

HARNESSING TECHNOLOGY TO TURN CHANGE INTO ADVANTAGE¹

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Mark Twain once said, "Everybody talks about the weather, but nobody does anything about it." He'd be surprised if he were here today. We are doing something about the weather, and we're here this week to talk about our efforts. That's the theme of this conference—technology, transfer, and timing of weather modernization. To these topics, I will add training—the final and most important step in weather modernization. With training, you harness technology and move forward. Without training, you have only the illusion of progress.

As operational meteorologists, you know what civilian meteorology is all about. You may be less familiar with military meteorology as we accomplish it in the Department of Defense—in particular, what motivates us to operate the way we do and make the technology decisions we make. I'll take a minute to highlight for you the key difference between civilian and military weather support, and then move on to discuss some of the similar challenges we face, the technology we are acquiring to meet those challenges, and what we've learned along the way.

Two years ago our Nation's attention was fixated on the DESERT SHIELD military buildup and the war to liberate Kuwait, DESERT STORM. For the first time in history television brought war into our living rooms in real-time. During the coverage, you may have watched American fighting men raising the stars and stripes at the U.S. Embassy following the liberation of Kuwait City. What you probably don't realize is that Air Force meteorologists were among the group of soldiers raising the flag. Air Force weather support was on the scene at every level of DESERT STORM, from supporting General Schwarzkopf, or briefing stealth fighter pilots, to advancing with the Army as they sliced through the Republican Guard. Air Force weathermen captured surrendering Iraqi troops—we were there. These experiences highlight the basic difference between civilian and DOD weather support. Combat weather support is our job.

While our focus on combat support is a fundamental difference between our operations, we have much in common as well. Outside pressures are forcing all of us in the government to change. Foremost among these pressures are shrinking budgets, which lead to the downsizing of force levels. The future promises increased pressure from this direction. While we in the Air Force have no control over these outside forces, we have a lot of control over how we react to the pressure. In the Air Force, we're reacting by moving even more aggressively to obtain new technology to maintain and enhance our capability, as well as improving and expanding our training programs for existing technology. In the next few minutes,

I'll describe where we've been, where we're going, and how these changes are driving us to use technology to turn change to advantage. I'll close by sharing some lessons we've learned along the way that may apply to you.

As you know, a massive restructure of the military is under way. The Air Force has carried a large portion of the burden to date. The Secretary of the Air Force, Donald B. Rice, describes it this way:

"The Air Force today is undergoing the most fundamental reshaping it has experienced since it was established as a separate service nearly half a century ago. The broad sweep of change has touched every corner of the institution and every aspect of how we do business. We are not paring down the Air Force. We are building a new, smaller Air Force from the ground up."

Rather than merely becoming a shrunken version of our former force, we've taken vigorous action to build a new, smaller Air Force. We're streamlining and flattening our organizational structure, clarifying our functional responsibilities, decentralizing authority, and strengthening the chain of command. These fundamental changes are not solely a reaction to external budgetary forces I alluded to previously. They are happening, as Air Force Chief of Staff General Merrill McPeak explains, because, "they make good sense." In his words, we're working to "turn change into advantage." New technology is also helping us do this.

Air Force weather support is on the leading edge of this fundamental change. We recently completed a major reorganization within the Air Force Weather functional area. On 1 April 1991, I assumed the position of Director of Weather under the Deputy Chief of Staff for Plans and Operations at Air Force Headquarters. Within six months, a major reorganization of the rest of the Air Force Weather functional area was completed.

Under the new structure, base-level weather flights belong to their operational commanders. This follows the concept of one base, one wing, one boss. The boss now has direct responsibility and control over all their war fighting assets—he or she is empowered with the forces needed to do the job, including the base-level weather folks. Air Weather Service Headquarters now provides only centralized support and technical assistance to the major commands. Headquarters Air Force Directorate of Weather is the Air Force weather functional manager, policy developer, and resource allocator. It was a challenge to complete our restructure while fighting a war, improving our support capability, and maintaining a viable career field for our officer and enlisted troops. We did it. Although much has changed, there is more change to come. In Secretary Rice's words, "As an Air Force, we're going to get smaller and as we get smaller we need to make sure we get smarter and better."

As the Air Force continues to downsize, so will the Air Force weather support team. By Fiscal Year 1995, under current force level plans, we will have reduced our officer

¹The keynote address by Brig. Gen. John J. Kelly Jr., Director of Weather, USAF, to the National Weather Association's 16th Annual Meeting, 20 October 1992, in St. Louis, Missouri.

force by 24%, our enlisted force by 17%, and our civilian force by 30% from where we were in Fiscal Year 1991. This includes a reduction in management overhead of 52%. The ratio of officers to enlisted will change from one officer for every 2.6 enlisted men and women in 1991, to one in 3.5 in 1995. We've also taken action to reduce the number of advanced academic degree positions by 40%, including a 70% decrease in the number of Ph.D.s. These changes are not unique to the weather career field, similar changes are occurring across every career field in the Air Force.

How can we get smarter and better with fewer people with less formal university training? That's where technology can contribute. It sounds simple—but it isn't. Technology is only part of the picture. To become smarter and better, we must effectively utilize all of our reduced resources. We must become not only technologically smarter and better, but organizationally smarter and better as well. We're doing both. The thrust is, we're changing in many ways. As Yogi Berra said, "The future ain't what it used to be."

In addition to reorganizing, we're changing the focus of our organization as well. The change in the threat to the United States due to the collapse of the Soviet Union and the democratization of Eastern Europe has caused a change in emphasis. We are no longer preparing to confront Soviet or Soviet-backed forces, but are preparing to face regional military powers who may threaten US interests anywhere in the world. Saddam Hussein has shown these types of threat are real.

Meanwhile, budgetary pressures I mentioned previously are dictating a smaller, primarily continental-based US military force which will be even more dependent on heavy airlift and fast sealift in order to react to worldwide contingencies. Therefore, our weather support vision is now focused on supporting continental US based military forces who have a global power projection mission. Weather support forces must be organized, manned, equipped, and trained to deploy on short notice to "support the high mobility, high intensity warfare of the future." US forces may fight on a sophisticated battlefield with an existing communications infrastructure and logistics facilities, or they may fight from bare bases with only equipment which can be rapidly deployed via airlift. We must be prepared to fight in all scenarios and every kind of climatic condition against a range of potential adversaries. To support the high intensity combat of the future with decreasing resources, we need increasingly sophisticated technologies and must be trained to use them at a moments notice.

Here's an example of how this changing focus is influencing our plans to apply technology to improve the way we do business in the future. The new emphasis on rapid deployment is driving us toward a new concept—using the same weather products for both peacetime and wartime weather support. We want to emphasize use of products with global applicability which can be tailored to specific theaters of operations, and rely less on more specialized unique products that may not be available in wartime or may not even exist for areas outside the continental United States. Standardizing our support products will normalize training across peacetime and combat support and improve our readiness to support rapid deployments to any location. Another concept we're moving toward is for weather personnel to provide mission-tailored weather products directly to their supported customer's automated Command and Control Systems. This fits into the Air Force combat forces plan to automate inputs to mission planning at all decision levels. Mission planners

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Director of Weather, USAF

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The idea is to give the battlefield commander access to all the information needed to win the war—where they want it, when they want it, and how they want it. Military men and women are becoming what General Colin Powell, Chairman of the Joint Chiefs of Staff, calls "Information-Age Warriors." Under this fundamentally new way of doing business, weather personnel will often be transparent to their supported customers. This is a distinct change in support methodology, and will require a smart combination of technology development and innovative training.

These examples of changing focus highlight our philosophy: "Practice in peace what we do in war." While we have always done this, we will continue to do it smarter, and better, to maximize our effectiveness using fewer forecasters. Our concepts of future operations, and our ongoing and future technology programs, are guided by this philosophy. In turn, this philosophy leads us to continue using technology smartly, to turn change into advantage.

To become smarter and better technologically, we're modernizing the base weather stations. Our primary base weather station acquisition, the Automated Weather Distribution System, or AWDS, is well underway, with 58% of our systems fielded. Our final U.S. system will be installed in February 1993 in Alaska, and all overseas installations will be completed by February 1994. AWDS upgrades both the on-base processing and inter- and intra-base distribution of weather information, providing more rapid, efficient, and tailored weather support. We're exploiting data automation and communications technologies. AWDS replaces existing facsimile and teletype equipment, and give forecasters capabilities to manipulate and analyze weather information in ways never before possible. We're also extending the capability of AWDS by applying technological advances which have occurred since we base-lined the system. For example, the Air Force recently awarded the contract for an AWDS Command and Control interface, with initial capability planned for early 1994. This will allow forecasters to pass weather information directly to decision makers without need for hard-copy briefings. AWDS is a good example of the way we are harnessing technology to revolutionize the way we do business, to do it smarter and better.

The NEXt Generation RADar (NEXRAD) Program is also well under way. All ten Limited Production Phase NEXRADs have been installed; installation of six Full Scale Production systems is complete or underway. Twenty-one Air Force and two US Navy/US Marine Corps operational units currently have access to one of these operational systems; we plan to have the last Air Force NEXRAD installed in

Fiscal Year 1996. NEXRAD has already revolutionized the way we all do business. Initial returns for Air Force NEXRAD sites are very promising. False-alarm rates are down 21%, and we have a 43% improvement in meeting severe weather warning lead times of 1 hour. We are now able to provide accurate warnings with positive lead time 94% of the time. These forecast improvements are comparable to those achieved by non-DOD NEXRAD users, even though lead times and spatial area covered by our warnings differ from those used by the National Weather Service. We issue warnings for small areas (often a 5 n mi radius circle about an airfield), rather than for a county, with required lead times of up to 1 hour. NEXRAD's outstanding performance in helping forecast the path of Hurricane Andrew was recently highlighted. Because we're working hard to bring technology to bear to improve wartime support, we're working with Air Combat Command to bring a small, tactically deployable Doppler Weather Radar capability to the battlefield. This effort is in the initial planning stages. Peacetime or wartime, we need the same capabilities, the same tools and technologies, to do our job. We have to be trained and ready to apply these technologies effectively. We're harnessing technology to turn change into advantage and maximize combat effectiveness.

We're also acquiring technology to modernize battlefield support in the near term, and planning substantial technology buys for the longer term. As an example of near-term acquisitions, we're on an aggressive schedule to acquire a Small Tactical Terminal, or STT, to improve our capability to ingest, display, and effectively apply meteorological satellite data on the battlefield. The STT will be small and rapidly deployable, fitting in a box less than 5 feet on a side, including a 2 foot antenna and all associated hardware. It will receive and process low-resolution data from multiple satellites, including military and civilian polar-orbiters and geostationary satellites. Modular expansion will be available to provide the capability to receive and process higher resolution data as well. We're on track for STT contract award in January 1993.

In the longer term, we're acquiring the Combat Weather System—a combination of tactical forecasting and observing equipment. We're moving aggressively to achieve Initial Operational Capability by 1996. The Combat Weather System will give weather support forces the capability to deploy within hours of notification, carry all necessary equipment and supplies with a limited amount of airlift, and be able to maintain themselves in the field for at least 30 days. Weather teams using the Combat Weather System will be prepared for operational weather support within hours of arrival in theater. The Combat Weather System will allow forecasters to apply the same forecasting tools and techniques they trained to use at home, using equipment functionally identical to that in the Base Weather Station.

To support the rapid deployment scenario of the future, we're designing the Combat Weather System to be small, durable, quickly activated, and field maintainable. The entire initial system configuration will fit in a box about 5 feet on a side. Modular design will provide the capability to expand the initially deployed Combat Weather System with more capable observing, analysis and forecasting equipment to add the technology needed for long-term battlefield support. The expanded Combat Weather System, including the basic Small Tactical Terminal I described previously, will still be small enough to fit on a single C-130 pallet. We're designing the system as small as possible to maximize portability and

responsiveness. No more than two persons will be required to quickly move, set up, and tear down the system. Once the Combat Weather System is activated, supported combat forces will access weather products, including observations, analyses, and mission tailored forecasts from the Combat Weather System through their local communication network.

In addition, the Combat Weather System will provide a suite of automated, modular weather sensors. Operators will have the ability to add additional modular sensors as desired, such as a lightning detection sensor or a nighttime illumination sensor. These modular sensors will plug directly into a central processor and transmitting system which will transmit data directly to the Combat Weather System computer workstations. Other Combat Weather System components will provide for improved hand-held tactical sensors and deployable vertical profilers.

In line with our philosophy of practicing in peace what we do in war, we plan to fold these advanced weather sensor technologies back into the base weather station environment at fixed airfield locations. New sensors include a lightning detection system, atmospheric profilers for wind shear detection, and slant range visibility detectors to provide ground based glide path visibility. A central processor will consolidate the full range of sensor readings, format them into observations, and transmit the observations locally and long line. This will allow continual and automatic sensing, collection, and dissemination of local weather data in real time to the base weather station. Sensed data will also be available for automatic dissemination to air traffic control facilities, operational flying units and other decision makers. This architecture will allow real-time sensing of mission-limiting weather conditions for automatic relay to all required base-level activities.

We're also becoming smarter and better by seeking innovative new ways to increase cooperation with our Navy counterparts. The Oceanographer of the Navy, Admiral Cheshbrough, and I recently approved a concerted effort to examine a long list of potential cooperative efforts. The goal is to improve our support to the "Shooters" by focusing on our Service-Unique strengths. Initiatives include the development of a Joint Meteorological and Oceanographic Concept of Operations. This proposal embodies the concept of "one theater-one forecast"—the use of a single tailored theater mission control forecast pushed by the combined efforts of Air Force and Navy Weather Centrals and accessed as needed by all Services. Related initiatives include cooperation in the development and acquisition of weather equipment for all the Services. We're also pursuing development of a joint computer flight plan (CFP) system to satisfy our requirements and eliminate duplication. These proposed efforts will leverage Air Force and Navy expertise and technology to maximum effect. Our goal is to get the right weather information, to the right person at the right time.

As I mentioned previously, technology is not the whole answer. To effectively employ technology, we have to train smartly and plan thoroughly. Training is everything. Air Force Chief of Staff General McPeak recognized this when he established 1992 as the "Year of Training" for the Air Force.

Some of our training efforts are driven by the external forces I mentioned earlier. Due to downsizing and the change in officer to enlisted ratio I mentioned previously, our observer authorizations will decrease by Fiscal Year 1995, and enlisted forecaster authorizations will increase. The need for more enlisted forecasters is leading us to develop a new

initial-skills training that will smartly combine observer and forecaster schools into a single course—the “single school-house” concept. This will increase flexibility and simplify our career field management as well.

Our change in focus is driving our training plans as well. The future base weather stations and tactically deployed weather stations will ingest more data, prepare more complex products for more customers in less time, and do it with fewer, typically lower-ranking personnel than we have employed in the past. We need better technology to do it, and we have to train smartly to use it. For this reason, we’re working hard to improve training methods and techniques. We are also harnessing technology for training—one example you’re familiar with is Interactive Video Disc technology. Another is computer-based instruction. Both have been effective in the NEXRAD precursor training material; future applications are limitless.

These are a sampling of our technology and training efforts. While we’ve moved forward in many areas, we’ve also experienced some growing (or more accurately shrinking) pains as well. Experience can be a good teacher—if you interpret the lesson correctly. Learn from your experiences, and those of others, to become smarter and better.

We’ve learned that being smarter and better requires aggressive training before new technology is implemented. Apply innovative technology to find effective training methodologies early in the game, before the actual operational technology is fielded. With limited manpower and decreasing budgets, we can’t afford the luxury of maintaining new technology in parallel with the old. We don’t have time to spin up a new operational system while we are using an older one—we have to hit the ground running, base-line our operational systems, and be ready to press when new technology is fielded. Effective training requires early planning. An effective Interactive Video Disc course may take two years to create from start to finish. Start early.

Effective planning is critical in other ways as well. Technical specifications must be well thought out to push technology, so when the technology is implemented, it’s the best available. Unless you push technology with effective planning and smart, well-stated requirements, you probably won’t get what you want and your resources will not be used effectively. Plan smarter and better—push technology where you want it to go. Be demanding as well.

Remember that nothing happens as quickly as you want. Often, an incremental approach in acquiring technology is better than working toward a longer term, quantum leap in capability. Many of our new acquisitions, such as the Combat Weather System and the Small Tactical Terminal I mentioned

previously, are designed just this way. Take advantage of off-the-shelf, readily available technologies where possible, and integrate them in a building-block approach to achieve the optimum capability in the shortest time. Strive for incremental success.

Ease your growing pains by making new equipment as similar as possible to old. Minimize change in functionality wherever possible. New systems should be as familiar as possible to the operators. As I mentioned previously, we’re following this strategy in designing the Combat Weather System by planning to use AWDS protocols as much as possible. Forecasters familiar with AWDS software functionality will be able to make a quick transition to the Combat Weather System. This strategy eases the user’s transition and integrates well with our plans to make our peacetime and wartime jobs functionally identical.

Allow time for adequate testing—independent agency testing is a must. It allows for critical evaluation and prevents biased commentary. In the Air Force, we rely heavily on the Air Force Operational Test and Evaluation Center (AFO-TEC). Take advantage of experts to perform the testing function wherever possible.

Cooperation pays big dividends. Find innovative ways to cooperate with others. There is a long history of successful cooperation between DOD and the civilian sector, and we’re continually seeking new ways to increase cooperation between DOD components and National Weather Service. Don’t overlook existing solutions or cooperative efforts when planning new technologies or training methods.

A final observation. Although technology and training are part and parcel of improvement, they’re not the real key to success. Despite their importance, our real strength is, and will remain, our people. General Colin Powell said it best, in describing DESERT STORM:

“People talk about stealth airplanes and smart bombs and all the great technology we used . . . but I remind audiences that the heart of our force, what really did it, was people.”

Remember that people are the key to your success—the best trained and motivated people, using technology to be smarter and better.

I will close this morning with a challenge. As you listen to the presentations, see the posters, and watch the demonstrations over the next few days, think about how you can use technology to improve. Seek new and innovative technologies to help you extend and improve your already high level of performance. Don’t just talk about the weather—continue to do something about it. Harness technology to be smarter and better, and turn change into advantage. Thank you.