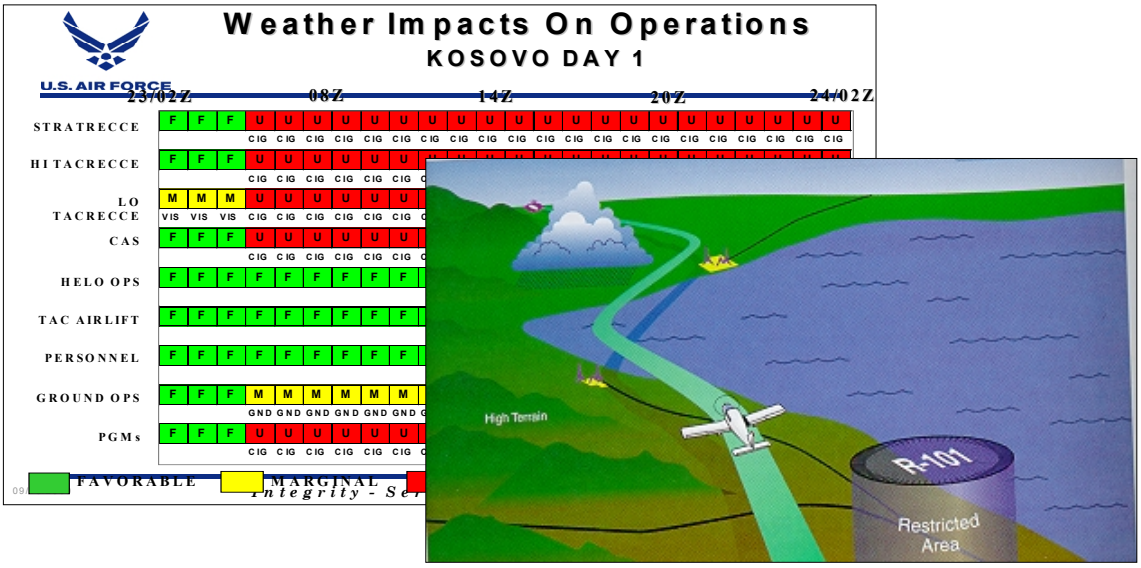
Panel 5 – Decision Support Systems/Capabilities



Moderator: Ms. Sabra Kaulia, *Deputy Director, Air Traffic Plans and Procedures, Federal Aviation Administration*

Rapporteurs: Mr. Donald R. Carver, *Assistant Federal Coordinator for Department of Transportation/Federal Aviation Administration Meteorological Affairs*

Mr. Richard Stone, *Aviation Program, Office of Meteorology, National Weather Service*

Synopsis

The following summarizes the major issues from this session:

- Partnerships and collaboration are essential. They are needed in the development of products, processes, and technology as tools by all interagency decision-makers focused on operations in the strategic and tactical environments and concerned with airspace traffic flow.
- All collaborators must have access to the same information to determine operational impacts to the NAS and agree on actions in response to these impacts throughout the day.
- Forecast accuracy must improve for terminal areas and routes of flight. In particular, convective weather, the most disruptive phenomenon to terminal approach control traffic management, requires specific emphasis.
- As a community of aviation weather users, we must continue our efforts to develop processes that are based on predictions of significant weather rather than reactions based on occurrences. Reaction management has proven to be ineffective and occasionally poses safety concerns.

- Both industry and federal agencies have resource limitations. Partnering and leveraging common efforts in the development of new tools will help offset increasing costs and improve the quality of the tool. Support for budgetary consideration will help.
- Some effort should be exerted to exploit ITWS for products that can present a better picture of the system when major terminals are impacted by weather.
- There was also an announcement of an ongoing initiative to bring aviation weather services back into the Air Traffic Control System Command Center.

Moderator Kaulia opened the session, announcing a series of meetings to bring about a renaissance in Flight Services. The meetings included general aviation and set out to improve the pilot briefing process and to promote better decision-making. The FAA administrator launched the Safer Skies initiative which forms teams for commercial and general aviation accident analysis and teams for developing intervention to help improve safety, lower accident rates, and improve system efficiency.

Mr. Jones indicated a major change in technologies and data gathering are necessary to meet the requirements of the decision-makers, pilots, dispatchers and controllers. Data sensed by aircraft are needed to fuel the models in the Rapid Update Cycle (RUC) and we need to find new ways to use our radars for sensing hazards to aviation. Improved computers and software are needed to assimilate more data at irregular times and at scattered locations. There has also been significant improvement in the areas of modeling, procedures and training.

Mr. Kies reported the Air Traffic Control System Command Center uses a new process to plan the daily programs for handling air traffic in light of the expected weather developments throughout each day. He noted that convection and thunderstorms are the most critical impacts on the flow of air traffic. The daily Collaborative Convective Forecast Product (CCFP) is developed by coordination of forecasts with all interested weather and industry points of contact. Decisions for en route hazard avoidance are usually taken in stride but dealing with the terminal cases at major hubs is troublesome. The challenge is to find new technology to support a single data base platform for all users and decision-makers. The Integrated Terminal Weather System (ITWS) shows promise of being able to track the weather activity affecting the major hubs. He believes that using information from all the ITWS locations may provide the decision-makers a better view of the weather and how it will impact arrivals and departures. This would be a tool for decisions on management of the National Airspace System traffic flow. ITWS, CCFP, and the SPRING 2000 effort are examples of a renewed commitment to be proactive, to plan better, rather than react to an already occurring event. He also announced a new partnership with the Aviation Weather Center to bring aviation weather services back to the Air Traffic Control System Command Center.

Lt Col Waldron reviewed the USAF decision support system from the aspect of weather impacts. She noted the impacts of weather on a mission are the products (information) delivered, not the weather itself. For long range decisions, planning climatology is the

basis; in the short range, weather personnel use the best forecasts and near-real-time data. The products help in decisions on best path to objective, best aircraft, best equipment or ordnance to use, etc. Many of the products are presented in a color code format; green for good, red for bad, and yellow for iffy - better look at circumstances more closely. She noted the various models used for the varied lead times for the decisions. Some data fields are provided by U.S. Navy and are leveraged for product generation. This illustrates leveraging in limited budget environments. More technology is needed in order to improve automation and use of graphics products illustrating decision impacts.

Mr. Jacobsen explained the partnership of NASA with FAA in looking for better ways to use the available airspace and time to enhance safety and enlarge system capacity. NASA is involved in a revolution for aviation mobility. Special uses for airspace and different kinds of terminal spaces are being examined to reach those objectives. For example, the use of tilt-rotor type aircraft for short haul cargo between terminals with limited runway/tarmac space. There is work being done to develop an Aircraft Vortex Spacing System that may allow for closer aircraft spacing without decreasing the safety factors. Trajectory models need improvements and more accurate weather inputs. ITWS will provide some useful products in this regard. The project is examining new tools for controllers to use in their business. Some will help in the sequencing of aircraft by advising on turns and speed of aircraft approaching the terminal. He noted the need for more accuracy and granularity in forecasts for convective activity.

Mr. O'Keeffe presented a vivid picture of the duties and responsibilities of dispatchers in coordinating and releasing flights for their respective companies. He noted the CCFP has proven to be helpful in the decisions about management of the flight schedules and movement of aircraft. He also believes that ITWS offers potential for mitigating the convection problem and hopes more work will bring better and more comprehensive products for decision-making. He made it very clear that a dispatcher needs to have all the same products and aviation weather information that any pilot needs - in fact he would prefer to see it first.

Decision Support Systems

John E. Jones Jr.
Deputy Director, National Weather Service

ABSTRACT

The National Weather Service (NWS) remains committed to work with our decision makers and users to develop new aviation products and services. The implementation of these new products and services will require a change in our operations. These changes will also require us to develop new partnerships and collaborative efforts. Some of the risks involved with these changes include the equipment that will be available, staffing levels, and our approved fiscal year budgets.

Our goals in implementing these changes are to increase the accuracy of our forecasts, develop real time products for aviation traffic managers, and move into new areas. The NWS will continue to work hard to meet our user needs.

Decision Support Systems: A Focus on Technology and Process

John (Jack) W. Kies
Manager, Air Traffic Control System Command Center

ABSTRACT

The Integrated Terminal Weather System (ITWS) and Collaborative Convective Forecast Product (CCFP) are two technologies upon which we must focus. An ability to predict early convective decay, better timing of low ceiling and high surface wind events are critical to system capacity maximization. Another system prediction tool of significant need would focus on enroute weather conditions. The need for alternative route development and system access is of profound importance. Once the necessary technology is developed it must assume a common platform. Common situational awareness is the foundation upon which any strategic plan is built.

Convective weather is our most vexing adversary—causing more system disruption than any other phenomena. Our reaction to its unpredictability manifests in huge efficiency losses and occasional safety concerns. Given airspace density (volume) and close proximity of airways (northeast) even the smallest of cells can have a major negative impact on operations.

ITWS, CCFP, and our Spring 2000 efforts are examples of a new commitment to plan rather than react. This new focus is about to usher in a new partnership. We need to re-engage the Aviation Weather System (NWS) and sensitize them to our need for an operational forecast. The best way to achieve that is for them to reside at the Command Center.

I look very much forward to our collective embrace of new predictive tools, common situational awareness, and system partnering. We are an interdependent and diverse industry with a wealth of challenges—I believe we are moving proactively in a direction to solve our collective concerns.

Decision Support Capabilities: AF Tactical Decision Aids

Lt Col Kim Waldron, USAF
Chief, Strategic Operations Plans
Directorate of Weather
Headquarters, United States Air Force

ABSTRACT

Air Force Weather (AFW) is working hard to ensure that raw weather data is being transformed into the weather effects and impacts information required by the supported Air Force, Army, and joint customers. This is primarily being done through the development of tactical decision aids (TDAs) and visualizations.

TDAs match analyzed and forecast weather data against aircraft and weapon system limitations to maximize mission effectiveness. Weather data is being integrated over the time spectrum of climatological data for long range planning through mission planning, and execution. AFW is developing realistic visualizations to support mission rehearsal and modeling and simulation applications.

Decision assistance is also provided for resource protection via weather warnings for criteria including severe thunderstorms and high winds. We have recently increased the warning lead-time to give commanders adequate time to react to protect people and assets.

AFW provides tailored impact decision matrices for military operations to enable commanders to anticipate the weather, maximizing mission effectiveness and safety. The bottom line is to provide the weather impacts in the best format for each mission supported.

Aviation Systems Capacity Program

Robert Jacobson
Associate Program Director
Aviation System Capacity
Ames Research Center, NASA

ABSTRACT

The presentation provides an overview of the NASA Aviation Systems Capacity (ASC) Program and its relationship to the NASA Goal to improve the nation's air transportation system in partnership with the FAA. The goal of the ASC Program is to enable a doubling of the capacity and productivity of the nation air space system through the development of revolutionary operations systems and vehicle concepts within the next 10 years. The presentation discusses the three projects that make up the ASC Program as well as the objectives of these projects.

An overview is provided of the specific program products that are dependent upon weather information. In general these products are either decision support tools used by air traffic service providers, pilots or airline operations centers or are new technologies to better understand specific local weather phenomenon. In the case of decision support tools, the presentation discusses the types of weather information used by the decision support tools and the needs for the future, for both the terminal area and enroute airspace. For local weather characterization, the presentation discusses the Advanced Vortex Sensing System and its status and plans.

Decision Support Systems; A Dispatcher's Perspective

Giles O'Keeffe
Dispatcher, Northwest Airlines and
President, Airline Dispatchers Federation

ABSTRACT

"Aviation safety is much too important to be left in the hands of a pilot. Now, I know there are pilots in the audience, but listen to the rest of what I say before you attack me! The commercial airline pilot is commonly portrayed as under-worked and overpaid. In fact, the most difficult part of being a commercial airline pilot is maintaining a level of readiness that will permit one to handle any emergency that might arise. Emergencies are curious: they give little or no warning, they don't read instruction manuals, and they have a punishing disregard for the superiority of the human animal and its technology. So, whatever you think of pilots, remember that every time you fly, you put your life in a pilot's hands. The pilot does, too, and the pilot has a vested interest in staying alive to enjoy that overpaid and under-worked lifestyle!

In the USA, commercial air carriers with more than 10 seats operating scheduled service (did I cover all the loopholes?) are required to have a certified dispatcher sharing joint responsibility for the safety of each flight. The certificate holder is responsible for initiating, conducting, monitoring and terminating each flight. The certificate holder is required to have sufficient numbers of trained, rested, drug and alcohol-free, up-to-date on Jeppesen revisions, ... dispatchers, to ensure proper operational control of each flight.

We see some marvelous tools in development, and there seems to be a huge emphasis on providing graphic weather displays in cockpits. Right now, the high school freshman back in the last row can get a real time weather display, in color, on a laptop that can be bought second hand for a few hundred dollars. A better, real-time picture than the pilot in command can get, because, right now, the pilot in command can't get one at all!

This, as we all know, is stupid. However, before we jump on the bandwagon and require every cockpit to have a PC with full access to the thousands or probably millions of images of weather that are produced daily in the USA, consider this. Whatever the pilot in command has access to should be screened first by the dispatcher monitoring the flight. Why? Job security for dispatchers? Well, believe it or not, that is not my reason. The real reason is that there is simply too much data available for the pilot... what s/he really needs is information, not data.

Dispatchers are required to have expertise in weather. Dispatchers are aware of the genetics of weather, the traps in weather, the operational limitations of each aircraft, and of each flight. Dispatchers are required to have situational awareness that adds complexity to a 'simple' weather picture. Dispatchers can access ATC facilities, meteorologists, local observers, or other flights. In sum, dispatchers can screen the data and provide accurate and timely and USEFUL information to the pilot in command.

The ADF further believes that Air Traffic Controllers need access to the same weather displays provided to dispatchers and (in the future) the pilot in command. The safety PAD of Pilot, Air traffic controller and Dispatcher is like a three-legged stool. If you attempt to make it work with one leg missing, you will be doomed to failure.