INTERVIEW: *A 40-Year Career Perspective* - Mr. William 'Bill' Proenza, Southern Region Director, NWS, National Oceanic and Atmospheric Administration (NOAA), Fort Worth, Texas

Mr. Proenza was unable to attend the Exploratory Mini-Workshop. However, he was interviewed to capture his perspective regarding the incorporation of social sciences into meteorological operations and services delivered by NWS. The synopsis of the interview is below.

Synopsis: The Southern Region of the NWS includes 27% of the nation's NWS Field Offices and is the nation's busiest area of severe meteorological activity. This area includes the states of Mississippi, Texas, Florida, Georgia, Alabama, Louisiana, Oklahoma, Arkansas, Tennessee, New Mexico, and Puerto Rico. These states and territories experience hurricanes, tornados, severe thunderstorms, violent lightning, high winds, flash floods and hail. While the occurrence of these weather events is unavoidable, the NWS must ensure the safety of the public and, in ways possible, mitigate damage to property.

With over 40-years of service with the NWS, Mr. Proenza has seen tremendous advancements in technology that has made the NWS a trusted agent for weather information. Two examples of these advancements are the Next Generation Weather Radar system (NEXRAD) and numerical weather prediction (NWP).

- The NEXRAD comprises 159 Weather Surveillance Radar-1988 Doppler (WSR-88D) sites throughout the United States and select overseas locations. This system is a joint effort of the Departments of Commerce (DOC), Defense (DOD), and Transportation (DOT). From the NOAAEconomics Web Site (http://www.economics.noaa.gov/?goal=commerce&file=obs/radar/nexrad): "Research has shown that the percentage of tornadoes warned for nearly doubled, from 35% pre-NEXRAD to 60% post-NEXRAD, and the average warning lead time increased from 5.3 to 9.5 minutes.[1] The study also examined a dataset of nearly 15,000 tornadoes in the U.S. that occurred between 1986-1999, comparing the number of tornado fatalities and injuries per year from 1986-1996, against the years 1997-1999, in which NEXRAD technology was widely available. The study concluded that NEXRAD tornado detection capabilities prevented 79 fatalities and over 1,050 injuries per year. In summary, expected U.S. fatalities were 45% lower and expected injuries 40% lower with the NEXRAD Doppler radar network installed. The additional minutes of warning time also provide critical time for the public to take proper precautions to protect lives and property from possible tornadic events."

- A vivid example of improvements made in the field of NWP is the improvement of tropical cyclone track forecasts. Over the past 15 years or so,

[1] Sutter, D., and Simmons, K., 2005: WSR-88D radar, tornado warnings, and tornado casualties. *Weather and Forecasting*, **20(3)**, 301-310. PDF version available at:http://journals.ametsoc.org/doi/pdf/10.1175/WAF857.1

24-72 hour track forecast errors have been reduced by about 50%, which is largely attributed to improvement in NWP.[2]

Mr. Proenza recalls the introduction of social sciences into the delivery of meteorological services in the early 1970s during his tenure at the NWS Headquarters in Silver Spring, Maryland. All NWS missions are important; however, highest priority is given to the protection of life. There was and continues to be sensitivity at the NWS regarding the effects of words used to characterize weather predictions on actions taken by all. While it is understood at the NWS that local, state and federal emergency managers (EMs) are the ones in charge of safeguarding the lives of the public, it continues to be realized that there must exist viable partnerships between the NWS and EMs. Subsequently, the words used to communicate weather predictions are important. During the early 1970s, social scientists were engaged by NWS to fine tune and reword warnings to ensure that the right message was delivered to emergency managers, first responders (fire, police and medics) and the media. A course was developed, *Warning – A Call to Action*, which was designed to communicate the key factors that best motivate people to act.[3] Dr. Benjamin McLuckie, a social scientist from the University of Delaware, worked with the NWS to develop this course and its associated guidance papers.

Mr. Proenza emphasized that many social scientists have long been involved in the design of the text in NWS products and services. He stated that a lot of work has gone into having our products "social science sensitive." In this vein, at least since the early 70s, the NWS has been using an effective blend between very time-efficient weather warnings text and information and the use of response-motivating "call-to-action" (CTA) statements. Mr. Proenza cited NWS Southern Region Technical Memorandum #215 (SR-Tech Memo 215) which incorporated decades of NWS social science sensitivity. Included in the tech memo are the CTA statements used by mission-delivery NWS field offices to effectively get the proper "protection of life" responses from EM partners, media and the public in the official NWS warnings, public information statements, and other services. The importance of the CTA statement is often overlooked, but it serves a very important purpose in the warning message. CTAs are the part of warning messages which prompts the public to respond, in effect saying, -*we have told you where the storm is and where it is going, now here is what you need to think about as it approaches.*

As one of the driving forces for the Exploratory Mini-Workshop was the 64th Interdepartmental Hurricane Conference (IHC), Mr. Proenza referred to his presentations at the last three IHCs, especially emphasizing the technological advances and strategic initiatives of the NWS that have or will advance NWS forecast and warning programs. Highlights from the presentations include:

- NWS Forecast Offices (WFOs) - excellent sources for hazardous weather's expected *local* impacts

[2] http://www.nhc.noaa.gov/verification/pdfs/Verification_2009.pdf
[3] McLuckie, B.F., 1974: Warning-A Call to Action: Warning and Disaster Response- A Sociological Background. NWS Southern Region Headquarters. PDF version available at: http://www.ofcm.gov/wg-ssr/noaa-nws-sr-a-call-to-action.pdf

    - WFO gridded data, plus WFO smart tools provide *impact* graphics
- WFOs – outstanding GIS radar data
    - Current radar enhancements
        - Improved elevation scans
        - Faster scans (from 6 to 4 minutes)
        - Improved national and regional mosaics
    - Radar enhancements allowed warnings to move from county-based to storm-based
        - Typical example: County-based - eight counties under warning (almost 1 million people warned); with storm-based warning, 70% less area covered and ~600,000 fewer people warned
    - Radar graphics include latest watches and storm-based warning boxes
    - Future radar enhancement: dual-pol radar
        - Finer imaging
        - Improved rainfall estimation
        - Pinpoint tornado location
- NWS Decision-Support: A Strategic Initiative
    - Local/state/federal EMs indicate they vitally need decision-assisting focused, on-site weather information
    - Solution: Emergency Response Meteorologists (ER-Mets)
        - EMs can immediately request from their local WFO an on-site forecaster to provide decision-support during both natural and human derived high impact events:
        - ER-Mets
            - Who: An "all-hazard" event trained meteorologist
            - From: From nearby WFO
            - To: Local/state/federal Emergency Operations Center (EOC) or 1st responder site in the field

Even with advances in technology and the Decision-Support Strategic Initiative, the NWS will continue to work with the social science community as has been done in the past. Currently, the more urgent need for social science guidance is in defining ways to better communicate predictions, their accuracy and risks to the EM community (county, city and state), and to the Federal Emergency Management Agency (FEMA.) The EM community must carry forth information that motivates people to take appropriate actions. The information delivered must be true, vital, and concise; and cause people to pay attention and know how to take action. Rapid-onset weather events, namely, tornadoes, flash floods, thunderstorms, hail and lightning require more pre-education than events with longer predictive lead times, as people may have only minutes to act after a warning is issued.

In summary, the inclusion of the social sciences into the delivery of meteorological operations and services has a long and significant history, and the work must continue as we partner with others to ensure the safety of the public.