An Incident Leading To an Implication of Unfulfilled Promises

By

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As usual, this is my opinion, based on nothing substantial apart from years of experience. If you have any opinions or criticisms about this content, contact me at cdoswell#earthlink.net [either use the email hyperlink or cut and paste after substituting @ for #]. If you're not willing to have your comments appear on this page, explain to me why I shouldn't ignore them.

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1. Introduction

The basic premise of this essay is the idea that we don't currently live in the best of all possible worlds regarding the use of severe weather warning information in American society. This was evident on 12 June 2009, as a tornado developed in east Norman. The tornado began at about 10:23 CDT and ended at about 10:38 pm CDT, and the sirens in Norman were sounded at 10:40 pm CDT. The National Weather Service (NWS) office in OUN issued a TOR warning at 10:24 pm CDT. At the time of the tornado, the city of Norman was in *severe thunderstorm* watch #395 - which included a low (20%) probability of two or more tornadoes of any intensity (and a 10% probability of one or more F2-F5 tornadoes).

Unlike the main event of 03 May 1999 (the F-5 tornado from storm A), this was not a daytime tornado with an extended life beginning in rural country and moving toward a metropolitan area with news media helicopters broadcasting live video during most of its approach. Nor was it a violent tornado that was anticipated many hours before storms developed. Rather it began from a supercell that formed rapidly, produced a tornado, and then dissipated nearly as rapidly as it began. It happened after dark, when spotting can be pretty difficult. Interestingly, despite the challenges with spotting at night, a fair number of meteorologists/storm chasers managed to see and document the tornado in photographs - but they failed to report the event to any official in the integrated warning system. And it happened in a *severe thunderstorm* watch - not a tornado watch. This was far from an obvious forecast situation and it seems that the NWS did a reasonable job dealing with the "surprise" event, despite its warning lead time being slightly negative. The decision to sound the sirens was only implemented *after* the tornado had dissipated. As it turned out, the damage was relatively modest and no fatalities resulted. It's *not* a predominantly successful reaction to a potentially significant weather event, very much unlike the 03 May 1999 event. Having said that, it's not a completely awful example, either; not all fatalities occur with long-track violent tornadoes (although most do) and this *could* have had a much less happy outcome.

But this event occurred after a constant litany of remarks in the media and by various PR folks for diverse organizations (including those in Norman) to the effect that new science and new technology are leading us to a "promised land" where no tornado goes unwarned-for and no warnings will be false alarms. This "promised land" is still pretty far from being a reality, as the events in Norman on the night of 12 June 2009 demonstrate quite convincingly.

One thing this case makes very clear to me is that our integrated severe weather and tornado warning system has some warts, as well as the well-documented beauty spots. Although that integrated warning system has been responsible for saving *many* lives, it's still not what many of us think it should be. It isn't a

completely *broken* system, but it *is* showing some signs of needing revision and rethinking.

For the record, I want to reiterate a message I've articulated many times. For weather information to be of value to users of that information, there are several essential requirements;

1. The information must be timely and accurate
2. The information must be disseminated to the potential users of that information in time for it to be used
3. The information must be understood by those potential users
4. Those users must know what to do on the basis of that information
5. Those users must make a decision based on that information
6. That decision must result in appropriate action by those users

We meteorologists are most concerned with #1 and, to a lesser extent, with #2 on that list. Our education and training is all focused on #1, actually, and we begin to have increasing difficulties beginning with #2. Even when requirement #1 is satisfied to *perfection* (However perfection might be defined, it's an extremely unlikely situation.), if *anything* breaks down during this path leading to appropriate action, then the process has failed, for all practical purposes. Historically, meteorologists have regarded anything beyond #1 to be someone else's problem - and it is. It's hard enough to be a good forecaster that it requires full attention to that task. But in good conscience, if we leave anything beyond #1 to chance, then we're abdicating any responsibility for what happens to the users as a result. That seems to defeat the purpose that forecasting was instituted to satisfy. As it stands, #1 is a major challenge, and we have much to do if we're to achieve everything we'd like to accomplish in that regard. But I believe we must also begin to *collaborate* as institutions (and as individuals) with other disciplines to address all of the rest of these requirements. Let forecasters continue to focus primarily on forecasting, but at the same time, we need to work with others to make the forecast products be as effective as possible. By the

way, I consider a warning to *be* a forecast so nitpickers needn't bother raising that point with me!

2. My version of the history of Norman's performance regarding sirens

Sirens are a legacy from the Cold War past. At one level, their basic purpose is to alert people outdoors - definitely not indoors and certainly not in noisy situations where their message can be drowned out. But sirens *do* represent a form of *confirmation* of the threat. When the sirens sound, the direct threat to a given community has been confirmed by *someone*. As a warning system, sirens have many problems, including the relatively high cost to install and maintain them. But when the button to sound them is delayed, for whatever reason, there's cause to call the whole process of sounding sirens into question.

In the time I've lived in Norman since returning in 1986, the sirens have been blown far more times than warranted by direct threats. Complaints from meteorologists in the community apparently have led to a policy where the NWS is considered to be the primary provider of weather information to the Emergency Management (EM) Director in Norman. See:

Alert and Warning System Within the City of Norman - Annex C: Warning

Compare this with the discussion in part 3, below. Despite this apparent response to the griping by some about how sirens have been used in Norman, false alarms continue to plague their use, even as this important event triggered sirens only *after* the threat actually had passed. I don't want to get into a "blame game" here - I'm not looking for a scapegoat. Rather, I see the situation in Norman as all too consistent with some problems that I see are rampant throughout the so-called Integrated Warning System (IWS). Although I agree that historically, sirens have been sounded for too many false alarms, it's disturbing when a tornado actually occurs within the city limits and the sirens were delayed until the threat had actually passed. All of this suggests to me that Norman's system for deciding to "push the button" needs some serious reconsideration.

With all the weather people here in Norman, that rethinking *could* result in a much improved process, but that will take the combined efforts of many people. I think in this town, as in many, there's a tendency for this to be seen as seeking a scapegoat and laying blame on someone. I could write an entire essay of the pointlessness of seeking to lay blame, but that doesn't mean we shouldn't try to understand why failures have happened in the past. **If we can't investigate those failures with frank and open discussion of all aspects of them, we simply won't be able to improve the system**. The goal should be to identify and fix problems, not to establish blame. Defensive posturing in such discussions is understandable, but very much counterproductive.

Although I have no factual evidence to support my beliefs, it seems to me that many, if not most, people in Norman consider the existing sirens to be "tornado sirens". They're tested every Friday (when the weather is fair) at noon and that's what I hear people calling them. There have been proposals to use the sirens to warn for extreme wind and hail events, as well as tornadoes. Presumably, there might be some wish to use them for hazardous material releases or even the threat of terrorist attack. To use the sirens for any threat other than tornadoes would call for a massive public re-education campaign, in my opinion.

3. My version of how communities should issue "warnings"

From a bureaucratic standpoint, the word "warning" seems to be the domain of the NWS. The NWS produces short-range forecasts called warnings for significant weather events (tornadoes are but one type of such event). But the NWS issues tornado warnings for areas that usually include many communities, and in most instances, few if any of those communities will actually experience a tornado. I've written about some aspects of this elsewhere, but in this essay, I want to emphasize the notion that NWS warnings are not some sort of absolute guarantee that every community in the warning will be struck. This implies a sort of uncertainty in *any* tornado warning, which Harold Brooks and I have discussed at some length elsewhere. This essay isn't focused on why tornado warnings should include a statement about uncertainty - although I may write such an

essay sometime in the future. For my purposes here, I want to emphasize that whatever the NWS chooses to do (or not do) regarding probabilistic warnings, there undoubtedly *should be* some degree of uncertainty within the decision-makers in each community affected by an NWS warning whether or not they actually will be affected. That uncertainty is inevitable, even if it's not expressed. I don't believe that the NWS is claiming that a tornado will strike every community in a warning, however that warning is constructed.

When communities initiate some sort of action (e.g., sounding sirens), that's another type of "warning" but it's not the same as what the NWS issues - it's a *local, community* warning (or whatever). It's this local warning that should be the final alert that a tornado is imminent and close enough to be a direct threat. During my storm chases, I've heard a lot of sirens sounding in communities. Some were definitely threatened by an approaching tornado, others were clearly *not* in the path but a tornado was occurring nearby, and others were threatened by storms that weren't tornadic at the time, but could be seen as having some non-zero likelihood of a tornado (or other severe weather). People in communities probably should decide for themselves when they want their community officials to initiate *local* tornado warnings, which means that input should be sought and a consensus found.

a. Who should be responsible for community public safety?

If the decision-makers in a community abdicate the responsibility to decide to sound the sirens (and/or any other system they may have in place for informing the community about the threat) to the NWS - as the policy document cited above seems to do - then the whole process could be automated. The NWS warning goes out and the sirens (and whatever other systems) are activated immediately. Given the relatively low probability of any specific community being struck, this would seem to lead to pretty large number of what could be called false alarms, but it does serve to deflect any criticism (and threats of litigation!) of public officials onto the NWS (which pretty much is immune from lawsuits). To do so, however, ignores a number of complicating issues. For instance, suppose

the severe weather watch for the area (assuming there *was* a watch issued) was a *severe thunderstorm* watch, not a tornado watch. Generally, sirens aren't sounded for severe thunderstorms, and this situation (a severe thunderstorm watch, not a tornado watch) has an impact in many communities on the question of deploying spotters. I'll have much more to say about spotters, watches, and warnings shortly.

However, offloading responsibility from community officials onto the NWS isn't what I think would be the best way to deal with this problem. I learned this from years of interactions with Alan R. Moller, who revealed a lot to me about how this IWS can and should work. [However, I accept total responsibility for what's being said in this essay!] I also had considerable experience with spotter training and thereby interacted with a lot of spotters.

So how do I think this should go? To begin with, **community officials should be responsible for public safety with regard to weather hazards within that community**. If they fail to provide for the safety of their public in an emergency weather situation, relying instead on Federal government forecasters in some possibly distant office, this seems to me to be a major violation of public trust. In some states (at least in the past), community officials are mandated by legislation to be responsible for public safety in emergency situations. I don't know the current laws of Oklahoma well enough to say whether or not this is the case here. [Perhaps some reader could enlighten me?] In my opinion, such a mandate is the right legislative choice. In every community, there should be an "Emergency Manager" (EM) who would be responsible for severe weather safety in that community (and likely for other hazards, as well). The EM would have to have facilities, such as an Emergency Operations Center (EOC), with appropriate staffing and resources to accomplish the responsibilities associated with that position. Such a system has a cost, and it might be considerable; to do less than this is, in my opinion, a violation of public trust. So **if legislatures mandate that such a responsibility is required in every community, then they should be prepared to <u>support</u> that mandate with public funding of the system**. People pay taxes for the purpose of having services provided. Public safety with

regard to hazardous weather is important enough that public funds should be allocated in order that such a service is in place in every community. Clearly, the communities themselves should also bear some of the financial burden.

b. The responsibilities of community officials

Let me begin with the hypothesis that it's up to each community's EM to provide for the safety of the public. If so, what processes and procedures should a community official charged with this responsibility pursue to live up to this mandate? At least for communities in "tornado-prone" areas (everywhere in the US east of the continental divide), one mechanism is to develop a **cadre of spotters** to be deployed when weather conditions warrant. It's reasonable that **each community's spotters would require training** to be able to do their important task properly and safely. It wouldn't be absolutely necessary that the NWS do all or even any of the training, but there would need to be some sort of **certification of competence of any spotter trainers should be required**. The spotters would have to have some specified amount of training before they would be considered "trained" (presumably, this would entail some sort of certification, as well - including an **examination** that some prospective spotters might actually fail!) sufficiently so that they could be *entrusted with the safety of their communities*. Any prospective spotter unwilling to be given an extensive training program (i.e., *many* hours, not just a single hour, once per year) would not be trustworthy when public lives are at stake, right?

There might be other tasks these community officials should be required to do. For one thing, they would need to be knowledgeable enough to **inspect and approve the severe weather emergency plans of <u>all public places in the community</u>***:* schools, churches, hospitals, nursing homes, recreational facilities, places of business, etc.). In a public place, where numbers of people would gather, the owner of each should be held responsible for developing a severe weather safety plan. As part of each such organization, someone would have to be designated as that organization's EM. It wouldn't be sufficient simply to have

a plan. Any such plan needs to be inspected by people who are capable of recognizing flaws in such plans. Let me explain what I mean.

In my experiences following 03 May 99, as part of the BPAT team, we interviewed school officials at an elementary school that was near but not in the actual tornado path, to see what sort of plan they had in place, and what sort of shelter they had designated. As it turned out, without going into detail, their plan was such that many of their students would be in danger just in getting to their designated shelter, and even worse, that designated shelter wasn't even close to a proper shelter for anyone! I've done other informal investigations before and since, and found many such flawed plans and shelters in virtually every example I've seen. In situations where I've been able to obtain information about the plans of other organizations, for the most part, the story is the same. The fact is that it appears that many people are operating under the assumption that (a) such plans exist - in many cases, no plan exists at all - and (b) the plans are in fact capable of providing safe access to a proper shelter - when in fact many of those plans include shelters that would be death traps, and access to the shelter may not be easy and fast enough to provide timely access in an emergency. Frankly, given the situation I see us operating under, it's remarkable that tornado casualties are as low as they are! There are many disasters just waiting to happen, and given enough time, they *will* happen unless we do something about it.

In many cases, it would take expert judgment to assess the adequacy of plans and the actual safety of designated shelters. In most cases, an employee appointed as the EM for some public organization likely would *not* have all the expertise to know that's needed to provide for the safety of the occupants in the event of a severe weather emergency. The community EM could act as a source of information for the community. **If s/he isn't qualified to inspect and approve the safety plans and designated shelters (or any other component of being prepared for severe weather), then s/he should seek the advice and, if necessary, consultation of experts who can do the job for the community EM**.

The community EM should serve as the community's focal point for severe weather preparedness, provide for the operation of the EOC, run the community's spotter program, arrange for proper spotter training, provide advice to community officials, and manage the deployment of spotters. That's a lot of responsibility and the individual so designated likely will need to delegate responsibilities and prepare for various contingencies.

One troubling issue that occurs to me is that the absence of a tornado watch in many communities is deemed sufficient to imply that spotters need *not* be deployed. Clearly, I believe this is an excessive level of confidence in the ability of the NWS to draw such a distinction. The reality is that the Storm Prediction Center (SPC), which issues all tornado and severe thunderstorm watches, is *not* capable of discriminating perfectly between tornadic and non-tornadic severe weather. Sometimes, tornadoes occur with no watch of any kind. Tornadoes can and do occur in severe thunderstorm watches. Sometimes, tornado watches are issued but no tornado occurs. Even with watches in place, there are times when the NWS doesn't issue timely and accurate *warnings*, as well. This isn't meant to imply incompetence regarding NWS watch and warning products - it only recognizes the reality that they're not yet *perfect*. The NWS products associated with severe weather have uncertainty attached to them and it may not be a good policy to assume that the absence of a tornado watch and/or warning is cause to relax and no need for spotter deployment exists.

c. Ownership of the spotters

Some local NWS offices - who do the lion's share of spotter training these days - seem to think that the spotters they train "belong" to the NWS and should send their reports directly to the NWS. I disagree strongly with this notion. **Spotters are properly considered the last line of defense <u>for their communities</u>**. Given that NWS warnings are not limited to specific communities, spotters can provide that key information about an approaching tornado to the community EM, so that s/he knows when to "push the button" on emergency procedures (or not). **The information spotters have should flow directly into the community**

emergency operations center (EOC - assuming that the community actually has an EOC, which it should), who can then pass it on to the NWS. The community EM has the greatest need to know just how direct the threat is to the community's they serve - spotter information needs to go directly to that EM, not up to the NWS and only *then* back down to the EM!

The crucial role of spotters in the safety of each community means that they need to be deployed in many situations where the threat seems relatively distant, or when storms develop unexpectedly. I understand that many spotters are volunteers who have other responsibilities besides spotting. A community EM should seek to have a cadre of trained spotters sufficient to allow a relatively high frequency of deployment. One way to help with this is to use law enforcement as spotters - this means that unless the law enforcement officer has passed the spotter training exam, s/he should not be considered a reliable spotter! I've seen many examples where law enforcement officers have demonstrated a lack of the necessary knowledge to know the difference between a harmless scud cloud and a developing tornado. I don't think I would want to trust community safety to such a "spotter". I've also been to enough spotter meetings to know that the truly reliable spotters, who have some reasonable chance of being able to deploy when needed, are a minority of the total spotter force. In my opinion, **an unreliable spotter is useless**. Yet every group of spotters includes unreliable members, apparently because there's a fear of alienating spotter volunteers. Some people want the "glory" of being a spotter but are unwilling or unable to do what it takes to be reliable. Spotter volunteers who are reliable will have little reward for their diligence and effort, save the knowledge that they're doing their whole community a tremendous service. Most will never see a tornado but will spend many hours watching for that which never seems to come. The *reliable spotters deserve far more credit than they'll ever get*. It's important that the community EM do whatever is possible to recruit the right people to be spotters, and do the most possible to recognize the value of their service, even when years go by without having to "push the button". With tornadoes, **complacency is the dire enemy of spotter programs and community preparedness** in

general. An EM worth having must be able to manage a high-quality program in the face of decades passing without any apparent need.

d. Who issues what and how should it be done?

From the preceding, it seems obvious that whether or not the NWS has issued a watch and/or a warning, **community EMs (or their designee) ought to have the final say about whether or not to "push the button" on whatever local public alert systems they might have available** (including, but not limited to, sirens). How would a community EM be able to do this if the NWS hasn't issued the appropriate products? Does this mean that community EMs have to become meteorologists, making their own forecasts in case the NWS drops the ball? The *last* thing I want to do is require that the community EMs become meteorologists. The situation in a truly *integrated* warning system should be one of free and full interaction among its components. I like very much the principle of what OK-First is trying to do - to provide training of EMs so that they can communicate more effectively with the NWS by, among other things, making live radar data available to the EMs who've had the training. It's not that we want the EMs to become their own warning forecasters - far from it! The NWS warning forecasters should be the most qualified to interpret the radar data, but when both NWS forecasters and EMs are looking at the same data, then it's easier for the EMs to understand what's going on, and they can send their input back to the NWS (which is part of the decision-making process that warning forecasters have to accomplish). **Two-way communication between EMs and NWS forecasters should be a goal**.

So what happens when the appropriate NWS products *aren't* in effect? Such "surprise" events can and do happen, so what could EMs do in the face of such a surprise? In my experience, some reliable spotters don't need approval from the local EM to go out and look at storms. They do so because of a special passion for spotting. In other words, *such spotters deploy themselves* and can provide an extra margin of protection from storms that don't have prior NWS products in effect. In the case of the 12 June 2009 event in Norman, there were many meteorologists around who were watching the storm develop. Nevertheless,

they failed to report what they saw to anyone who needed the information to make the decision to sound the sirens. The NWS put out the tornado warning more or less at the same time the tornado began - in such a surprise situation, this is reasonably good, but not exceptionally good, performance. But this warning necessarily was too late to alert anyone to initiate public alert systems. If there are volunteers out looking at storms, a procedure is needed to allow them to get their time-critical information to someone who can make the decision to push the button. Contacting the NWS is fine for some purposes, but as noted above, the primary responsibility of spotters is not to the NWS but to their communities. **Mechanisms for dealing with diverse situations regarding the NWS forecast products need to be developed and in place** so that developing weather information can be made available to decision-makers in a timely way, in order that public safety be served in the best possible fashion (given all the uncertainties).

This brings up another issue: a *lot* of important severe weather happens outside of normal business hours. For the community EM, this means that it's not just a 40-h per week job. Decisions often need to be made after business hours, and sometimes well into the night. **The system needs to include effective established procedures for situations when the EM needs to make decisions about severe storms occurring outside of normal business hours** (including when no NWS watch and/or warning has been issued, or when the watch/warning is for severe thunderstorms rather than tornadoes). Developing such procedures is necessarily a challenge. New technologies exist and there are now many more possibilities for consideration than there were even 10 years ago. Every community needs to have a mechanism in place to *review* their severe weather preparedness procedures on a routine basis, with an eye toward developing affordable, effective ways to deal with the challenging problem represented by hazardous weather (including tornadoes, of course). This review should include participation by all components of the IWS. What are we doing right? What are we doing wrong? If there's a problem, what do we need in order to fix it? Everyone needs to recognize that the NWS isn't perfect and never will

be. That uncertainty has to be built into the IWS and accounted for in local procedures in the best way possible. Clearly, the system works best when the NWS is able to help the communities be prepared for approaching severe weather hazards, and the NWS often does just that, but the communities should understand *they* bear the burden of the final important decision to help people know that the threat actually is approaching *them* this time.

A more effective IWS than we now have can't be built in a day. It's going to take the collective efforts of many people a *long* time - years, undoubtedly - to bring to fruition. Many of the social aspects of this are still uninvestigated and crying for answers before we can *begin* to build a new IWS. And it can't simply stop after one massive effort and then go along indefinitely without review and revision. The warning landscape is constantly changing as new technologies burst on the scene and our society continues to evolve in ways that may be difficult to anticipate. New forecasting capabilities also are being considered. This is *not* a "once and for all" project. The challenge of enhancing public knowledge about the risks associated with natural hazards alone is a formidable part of the process I can envision. Once collaboration among the various components begins, they need to be maintained. Collaboration is always fragile, subject to destruction when individuals clash. Interdisciplinary coordination must be supported indefinitely.

4. The responsibilities of the public

This brings up another important issue: when hazardous events strike, the people themselves bear the lion's share of the responsibility for their own safety. Time and time again, after tornadoes, people say "It struck without warning!" *even when a warning was in effect*. How can this be? It seems to me that what they're *really* saying that they never believed it could happen to *them*, so when it did hit, they were unprepared for that reality. I've discussed some of this elsewhere, but some basic principles need to be discussed in this context.

Before going on, though, I want to establish some background regarding "the public". In my field, "the public" is often referred to as if it's some sort of monolithic block of more or less homogeneous folks who aren't meteorologists. Reality is that "the public" is *very* diverse regarding its weather knowledge, ranging from the newly born who obviously know absolutely nothing about the weather, to professional severe storm meteorologists (i.e., *us*), and everything in between. The distribution of weather knowledge in communities varies from place to place, as well. Moreover, the *needs* of this diverse "public" for severe weather information varies extensively - if you live in a mobile home in central Oklahoma, your requirements are quite different from someone living in an underground bunker in southern California. Hospitals and nursing homes need longer lead times to be prepared than those living in homes with above-ground "safe rooms". Elderly and physically-impaired people also need more time and perhaps personal assistance. Non-native English speakers may not be able to understand the warnings and need translations. So, how do we serve the needs of *everyone*? It's probably impossible to do so, and the best we can hope for is to serve as many needs as we have the resources to serve. Coming to a consensus about what a community can afford to do is clearly within the political sphere. What I'd hope to see in this is that communities seek to arrive at what constitutes the *most good for the most people*, with input from the "public" and with the advice of experts in the various components of the severe weather warning process. The result might be considerable variation from one place to another but, done properly, then most everyone at least has had a *chance* to have a say in the system they have to warn them of impending severe weather.

a. Severe weather as rare events

Even in the midst of "tornado alley" here in central Oklahoma, you could live your entire life without ever being struck by a tornado. On the scale of hazards facing us, it's a low-probability event, especially for being hit by the strongest winds in a violent tornado. After 03 May 1999, I saw a house where the residents had spray-painted on the surviving walls, "We survived the F-5 tornado!" without even realizing that those standing walls were mute but compelling evidence that they

had *not* been hit by the F-5 *winds*. The label "F-5" is applied to the whole path, but within that path, the part actually experiencing F-5 winds is but a tiny part of that whole path area. [I wish I'd photographed that spray-painted message to passers-by.]

The simple fact is that most people don't believe it will ever happen to them and, for the most part, they're right! It *won't* happen for the vast majority of the people living even here in central Oklahoma. But the problem is that **even though the probability is extremely low, that probability isn't zero**. Low-probability events *do* occur somewhere just about every year and it's basically just a matter of luck when someone finds themselves in the path of a major event - *bad* luck, that is. After such events happen, people also frequently say that "My sense of security has been lost." That sense of security, unfortunately, is an illusion! No one living on this planet is guaranteed security from natural hazards - only that most hazards are unlikely to affect them, and the threat of specific hazards varies from place to place. Violent tornadoes in New England are far less likely than here in Oklahoma - but ask the folks living in Worcester, Massachusetts in 1953 about that! *Unlikely* does not equal *impossible*.

If the climate were to undergo some radical change, and violent tornadoes became an everyday thing here in the Plains, life here would have to adapt to those new conditions. Then, virtually no one would be complacent about developing plans for dealing with tornadoes. Under the present circumstances, it could be considered a reasonably good bet to do *nothing* to prepare for a tornado. Consider the consequences of losing that bet. Yes, the odds are definitely in the public's favor, but **what's at stake is your life and those of the people around you**. There can be no *guarantee* your luck will hold, even though it *probably* will.

b. Are you willing to pay the price?

If we had to *bankrupt* our local economies to deal with the tornado threat, then we'd likely just have to accept our losses. But it's my belief that we can develop

even more effective ways than we now have to address this hazard that are affordable. Affordable, but *not* free! The commitment to support efforts within our communities to protect everyone from the threat of tornadoes begins with the public understanding the risks associated with the hazard. How much is peace of mind worth? What are we willing to do to protect ourselves and our families, and what are we willing to do to protect our neighbors and friends? Perhaps the answers to such questions vary considerably from person to person and place to place, but I can imagine we'd find a greater willingness to pay for improved protection among those who have survived a direct hit, or had friends and/or family killed in a tornado.

I'm not a psychologist, but I suspect that for many people, a distant threat is a non-existent threat. Why pay extra taxes to support something that we're likely never to need? How much are we willing to spend to maintain vigilance and provide for the purchase and maintenance of alert systems for a threat we've never even seen? I've already noted elsewhere that the cost to an individual taxpayer for the entire NWS amounts to about the cost of a movie ticket or a fast-food "meal". Not just for the part of the NWS that does tornado warnings - *everything* the NWS does! Would you be willing to give up the cost of a movie or a junk-food meal for better protection? Many local communities could do fabulous things with that much financial support.

There seems to be a widespread public perception that their safety in tornado situations is entirely *someone else's* responsibility (usually local, state, and federal government). It's my opinion that this perception is a major challenge for those of us who want to improve things. Improvements don't come without cost, but if the belief is that individuals need to bear *no share* of the burden for their own personal safety, there's very little any of us can do to improve things. Whereas most people accept that if they want water to come from their taps, garbage and sewage to be removed and dealt with, and electricity in their homes and apartments, they're going to have to pay for that - in both direct fees and taxes for public infrastructure needed to deliver those services. Severe weather preparedness is another service provided by communities and is no different.

Sirens cost money to purchase and maintain, but the decision-makers (and their support systems) who have to sound those sirens also aren't working for free (nor was their education and training). If you want improved service here, the support for the funding of those improvements has to come from you. Warning services, just like water and electricity and garbage trucks, aren't like manna from Heaven, appearing mysteriously overnight for everyone without having to pay a price.

Many of the things needed by individuals to be prepared for tornadoes are inexpensive and easy. Making a tornado plan for your home and stocking a tornado emergency kit aren't extremely costly. **If you want your community to do its best to help you make your tornado safety decisions correctly, then you have to be willing to ante up for that**. I doubt seriously that it would bankrupt you, but in the final analysis, the choice is yours and yours alone. Choosing *not* to support your community's efforts apparently means you're accepting *most* of the responsibility for your own safety and putting up your life as the stakes in a gamble that you don't *need* that help.

c. Implications for Norman

Part of the obligation that we in the Norman weather community should accept is to **take a leading role in affecting a change in public perceptions**. We presently have an on-paper commitment to incorporate a wide variety of non-meteorological factors into the meteorology of severe weather (the primary specialty of the Norman weather community). Sociologists, psychologists, economists, communication specialists, structural engineers, geographers, private sector interests, stakeholders, etc. all need to be woven into the fabric of a severe weather program. We even have some folks onboard who are young, enthusiastic, and innovative - and *want* to become immersed in the issues that confront the development of effective severe weather products. Unfortunately, we here in Norman also are saddled with some OU-based "centers and institutes" who have bureaucratic license to serve as the foci for such activity but who also have a long track record of unproductive inactivity in addressing the

issues they nominally address. As I see it, these serve as barriers to real progress, soaking up resources without offering much, if anything, in return.

And we currently have an abysmal record of actually seeing ideas through to practical implementation. First and foremost, this is an academically-oriented community and most academics are considerably less than enthusiastically involved in seeing things through to operational implementation. Lip service to interdisciplinary coordination is widespread, including within agencies funding research (e.g., the National Science Foundation), but the fact is that **interdisciplinary projects are <u>orphans</u> on any campus**. Disciplinary scientists in academia (and in government) generally are evaluated by their productivity *within* their disciplines (usually formal, refereed publications and bringing in funds to support research leading to publications), not by "time-wasting" efforts at projects involving other disciplines. Tenure, salary, bonuses, and prestige all hang on those evaluations, so the only reason to become interdisciplinary is because you're willing to sacrifice those things to do interdisciplinary projects.

In my rather jaundiced opinion, the Norman Weather Center (I decline to refer to this as the so-called "National Weather Center") was justified on what I maintain is *another* unfulfilled promise - that by collocating most of the disparate parts of the Norman weather community, there would be a surge of synergistic interactions that would result in the dawning of some sort of new millennium of cooperation among those previously disparate parts. The events on the night of 12 June 2009 seem to suggest that we're still waiting for this Renaissance of collaboration and interactivity to develop and come to fruition. Norman should be the ideal location for frank and unflinching discussions about the deficiencies in severe weather warnings revealed by that recent event, but I've observed no calls to convene such discussions. Everyone seems most concerned about avoiding the spotlight being put on what happened that night, perhaps because if blame is laid on someone, litigation could result. This Norman weather community seems more than willing to pat themselves on the back for their obvious successes (e.g., 03 May 1999), but when we can't claim success, no one seems interested in exploring those events any further. It seems that we're

dominated by the fear that an investigation of non-successes might suggest that we're *not* currently operating in the best of all possible worlds. This isn't a formula for a Renaissance of collaboration and interactivity - it's a formula for stagnation and failure to fulfill on the promises that justified building a costly new edifice for the Norman Weather Center in the first place. With all the diverse talent and apparent enthusiasm for progress on the forefront of providing the most effective severe weather warning services possible, this inactivity strikes me as inexcusable - it should be an embarrassment to all of us. We could be very proactive in helping Norman as a community, become aware of their responsibilities to develop grass-roots support for the improvements that could make a difference the next time Norman is "surprised" outside of business hours. Next time, the event might be more significant. Most of us can't do our weather research without the support of taxpayers, so we need to recognize that we owe them more than our personal disciplinary success in our chosen fields. They have a right to expect us to help improve the IWS, according to our abilities and interests. Lip service is no service at all. Talk is worthless. Inactivity is inexcusable.

If we simply began with the premise that at least some part of this vast, diverse array of expertise and talent in the Norman Weather Center needs to be focused on improving the situation *right here, right now, in our own backyard*, it might be possible to develop (in cooperation with Norman community officials) a model of how things could be done that we'd be proud to exhibit worldwide. As I see it, events of the night of 12 June 2009 reveal that we can't make credible recommendations to *anyone* around the nation and the world about how to deal with severe weather, when our own local community is struggling to deal with the problems we in the Norman Weather Center have committed on paper to try to solve. Working out practical, effective ways to *improve* warning services (by the NWS and by local communities) is a huge problem, but it seems to me that an obvious first step should be to address the issues in Norman! Let's put all that expertise and talent to work making progress to solve one small part of the challenge, in one place. Then, with the lessons learned, we might be able to

spread that information around and be justified in taking a leading role in helping others to address similar problems elsewhere.

Added discussion - 02 August 2009 ... my response is in a *different font*. The email message is from Mr. Bernie Kopp

I have been a NWS trained Skywarn spotter here in SE WI and Northern IL for the last 15 years. I am an active spotter and have also functioned as a Net Control Operator working out of the Milwaukee/Sullivan NWSFO during severe weather events. I am also a member of the Northern Illinois Multi-County Warning System, as I travel there on occasion. In my experience the biggest problem with a community EM-based system that has spotters - directly - reporting to the EM, is simple and well proven in many areas of the country.

The local community EM does not share their information with anyone else! Unfortunately it seems that almost any bureaucracy almost always loves to hoard information. Also they feel committed to only their own community and feel no responsibility to those outside of their immediate realm.

The dangers posed are twofold. The NWS is not getting real time spotter reports and communities - downstream - from the tornado are ignorant of an active and verified tornado on the ground due to the lack of information from communities upstream.

Best example is the July 18th, 1996 Oakfield Wisconsin tornado event. The Sullivan NWSFO WCM related to me how after an hour and a half of severe weather, he received only one telephone call from any community affected by the tornado which offered any real time information. Another great example is the 1990 Plainfield Illinois F5 tornado event which became the inspiration to develop the Illinois Multi-County Warning System.

How to correct this? Put amateur radio operators in the EOC or dispatch centers of local communities. The amateur radio operator would monitor the tornado/damage reports the local EM is getting from their own PD or fire/rescue spotters and forward that to the NWS in real time. Conversely those same radio operators would forward spotter reports from the NWS Skywarn spotters to the EM. IMHO a - very - efficient two-way exchange of info between the NWS and local EM. Note that this system is volunteer-based and would incur little or no expense to the NWS or EM.

This notion has been discussed locally and never seems to take hold. I can guess at a number of reasons.

- Back to Rule #1 The local EM's have no desire to share - their - information with anybody else. It's an inherent and endemic core structure of any bureaucracy. Even after 9/11 we are still making baby steps toward true interagency mutual aid.

- Many local communities do not use or train their police/fire resources as weather spotters. IIRC the Illinois State Police -does- have active police spotters and uses a dedicated network radio frequency to forward their reports to each other and to the Northern Illinois Multi-County Warning System. Nice!

- IMHO many EM's are simply deferring completely to NWS issued electronic warnings. The EM's don't see it as - their - responsibility to issue a local warning on their own initiative.

- Yes, politically the NWS does see the warning function as - their - turf. Even with their own spotters, the NWS is lacking in outbound information to spotters in harms way. Spotter safety is a pet peeve of mine. Also state lines pose a weird informational boundary between NWSFO offices during active weather events.

To summarize,
Amateur radio has always been a proven resource to effect real time communications between disparate agencies in disaster recovery operations. The same benefit can be applied to an active ongoing tornado event.

You're quite right. I've seen some pretty appalling lack of communication at times between parts of the integrated warning system - that is, it isn't as "integrated" as it should be. If the information only goes to one place, however, I believe it should be to the community EMs. If they don't share that information, then that's a problem, but they're the ones who need it the most. I certainly agree that EMs should share the reports they've heard with the NWS and downstream communities - the IWS is supposed to be associated with a two-way information flow. If EMs want information to come to them from the NWS and from other EMs, they must be willing to reciprocate. The same is true for NWS offices - they need to pass information on to the EMs and spotters, which can be important for spotter safety (an important issue for me, too!). The value of time-sensitive weather information to everyone involved is severely limited when it's not being shared. I don't understand the mentality that creates this "hoarding" syndrome and certainly don't condone it in any way. The IWS needs to be a partnership, not an opportunity for someone to be a petty dictator or to grab the glory for protecting the community. Regrettably, I've seen this sort of "thinking" first hand. It does indeed seem to be common, sadly.

Also, I agree that amateur radio is an important component in many spotting programs I've seen, although many spotters don't have amateur licenses. I don't think it ever will be mandatory for spotters, but it's a practical and efficient way to spread information throughout the IWS. Good NWS offices use amateur radio in their warning operations, typically with the assistance of local amateur radio groups - I've seen instances where the local amateur radio groups provide spotter network operators to run the radios in the NWS office (and even donate the radios!) to help with NWS warning operations. The marriage between amateur radio and severe weather warning operations can be an excellent match.