# P1.17 Digital Services Training in the National Weather Service

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## 1. INTRODUCTION

The National Weather Service (NWS) has completed an important milestone in the implementation of a software system that allows graphical editing of forecasts based on model and observed data. The new software system is known as the Interactive Forecast Preparation System (IFPS). The core application is a grid editor that allows graphical depiction of weather variables or "elements". This new, gridded/graphical forecasting approach opens many favorable opportunities to improve forecasts and service. However, it also presents implementation and continuous/rapid improvement challenges.

The National Oceanic and Atmospheric Administration (NOAA) Forecast Systems Lab (FSL) developed a project to produce rapid prototype software which could be used for grid editing (Mathewson, 2000). Train-the trainer workshops were held to help the NWS field offices become acquainted with installing and configuring the software at the Warning and Forecast Offices (WFOs).

Over the past several years the NWS has strived to improve the efficiency of forecast preparation. New tools have been developed for interactive forecast preparation by forecasters using computer workstations that create digital databases of forecast information. Both policy and methodology reviews have been the focus of several teams during the last year. Each team has contributed to a refinement of forecast methodologies, science and policy issues, and a new focus for training.

NWS forecasters at local offices across the nation are now generating forecasts of gridded sensible weather elements using new computer workstation capabilities provided with the IFPS. This system provides capabilities for generation of a local digital database, and has revolutionized how local NWS forecasts are prepared. Local forecast grids are now transmitted to a National Digital Forecast Database (NDFD) and a mosaic is created to create regional and national products (Spayd, 2005).

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## 2. REFORMING THE TRAINING STRUCTURE

A team of forecasters and managers from local, regional, and national NWS offices met to define the training required by the new IFPS grid-based forecasting system. An IFPS Professional Development Series (PDS) (Lamos, 1997) was established to describe the areas where training is and will be needed. The PDS attempted to describe the scope of the needed training and formed an initial description of the universe of training that is needed. The PDS included topics in the areas of Vision, Operator Interface, Forecast Methodology, Collaboration, Operations Management, Local Applications, Focal Point Duties, and Applications of IFPS Techniques.

Each topic area, also called a Professional Competency Unit (PCU), consists of four basic sections. The first section is "Description of Job Duty Competency to be Achieved." This is a general goal for that topic area. The second section is titled "Description of Need" and discusses the motivation(s) for the training. The third section of the PCU describes specific job task skills and knowledge. These skills and knowledge items are related to the fourth and final section which contains descriptions and links to training materials called Instructional Components (ICs). The instructional components then address specific job task skills and knowledge. There are instructional components that may be listed by more than one PDS if appropriate.

Over the last year, the need for more specific and structured training sequences has been identified. Because of the skills needed by all forecasters, lead forecasters, and managers, training will now be organized and prioritized into more job-specific curriculums that represent the training requirements for particular levels of responsibility. These curriculums will

then be used to build a blended-delivery Digital Services Operations Course (DSOC). The DSOC will be modeled after other successful training courses that employ the use of distance learning techniques to leverage both residence and on-station training into a more relevant, efficient, and effective suite of training opportunities. Some of these learning techniques include the use of recorded on-demand instruction, local facilitation, and progressive measurement/tracking using a learning management system. Each and all of these components are critical to ensuring that the necessary training required by the substantial changes in software and operations are delivered and successfully completed. As additional grids and programs are added to the NDFD and the National Digital Guidance Database (NDGD), the suite of products and needed training will continue to grow.

## 3. RAPID DEVELOPMENT AND DEPLOYMENT

While the overall graphical forecasting effort has been in a development and prototype phase for a few years, there has been a significant amount of evolution occurring rapidly as the field offices use and adapt the software to create forecasts with a grid-driven product generation process.

Much of the initial effort in deployment and training was directed at installation and configuration issues. Training topics were addressed in a series of classes and workshops for IFPS focal points and via E-mail list servers. The classes provided a mechanism for "hands-on" learning while the list servers allowed for interaction and sharing of information. This knowledge sharing was and still is an important aspect of successful implementation and evolution of a rapidly evolving software deployment.

Training is also developed from early software releases as new configuration items or changes in infrastructure or added capabilities are introduced or changed. An important part of the training is to use different delivery modes as appropriate to the material and audience.

In the future, software release frequency will likely decrease and the use of simulation capabilities like the Weather Event Simulator (WES) will be added to the IFPS software capabilities. Some forecasters have already used a Displaced Real-Time format to practice forecasting for hurricanes prior to the 2004 hurricane season. Additional grids and programs will be added to that capability for use on-station and in the classroom setting. This will allow forecasters the opportunity to gain a deeper understanding of more complicated aspects of the software and editing tools environment.

## 4. TRAINING MODES FOR BLENDED COURSES

While the training venues have been classes and workshops initially, the training team is using distance learning techniques and software developed by Whittaker (Whittaker, 1999) as part of the Virtual Institute for Satellite Integration and Training (VISIT). Initial distance learning activities have involved communicating the reasons and motivations for such significant changes in the NWS forecasting and product generation processes. It is now critical that training be made available via several delivery methods to address concerns related to access, time management, learning management system compatibility, and uniform availability.

The modes used include presentation slides with documentation, web-based training modules, teletraining, E-mail list servers, web-based discussion forums, and recorded presentations with audio. In addition, many of the materials developed for documentation and training, are used locally and customized for on-station or on-the-job training. We have accelerated or prioritized training in order to follow the evolution of the software and field practices as they are developed and fielded at regional and larger scales. In addition, the operational implementation of the NDFD has also required specific customization and training. Continued implementation activities will be linked to training requirements, the use of advanced tools, and updates to policies and procedures.

The DSOC will serve as an organizing mechanism to prioritize future training development for forecasters to continually improve the digital services forecast process and the quality of the products and services generated from the forecast grids.

## 5. CONCLUDING REMARKS AND NEXT STEPS

One of the main challenges in developing and delivering training for this major change in NWS operations has been the rapid development process. The NWS Meteorological Development Laboratory and the NOAA Forecast Systems Lab are producing software updates to provide incremental improvements and additions but produce a flexible and adaptable grid-editing software package that will meet the needs of operational forecasters. With regard to the training activities, the NWS also seeks to provide a foundation of material which can then be augmented by several modes of training to include WWW modules, teletraining, recorded presentations, and documentation.

The current IFPS training activities are being re-scoped and reorganized into a broader Digital Services curriculum-based course format to provide an improved structure and relevance to operational forecasters and managers. Course content will come from a matrixed team based on the work of regional and national teams focusing on science, tools, policy, and other key areas related to implementation of the NDFD and NDGD. Much of the content will be delivered via distance learning techniques with the utilization of new local

simulator capabilities and increased on-station training opportunities.

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