

Mary Glackin, June 2010

Topics: PROFS, AWIPS, long view of the NWS Modernization

Mary Glackin: I'm Mary Glackin. I'm NOAA's Deputy Undersecretary for Oceans and Atmosphere. I've worked for NOAA for thirty-three years. I started with NOAA in the National Weather Service in 1977. I actually worked there for a contractor a year or two before that and I came to the National Weather Service with a background in Computer Science. And when I was there, I took quite a few courses in Meteorology, so I've actually held positions as both meteorologist, supervisory meteorologist, and computer specialist over the years.

It was really my pleasure, in the twenty-two years I worked for the National Weather Service to see the very beginning of the modernization of the Weather Service and to be there when we put the equipment in the last offices. One of the early jobs I did, and this would have been about 1978 or maybe between 1978 or 1980 was to actually develop, with my colleagues, a verification system for the Weather Service. And that was one of the things that I think Dick Hallgren at the time really recognized, is that we wouldn't be able to modernize and improve services if we didn't have a really good handle, baseline handle on performance. So we spent a lot of time on that and got a system deployed throughout the Weather Service so we were able to routinely verify not only our warnings but our routine forecasts as well. And I often thought later I'd, you know, the word modernization of the Weather Service wasn't on my mind but what a critical first step that was.

Barry Reichenbaugh: Yeah, I hadn't thought about that, I just kind of assumed the verification program had existed for a long time but, so that was really setting the stage for ...

Mary Glackin: Yeah, there were elements of a verification program in place but not very comprehensive and for example, there was no verification for the hydrology program, in place. So it was really, it was really kind of like the modernization of the verification program and that really created a good baseline to move forward, for improving services in all areas.

Barry Reichenbaugh: When I, when I spoke with Lou Boezi, he sort of walked me through the background -- pre-AFOS and what was learned from the effort of field AFOS. Were you involved much with that?

Mary Glackin: I was. I was really hired in the National Weather Service to work on AFOS and it was to develop applications that would be used there. So it was a basic, communication system that was there but it had capability to run software on top of that. I always remember we got 13K of memory to work with to do our programming there, which was an incredibly tiny amount of memory to work with. But the verification system that we developed was fielded on AFOS. We developed a system that would monitor things like Aviation Forecasts and tell you whether they were about to become invalid because the weather had changed. A number of applications like that. So it really gave us a real taste for what could be done and how things could be tailored for local offices.

Barry Reichenbaugh: Could you walk us through the idea for PROFS and AWIPS which followed.

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3:34 Mary Glackin: Sure I think as we were fielding the AFOS system there were some thing that were I think kind of immediately obvious. One is that the system was not designed in such a way to keep up with the capabilities of observing systems that were being developed, new numerical weather prediction models and all of that, that communications was inadequate, that the processing was inadequate. So really before AFOS was even completely fielded or operational, there was a concept developed and I know Doug Sargeant was there and I actually happened to be there in the room at the time of that we needed to work towards a system that we only called for a number of years,; it was called System 2 with the idea that AFOS was the first system and then this would be System 2 and that became known as AWIPS. But I think as part of that, one of the things that was also recognized was we needed a lot more experience with how to use a computer system. We knew that the way we developed AFOS which was writing down all our requirements and giving them to a contractor, didn't go all that well for us. So we really needed to get some first hand experience in doing it and it was out of that that the concepts of PROFS was born. Let me see if I could remember it Prototype Regional Operational Forecast Systems or something like that was about the title and the idea of working with data and systems in real time and actually simulating through various experiments how a forecast office might run, and it's really out of that that we developed our operations concepts for the modernization, for the Weather Service as well as systems specifications so we knew kind of what we needed for capabilities to display satellite data, radar data, we were able to make projections about how good our forecasts might be with those types of capabilities.

Barry Reichenbaugh: Lou spoke about how, involving the forecast staff at least in some locations with the development of the system was a practice that that you followed the second time around.

6:05 Mary Glackin: Yeah, but we-we absolutely did, we ran what we called real-time experiments out in Boulder and we would actually bring forecasters in from around the country to work on the new systems there. I probably can't say enough about how fabulous the Weather Service Field Office staff was throughout the whole modernization. They were incredibly accepting of new technology that wasn't perfect and really good at making it better. Whatever we gave them, they would be adjusting and coming back with great suggestions on that. So you hear a lot of times about people not being willing to accept new technology, this was the exact opposite. They were hungry for the technology and from a systems development point of view, that made it so easy, so easy to move forward.

Barry Reichenbaugh: Were you really breaking new ground here with-with this approach? ...

7:05 Mary Glackin: I think we were and I think in the end, it was an incredible bargain. You know what we were able to accomplish. I think if somebody had said, in the mid-seventies that we were going to close more than a hundred forecast offices around the country, and we were going to have these dramatic improvements and lead times for tornado warnings and all, it really wouldn't have been believed. But the fact that it was really so well planned and well executed, not that things didn't take longer than we all wanted them to do, is a real testimony to being able to move forward

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and achieve the vision that had been there really, in some peoples mind I'm convinced Dick Hallgren and Doug Sargeant and other people, that was really there in the late seventies. So it took a couple decades to get there but we got there.

Barry Reichenbaugh: Is there a particular science challenge that stands out, that you had to kind of overcome or solve?

Mary Glackin: Well, I think in a couple of ways, you know the science I think was challenging in terms of development of the algorithms, I think there was a real challenge to actually pull information out of the vast amount of data that was there. And I think it surprised us in a number of turns. I know from a satellite prospective, you know we ended up, the scientists ended up developing a great product that let us see fog and we had never thought that. We hadn't gone in with that idea of being able to, you know, come up out with a product like that but it's something that was discovered along the way. I think where we really pushed the envelope was on the technology end of this. You know you can buy incredible, off-the-shelf software today to allow you to manipulate data and do things like that but we had to develop all of that and we had very small, you know very tight performance specifications. We had to be able to manipulate data within seconds because we were making warning decisions. So we not only had to manipulate -- and communicate and manipulate incredible amounts of data, but we had to do it pretty much, we had to do it without our, in a matter of seconds to be able to do it. So I think we really pushed the envelope from a technology point of view.

9:40 Barry Reichenbaugh: Having been there and during those times, I seem to remember that in at least in some of the few meetings I sat in on, there was discussion about not just coping with the current data and ingest information but looking down the road at, would this system be able to accommodate other things that either were planned or-or not for...envisioned yet. Can you talk a little bit about that?

Mary Glackin: Sure, well I think the easiest way to talk about that is to actually talk about what's happened, because you know, meteorology is a field and hydrology that there's constant advances. We see new observing systems, and there's no data that we don't want to get our hands on to try to better complete the picture. So we've been assimilating a lot of data into the AWIPS system over time and improving the functionality, the step that's most recently been taken is to move all of that to what would be more of a considered a commercial platform because they're out there now, to allow us to build forward. But essentially the same architecture that we've used, were just upgraded hardware as faster processors become available. So you know, for hardware and software designs that were done in the early nineties, it's really seen us through a couple of decades now and is serving as a good baseline for moving into the next generation as those discussions are underway.

11:20 Barry Reichenbaugh: Looking back, what impresses you the most about the, let's start with the, development of AWIPS.

Mary Glackin: Well I think, I was probably as impressed as I'll ever be when we had the tornado

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outbreak in Oklahoma in May of 1999. And this is when you know we'd first gone operational with all of these systems so really all of the pieces of the modernization were in place and that day. I think the forecast office there issued something like three hundred warnings and they were both able to handle that with basically their same sized staff, communicate across the tens of counties that they were dealing with and all. So I think that, that for me that day was-was really an impressive, impressive day. I think in looking at the modernization over all which you know, brought to bear the better computer systems at our national centers and, all the new technology... I actually think the winter that we have just gone through in 2009 and 2010 where we've had incredible severe storms you know, in the DC, East Coast area here, in excess of thirty inches. How fabulously well forecast they were, you know incredible forecasts but even more impressive is how people have come to expect that quality of a forecast and so they made decisions well in advance, based on that forecast. So you did not see airplanes stranded and, you know, people caught off guard. People made their plans because of that. So I like to say in my career from the 1970s to where we are today, that the weather forecaster has come from the comics page onto the business page.

Barry Reichenbaugh: You had several positions over the years including your current position. What, thinking back to the modernization or those earlier years, what have you learned from going through that process that you use today?

Mary Glackin: Yeah, I think one of the guiding things about the modernization was a very clear vision of what you're trying-what we were trying to accomplish. And we really had a mantra, which is-was you know, improve services to do that, by bringing together technology, improving the skill sets of our personnel, to be able to do that and improving observing capacity. So all of those pieces were in there and I think it really was the ingredients I think for a good program. So what I've kind of sought to do is trying to make it really clear, as I take on other areas, what is it we're trying to accomplish. Whether we have the people on board and what are their skill sets that we need and how we're using technology and then communications capability.

Barry Reichenbaugh: Is there anything I didn't cover that you'd like to get into?

Mary Glackin: Well I guess, what I would say just in kind of wrapping this up is, what a real kind of pleasure and honor it was for me to work on the modernization. I think it gave me a wonderful chance to work with some leaders that I think were very visionary. It gave me a chance to look at really an overall program that was put together so well, with people and technology and a very active communication outreach engagement component to it. And most importantly, it resulted in such a tangible result and benefit for the American Public. You know, so many lives saved and so many dollars as well.