



Highlights of [GAO-08-1073](#), a report to Congressional Committees

Why GAO Did This Study

In 1996, DOD initiated the Space Based Infrared System (SBIRS) to replace the nation's current missile detection system, and to provide expanded missile warning capability. Since then, SBIRS has been restructured several times to stem cost increases and schedule delays, including revising program goals in 2002, 2004, and 2005. These actions were partly due to the challenges of developing sophisticated technologies and software. In 2007, SBIRS had a major setback when flight software for the first satellite underwent testing and failed, a failure caused by design issues. DOD developed a plan for resolving these issues, and revised its cost and schedule goals. GAO has assessed (1) the approach used to mitigate the problems, and (2) the cost and schedule risks and challenges of that approach. To conduct our work, GAO has contacted, met with, and performed detailed work at numerous DOD and contractor offices; and reviewed technical documents on flight software.

What GAO Recommends

GAO recommends that the Secretary of Defense revise cost and schedule goals commensurate with acceptable risk to increase the confidence of success, and require the contractor to adhere to disciplined software practices as a priority to reduce risk. DOD partially concurred with the first recommendation to revise the cost and schedule estimates, and concurred with the recommendation to prioritize adherence to software practices.

To view the full product, including the scope and methodology, click on [GAO-08-1073](#). For more information, contact Cristina T. Chaplain at (202) 512-4841 or chaplainc@gao.gov.

SPACE ACQUISITIONS

DOD's Goals for Resolving Space Based Infrared System Software Problems Are Ambitious

What GAO Found

To mitigate the SBIRS flight software problems, DOD has assessed various alternatives and developed a way to implement the software redesign and oversee its development. In April 2008, DOD approved the redesign effort, which addressed problems with the original design that affected the timing of stored programs, distribution of control between processors, and failure at the hardware interface level. Six review teams comprised of 70 personnel in all evaluated the designs to ensure the technical solutions, development approach, and readiness of test facilities were adequate. DOD and its contractor are now implementing the simplified architecture, developing new software, and testing elements critical to the integration and test of systems. DOD is also improving its program oversight and better managing the SBIRS development, by acting on the recommendations of an Independent Program Assessment; addressing weaknesses in management responsibility, accountability and organizational structure; and establishing a central execution team.

DOD has estimated that the SBIRS program will be delayed by 15 months and cost \$414 million in funding to resolve the flight software problems, but these estimates appear optimistic. For example, confidence levels—based on the program's ability to develop, integrate, and test software in time to meet the schedule goal—have been assessed as low.

Confidence Level to Produce Software in Time to Meet First Satellite Launch Goal

| Confidence level | Contractors | Estimated launch goal |
|----------------------|-----------------------|-----------------------|
| Less than 10 percent | Aerospace Corporation | December 2009 |
| 5 percent | Galorath, Inc. | December 2009 |
| 50 percent | Lockheed Martin | December 2009 |

Source: U.S. Air Force (data); GAO (analysis and presentation).

Further, the review teams who approved the designs to start coding software report that the program's aggressive schedule is a major challenge because it allows "little margin for error." DOD has also introduced risk by granting waivers to streamline the software development processes to meet the aggressive schedule. These allow the program to deviate from disciplined processes in order to compress the schedule and meet the goal. In addition, some software elements are behind schedule, and thousands of software activities and deliverables remain to be integrated. Delay by these other programs could create unintended consequences for the SBIRS launch goal. If DOD should need additional time or encounter problems beyond what was planned for, more funds will be needed and launch of the first satellite in December 2009 could be jeopardized.