

Chapter 1

Introduction

1. **Problem Statement**

Weather has a continual impact on both the safety of aircraft in flight and the efficiency of operations throughout the National Airspace System. National Transportation Safety Board reports of 17,511 aviation accidents¹ between 1989 and early 1997 cited various weather conditions as primary or contributing factors in 22.5 per cent of all accidents. Although the number of accidents every year decreased during that period, the weather-related percentage remained relatively steady. Analyses performed in the course of preparing this document revealed an estimated annual cost of \$1.35 billion due to weather-related aviation accidents in 1995. The estimated price tag for weather-related delays, diversions, cancellations, and unexpected operating costs during 1996 was another \$2.1 billion². The U.S. Government³ invested approximately \$818 million in aviation weather services and supporting research during Fiscal Year 1998⁴. As the magnitude of these numbers indicate, maintaining weather-related aviation safety and efficiency is a big investment.

The 1998 investment demonstrates that many activities are currently going on, not only in providing aviation weather support but also in the research and development of new ways to observe, model, and predict the state of the atmosphere as it affects aviation. Research funded by the Federal Aviation Administration's Aviation Weather Research Program, the National Aeronautics and Space Administration's Aviation Safety Program, and the National Science Foundation is focused on many of the service areas where initiatives are identified in this document. The operational support provided by the National Weather Service Forecast Offices, the Aviation Weather Center, and the Center Weather Service Units is critical to safe operations within the National Airspace System. It is the intent of these initiatives to capture what is currently the state of the art of the aviation weather system as well as to highlight those areas where improvements will make flying even safer.

¹ A more detailed discussion of these statistics is found in Chapter 2.

² Estimated costs were provided by the Federal Aviation Administration (ASD-400) based on analyses of National Transportation Safety Board, FAA, and industry data. The estimates must be considered preliminary and subject to revision as the analysis progresses.

³ Specifically, the Departments of Commerce, Defense, and Transportation, and NASA.

⁴ *The Federal Plan for Meteorological Services and Supporting Research*, FY 1998. FCM P1-1997, Office of the Federal Coordinator for Meteorological Services and Supporting Research, Silver Spring, MD.

2. Goals and Objectives

In 1997 the White House Commission on Aviation Safety and Security established a national goal of reducing the fatal aviation accident rate by 80 percent by 2007. That goal has been adopted by both FAA and NASA in their strategic plans, and NASA has set a 25 year goal as well. In April 1997 the National Aviation Weather Program Council approved the *National Aviation Weather Program Strategic Plan*. This document was the result of a concentrated effort by an interagency team of aviation-weather experts — the Joint Action Group for Aviation Weather — to develop a set of objectives which would contribute to substantial reductions in the accident rate and also to increased aviation efficiency. These objectives, referred to as strategic elements in the *Strategic Plan*, are:

- provide improved aviation weather information,
- enhance the ability of decision makers to use the information,
- facilitate improvements by forging the required institutional arrangements, and
- direct and utilize research related to aviation weather.

This follow-on document, the *National Aviation Weather Initiatives*, builds on the *Strategic Plan* by identifying more focused actions to be undertaken by both governmental and non-governmental organizations to reduce the number of accidents attributable to weather. In the course of preparing this document, a fifth objective became apparent:

- improve the capabilities for aircraft to fly safely and efficiently in all types of weather conditions.

These five objectives, then, provide the basis for building the initiatives described in this document.

3. Scope of the Initiatives

This *Initiatives* document concentrates on actions that will improve both the safety and the efficiency of flight in the United States. Although the discussions generally center on hazardous conditions, the implementation of the initiatives identified will provide benefits to pilots flying in all types of weather, both good and bad. The document's scope is defined by several guidelines:

- focus on the impact of weather on aviation operations, not just on the meteorological phenomena themselves,
- outline improvements in terms of general initiatives instead of specific solutions, and
- recognize that needed initiatives are not solely the concern of the Federal government, but also extend to state and local governments and private industry.

4. Approach

The fundamental premise of the *Strategic Plan* was straightforward: *the users of aviation weather information must be provided with the best available tools for making safe decisions concerning aircraft flying in all types of weather conditions.* Focusing the discussion of initiatives on operational considerations leads to a central question: *How can aviation-weather services be improved to increase aviation safety and efficiency?*

This question can be addressed in terms of the Service Improvement Model shown in Figure 1 which depicts service improvements within the context of the five objective areas. Improvements in any or all of these areas will lead to more effective services.

In order to make the discussion of initiatives more concrete, specific service areas are identified. These areas focus on the meteorological conditions which have either proven to be frequent causes of aviation accidents, injuries, and delays or, in the case of volcanic ash and other airborne hazardous materials, are considered to be serious potential causes. The specific service areas discussed in this document are:

- Ceiling and Visibility
- Convective Hazards
- En Route Winds and Temperatures
- Ground Deicing
- In-flight Icing
- Terminal Winds and Temperatures
- Turbulence
- Volcanic Ash and Other Airborne Hazardous Materials.

5. Purpose of The Initiatives Document

This document discusses areas of concern that follow the general tenor of a variety of recent documents, including the National Aviation Weather Program Strategic Plan and reports from the National Research Council⁵ and the National Aeronautics and Space Administration⁶. This effort is also in line with the Federal Aviation Administration's Strategic Plan⁷, which includes accident rate reduction performance goals and also places an emphasis on system efficiency. Additionally, the

⁵ *Toward a New National Weather Service: Weather for Those Who Fly*, March 1994, and *Aviation Weather Services: A Call for Federal Leadership and Action*, December 1995, both National Academy Press, Washington, DC.

⁶ *Toward a Safer 21st Century: Aviation Safety Research Baseline and Future Challenges*, December 1996, NASA Document NP 1997-12-231-HQ.

⁷ *FAA Strategic Plan*, 20 May 1998.

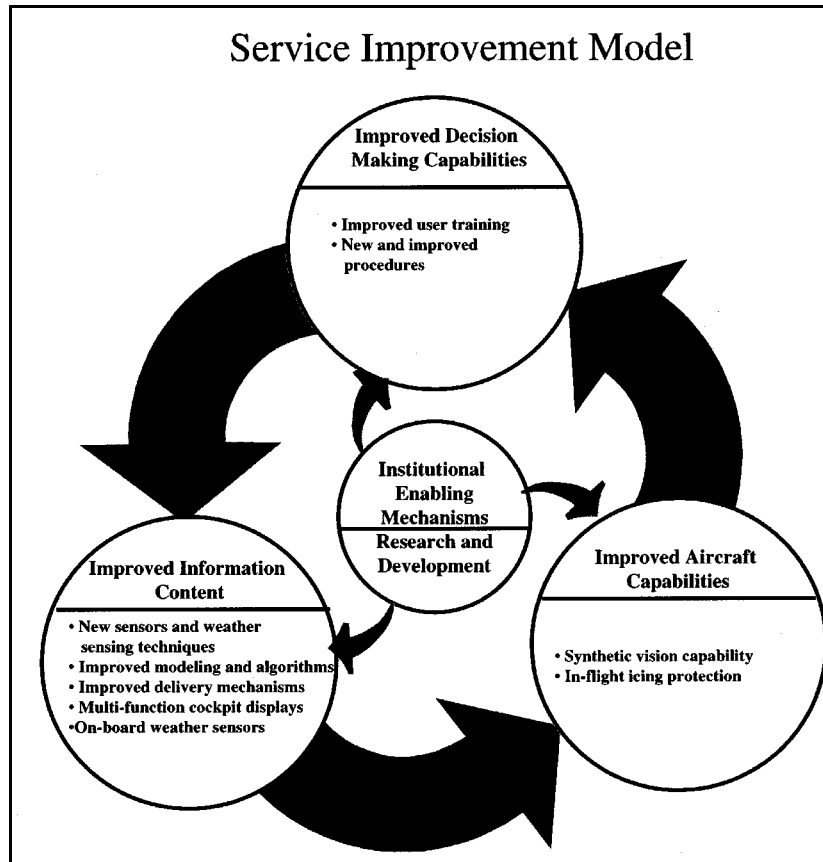


Figure 1. Service Improvement Model

Federal Aviation Administration’s “Safer Skies” is a commitment for a focused agenda, in partnership with the aviation community, to address a variety of safety issues, including weather.

These initiatives are designed as a focus for follow-on agency implementation and operations plans, known as Tier III planning. The initiatives also provide a rationale for leveraging limited resources during the budgetary process, both because they seek to capitalize on already existing momentum toward improvements and because they tend to span multiple agency responsibilities and charters. As will become apparent in succeeding chapters, many of the initiatives point toward integrated efforts across service areas, thus leading to a broader base of justification for investment in their implementation.

Identifying specific performance metrics for each initiative is beyond the scope of the document. As an overall measure of success for these initiatives, a reduction in weather-related accidents, as shown by NTSB accident statistics, could be used. Additionally, since many of the initiatives are designed to meet previously stated user needs, a simple statement by the user community that a need has been met would be an indication of success.