# Exploring the effectiveness of Integrated Warning Team Activities

Caleb D. Johnson[1], Lans Rothfusz[2]

[1]National Weather Center Research Experiences for Undergraduates Program
Norman, Oklahoma, 73072
[2]NOAA/NWS/National Severe Storm Laboratory,
Norman, Oklahoma, 73072
7/29/2013

ABSTRACT

An Integrated Warning Team (IWT) is an ad hoc team of people involved in the preparedness and response to high-impact weather events. The most common members of this team are the NWS, broadcast media and emergency managers. This study focuses on the effectiveness of IWT activities. NWS offices are leading many IWT activities with little communication between offices about what is working and what isn't. The goal of this study is to see if IWT workshops enable more effective IWTs before, during, and after real events. Semi-structured interviews were conducted with IWT workshop participants to evaluate the effectiveness of the workshops. IWT participants from the NWS, broadcast meteorology, emergency management, and social science were interviewed. The interview was designed to identify characteristics of effective/ineffective IWT workshops and also help to develop a set of ideas on how to improve IWT activities. This study succeeded in identifying ideas for improvements and also identified a weakness between some of the core groups of an IWT. Future work will be discussed to further improve operational IWTs and IWT workshops.

## 1. Introduction

Throughout the years, there have been many improvements to the warning systems and how severe weather preparedness and response is initiated. One of those many improvements is an Integrated Warning Team, (hereafter, IWT). The IWT refers to the ad hoc "team" of people who are involved in the preparedness and response to high-impact weather events. These people are from a variety of agencies such as the National Weather Service (NWS), emergency management groups (EMs), the broadcast media, the U.S. geological survey, forestry and agricultural groups, the private sector (e.g., companies involved with weather, security, emergency management)etc.

While the name may be fairly new, the concept of an IWT is not. Doswell first introduced the notion of an Integrated Warning System (IWS). An IWS consists of four basic elements: forecast, detection, dissemination, and public response (Leik et al.1981). In an IWS, there are three central parties that utilize weather information. These three groups are 1) broadcast media and private sector meteorologists, 2) emergency management officials and storm spotters, and 3) the general public (Doswell et al, 1993). The structure is the same for an IWT; however, three groups that utilize weather information the most within an IWT are 1) the NWS, 2) broadcast media, 3) and emergency management officials. IWTs are very similar to IWSs.

Because IWTs are a relatively new concept, workshops have been constructed to introduce them. One of the first groups to start these workshops was the Weather and Society Integrated Studies (WAS*IS) group. WAS*IS is working to change from what "was" to what "is " the future of integrated weather studies by incorporating social science tools and concepts into meteorological research and practice (Demuth et al. 2007). With the help of the NWS the WAS*IS group has assisted in seven IWT workshops in seven different locations. These seven locations are Kansas City, MO, Omaha, NE, Huntsville, AL, Cedar Rapids, Iowa, Kansas, Atlanta, GA and Grand Forks, MI (Nietfeld et al, 2011). The Dallas-Fort Worth area has also had experience in putting together a successful operational IWT during the April 3rd 2012 tornadoes in that area. "Despite impacting over 650 homes and causing an estimated $800 million in total damage, no fatalities and few serious injuries were reported. In an effort to explain why no fatalities occurred in an event of this magnitude, the actions of the North Texas IWT were analyzed. Post- event surveys were conducted to evaluate public response during the event. The surveys were designed to: identify the means by which warning information was received; ascertain the most common actions

*Corresponding author address: Caleb D. Johnson, Jackson State University, 552 rabbit road, Silver Creek, MS, 39663; e-mail: cdj89@hotmail.com

taken; and understand the motivation behind those actions. This study provides evidence that the coordinated actions of the IWT played an important role in achieving a favorable public response" (Cavanaugh et al, 2012). What is going on in IWT workshops that help make the IWT successful during events such as this? NWS offices are doing all kinds of IWT activities with little communication between offices about what is working and what isn't. The goal of this study is to see if and how IWT workshops enable more effective operational IWTs before, during, and after real events.

**2. Methodology**

This study focused on interviewing these participants of IWTs. This study was approved by the University of Oklahoma Institutional Review Board. With the use of an interview guide participants were asked about their experiences in IWT activities conducted across the U.S. There were questions asked about topics that pertained to how the IWT was organized and facilitated, what content was included, what groups participated, etc. The goal of this study was to understand what participants gained from these experiences and how IWT workshops were successful (or not). Fifteen people participated in this study. There were nine NWS employees, two broadcast meteorologists, three EMs and one social scientist.

Information on potential participants was obtained in two ways. The first was from the coordinators of IWT workshops; however, the potential participants had to consent to their information being given in order for them to be contacted. The second recruitment method was to visit public websites and obtain contact information from those sites. Once contact information was obtained, the process of contacting each potential participant began. The potential participants were approached via direct contact, via email, and via Facebook. This initiated sort of a snowball effect. When one participant was contacted they would give contact information for another possible participant of the study and it continued to grow just like a snowball would as it rolls down a hill. The potential participants were told that the interviewer was a third party to these IWT activities and that this study is being conducted in order to discover how to establish a successful IWT. The decision to participate was completely optional; there were neither incentives nor penalties for participation.

All of the interviews were conducted via phone, with the exception of three, which were done face to face. The interviews lasted no more than an hour and were conducted within a private office at the National Weather Center. Data were de-identified as soon as possible. The identities of participants were not shared among the IWT partners. All interviews were audio recorded, but only if consent was given and, in this case, it was by all interviewees.

**3. Data Analysis & Results**

Once the data were de-identified, analysis began. Since all of the interviews were recorded, they could either be transcribed or detailed notes could be taken from them. Because of time constraints, the latter was chosen. Detailed notes were taken for each interview. The goal of this note- taking was to find consistency and common themes amongst the information the interviewees provided, and that goal was achieved.

From these notes it was gathered that the NWS usually takes the initiative in coordinating and hosting IWT workshops. Each workshop that the interviewees participated in held the same goal, which was to discuss how to achieve getting that clear concise message to the public during a severe weather threat. The interviewees believed the best way to do that was to get people from the core groups of an IWT to start talking and discussing their issues. The IWT workshops encouraged this by gearing the content towards further explaining the concept of an IWT. It was also recognized that dialogue is needed in order to make these workshops useful. It was also discovered that IWT member relationships varied from one area to another. Tables were created to illustrate the different responses of these interviewees concerning their relationships with the different group members. Table 3.1 shows the responses for the NWS personnel on how their relationship is with the EMs in their respective areas. The relationship between the two is good.

| Resp. | NWS 1 | NWS 2 | NWS 3 | NWS 4 | NWS 5 | NWS 6 | NWS 7 | NWS 8 | NWS 9 |
|---|---|---|---|---|---|---|---|---|---|
| Good | X | X | X | X | X | X | X | X | X |
| Fair | | | | | | | | | |
| Bad | | | | | | | | | |
| Nonexi. | | | | | | | | | |

(Table 3.1 Relationship between the NWS and EMs in their respective areas)

Table 3.2 shows the responses for the NWS concerning their relationship with the broadcast media in their respective areas. The

NWS personnel seem to have fair to good relationships with the broadcast media in those areas.

| Resp. | NWS 1 | NWS 2 | NWS 3 | NWS 4 | NWS 5 | NWS 6 | NWS 7 | NWS 8 | NWS 9 |
|---|---|---|---|---|---|---|---|---|---|
| Good | | | | X | X | X | X | X | X |
| Fair | X | X | X | | | | | | |
| Bad | | | | | | | | | |
| Nonexi. | | | | | | | | | |

(Table 3.2 Relationship between the NWS and Broadcast Media in their respective areas)

Table 3.3 shows the responses for the broadcast media concerning their relationship with the NWS in their respective areas. The broadcast media also have good relationships with the NWS in their areas.

| Response | Broadcast Met 1 | Broadcast Met 2 |
|---|---|---|
| Good | X | X |
| Fair | | |
| Bad | | |
| Nonexistent | | |

(Table 3.3 Broadcast Mets relationship with the NWS in their respective areas)

Figure 3.4 shows the responses of the broadcast media concerning their relationship with the EMs in their respective area. Both broadcast meteorologists responded that the relationship between the two is nonexistent.

| Response | Broadcast Met 1 | Broadcast Met 2 |
|---|---|---|
| Good | | |
| Fair | | |
| Bad | | |
| Nonexistent | X | X |

(Table 3.4 Broadcast Mets relationship with the EMs in their respective areas.)

They further went on to explain that there wasn't any animosity between them and the EMs in that area, there just isn't enough time to communicate with the EMs, and sometimes the EMs have restrictions on some of the information they can relay to the broadcasters. Most of the time the broadcasters got their information from other sources and the NWS.

Table 3.5 shows the responses for the EMs concerning their relationships with the NWS in their respective areas. The relationship between the two is good in their areas.

| Response | EM1 | EM2 | EM3 |
|---|---|---|---|
| Good | X | X | X |
| Fair | | | |
| Bad | | | |
| Nonexistent | | | |

Table (3.5 EMs relationship with the NWS in their respective areas)

Table 3.6 shows the responses for the EMs concerning their relationships with the broadcast media in their respective areas.

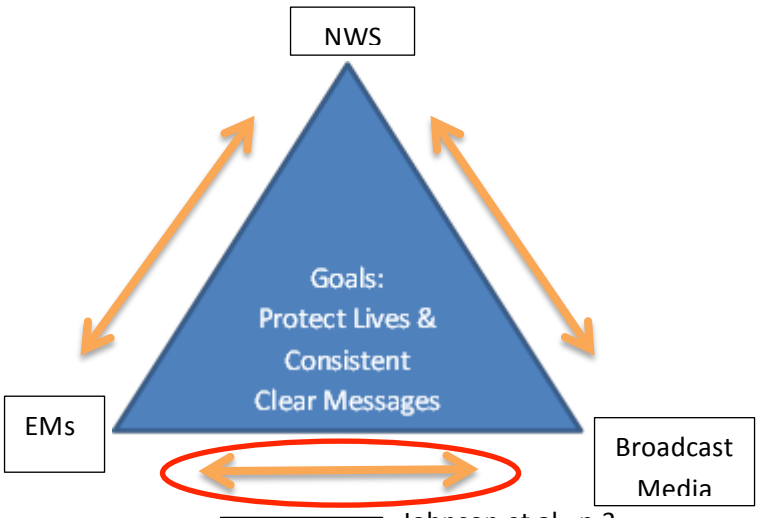
| Response | EM1 | EM2 | EM3 |
|---|---|---|---|
| Good | | | X |
| Fair | X | | |
| Bad | | | |
| Nonexistent | | X | |

(Table 3.6 EMs relationship with Broadcast Media in their respective areas)

Table 3.6, unlike table 3.4, shows some interesting differences in responses. EM1 responded that their relationship was neither good nor bad. EM2 responded that there was no relationship with the broadcasters prior to the IWT workshop, but afterwards the desire to start one was noticed. EM 3 stated their relationship with the broadcasters was excellent. This shows somewhat of a barrier that might hinder the success of an IWT. On the other hand, it might help spur more IWT workshops to help combat these particular issues.

**4. Conclusions**

Figure 4.1 shows an idealized IWT.




Johnson et al. p.3

Fig. 4.1

At the top of the triangle is the NWS and on the other two sides are the EMs and broadcast media, respectively. The arrows connecting the groups represent the lines of communication between the three groups. In the center of this triangle are the goals of this IWT which are to protect lives and give consistent clear messages. This is how an ideal IWT would function. This study identified a relationship weakness between the EMs and broadcast media (see circled arrow in Fig 2.1). Of all the components that make an IWT it seems that the relationship between the EMs and the broadcast media is the weakest. “There are a few places where the relationship among the groups has not always been as cordial and mutually supportive as it needs to be. More over; the various disseminators of weather information are not always on the best of terms with each other” (Doswell et al, 1999). Maybe this suggests that some areas need to work on mending those relationships more so than others. These issues can be addressed within the IWT.

The interviewees had four great ideas on how to improve IWT workshops so that problems like these won’t hinder the success of operational IWTs. The first idea is follow ups. As one interviewee said, “Without follow ups what’s the use of having an IWT or workshop for that matter”. Follow ups are crucial in the fact that they determine the success of an IWT workshop. Follow ups serve as indicators that relationships between the groups have been established and it’s essential to continue that flow of communication between the groups.

The second idea is the use of NWS chat. As one interviewee said, “NWS chat is the embodiment of an IWT”. NWS chat seems to have become quite useful as a tool for IWT communications. It keeps channels of communications open when these groups are not in the same room during severe weather events.

The third idea is making a commitment and taking the time to participate in more IWT workshops. All the interviewees stated that if they had the chance to participate in more of these workshops they would. This is another point that indicates if an IWT workshop was successful. If the participants left with a desire to participate in more, it’s more than likely that the IWT was successful.

The fourth and final idea is implementing role reversal. One interviewee said, “This opened my eyes to what problems these people face”. Role reversal provides the participants a walk in the shoes of another’s profession. This is a good way for members of these groups to understand the difficulties that each of them face. This not only builds and improves existing relationships; it also helps these groups to trust one another.

For future work, use of a larger sample size is needed to see if results are nationwide. These data are promising and it provides some very good questions to be answered in the near future. For example, why is it that some of these relationships are different in certain areas? Does demographics play a role in fostering those relationships? What can we learn from what others have done so far concerning operational IWTs and IWT workshops? How much of a role does social science play in IWTs? And how can this be taken from a great idea to a wonderful achievement? Overall this involves more than just the science. An interviewee summed it up nicely by saying, “It is much more than the science and technology that we learned. It was how people interacted. It was about leadership being portrayed during these events. It was about communication, coordination, and interactions with those partners that contributed to an event success”. Hopefully, with this study as a foundation, this can be achieved.

**5. Acknowledgments**

The author would like to thank the following individuals for their assistance and ideas. This study would not have been possible without their support: Lans Rothfusz, Daphne LaDue, and Joseph Ripberger. This material is based upon work funded by the National Science Foundation under Grant No. AGS 1062932. The statements, findings, conclusions, and recommendations are those of the author and do not necessarily reflect the views of the National Science Foundation and NOAA.

**6. References**

Cavanaugh, Dennis, Melissa Huffman, Mark Fox, Joseph E. Trainor, Brenda Philips, Cedar League, Carrie Little, Larry Mowry, and Rebecca Miller. "The 3 April 2012 Tornado Outbreak: An Analysis of the North Texas Integrated Warning Team." *American Meteorological Society Home Page*. N.p., 7 Nov. 2012.[Available online at https://ams.confex.com/ams/26SLS/webprogram/Paper211760.html]

Demuth, Julie L., Rebecca E. Morss, Jeffrey K. Lazo, Eve Gruntfest, and Sheldon Drobot. "WAS*IS: Building a Community for Integrating Meteorology and Social Science." *Bulletin of the American*

*Meteorological Society* 88.11 (2007): 1729-737.

Doswell, Charles A., Alan R. Moller, and Harold E. Brooks. "Storm Spotting and Public Awareness since the First Tornado Forecasts of 1948." Weather and Forecasting 14.4 (1999): 544-57.

Leik, R.K., T.M. Carter, and J.P. Clark, 1981: Community response to natural hazard warning. U.S. Dept. Of Commerce (NTIS Accession no. PB82-111287), 77 pp

Nietfeld, Daniel, and Andy Bailey. "Session: Decision Support, Forecast Verification and Downscaling (*91st American Meteorological Society Annual Meeting*).").N.p., 24 Jan. 2011. [Available online at https://ams.confex.com/ams/39BROADCAST/webprogram/Paper188956.html]