the building codes for such dwellings and also to require hardened shelters at mobile home sites.

## More Detailed Cause Map - Add detail as information becomes available.



# 3 Solutions

No.	Action Item	Cause
1	Improve prediction methods	Tornados are difficult to predict
2	Change building codes	Buildings more susceptible to tornados



For a free copy of our Root Cause Analysis Template in Microsoft Excel, used to create this page, visit our web site's

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