J10.3 OK-FIRST: A 6-YEAR RETROSPECTIVE

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1. INTRODUCTION

The Oklahoma Climatological Survey (OCS) began a project known as OK-FIRST (Morris *et al.* 2001) in 1996 as a 30-month demonstration project to serve 65 public safety agencies (emergency management, law enforcement, and fire departments) across rural Oklahoma. The goal of OK-FIRST was to modernize local public safety agencies by developing a transportable, agency-driven information and decision-support system to help the agencies harness the information age. Because OK-FIRST was to be "agency-driven", the system was initially designed and subsequently refined by a staff member tasked to understand the targeted user community. Thus, user feedback ensured that OK-FIRST would be functional to meet their needs.

Today, OK-FIRST has annual funding through a state appropriation via the Oklahoma Department of Public Safety. The mature OK-FIRST system serves 140 public safety agencies (Fig. 1). All but six of Oklahoma's 77 counties (92%) are formally represented in OK-FIRST. Currently, 88% of OK-FIRST participants represent rural areas with populations under 25,000; 72% are below 10,000; and 52% are below 5,000. Even so, most of the population of Oklahoma benefits from OK-FIRST. Of the 20 Oklahoma cities with populations *above* 20,000, 17 participate in OK-FIRST (the three cities that do not participate are suburbs of Oklahoma City). Nearly 80% of all towns in Oklahoma with populations above 5,000 have participants in OK-FIRST.

From the beginning, staff at OCS recognized that simply building the OK-FIRST decision-support system would not ensure the proper application of the available information in local settings. The OCS philosophy has been that mere access to timely and relevant information is not the *total* solution. Therefore, OK-FIRST included training and follow-up support components to facilitate the use of this environmental information into local operations. Because Oklahoma is a microcosm of the nation in how local agencies respond to emergencies, this manuscript focuses on the management and logistical concerns associated with OK-FIRST in an effort to share the experience base gained in Oklahoma. This manuscript also covers how OK-FIRST successfully transitioned from a demonstration project into a permanent program.

2. PROGRAM MOTIVATION AND DESCRIPTION

OK-FIRST was established to help address the problem of human and material losses from natural disasters and other weather-related situations. Oklahoma has been hit especially hard with hazardous weather, including ice storms (Dec. 2000), drought and accompanying wildfires (Aug.-Sep. 2000), floods (Oct. 2000), and severe weather (including the 3 May 1999 tornado outbreak). Other states face similar hazards, and share a common problem: access to quality weather information in the local community has been lacking or non-existent. Even so, access to quality information and training on the use of the information are required for local disaster mitigation programs to be successful (National Research Council 1991, 1999). Because local officials do not necessarily possess quality information or the skills to apply the information, local officials have made decisions time after time without the benefit of critical, but perishable, information. Rural areas especially are at high risk because they lack infrastructure and cannot afford commercially available data feeds. In 1999, a report issued by a coalition funded by the regional Bell carriers ranked Oklahoma as one of the "Disconnected Dozen" – the states with the poorest telecommunications infrastructure. Private firms often provide unequal service (e.g., more television coverage for metropolitan areas than outlying rural areas). Moreover, local officials frequently desire knowledge of weather conditions (i.e., wind shifts for fire-fighting, and rainfall that impacts little league games or public-works projects) that do not gain the attention of the broadcast media or the NWS. Therefore, even in the information age, local officials are hampered in obtaining current, localized, and relevant data.

OK-FIRST forged partnerships with local, state, and federal government stakeholders plus the private

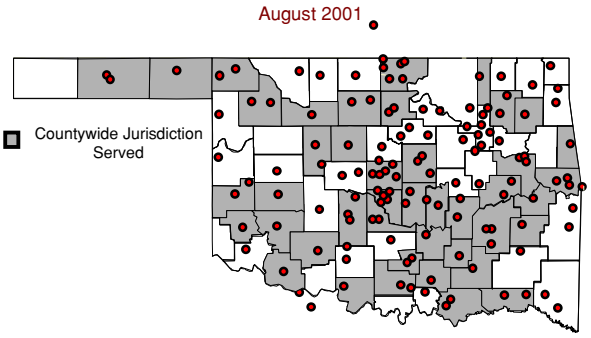

Figure 1. Locations of communities served by OK-FIRST as of August 2001. In cases where a jurisdiction serves an entire county (such as a sheriff's office or a county emergency management office [which serves unincorporated areas of the county]), the location of the office is noted, and the county served is shaded.

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sector to overcome these problems. While access to quality information for local officials is essential for successful disaster mitigation, mere access is not the *total* solution. OK-FIRST is unique because it delivers both affordable weather information *and* requisite training designed for public safety. Through the instruction provided by OK-FIRST, local officials learn the proper interpretation and application of the data.

OK-FIRST has empowered Oklahoma's public safety officials (fire, police, and emergency management) to make proactive mitigation decisions beneficial to the protection of life and property. The OK-FIRST decision-support system incorporated reliable and intuitive access to real-time and high-quality weather information. The system integrated up-to-the-minute weather data from multiple sources including: (1) 15 WSR-88D radar units; (2) information from the Oklahoma Mesonet (115 automated observing sites that measure temperature, winds, humidity, and rainfall every 5 minutes; Brock *et al.* 1995); and (3) the NWS and other agencies. The OK-FIRST system was tailored for public-safety. Several examples of products include: (1) detailed wind reports based on Mesonet data for fire-fighting and hazardous materials spills; (2) products which classify various types of thunderstorms based upon WSR-88D information; (3) maps of fire intensity and spread component from the Oklahoma Fire Danger Model (Carlson and Engle 1998); and (4) thickness maps that delineate areas which will receive snow, sleet, ice, or rain. The OK-FIRST web site also blends the weather data with instructional material to assist with interpretation. Morris *et al.* (2001) provided details on the decision-support capability of OK-FIRST. The confidence, credibility, and capability of Oklahoma's public safety officials have dramatically increased during weather-impacted situations because they possess information critical to the protection of life and property. OK-FIRST is so mission-critical that one participant publicly stated he would resign if it somehow terminated. (*Daily Oklahoman*, May 11, 1999).

3. MANAGEMENT CONCERNS: FROM A DEMONSTRATION PROJECT TO A PERMANENT PROGRAM

OK-FIRST was modeled after an outreach program for teachers sponsored by OCS and known as EARTHSTORM (McPherson and Crawford 1996). In EARTHSTORM, three classes of 15-20 teachers enrolled for a month-long summer workshop held during successive years. Each teacher received a computer, free access to Oklahoma Mesonet data via a dialup bulletin board service, and customized software. During the second and third summers, previous EARTHSTORM graduates were brought back for a short refresher workshop conducted in conjunction with the final portion of the month-long workshop. Through this process, previous EARTHSTORM graduates were informed of program changes. Professional bonds were also formed among many of the teachers.

Similarly, the demonstration phase of OK-FIRST called for three groups of public safety officials to participate after completing three days of computer training and a subsequent weeklong data interpretation workshop. The data interpretation workshops covered severe weather, fire weather, and flooding with "hands-on" computer laboratory exercises. These first OK-FIRST workshops were held during June 1997 (emergency managers), October 1997 (emergency managers and fire officials), and March 1998 (emergency managers, fire officials, and law enforcement). One- to two-day refresher workshops also were conducted during the data interpretation portion of the 1997 and 1998 workshops.

3.1 *Program Adaptability*

From its beginning, OK-FIRST answered a need within the public safety community in Oklahoma. Many more applications were received to participate in the workshop than facilities and funding would permit. The original demonstration project proposed to provide modern personal computers for each participant on extended loan. To grant project participation and to justify the placement of the computers, a competitive application process gathered user information including existing telecommunications and computing infrastructure, existing sources of weather data, and a narrative stating how the OK-FIRST system would be used in the local community. The information provided by the applicants gave project leadership an important knowledge base about the attributes of the user community. For example:

- most emergency management offices in Oklahoma in 1997 possessed no better than a 486-class PC; but a few offices did have Pentium-class computers
- very few public safety offices had internet access
- most emergency management offices had only one paid or part-time paid position; many emergency managers worked strictly on a volunteer basis
- storm watch activities in many communities were delegated to law enforcement and/or fire agencies rather than emergency management

The initial funding for the demonstration allowed for 32 fully-funded, or "subsidized" participants. Because of the overwhelming response to participate, the OK-FIRST project leadership realized that the number of project participants could double in scope if additional agencies were allowed to participate on a "non-subsidized" basis. These additional agencies (which had been successful and progressive in obtaining funding to improve their own infrastructure) provided their own computers and paid their own travel expenses for the workshops. Otherwise, the subsidized and non-subsidized participants were treated equally.

As the three initial groups became involved in the program, several changes in the public safety community were observed:

- local agencies were becoming increasingly successful in obtaining adequate computer and telecommunications infrastructure
- trained participants were lost from the program due to various attrition factors including retirement
- computer literacy improved from year to year in most public safety agencies

A successful outreach program, by definition, should effect change in its targeted user community. In the case of OK-FIRST, the capabilities, confidence, and credibility of the participants increased so dramatically that neighboring communities began to prepare themselves so they could participate at a later time. Consequently, the need for OK-FIRST to continue to provide computers to the program participants began to be diminished.

As OK-FIRST made the transition the from demonstration phase to the permanent program phase, it became clear that growth would have to be managed. In other words, adding too many participants too quickly would undermine the ability of the program staff to effectively respond to user needs. Therefore, additional participants have been added to OK-FIRST in one or two classes of approximately 20 participants per year. In addition, the computer training and data interpretation workshops were condensed into a single weeklong workshop because computer literacy had improved among potential participants, and because it was difficult for participants who were volunteers to be away from their regular jobs for two weeks.

3.2 *Funding Availability*

An obvious requirement for a demonstration project to become permanent is the acquisition of stable funding. In the case of OK-FIRST, the initial demonstration funding was provided through a federal grant. Participants were told what the financial situation was, and they acted to inform their state legislators. Most of the participants already knew their legislators (e.g., many were classmates). The impact OK-FIRST in many local communities (see the results section and Morris *et al.* 2001, 2002 for examples) made the decision easy for the state legislature to fund OK-FIRST.

3.3 *User Certification and Collaboration with the National Weather Service*

OK-FIRST has involved staff from local National Weather Service (NWS) offices in the training workshops since the first workshop held in 1997. During the workshops, the NWS employees reminded the participants about the necessity of two-way collaboration with NWS during storm events (e.g., Doswell *et al.* 1999). One outcome of OK-FIRST has been a reduction in the amount of communication between the local agency and the NWS. Part of the decrease results from a change in the type of communication from basic "What is going on?" questions to discussions regarding specific storm attributes. Unfortunately, a small number of users have misinterpreted certain imagery available via OK-FIRST without consulting with the NWS. To mitigate the NWS concern regarding local decisions being made in the warning process without NWS input, OK-FIRST staff instituted a mandatory user-certification program (Morris *et al.* 2001). Under this policy, initial access to the OK-FIRST system is granted only after completion of the weeklong workshop, and users maintain access through continuing education workshops. This certification policy gained nearly unanimous support from the body of OK-FIRST users after a few participants expressed concerns about misinterpretation of imagery by participants in neighboring jurisdictions.

3.4 *Additional Workshops for Users*

Because of the user certification requirement mentioned above and to address the problem of participant attrition, additional workshops beyond the yearly weeklong data interpretation workshop were implemented. The additional refresher courses created a logistical problem of hosting these workshops at the University of Oklahoma where facilities are typically available only during breaks and between semesters. In addition, an increasing number of participants complicated the problem of finding adequate facilities. Program staff addressed these problems by conducting identical workshops both at the University of Oklahoma and at remote locations. For example, several refresher workshops have been held in conjunction with meetings of the Oklahoma Emergency Management Association. Venues for the remote workshops have included community colleges, high school computer labs, and other technical training facilities.

Several OK-FIRST participants also desired the provision of training to their other staff members who use the OK-FIRST system when the primary user is unavailable. Program staff created a two-day "assistants course" which concentrated on the severe weather aspects of the OK-FIRST system. These workshops have also been quite popular with more applications received than computer lab facilities typically permit.

4. RESULTS

As a result of keeping the OK-FIRST program healthy, OK-FIRST users have made an impact in the lives of many rural Oklahomans. OK-FIRST users have *changed* their work routines in weather-impacted situations by being *proactive* (e.g., firemen *pre-alerted* to approaching wind-shifts; roads and bridges closed *before* flooding occurs; ambulances *diverted* around intervening tornadic storms). This stands in stark contrast to the "old way of doing business" (e.g., *reactive* decisions based on sporadic glimpses of television radar). Uses of OK-FIRST vary widely. OK-FIRST was used forensically to invalidate a murder suspect's alibi; a confession resulted. Precious tax dollars are spent more wisely when paving projects are better scheduled. Outdoor audiences at parades, sporting events, and concerts are better protected as event organizers are informed of potential hazardous conditions. The significance of OK-FIRST is evident in these proactive decisions, associated improvements in safety, and reductions in human casualties from natural hazards. Significant illustrations of the application of these capabilities were demonstrated during the 3 May 1999 tornado outbreak (Morris *et al.* 2002).

In a recent survey, nearly every participant either strongly or very strongly agreed that OK-FIRST had increased their ability to inform and advise the public about potentially dangerous weather-related situations. Among quotes from several participants:

- "OK-FIRST is the best thing to come along for emergency management in many years."
- "You and your staff are doing great things and I just wish that more people knew and understood the wonderful work you are doing. I brag on you every chance I get. *This program has definitely brought rural areas in the 21st century and given us tools we never dreamed possible*."
- "There are no words in the English language to express how great OK-FIRST is to Emergency Management, so I will just say 'Thank You' for allowing the City of Grove to be a part of your OK-FIRST project." – City of Grove Emergency Management.

5. SUMMARY

In an effort to widely disseminate the results of the OK-FIRST program and to aid in its potential replication in other locations, management philosophies and experiences have been shared. In particular, it is the authors' judgement that a major key to the success of the OK-FIRST program has been the program's commitment to stay abreast of changes in the user community and the willingness to adapt to those changes.

Program participants, program staff, and external advisors unanimously agree that the training component of OK-FIRST is critical to the program's success. Periodic refresher courses ensure that these non-meteorologists stay abreast of the important concepts and permit the exchange of new ideas between participants and program staff. Over 90% of the participants have attended refresher courses in the last 18 months. In the period between August 2001 and August 2002, OK-FIRST program staff have conducted nearly 200 hours of instruction for more than 275 pupils.

6. REFERENCES

Brock, F.V., K..C. Crawford, R.L. Elliott, G.W. Cuperus, S.J. Stadler, and M.D. Eilts, 1995: The Oklahoma Mesonet: A technical overview. *J. Atmos. Oceanic Technol.,* **12,** 5-19.

Carlson, J.D., and D.M. Engle, 1998: Recent developments in the Oklahoma Fire Danger Model, a mesoscale fire danger rating system for Oklahoma. *Second Symp. on Fire and Forest Meteor.,* Phoenix, AZ, Amer. Meteor. Soc., 42-47.

Doswell, C.A. III, A.R. Moller, and H.E. Brooks, 1999: Storm spotting and awaremess since the first tornado forecasts of 1948. *Wea. Forecasting,* **14,** 544-557.

McPherson, R.A., and K.C. Crawford, 1996: The EARTHSTORM Project: Encouraging the use of real-time data from the Oklahoma Mesonet in K-12 classrooms. *Bull. Amer. Meteor. Soc.,* **77,** 749-761.

Morris, D.A., K.C. Crawford, K.A. Kloesel, and J.M. Wolfinbarger, 2001: OK-FIRST: A meteor-ological information system for public safety. *Bull. Amer. Meteor. Soc.,* **82,** 1911-1923.

_____, _____, _____, and G. Kitch, 2002: OK-FIRST: An example of successful collaboration between the meteorological and emergency response communities on 3 May 1999. Accepted for publication in *Wea. Forecasting,* in press.

National Research Council, 1991: *A safer future: Reducing the impacts of natural disasters.* National Academy Press, 76 pp.

_____, 1999: *Reducing disaster losses through better information.* National Academy Press, 72 pp.