Summary of the panel discussion on:

"THE EFFECTS OF AUTOMATION ON OPERATIONAL METEOROLOGY",

which was held at the first annual NWA national meeting,
December 14-15, 1976

Panel Members were;

Jim Giraytys, NOAA Hdqtrs
Chet Hendricksen, NWS, WSFO DCA
Leo Harrison, NWS, WSFO DCA
Dale Lowry, NWS TDL
John Stackpole, NWS NMC
Joe Gamble, FAA ARD, Washington, D.C.
Jim Wright, AWS Hq., Scott AFB, Ill.
Hugh O'Neill, NWS SDO

The moderator for this session was Mr. E.B. Fawcett, the chief of NMC's Forecast Division World Weather Building, Camp Springs, Md.

Bob Richey (NWS) gave a brief introduction to the discussion. He pointed out that you have to consider three things about automation; namely, the impact on the worker, the tools used by the worker, and the most important, the final product.

Each panelist presented a short opening statement. The salient points follow.

The lead-off panelist was Mr. Gamble (FAA) who focused on the FAA's role in operational meteorology. He pointed out that by mutual agreement between the NWS and the FAA, the FAA has the primary responsibility for the display and presentation of operational aviation weather and aeronautical information to civilian pilots. It does this through their systems of Flight Service Stations (FSSs), which number 292 in the contiguous U.S.. The FSS specialist is the link between the NWS meteorologists, who produce the analyses and forecasts, and the civilian pilot, who are the ultimate users.

The FSS system, he continued, will be the last part of the FAA Air Traffic Control System to receive automation. As yet only two stations are automated, one which is, is the Washington FSS. But, from what the FAA has found out at the two places, the FSS specialists welcome automation and have no problem adapting to the use of automation at their present work places. They are concerned, though, of what will happen when sutomation is implemented, as the FAA's plan to modernize the 292 FSSs into 20 "hub" FSSs gets under way. Of much concern is the plan to meet, as much as possible, the demand for pre-flight briefings and flight plan filing services by direct-user-acess-terminals (DUATS), and the direct user access to voice response system.

Mr. Giraytys (NOAA), the second panelist made three points. First, mechanization applies machines to making people more productive. Next, automation makes machines more efficient. Finally, computerization makes machines smart.

The main characteristic of field automation today is the marriage of computers to automation. What is important is that automation/computerization will affect both the way jobs are done, and how people use their brains.

Automation also works on the middle range of jobs so that "people-skills" are pushed to the upper and lower extremes. Therefore jobs must be restructured, and people have to be trained. Both users and management must plan their response to this carefully, keeping in mind that significant changes will be created, as will opportunities for improvement. Jim's closing point was that machines should work for people, not instead of them.

Mr. Harrison (NWS) stated that while some automation isgood and desirable, the present emphasis on automation in the NWS has become an obsession. It was an old Weather Bureau notion that a meteorologist could do anything; now, the NWS idea seems to be that machines can do anything. It is an indication that the NWS doesn't understand the system they work with, and this can't help but have a deleterious effect on the employees, the product, the users, and the public.

For instance, the NWS says that the forecast guidance is such that people can't improve on it. Automation reduces service to the public and its cost can be hard to justify. There is a "blind dedication" to AFOS, which isn't good management because people are not considered, with a natural loss of morale.

Mr. Hendricksen (NWS) pointed out that due to the "smart" machines, the entire synoptic package has improved. But, has the forecast imrpoved? Some 40 years of verifying the Washington, D.C. local forecast suggests there's been no significant improvement since the advent of the computer. He raised the question whether the computer has been brought up to the level that human forecasters have

reached. In the case of Washington's verification, about 15 percent of the weather has been unforecastable. He reminded the panelists that there's no exact solution to the system of atmospheric equations, only approximations, so that all weather situations can't be caught by the machine. There has in fact been a slight decline in NMC verification in the last several years; so there are diminishing returns.

With this in mind, the goals of automation must be reviewed, and forecasting must be returned to human hands. This will lead to a better forecast. Humans should not compete with the computer.

Mr. Lowry (TDL) felt that the effects of automation on operational meteorology have been clearly positive. By this he meant, the final product going to the public was better; not a whole lot better, but a little bit better.

While automation could not be stopped even if we wanted to, he said that an automated system can be made such that the forecaster is aided rather than replaced. But another problem is foreseen, namely that the gap in accuracy between objective and subjective guidance will become smaller and smaller. So at some point, the gap between objective guidance and the final product will become very small. The problem is then, is the forecaster to be replaced by machines?

Mr. O'Neill (SDO) raised two issues brought about by automation. First, how many jobs will be available in operational meteorology ? Second, what types of jobs will they be ?

For the first question, the answer was that for a while there isn't going to be much change in the work force, but with increasing automation, it must be realistically assumed there will be significant decreases in the job force.

As to the type of jobs to be available; he felt that most forecasting tasks will be done by centralized automation. Such things as computer-worded public forecasts, aviation terminals, TWEBs, and programs like agriculture and fire weather are all going to be done this way, especially for the short range (up to 6 hours).

So there will be more time available for the meteorologist; what can be done with it ? First, monitoring the computer products; there will be busted forecasts that will have to be corrected. Then, there can be increased emphasis on dissemination of products, by having more effective interface between operational users and those agencies that disseminate information to the public.

A big area in which forecasters can make use of automation is in applications. They can use their education and training in developing new automated techniques for display verification, and short-range forecasts.

Mr. Stackpole (NMC) recalled the Luddites, who in 1811 destroyed automated textile machines that were taking away their jobs. The textile factory owner was murdered, the militia were called in for protection, a mob of Luddites were shot up; after mass trials, there were numerous "hangings and transportations"

While there aren't any latter-day Luddites in the NWS, the parallel can still be drawn. People are losing their jobs to automation; there is no reason to believe automation will decrease. Hangings of a sort manifest themselves as RIFs. Transportations also can be likened to job "offers" in faraway, undesirable places.

So what's left? In the NWS more service products: warnings, advisories, specialized forecasts, short-range forecasts.

Col. Wright (AWS) presented some ideas on costs involved. He echoed the sentiment that automation is here to stay, and that the trend towards more of it can't be reversed. He pointed out that people are expensive, compared to automation. The Air Weather Service performs services on demand; to make them cost-effective, there must be as much automation as possible. The problem is to make the impact of automation on operational forecasting positive rather than negative, so that the operational forecaster doesn't become an assembly-line worker. In the AWS, this problem is being attacked in two ways.

First, the base weather station forecaster is being allowed to concentrate on doing what the man can do best, namely short-range forecasting. Second, the AWS is getting more involved in the operation of the people they support-- tailoring their meteorological support to help customers make the best operational decision possible.

This concluded the opening statements by the panelists, and discussion followed; we hope that we have captured the pertinent facts that emerged.

Gamble said that the FAA uses automation because people are expensive. Money can be saved and better services can be provided. Giraytys pointed out that mechanism eliminates people in production, not services. Since services are increased, the man must be increasingly supported by machines. The NWS approach, namely, to get rid of people to pay

for computers is wrong. Harrison agreed, pointing out that the NWS eliminates man and brain power; also, it's true that people are expensive, but so are crime, welfare, and other problems arising from the situation where people are displaced from jobs by automation. Hendricksen suggested that in the NWS during the last 15-25 years automation has gotten "out of control", also that organizations are pitted against one another in adversary relationships, which is not a good way to run things. Therefore we must re-evaluate what we're looking at, since the perfect "prog" is unattainable. Man's overall responsibility over the product must be re-tained, for all weather situations.

Lowry said the basic missions must be kept in mind, so that automation can't be for the "convienence" of the forecaster; that is automation can't be stopped at any given point just because it's not convienent for the forecaster. O'Neill pointed out that while automation can result in improved service to the public, and therefore it's necessary, the automated products shouldn't be "spoon-fed" to the forecaster, so that the operational meteorologist becomes victimized. Stackpole agreed; you can't approach the situation with the view that man will be regulated to going to work fixing the machine. Wright again mentioned the economic factor. Economic decisions are made all the time by people, why not the same in spending the taxpayers money. So, if automation will save money do it; besides, people can be retrained to do other work.

The discussion was then opened to the floor.

Sol Hirsch (NESS) made the following comment. There are questions raised in modeling, namely, can the model's expectation go beyond a certain percent? What happens if the automated system goes down? If calamity occurs? He feels management hasn't considered this. Also, workers have had no input to the system. Another item--how many more workers will be needed to service the machines?

Gale Haggard (NWS) wondered how the forecaster jobs would be restructured to the new environment. He commented the NWS does not understand the concept of service, so how is it going to provide true service?

Don Sankey (FSS, Pasadena) asked if the services provided by the Air Weather Service (AWS) are as varied as those of the NWS? Leo Harrison replied, that the AWS has "captive users, whereas the NWS' users aren't captive." Also, the customers of the NWS have no recourse for complaints. He continued, there has been a deterioration of NWS services in agriculture and aviation, for example. When asked for specifics on the deterioration of services, he pointed out how hard it is to get any weather information from a NWS office, because of its inaccessibility; and the VHF radio does not do the job in this regard, and that people can. Harrison further noted there has been zero growth in the NWS staffing since 1969, while people's duties have increased. So services have deteriorated, and despite the automation, the NWS is not reaching users. Jim Giraytys agreed, but said there must be good products to disseminate and good dissemination methods.

Tom Laufer (NMC) commented that automation has gained more time for the forecaster, so that he can use his knowledge more efficiently. But, have there been gains meteorologically ?

Harrison responded that this was hard to answer since the public has not been questioned on this. Tony Tancreto (NWS, Boston) said that the verification statistics say the NWS does a good and improving job in forecasting precipitation; the computer worded forecasts are good, especially on the second day. He added that there may be a problem in that the computer may be taking away from what people have done. For example, people have been doing their jobs in their own ways, and now the computer is interfering so they're upset.

Tancreto continued by saying that if forecasting becomes good enough, the specialized (i.e. service-oriented) meteorologist will be in demand. He warned that the NWS isn't capable, at this time, of providing their people, but the private sector is capable; the machine can't give specialized services.

K. Hinman (USNR) asked Joe Gamble how much expansion of weather dissemination there will be in the Enroute Forecast Advisory Service (EFAS) program, and can it be applied to the private sector. Gamble replied that EFAS will expand to 44 sites, giving nationwide coverage at the 5,000 ft. flight level. The FAA will be working with the NWS to improve communications systems and products. One other thing which will improve is the recording equipment, which is obsolescent now.

The discussion returned to dissatisfaction with the present level of the NWS services. It was pointed out, again, that the average local NWS office is hard to contact. Cases were cited where people have called long-distance to get local weather in their own area because they couldn't get in touch with the nearby NWS office. H. Lehnert (USDA-ES) added that the NWS doesn't satisfy users of agricultural products because the NWS does not know what users want. It's true there will be increased demands for weather services in the future. The basic data used by the NWS will figure in.

But agricultural people don't know what's available, what can be done with what is available or what its limitations will be. Automation will free people to serve agricultural needs better, it is hoped. Lehnert said, finally, that there is a small problem in that forecasters know what they mean when they talk to each other, but the farmers don't get the same meaning when they hear the forecasts; so there must be improved communications.

Jerry Larue (NWS, Washington, D.C.) noted there have been increasing numbers of forecasts made in the last ten years, along with more watches and warnings. So the NWS has had to turn to mass dissemination in the form of recordings, VHF, and automatic communications. Contact with users has diminished greatly, so the public doesn't identify us (i.e. the NWS) as providers of services. The public is not being served by this lack of contact, therefore in the public's eye, there is a degradation of the product. And, if there is further automation, the NWS will lose control of the products.

It was noted that at a meeting of the Omaha AMS, Mr. Snellman of the NWS' Western Region informed them that since 1961, at Salt Lake City, automation has produced a leveling off in the goodness of the forecasting. A paper summarizing these results was referred to.

J. Norton (AWS) said there's dissension among forecasters who are losing jobs to automation, with the automaters pushing more automation. He agreed the product going to the public must be improved, to gain better public acceptance. He wondered how to justify the amounts being spent on automation.

Sankey (FSS) asked the panel two questions. First, how to educate the public on available services; for example, pilots know where to look for what they need, but the public does not. Second, will the increase in demands for services brought about by increasing automation be limitless; if not, does anyone know what the limits will be?

Harrison replied that certain people can't be educated because they won't be, but even allowing for this, person-to-person contact must be retained. There was no reply on the limits question. Referring again to public contact, Gamble wondered how the public can get personal weather information, since there is no way for them to call the local NWS office. Would advertising be an answer? Harrison and LaRue both pointed out that at one time such listings were in the phone book, but no more.

This was the last of the discussion. Fawcett then summarized as follows. There are problems, but they must be made known to management. Automation is here to stay, and we must live with it. Ways must be found to live with it and to overcome the fear of losing jobs to automation. The human factor must be considered, and realistic planning needed. But, again, management needs more feedback from the people who will use the automated products Fawcett admitted this has not been done before because management has not asked for it.

Summary of the panel discussion held at the first annual national NWA meeting, December 14-15, 1976, on:

"THREE VIEWS ON TV AND RADIO WEATHER DISSEMINATION".

The panelists were:

Don Sarreals, NOAA
Herb Lieb, NOAA
Fred Davis, MIC, WSO Baltimore

Each panelist presented an opening statement, with discussion following. Don Sarreals led off, and prefaced his comments by noting that he no longer was on TV partly because of the problems in weather presentation. He added that stations that give problems in weather dissemination also present problems for the meteorologists who prepare the weather.

Don gave some insights on TV operations, historically and currently. Originally (in the 1950's) TV newscasts were short, and patterned after the highest standards of newspaper journalism. But it was discovered that TV stations didn't make money on newscasts, so more dynamic people were brought in to do the news. Also, equipment wasn't as advanced as it is today.

So, with time, people were brought in to do various segments of the news, like the sports and the weather. But even here the presentations were pretty straightforward. But this didn't sell either, and technological advances made more time to be filled.

Don continued· sponsorship of the news pro grams by the various companies probably led to the deterioration/compromise of TV news people, especially the "weathermen", because