AIRSPACE REDESIGN EFFORTS ARE CRITICAL TO ENHANCE CAPACITY BUT NEED MAJOR IMPROVEMENTS

Federal Aviation Administration

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Office of the Secretary
of Transportation
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Memorandum

Subject: <u>ACTION</u>: Airspace Redesign Efforts Are Critical To Enhance Capacity but Need Major Improvements
Federal Aviation Administration
AV-2005-059

Date: May 13, 2005

From: David A. Dobbs
Assistant Inspector General
for Aviation and Special Program Audits

Reply to Attn. of: JA-10

To: Federal Aviation Administrator

This report represents the results of our audit on the Federal Aviation Administration (FAA) National Airspace Redesign (NAR) program, the Agency efforts to improve the efficiency of the National Airspace System by redesigning the Nation's airspace. FAA's airspace redesign efforts are important to enhance capacity and meet the demand for air travel, which is rebounding to levels experienced in 2000. We periodically met with FAA officials responsible for managing airspace redesign efforts, including the Program Director for Air Traffic Airspace Management and the Acting Director of Systems Operations and Safety, and we have incorporated their comments as appropriate. The Vice President for Systems Operations within FAA's new Air Traffic Organization is now responsible for airspace redesign efforts.

OBJECTIVES

The objectives of our review were to determine (1) if FAA has an effective process to control costs, mitigate risks, and coordinate local, regional, and Headquarters NAR efforts, and (2) whether opportunities exist for FAA to make airspace redesign efforts more cost effective. We conducted our work in accordance with <u>Government Auditing Standards</u> as prescribed by the Comptroller General of the United States. Exhibit A describes the scope of our review and the methodology we used to achieve our objectives.

BACKGROUND

Airspace redesign efforts have played and will continue to play a critical role in enhancing capacity, transitioning to more flexible routing, and reducing delays. FAA's airspace redesign efforts are highlighted in FAA's strategic plan, *Flight Plan 2004-2008*, as well as the *Operational Evolution Plan*, the Agency's blueprint for enhancing capacity over the next decade.

In 1997, the FAA initiated NAR as a multi-year effort to increase the efficiency of the National Airspace System. FAA has estimated the cost of its airspace redesign efforts to be $250 million. FAA requests over $20 million annually for NAR, and these efforts are funded through the Agency's Operations account. For fiscal year (FY) 2005, FAA requested $21.5 million for airspace redesign.

Airspace redesign is managed as a national program encompassing the efforts of FAA regions and Headquarters. However, local facilities are tasked with the responsibility to identify and develop NAR projects, and most resources are spent by the regions on local projects.

RESULTS IN BRIEF

Revamping the Nation's airspace is critical to enhancing capacity and meeting the demand for air travel, which is rebounding to 2000 levels in terms of flights and delays. In fact, the most recent holiday season was projected to be the busiest in 5 years and to exceed 2000 holiday traffic levels by 1.3 percent (a period when air travel was at a peak). System-wide delays and cancellations also reached a peak during the December 2004 holiday travel period, with nearly half of all flights either delayed or canceled during this period.

Airspace changes are critical to get the most benefit from new runways. For example, the capacity increases and delay reductions envisioned in the Chicago O'Hare Modernization Plan depend on significant airspace changes. The first stage of the plan is expected to be complete in 2007 (the new north runway only), and its combination of airfield and airspace changes will produce more than a 50 percent reduction in the average minutes of projected delay per flight from 19.6 to 9.6 minutes. FAA and Mitre[1] analyses show the new north runway, without corresponding airspace changes, will have little impact on delays.

Even without new runways, we have seen that airspace changes can have an impact on reducing congestion and enhancing the flow of air travel. FAA's Choke Point initiative—the Agency's effort to revamp airspace in response to delays that reached intolerable levels in 2000—focused on eliminating bottlenecks east of the

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[1] The Mitre Corporation functions as a Federally funded research and development center for FAA.

Mississippi. FAA reports that the Choke Point initiative reduced delays and resulted in an annual savings to airspace users of $70 million. This initiative was successful because it was placed on a fast track, had significant management oversight, and linked plans and resources—all which are best practices that need to be transferred to all airspace redesign projects.

We reviewed the 42 approved airspace redesign projects in FY 2004. This includes major efforts to enhance the flow of air travel in and around Chicago, New York City, and Los Angeles, as is illustrated in Figure 1.

Figure 1. Three Major Metropolitan Airspace Redesign Initiatives
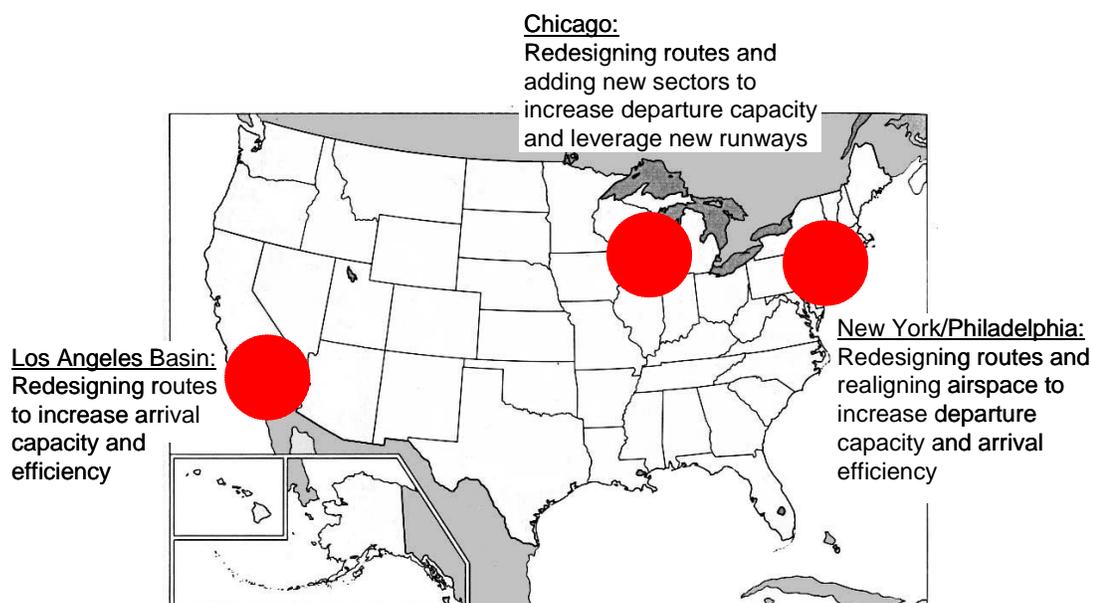
We found that FAA's overall process for controlling costs; mitigating risks; and coordinating local, regional, and Headquarters efforts is not effective. The management and oversight of airspace projects is diffused and fragmented between FAA Headquarters and various local FAA facilities. Specifically, we found:

- Cost and schedule estimates for the vast majority of airspace redesign projects are not reliable. Cost estimates—for the program as well as individual projects—include costs only for planning, not for implementation. Therefore, we could not, nor could FAA, determine the cost of implementing the 42 projects that were approved as of FY 2004.

- FAA's redesign projects are often delayed 3 years or more because of changes in a project's scope, environmental issues, and problems in developing new procedures for more precise arrival and departure routes. For example, of the 42 approved projects in FY 2004, 7 were affected by environmental concerns, 10 by problems in developing new procedures, and 21 by changes in a project's scope.

- Projects are not effectively coordinated among Agency organizations that manage resources (e.g., new equipment and radio frequencies) or linked to the Agency's budget process. This directly affects a project's implementation. We found that 19 of the 42 approved projects in FY 2004 had unresolved equipment issues.

Greater oversight and control from FAA Headquarters is needed to get the Agency's airspace redesign efforts on track. Specifically, FAA needs to:

- Establish cost and schedule controls for airspace redesign projects and incorporate costs for both planning and implementation.

- Establish procedures to ensure that airspace redesign efforts are coordinated with other FAA entities in a timely manner.

- Prioritize current airspace redesign projects and establish criteria for assessing a project's system-wide impact.

- Re-evaluate how resources are allocated and used by local and regional facilities to determine the most effective way to move forward with airspace redesign efforts.

Generally, FAA views our report and its recommendations as a balanced assessment of the NAR program. FAA stated that changes are underway to address our recommendations. However, the Agency did not provide specific information on actions taken or planned to address our recommendations. Given the important role airspace redesign efforts play in enhancing capacity, a clear understanding of the specific steps being taken to address our recommendations is needed.

FAA's Management and Oversight of Airspace Redesign Efforts Are Fragmented, Costs and Schedules Are Not Reliable, Risks Are Not Effectively Mitigated, and Coordination Is Not Effective

FAA managers and air traffic controllers work collaboratively on airspace changes through numerous regional and local work groups. FAA's process for developing and designing airspace projects is explained in its *Strategic Management Plan for*

Airspace Redesign, as well as in a memorandum of understanding between FAA and the air traffic controllers' union. The memorandum of understanding allows controllers to be assigned to numerous national, regional, and local workgroups.

FAA's Management and Oversight of Airspace Redesign Are Fragmented

The airspace redesign process begins at the local FAA facility and is driven by a "bottom-up" approach, meaning that local and regional air traffic control facilities are responsible for initiating, conducting, and managing the bulk of the work. The Airspace Branch Management Office within each of FAA's regions is responsible for day-to-day oversight of projects.

Although FAA Headquarters is responsible for approving projects and funding levels, decision-making and program management are diffused. In practice, decisions about what projects to fund and at what level are guided by consensus decision-making through the Airspace Liaison Team (composed of FAA staff and controllers) and its subgroups. This pits one region against another and makes it difficult for airspace redesign to function as a national effort. The Choke Point initiative (completed in 2002) was successful precisely because it was *not subject to this process.*

We also found that there is minimal, if any, guidance or oversight by Headquarters to ensure that project costs and schedule estimates are completed or that projects are effectively coordinated among Agency organizations. The problems are traceable to a lack of controls at the FAA Headquarters level. This situation is exacerbated by the fact that FAA has not issued criteria for assessing a project's system-wide impact or ensuring that cost and schedule estimates are reliable.

Cost and Schedule Estimates for Airspace Redesign Projects Are Not Reliable

FAA estimated that NAR would cost the Agency $250 million, and mid-term initiatives would be completed in 2008. FAA has never established completion dates for long-term NAR projects or updated the cost estimate. The $250 million estimated cost for NAR does not include the cost to implement redesign projects, nor does it recognize the effect changes in project scope, problems in developing new procedures, and environmental issues have on cost and schedule estimates.

Individual project plans and cost estimates we reviewed are not reliable because they do not clearly identify what is needed to shift a project from the design phase to implementation (see Table 1). FAA could not—nor could we—determine the cost of implementing the 42 projects. This makes it difficult to evaluate NAR projects and their merit in terms of enhancing capacity. Although projects can continue to originate at the facility level, Headquarters must exert much more centralized oversight and planning.

> **Table 1. Reasons Why Airspace Cost and Schedules Are Not Reliable**
>
> - Design teams did not develop estimates beyond the design stage, and some did not forecast beyond the current fiscal year.
>
> - Design teams often did not fully identify requirements or costs for implementation.
>
> - Schedules did not allow lead time for acquiring equipment or developing procedures.

When our review began, we identified over 80 distinct redesign projects that were subsequently consolidated or "re-scoped" to 42 during FY 2004. We found it difficult to determine exactly how many NAR projects there were (as well as the cost and schedule information of each project) because project information at Headquarters was not always consistent with information at the regional level. There is still uncertainty about the accuracy of some information about schedules and scope.

FAA needs to establish cost and schedule controls for airspace redesign projects that are reflective of the current budget environment. Cost estimates for NAR projects should include *both* planning and implementation costs. This would improve the flow of NAR projects from identifying problem areas in the National Airspace System to implementing appropriate solutions. It would also assist in prioritizing projects based on available resources and potential benefits and minimize cost and schedule problems.

Airspace Redesign Efforts Face Risks That Can Delay Implementation

Our analysis of the NAR project charters and status reports for the 42 approved projects in FY 2004 reveals a substantial number have implementation issues that could delay or stop the projects (see Table 2). We found that environmental issues, problems in developing new procedures for more precise arrival and departure routes, and changes in project scope have led to delays of 3 years or more. A number of important airspace projects have missed deadlines.

Table 2. Risks Facing Airspace Redesign Projects	
Type of Risk	**Number of Projects**
Environmental Issues	7
Unresolved Resource/Equipment Issues	19
Re-scoping	21
Lack of Radio Frequencies	7
Problems With New Procedures	10
Note: Projects may have multiple problems.	

- The *Southern California Redesign* project slipped from a 2002 target date to 2010. This project focuses on redesigning airspace surrounding Los Angeles International Airport. Problems in developing new procedures and changes in project scope contributed to the delays.

- The *New York/New Jersey/Philadelphia Redesign* project is behind schedule. This large, complex, and controversial project seeks to revamp airspace in the heavily traveled airways on the East Coast. Release of the draft environmental impact statement has slipped from 2003 to 2005, and it is unknown when the project will be fully implemented.

- The *Bay to Basin Redesign* project slipped from a 2003 target date to 2008. This project addresses congestion and airspace limitations between the Los Angeles Basin and the San Francisco Bay in California. Delays are due to, among other things, problems in developing new procedures, acquiring new equipment, and changes to project scope.

The problems we found mean that FAA is at risk of not meeting expectations for enhancing capacity as outlined in the *Operational Evolution Plan* or the Agency's strategic plan. An internal FAA study done in January 2004 found that about half of the airspace redesign projects directly related to *Operational Evolution Plan* initiatives were not on track to meet scheduled milestones. When we traced FAA's study results to the 42 projects approved in FY 2004, we found that

34 were related to *Operational Evolution Plan* initiatives, but half of the projects (19 of 34) were behind schedule. These include efforts in San Francisco, Los Angeles, and Las Vegas. FAA needs to do a much better job of assessing the risks of airspace redesign projects and resource constraints early in the design phase.

Planning and Coordination for Airspace Redesign Projects Are Not Effective

FAA also needs to improve the process by which airspace redesign teams coordinate and plan with other Agency organizations. We found that coordination problems with airspace redesign projects exist on several fronts, especially with FAA organizations responsible for managing both capital equipment and radio frequencies. This lack of coordination has increased the cost of projects. It also means that projects are being planned with insufficient attention to how much they will cost or whether they can be implemented.

- Coordination is ineffective between airspace design teams and FAA organizations that provide equipment for implementing airspace changes. Airspace changes often require new controller displays and communication equipment that are funded through the Facilities and Equipment account. FAA is pursuing many projects that may not be implemented or may be implemented outside schedule estimates because planning and implementation phases are not linked. For example, in FY 2004, 19 of the 42 approved projects had unresolved resource or equipment issues. These include efforts to revamp airspace in Seattle, Memphis, and Los Angeles. The lack of linkage with FAA's budget can delay a project's implementation by several years.

- Coordination is also ineffective between airspace design teams and the FAA organization responsible for managing the radio frequency spectrum: the Office of Frequency Management. Airspace redesign projects often require new radio frequencies or adjustments to existing frequency assignments—close cooperation is essential. However, FAA officials responsible for managing the spectrum told us that they are not linked to local and regional NAR efforts and need to be. For example, of the 42 ongoing projects, 7 had problems with a lack of available frequencies. These include efforts in the Great Lakes Corridor and Northern California.

The importance of coordination, as well as resources (in terms of equipment and available frequencies), is illustrated by Agency efforts to enhance capacity and reduce delays at Chicago O'Hare Airport through the O'Hare Modernization Plan. Chicago O'Hare Airport is planning to add one new runway, extend two existing runways, and relocate three others. Airspace changes are expected to play a vital

role in reducing delays at O'Hare. The new runway is planned to open in 2007, with the entire effort planned for completion in 2013.

The essential design for reducing delays at Chicago O'Hare in the near term focuses on new procedures, new air traffic control sectors, and the establishment of new routes to the East Coast and southern United States. Initially, four new sectors will be needed, but as many as nine may be required. Figure 2 illustrates the routes FAA intends to add.

Figure 2. Current and Planned O'Hare Departure Routes

| Today | Planned and When Fully Implemented |

The airspace changes specifically for the O'Hare effort are only part of several planned airspace initiatives in the region, such as the Midwest Airspace Enhancement project to improve traffic flows managed by the Cleveland and Indianapolis Centers. At one time, various projects planned for the region requested an additional 27 air traffic control sectors, of which only 21 were validated by FAA Headquarters. Due to lack of resources, none of the validated new sectors have been implemented.

The resource requirements for the O'Hare Modernization Program are significant, and the key will be shifting from planning to actual implementation. Creating additional sectors often has resource implications for FAA in terms of additional controllers, equipment, and radio frequencies. How to deal with requests for new sectors and the corresponding resource requirements nationwide is a matter the Air Traffic Organization *must* address.

We note that FAA has taken a *markedly different approach* with the O'Hare Modernization Program by establishing a special office to coordinate all Agency efforts specifically for the airport modernization effort. This is a positive step, but the airspace changes envisioned for O'Hare are complex and will require sustained management attention. We are reviewing the O'Hare Modernization Program and

will discuss our results in a separate report. FAA needs to establish procedures to ensure that all NAR efforts are coordinated with other FAA entities in a timely manner and to link project development and implementation phases to the Operations and Facilities and Equipment budgets.

FAA Can Take Steps To Make Airspace Redesign Efforts More Cost Effective

FAA has opportunities to make its airspace redesign efforts more cost effective as it fully transitions to the Air Traffic Organization, which will affect airspace redesign efforts. We could not accurately estimate the savings that could be achieved from greater controls over how projects are planned but believe it could be substantial. In addition to the need for more discipline in how airspace redesign efforts are managed, several other areas, such as prioritizing airspace projects, addressing the need for additional sectors, and re-evaluating how resources are used, require attention because they will materially affect the effectiveness of FAA redesign efforts.

- FAA needs to prioritize the 42 ongoing NAR projects to determine which projects provide the most benefits and to develop criteria for assessing a project's system-wide impact. Setting priorities for airspace redesign initiatives is important because demands for implementing projects will likely exceed resources. FAA officials caution that implementing the O'Hare Modernization Program, with its related resource requirements, may limit the Agency's ability to implement airspace efforts in other parts of the country for the next several years. FAA needs to set expectations for what can be done in the short- and long-term.

- FAA must develop a strategy for redesigning and establishing air traffic control sectors. This is directly related to issues of productivity and resource requirements for the Air Traffic Organization. We found that airspace redesign teams often propose implementing additional sectors for managing traffic or adjusting existing ones without sufficient consideration of the implications. The Choke Point initiative added 19 sectors between 2000 and 2002. The Chicago O' Hare Modernization Program calls for an additional four sectors to be established, with a number of others to be added over the next several years.

  According to the *Operational Evolution Plan*, there are over 700 sectors in the National Airspace System and over 100 additional sectors under consideration. FAA is working to reduce the number of additional sectors needed. This is important because each additional sector can require additional controllers, equipment, and radio frequencies. According to FAA, a new sector can require as many as 10 additional controllers.

However, there are a limited number of controllers, and possible retirements could make it even more difficult to open new sectors. A limited amount of equipment and a nationwide shortage of radio frequencies are other problems. A strategy for addressing the creation of new sectors must take into account available resources, planned technology enhancements, expected size of the controller workforce, and the extent to which facilities can be consolidated.

- FAA must re-evaluate roles and how resources are allocated and used by local and regional facilities to determine the most cost-effective and expeditious way to move forward with airspace redesign efforts. FAA records show that over 600 FAA employees are working on various airspace redesign efforts: 240 staff and 396 controllers. This excludes work on the high-altitude redesign project. This also excludes resources (about 50 staff-years annually) provided by the Mitre Corporation, which functions as the Agency's Federally funded research and development center. About half of FAA's annual investment in airspace redesign efforts is spent on travel and overtime; the other half is spent on contracts principally for environmental work.

  Airspace redesign efforts have evolved from map and paper exercises at local facilities to ones that often require extensive simulation and computer modeling. Extensive analysis of benefits and potential system-wide effects are also critical factors. This explains Mitre's increasing role in FAA airspace redesign efforts.

  Controllers are embedded in the planning process and are now expected to have expertise and receive training on new tools, benefit assessment, overall project management, and design of projects. Given pending retirements, FAA should rethink the controllers' role in airspace redesign efforts, the stage of the process at which they can have the most impact, and what can and should be expected of them.

SUMMARY OF RECOMMENDATIONS

FAA's airspace redesign efforts are important to enhance capacity and reduce delays. While FAA can continue to rely on local and regional facilities to manage airspace projects, greater oversight and control from the Agency's Headquarters is needed. We are making six recommendations aimed at strengthening FAA's process for airspace redesign and making efforts more cost effective. The full list of recommendations can be found beginning on page 15. We are recommending that FAA:

- Establish cost and schedule controls—as if NAR were a major air traffic control initiative—for airspace redesign projects. Airspace redesign projects need reliable cost and schedule parameters, and plans should include costs for both planning and implementation.

- Establish procedures to ensure that NAR efforts are coordinated with other FAA entities in a timely manner. As part of this effort, FAA should link the Operations and the Facilities and Equipment budgets to the NAR process. Also, FAA needs to ensure that constraints and risks (e.g., the availability of radio frequencies, Facilities and Equipment funds, and equipment) are factored into the process at the earliest stage.

- Prioritize current NAR projects and establish criteria for assessing a project's system-wide impact. This will help set expectations for what can be done in the short- and long-term.

- Develop a strategy and establish guidelines for addressing the demand for new sectors. This strategy should take into account, among other things, planned technology enhancements, equipment and frequency limitations, and the expected size of the controller workforce.

- Re-evaluate how resources are allocated and used by local and regional facilities to determine the most effective way to move forward with airspace redesign efforts. Controllers play a key role in airspace redesign, but FAA needs to examine ways to reduce the amount of administrative, planning, and airspace modeling work that is placed on them.

AGENCY COMMENTS AND OIG RESPONSE

Periodically during our review, we met with FAA officials responsible for managing FAA's airspace redesign efforts and informed them of our findings and the need for corrective action. As a direct result, the Air Traffic Organization recently began to craft a new approach for developing and managing airspace redesign projects, including the establishment of a new executive steering committee specifically for airspace management.

On March 11, 2005, we provided FAA with a draft of this report, and on March 25, 2005, we met with the Acting Director of System Operations and Safety and other Agency officials to discuss FAA's comments and response to our recommendations. FAA officials stated that they agree with our findings and recommendations. They stated that plans are being developed to address our concerns about the lack of an effective process to establish priorities, lack of cost and schedule controls, and insufficient coordination. On April 13, 2005, FAA

provided us with its formal written response, which is contained in its entirety in the Appendix.

Generally, FAA views our report and its recommendations as a balanced assessment of the NAR program. FAA's written comments explain that the Agency is developing a new plan (called the Airspace Management Action Plan) for changing the way airspace projects are managed. These changes are intended to link each project's requirements to both the operations and capital budgets by addressing procedural, environmental, technical, and staffing requirements with participation across organizational lines. FAA believes these changes will permit much tighter integration of cost and schedule management and thereby address the recommendations contained in this report.

FAA stated that changes are underway to address our recommendations. However, the Agency did not provide specific information on actions taken or planned to address our recommendations. Given the important role airspace redesign efforts play in enhancing capacity, a clear understanding of the specific steps being taken to address our recommendations is needed. This is particularly true for how FAA intends to address the need for new air traffic control sectors, which has significant resource and productivity implications for the new Air Traffic Organization.

ACTION REQUIRED

In accordance with Department of Transportation Order 8000.1C, we would appreciate receiving your more detailed responses to each of our recommendations within 30 calendar days. Please indicate the specific action taken or planned for each recommendation and the target date for completion. You may provide alternative courses of action that you believe would resolve the issues presented in this report.

We appreciate the courtesies and cooperation of FAA representatives during this audit. If you have any questions concerning this report, please call me at (202) 366-0500 or Matt Hampton, Program Director, at (202) 366-1987.

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cc: Mr. Anthony Williams, ABU-100

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FINDINGS

FAA's Management and Oversight of Airspace Redesign Efforts Are Fragmented, Costs and Schedules Are Not Reliable, Risks Are Not Effectively Mitigated, and Coordination Is Not Effective

Our review found that FAA needs to improve the NAR project planning and development process. Specifically, NAR project cost estimates are unreliable, equipment and risks or resource needs are not adequately addressed, and NAR personnel are not coordinating with other FAA personnel in a timely manner. These issues are rooted in poor planning, lack of attention to budget and resource constraints, and inability to link airspace projects with the Facilities and Equipment account. As a result, project cost and schedule estimates are unreliable, projects encounter unanticipated delays, and cost increases.

Perspectives on Airspace Redesign and Enhancing Capacity

Airspace redesign efforts have played and will continue to play a critical role in enhancing capacity, transitioning to more flexible routing, and reducing delays. FAA's airspace redesign efforts are highlighted in both the *Flight Plan 2004-2008* (the Agency's strategic plan) and the *Operational Evolution Plan* (the blueprint for enhancing capacity over the next decade). As we have noted in a previous report on FAA's capacity enhancing initiatives,[1] the combination of airspace redesign efforts, new procedures, and systems currently on board aircraft offer significant potential to increase airport throughput and reduce delays.

Revamping the Nation's airspace is important to meet the demand for air travel, which is rebounding to 2000 levels in terms of flights and delays. In fact, the most recent holiday season was projected to be the busiest in 5 years and to exceed 2000 holiday traffic levels (a period when air travel was at a peak) by 1.5 percent. System-wide delays and cancellations also reached a peak during the December 2004 holiday travel period, with nearly half of all flights either delayed or canceled during this period.

Airspace changes are critical to get the most benefits from new runways. For example, the capacity increases and delay reductions envisioned through the Chicago O'Hare Modernization Program (the addition of one new runway, extension of two runways, and relocation of three others) depend on significant airspace changes. For the first stage of the plan expected to be complete in 2007 (the new north runway only), a combination of airfield and airspace changes

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[1] OIG Report Number AV-2003-048, "Status Report on FAA's Operational Evolution Plan," July 23, 2003. OIG reports can be found on our website: www.oig.dot.gov.

provides for more than a 50 percent reduction in the average minutes of projected delay per flight from 19.6 to 9.6 minutes. FAA and Mitre analyses show the new north runway, without corresponding airspace changes, will have little impact on delays.

Even without new runways, airspace changes can reduce congestion and enhance the flow of air travel. FAA's Choke Point initiative—the Agency's effort to revamp airspace in response to delays that reached intolerable levels in 2000— focused on eliminating bottlenecks east of the Mississippi. It encompassed 21 initiatives, including the controversial "Yardley Robbinsville/Flip-Flop," which we reported on in May 2003.[2]

FAA reports that the Choke Point initiative reduced delays and resulted in an annual savings to airspace users of $70 million. To address choke point problems, FAA used a combination of techniques, including reorganizing existing air traffic control sectors, creating new sectors, adjusting controller staffing, and modifying aircraft routes. The initiative was viewed by the Agency as a modest step that could be done easily and quickly, leading to more significant and complex changes to the Nation's airspace. It was successful because it was placed on a fast track, had significant management oversight, and linked plans and resources—all of which are best practices that need to be transferred to all airspace projects. Also, we note that the Choke Point initiative was not subject to the normal process for airspace redesign efforts.

FAA spends about $20 million annually on airspace redesign initiatives. Most airspace redesign work is done at the local and regional levels jointly by controllers and FAA management staff. One exception is the Headquarters-managed High Altitude Redesign Project, which is an effort to revamp high-altitude routes and take advantage of systems currently on board aircraft. Figure 3 illustrates airspace funding by FAA region.

[2] OIG Report Number AV-2003-042, "Airspace Redesign: Yardley/Robbinsville Flip-Flop," May 20, 2003.

Figure 3. Total NAR Expenditures by Region, FY 2000-2004

Alaskan Region
$185,418

National Programs
$29,347,290

Northwest
Mountain Region
$1,855,677

Great Lakes
Region
$7,869,159

New England
Region
$1,735,601

Western Pacific
Region*
$6,826,516

Central Region
$2,631,668

Eastern Region
$33,459,857

Southwest Region
$2,672,988

Southern Region
$4,426,273

* Includes Hawaii

Thirty-seven percent of all NAR funds are spent on projects in the Eastern region, which includes major airports in the New York, Philadelphia, and Washington, DC, areas. The remaining funds are spent on projects in the other eight regions (about 31 percent) and on FAA Headquarters' initiatives (32 percent). FAA's work on airspace changes for enhancing capacity and reducing delays at Chicago O'Hare International Airport is included in the total for the Great Lakes Region. Congress recently directed that $5 million be earmarked in the FY 2005 Operations budget specifically for Chicago O'Hare airspace redesign. Also, because of concerns about previous efforts to redesign airspace in the New York/New Jersey/Philadelphia region, Congress has specifically directed FAA to fund the New York/New Jersey/Philadelphia project.

FAA's Management and Oversight of Airspace Redesign Efforts Are Fragmented

Over the years, FAA has developed a process for developing and designing airspace projects. This process is outlined in FAA's *Strategic Management Plan for National Airspace Redesign*, as well as in a memorandum of understanding between FAA and the air traffic controllers' union. The memorandum of understanding allows controllers to be assigned to numerous national, regional, and local workgroups and authorizes the use of "back fill" overtime to cover absences when controllers are working on airspace projects.

The airspace redesign process begins at the local FAA facility and is driven by a "bottom-up" approach, meaning that local and regional air traffic control facilities are responsible for initiating, conducting, and managing the bulk of the work. The Airspace Branch Management Office from the Air Traffic Division in each of FAA's nine Regional Headquarters has immediate oversight for NAR project development.

In most cases, the local facility or region affected by an airspace problem or its potential solutions assumes responsibility for project development, which includes problem identification, initial problem evaluation, and initiation of an airspace study. At each facility we visited, airspace redesign teams composed of FAA staff and controllers from en route, terminal, and tower facilities were in place and working on various airspace projects.

FAA Headquarters has responsibility for approving projects and establishing funding levels. It also has responsibility for issues that involve multiple regions or that have a greater impact on the National Airspace System. Prior to FY 2002, FAA Headquarters provided funding to each region to be used at the region's discretion. Since then, FAA Headquarters has allocated funds to each region in a piecemeal fashion and most approved projects receive some funding each year.

Although FAA Headquarters is responsible for approving projects and funding levels, decision-making and program management is diffused. Decisions about what projects to fund and at what level are essentially guided by consensus decision-making through the Airspace Liaison Team*,* which is composed of FAA management and controllers. Table 3 illustrates the fragmentation of decision making and describes the various airspace redesign teams and working groups.

Table 3. National Airspace Redesign Work Groups and Functions

National Airspace Redesign Work Groups	Program Management and/or Technical Functions
Air Traffic Airspace Management Program Office	Manages and develops policy for the NAR program, tracks projects, chairs the Airspace Liaison Team, and serves as a liaison with other programs.
Airspace Liaison Team (ALT)	Prioritizes and approves projects, allocates funding, and implements planning
Subgroup of the ALT (SALT)	Works on national requirements, planning, and design
SALT Technical Teams	Provides technical input and is established by SALT and disbanded at the completion of their tasks
Regional Focus Leadership Teams	Assist in developing airspace solutions and coordinate activities among facilities in the region
Facility Focus Leadership Teams	Assist in developing airspace solutions, functions are similar to those of the Regional Focus Leadership Teams
Facility Design Teams	Works on local design, cross-regional facility design

Source: Strategic Management Plan for National Airspace Redesign (July 2002)

The Airspace Liaison Team makes recommendations for the distribution of funds at an annual October meeting, with adjustments made at quarterly meetings. In the past, these recommendations have translated into de facto programmatic decisions. The funding allocation is by individual project, and every region receives some funding. This scenario pits one region against another and makes it difficult for airspace redesign to function as a national program. The overall process has led to haphazard stops and starts with projects. Also, it is not reflective of the current budget environment. Specifically:

- In FY 2003, regional and local work groups submitted funding requests of $49 million, even though the previous year's funding level was about $20 million. Later, FAA Headquarters instructed the work groups to plan for a total program funding level of $35 million, which proved unrealistic because the final funding allocation for airspace redesign projects was $23.7 million. Work on some NAR projects was stopped in April and May 2003 when funds ran out, 4 to 5 months before the end of the fiscal year.

- In FY 2004, regional and local work groups submitted funding requests of $47 million, even though Headquarters expected a funding level of about $27 million. When the budget was approved, $21 million was allocated to

airspace redesign efforts. Project managers set up projects reflective of their priorities—not necessarily system-wide priorities.

We shared our concerns about this process with the Director for Airspace, who then took steps to bring more order to the process in FY 2005. For the first time, FAA worked to establish priorities and did not fully fund all projects. However, FAA has not yet standardized the effort.

Also, we found that there is minimal, if any, guidance and oversight—at either the Headquarters or regional level—to ensure that project cost and schedule estimates are reliable, resource needs and constraints are identified and resolved, and projects are effectively coordinated among Agency organizations. As a result, the vast majority of project cost and schedule estimates are unreliable, and projects encounter unanticipated delays and cost increases that could have been avoided.

Costs and Schedules for Airspace Redesign Projects Are Not Reliable

FAA estimated that its airspace redesign initiatives will cost approximately $250 million, and mid-term initiatives would be complete by 2008. FAA never established completion dates for longer-term projects. This amount excludes implementation costs, which could be substantial. Also, the $250 million estimate does not include significant resources provided by the Mitre Corporation, which functions as a Federally funded research and development center for FAA. Between FY 1999 and FY 2003, Mitre provided over 195 staff-years to support various design efforts with airspace modeling studies and traffic flow studies related to NAR projects. Another 50 Mitre staff-years were allocated for FY 2004.[3]

Local and regional facilities develop project cost and schedule estimates. However, this information is for the redesign phase only and does not adequately address cost and schedule information for the implementation phase with respect to new equipment (e.g., controller displays), staffing, and necessary radio frequencies. FAA could not—nor could we—determine the costs of implementing the 42 ongoing projects. Cost and schedules are not reliable for a number of reasons:

- Project teams did not develop cost and schedule estimates for projects beyond the design phase, and some projects did not forecast schedules and costs beyond the current fiscal year.

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[3] Of the 245 Mitre staff-years devoted to NAR, only 38 (about 16 percent) were directly funded by the NAR program.

- Project teams often did not fully identify requirements for implementing airspace projects.

- Schedule estimates did not include lead times for acquiring equipment or implementing new procedures.

It is difficult to evaluate NAR projects because regions frequently change the scope and direction of projects. When we began our review, there were over 80 ongoing projects, which were subsequently reduced to 42. Many smaller projects were combined into larger ones. For example, the Salt Lake City Center Airspace Redesign project used to be five separate projects, as did the Southern California Redesign Project.

Moreover, airspace redesign project information at Headquarters was not always consistent with region project information, and there is still uncertainty about the accuracy of some information. For example, it took FAA several months to provide documentation for the Portland International Airport Class B Airspace project identified in a recent FAA report. FAA published inaccurate dates in its *Operational Evolution Plan* for three airspace redesign initiatives because of these problems. The fluid nature of the projects—without any controls in place—makes it difficult to determine exactly how many NAR projects there are, how long it will take to implement them, or how much they will cost.

A strategy with appropriate cost and schedule controls would improve the flow of NAR projects from development through design and into implementation. A strategy similar to the one FAA uses to address cost, schedule, and performance problems in acquisitions would greatly benefit the NAR process.[4] FAA major acquisitions are expected to have reliable cost and schedule baselines and include both costs for development and implementation. Major risks to efforts are identified and mitigation strategies are required to address potential risks. Moreover, major efforts have their costs and schedule baseline approved by the Joint Resources Council (composed of senior-level decision makers). Projects that significantly change scope or experience cost increases are expected to receive another review. This type of discipline is clearly lacking in NAR projects.

FAA Must Mitigate a Wide Range of Risks to Airspace Redesign Projects

Our analysis of the NAR project charters and status reports for the 42 approved projects in FY 2004 reveals a substantial number of these projects have implementation issues that could delay or stop the project. We found that

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[4] FAA's polices and procedures for major air traffic control initiatives are contained in the Agency's Acquisition Management System.

environmental issues, problems in developing new procedures, and changes in scope can delay a project for 3 years or more. The completion dates for several projects have slipped.

- The *Southern California Redesign* project slipped from a 2002 target completion date to 2010. This project focuses on redesigning airspace surrounding the Los Angeles International Airport by transferring the responsibility for managing segments of airspace from the Los Angeles center to the Southern California terminal facility. The goal is to improve the flow of traffic to Los Angeles International, San Diego International, and other airports in the area. Problems in developing new procedures and changes in project scope contributed to delays.

- The *New York/New Jersey/Philadelphia Redesign* project is behind schedule. This large, complex, and controversial project seeks to revamp airspace in the heavily travel airways on the East Coast. The proximity of Newark, Kennedy, LaGuardia, Philadelphia, and several regional and general aviation airports results in complex pilot and controller coordination and circuitous flight paths. The release of the draft environmental impact statement has slipped from 2003 to 2005, and it is unknown when the project will be fully implemented.

- The *Bay to Basin Redesign* project slipped from a 2003 target completion date to 2008; this project addresses congestion and airspace limitation issues between the Los Angeles Basin and the San Francisco Bay in California. It is related to the Southern California Redesign project but is principally focused on high-altitude routes. Concerns about navigating special use airspace—airspace managed by the Department of Defense and FAA—is a complicating factor. Delays are due to, among other things, problems in developing new procedures, acquiring new equipment, and changes to project scope.

Airspace redesign projects face a wide range of risks, such as environmental issues, unresolved resource issues, and frequent changes in scope. Table 4 shows examples of issues that have affected NAR initiatives.

Table 4. Examples of Issues Affecting Select NAR Initiatives

Project	Issues			
	Scope Redefined?	Problems in Developing New Procedures?	Unresolved Resources/ Equipment Issues?	Environ-mental Issues?
Seattle Terminal Radar Approach Control Airspace Redesign	Y	N	Y	N
Atlanta Air Route Traffic Control Center North South Flows	Y	N	Y	N
Las Vegas Terminal Redesign	N	Y	N	N
Southern California Redesign	Y	Y	N	Y
Denver Air Route Traffic Control Center	Y	N	Y	N
Orlando 4th Runway Airspace Redesign	Y	N	Y	N
Omaha Airspace	N	N	Y	Y
Honolulu Control Facility Redesign	N	Y	Y	Y

Environmental issues are always a factor when adjusting airspace, but airspace redesign efforts have been affected most recently by problems in developing new procedures (for arrivals and departures) that rely on systems already on board aircraft, such as flight management systems. This capability enjoys considerable industry support, is referred to as Required Navigation Performance (RNP/RNAV), and allows for more point-to-point navigation.[5]

After using new procedures on a limited basis at several locations, including Charlotte Douglas, Dulles, and Las Vegas airports, FAA discovered numerous problems. For example, FAA found that aircraft were taking unanticipated flight paths and that more training for both pilots and controllers was needed. FAA declared a moratorium for developing these procedures and subsequently established an 18-step process for designing them. This resulted in a 2.5-year

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[5] For additional details on these new procedures, see FAA's *Roadmap for Performance-Based Navigation* (version 1.0, July 2003).

delay to any NAR project that had RNP/RNAV procedure development as a core item.

In addition to environmental concerns and problems in developing new procedures, we identified other risks in our visits to several FAA facilities.

Lack of Additional Frequencies Is a Limiting Factor. The lack of available radio frequencies is also of particular concern, since establishing new sectors often requires additional frequencies. While FAA estimates that the available spectrum should accommodate aviation growth until around 2010, a lack of available frequencies is already a concern in congested airspace near Chicago and Atlanta. These limitations make it difficult to understand why so many new sectors were proposed and why the level of effort on projects requiring new sectors is not reduced.

For example, various airspace projects in the Midwest/Great Lakes Region identified a need for 27 new sectors, which was subsequently reduced to 23 sectors. According to documentation supporting the projects, the full benefits of these projects cannot be realized without implementing additional sectors. However, the lack of frequencies may prevent or delay completion of these projects.

Lack of Back-up Communications Equipment. Another limiting factor for airspace redesign efforts and for establishing new sectors (assuming new frequencies can be found) is the back-up communication equipment at facilities that manage high-altitude traffic. Specifically, the capacity of the Voice Switching Communications System (VSCS) and its backup system, the VSCS Training and Backup System (VTABS) is limited to 50 positions in each center. Currently, this system cannot be upgraded or expanded. FAA data show that 29 of 31 en route sector requests for new sectors are delayed because VTABS is not available. We note that the Chicago Center is at the maximum capacity of 50 positions, and Cleveland is at 48 positions. FAA is reluctant to implement new sectors without a back-up communications system.

The problems we found with NAR mean that FAA cannot meet expectations for enhancing capacity as outlined in the *Operational Evolution Plan.* NAR projects are essential to take advantage of new procedures and systems currently on board aircraft. An internal FAA study done in January 2004 found that about half of the airspace redesign projects directly related to *Operational Evolution Plan* initiatives were not on track. When we traced FAA's study results to the 42 projects approved in FY 2004, we found that 34 were related to *Operational Evolution Plan* initiatives but half of the projects (19 of 34) were behind schedule.

These include efforts in San Francisco, Los Angeles, and Las Vegas. Changes in project scope, problems in developing new procedures, and environmental issues are the primary reasons the projects may not meet their milestones.

Planning and Coordinating NAR Efforts Among FAA Stakeholders Need To Be Improved

Projects are being planned with insufficient attention to how much they will cost or whether the project can be implemented. We found major disconnections between planning and implementation. Coordination problems exist on several fronts with the FAA organization responsible for providing equipment and managing radio frequencies.

- For example, the Ft. Myers, FL, NAR team tried to obtain Facilities and Equipment (F&E) funding locally for controller display hardware needed for a radar position on a NAR project. Because they were unable to obtain the needed funds, they tried to obtain parts from locally available equipment but still did not have all the hardware needed and asked the region for help. What was originally estimated to cost $40,000 for local equipment ultimately increased to $140,000 for equipment, installation, and training. After review, FAA officials decided that the increased cost outweighed the benefits and did not approve the funding.

- Another example of breakdown in coordination is the Memphis Center project. On the Memphis project, the estimated F&E cost to acquire and install equipment increased from $10,000 to $146,000, with an additional $636,500 needed to cover the cost of training and related overtime expenses.

Coordination is ineffective between airspace design teams and FAA organizations that provide equipment (from the F&E account) for implementing airspace changes. Airspace changes often require new controller displays and communication equipment. Currently, FAA is pursuing many projects that may not be implemented or may be implemented outside their schedule estimates. The following are efforts that require F&E funds to shift from planning to implementation.

- The Anchorage Terminal Area Airspace Redesign project needs additional navigation equipment. This project will create new arrival and departure routes for the Anchorage area.

- The Great Lakes Region needs new sectors and equipment to support communications with military and civilian users. At one time, plans called for an additional 27 sectors. Projects in this area address the redesign of

the en route high- and low-altitude structure, terminal airspace, and special use airspace in the region.

- The Orlando 4th Runway project has a shortage of equipment and frequencies. The purpose of this project is to develop new procedures or redesign airspace or both to take full advantage of a new runway.

Also, coordination is a problem between airspace design teams and FAA organizations responsible for managing the radio frequency spectrum. Airspace redesign projects often require new radio frequencies or adjustments to existing frequency assignments, so close cooperation is essential. FAA officials responsible for managing the spectrum told us that they are not linked to local and regional NAR efforts and need to be.

The importance of effectively linking FAA offices, as well as the question of resources in terms of equipment and available frequencies, is illustrated by Agency efforts to enhance capacity and reduce delays at Chicago O'Hare. The design for reducing delays at Chicago O'Hare establishes new routes to the East Coast and southern United States from the airport. FAA then plans to add new routes to the north and west of the airport. Initially, four new sectors will be needed.

The establishment of new sectors is key for implementing these new routes and taking advantage of new runways at Chicago O'Hare. Creating additional sectors requires additional controllers, equipment, and radio frequencies. How to deal with requests for new sectors—and the corresponding resources requirements—nationwide is a matter the Air Traffic Organization must address.

FAA has taken a markedly different approach with the O'Hare Modernization Program by establishing a special office to coordinate all Agency efforts specifically for the airport modernization effort. This is a positive step, but FAA needs to establish procedures to ensure that all NAR efforts are coordinated with other FAA entities in a timely manner and link project development and implementation phases to the Operations and F&E budgets.

FAA Has Opportunities To Make NAR Efforts More Cost Effective

FAA has opportunities to make its airspace redesign efforts more cost effective. We could not estimate with any degree of accuracy the savings that could be achieved in the $20 million annual investment in airspace redesign from greater controls over how projects are planned but believe it is substantial. FAA is in the process of transitioning to the Air Traffic Organization, and airspace redesign efforts are a cross-cutting issue for the new organization.

NAR is not yet operating as a national program as intended nor is it reflective of FAA's current budget environment. In addition to bringing more discipline to airspace redesign efforts, there are several areas needing attention that will materially affect the effectiveness of FAA redesign efforts. Those areas include prioritizing airspace projects, addressing need for additional sectors, and re-evaluating how resources are used.

- **Airspace projects should be prioritized.** Our review identified 42 approved NAR projects, but FAA has not prioritized the NAR projects to ensure they are consistent with nationwide needs. Currently, priorities are loosely based on projects' linkage to FAA's *Flight Plan* and the *Operational Evolution Plan*, but this process has thus far been ineffective. Because FAA does not have established criteria for assessing a project's system-wide impact, FAA may be using limited resources on NAR projects that are not cost effective or have minimal or no impact on the efficiency and effectiveness of the flow of air traffic.

  While the cost of implementing ongoing airspace projects is uncertain, it is likely the demands (for implementing projects) will outstrip resources. FAA officials caution that addressing concerns about the O'Hare projects resource requirements will limit the Agency's ability to implement planned airspace efforts in other parts of the country. FAA needs to set expectations for what can be done in the short- and long-term given funding, spectrum, equipment, and staffing limitations.

- **FAA needs to develop a strategy for redesigning air traffic control sectors.** According to the *Operational Evolution Plan*, there are over 700 sectors in the National Airspace System and over 100 additional sectors under consideration. "Sectorization," a common term in airspace redesign efforts, refers to the process whereby FAA divides airspace into appropriately sized and shaped volumes to facilitate the flow of traffic and provide for a manageable level of work for controllers assigned to each sector. The Choke Point initiative, which was a relatively modest change, resulted in 19 new sectors being established.

  FAA is working to reduce the number of additional sectors needed because each additional sector requires additional controllers, equipment, and radio frequencies. A new sector can require as many as 10 additional controllers. For the Choke Point initiative, FAA allocated 10 controllers to each new sector but there was no direct hiring. Most facilities accommodated the additional staffing requirements using overtime and existing staff.

  A limited number of controllers (14,934) and possible retirements could make it even more difficult to open new sectors. A finite amount of

equipment and a nationwide shortage of radio frequencies are other problems. While adding or splitting sectors appears to be the preferred way to alleviate key areas of congestion, FAA needs to determine the best approach for doing so. FAA must determine the right level of sectorization if a strategy to reduce the number of sectors is needed, which appears to be the case. This strategy must take into account available resources, planned technology enhancements, expected size of the controller workforce, and the extent to which facilities can be consolidated.

- **FAA should re-evaluate how resources are allocated.** Given changes in the industry, the current budget environment, and the growing sophistication of airspace modeling and simulation techniques, it is an opportune time to rethink how resources are allocated and used for airspace redesign efforts. According to FAA data, there are 636 FAA employees currently working on airspace redesign efforts: 240 managers and staff and 396 controllers. This does not include resources being expended on the High Altitude Redesign effort or support provided by the Mitre Corporation. About half the airspace redesign funds are spent on travel and overtime. Figure 5 illustrates how airspace funds have been spent since FY 1999.

Figure 5. National Airspace Redesign Expenditures FYs 1999-2004
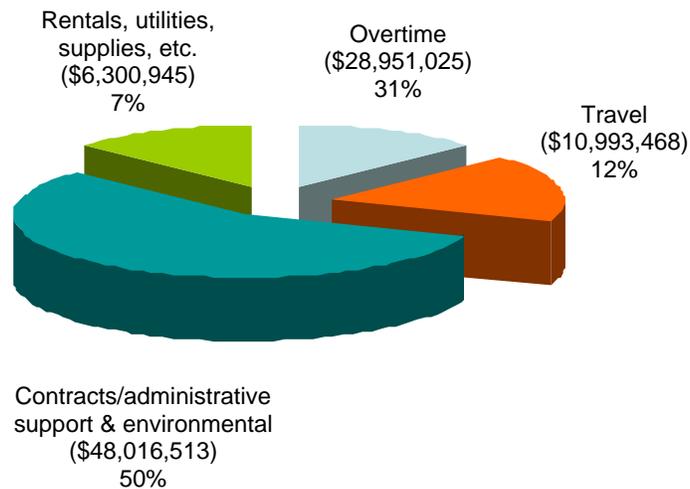
There is no question that controllers play an important role in airspace redesign, but they are asked to perform administrative and other duties outside the scope of their expertise. At the same time, airspace redesign efforts have changed from relying on maps and table exercises to complex efforts that require computer simulation and the quantification and

assessment of benefits. This, in part, explains the Mitre Corporation's commitment of resources to airspace redesign projects.

While we agree that controller involvement is vital to NAR, FAA should re-evaluate the role of controllers in the NAR process, particularly in the administrative, project development, budgeting, and decision-making arenas. Further, many controllers had to be trained on various design tools, such as the Sector Design and Analysis Tool, the Terminal Area Route Generation Evaluation and Traffic Simulation, and MapInfo, before they could do any redesign work. Some controllers selected to perform administrative functions received training on Microsoft Project so they could perform NAR administrative work. Also, controllers had to receive training on how to do staff studies for NAR.

RECOMMENDATIONS

To improve the efficiency of the NAR program and to ensure the most effective use of limited resources, changes are needed in the methods employed by FAA to develop and implement NAR projects. We recommend that the Federal Aviation Administrator:

1. Establish cost and schedule controls—as if NAR were a major air traffic control initiative—for airspace redesign projects. Airspace redesign projects need reliable cost and schedule parameters, and plans should include costs for both planning and implementation. Airspace projects should obtain Headquarters' approval and be revisited when scope and requirements change.

2. Establish procedures to ensure that NAR efforts are coordinated with other FAA entities in a timely manner. As part of this effort, FAA should link the Operations and F&E budgets to the NAR process.

3. Revise the current process for developing NAR projects to ensure that constraints and risks, (e.g., the availability of radio frequencies, F&E funds, and equipment) are factored into the process at the earliest stage.

4. Prioritize current NAR projects and establish criteria for assessing a project's system-wide impact. This will help set expectations for what can be done in the short- and long-term.

5. Develop a strategy and establish guidelines for addressing the demand for new sectors. This strategy should take into account, among other things,

planned technology enhancements, equipment and frequency limitations, and the expected size of the controller workforce.

6. Re-evaluate how resources are allocated and used by local and regional facilities to determine the most effective away to move forward with airspace redesign efforts. Controllers play a key role in airspace redesign, but FAA needs to examine ways to reduce the amount of administrative, planning, and airspace modeling work that is placed on them.

EXHIBIT A. OBJECTIVE, SCOPE, AND METHODOLOGY

The objective of this review was to determine (1) if FAA has an effective process to control costs, mitigate risks, and coordinate local, regional, and Headquarters efforts, and (2) whether opportunities exist for FAA to make airspace redesign efforts more cost effective.

- To determine if FAA has an effective process for controlling costs, mitigating risks, and coordinating local, regional, and Headquarters efforts, we reviewed NAR project charters, spending plans, overtime and expense spreadsheets, project status reports, and other documents, as we deemed appropriate during the course of our review. We interviewed managers and staff of relevant FAA offices, representatives of the National Air Traffic Controllers Association who worked on NAR projects or participated in the NAR program, representatives of the Mitre Corporation, and members of various facility leadership and design teams, as well as the Airspace Liaison Team. In addition, we reviewed reports and testimonies issued by our office and FAA.

- To identify opportunities for improving the airspace redesign process and making it more cost effective, we reviewed the *Strategic Management Plan for National Airspace Redesign* and minutes of Airspace Liaison Team meetings to identify current NAR planning and implementation processes and problems arising from those processes. We also met with representatives of Northwest Airlines, the National Air Traffic Controllers Association, and current and former FAA airspace managers.

We performed the audit from August 2003 through December 2004 and updated our report to reflect recent developments with the Chicago O'Hare Modernization Program. The audit was conducted in accordance with Government Auditing Standards as prescribed by the Comptroller General of the United States and included such tests of procedures, records, and other data as was warranted. In particular, we obtained spreadsheets from the FAA's Budgeting and Accounting Tracking System and reviewed the process whereby data are entered, reviewed, and corrected. We used the data solely to generate the overall cost of the NAR program and identify projects that required closer scrutiny. Since the data we obtained were not used to formulate our findings or recommendations, we did not proceed to a full review of the Budgeting and Accounting Tracking System.

EXHIBIT B. FAA SITES VISITED

FAA Headquarters

Air Traffic Control System Command Center

Eastern Region
    Region Headquarters
    Region NAR Office
    New York Terminal Radar Approach Control (TRACON)
    New York Center
    LaGuardia Air Traffic Control Tower

Great Lakes Region
    Region Headquarters
    Chicago Center
    Detroit Air Traffic Control Tower

Northwest Mountain Region
    Region Headquarters
    Seattle TRACON
    Seattle Center

Southern Region
    Region Headquarters
    Atlanta Large TRACON
    Atlanta Center

Western Pacific Region
    Region Headquarters
    Southern California TRACON

Non-FAA Sites
    The Mitre Corporation's Center for Advanced Aviation Systems Development

EXHIBIT C. MAJOR CONTRIBUTORS TO THIS REPORT

THE FOLLOWING INDIVIDUALS CONTRIBUTED TO THIS REPORT.

Name	Title
M. E. Hampton	Program Director
Fidel Cornell Jr.	Project Manager
Coletta Treakle	Lead Analyst
Raymond Denmark	Senior Analyst
Krystal Patrick	Senior Analyst
Jennifer Randall	Analyst

Exhibit C. Major Contributors to This Report

APPENDIX. AGENCY COMMENTS

**U.S. Department
of Transportation

Federal Aviation
Administration**

Memorandum

Subject:	**INFORMATION:** FAA's Response to OIG Draft Report: Airspace Redesign Efforts Are Critical But Major Improvements Are Needed
From:	Assistant Administrator for Financial Services and Chief Financial Officer
To:	Assistant Inspector General for Aviation Audits

Date: April 13, 2005

Reply to
Attn. of:

As requested in your memorandum dated March 11, we are providing the following comments to the subject draft report.

The implementation of the Air Traffic Organization (ATO) emphasizes strategic planning and integrated program management across service lines. This philosophy serves as the foundation for a renewed airspace management plan. This new plan takes projects from idea through implementation in an end-to-end process that bridges the gaps between the traditionally held view of operations and capital account activities. It is a complete program management activity that considers each component of National Airspace System (NAS) modernization--communications, navigation, surveillance, and air traffic management (CNS/ATM)--to enhance the capacity of the NAS. The National Airspace Redesign (NAR) design activities, while still critical to success, will become a subset of this overall activity.

NAR evolved as a program from the late 1990s from the realization that immediate changes were needed in the NAS to keep pace with rapidly growing demand. Across the country, airspace design teams were formed in facilities and regions to undertake this assignment. Largely, they succeeded with the task they were given--to explore the problems in their own airspace and set about improving their service. They rapidly implemented what amounted to an almost continuous series of incremental sector design projects that generally keep pace with demand, despite a focused national strategy. A related activity was support

Appendix. Agency Comments

for the development of airspace plans to complement the Operational Evolution Plan's new runway initiatives.

The tools at their disposal were the creation of "more manageable" airspace designs primarily through sector "splits" and realignment of workload among sectors with static airspace boundaries. NAR was created to permit the development of concepts and ideas that previously were not addressed as part of the Capital Investment Plan because they were not acquisitions or new systems. That very omission meant that the plans created in the field faced inadequate staffing or equipment to implement many of their plans and designs.

Generally, we view the OIG report to be a balanced assessment of the NAR program as it existed during the report period. However, as we discussed during recent meetings with the report authors, many changes are underway to create an end-to-end airspace management process. We believe these changes are directly addressing the recommendations contained in the report. NAR airspace design activities are only part of the total scope of NAS change management. Within the ATO's strategic management process, we are taking steps to coordinate and validate airspace change needs among all of the stakeholder organizations in the agency. This validation considers the cost-benefit ratio of the proposal from the aviation community's perspective and as a service provider. It also evaluates the risk to implementation posed by environmental processes and CNS/ATM technical limitations. With this key validation process in place, complete funding requirements for each initiative will be planned in both the operations and facilities and equipment accounts. As a result, cost and schedule control become much more straightforward than in the past. This last task will be accomplished with participation from each involved line of business under the policy guidance and oversight of ATO's Finance Services organization.

By linking each project's requirements to both the operations and capital budgets, we will address procedural, environmental, technical, and staffing requirements in complete service implementation packages. This will permit much tighter integration of cost and schedule management, along with increased visibility for risks posed by any part of the program. We have learned many lessons since the NAR program was established. Our successful experience with the chokepoints initiative and, recently, with Domestic Reduced Vertical Separation Minimum are leading to a more tightly integrated change management process.

The recommendations raised by the OIG report serve to validate that we are on the right track. We look forward to updating the OIG on our progress in the months to come.

Ramesh K. Punwani

Appendix. Agency Comments