



# **STATUS OF THE FEDERAL BUREAU OF INVESTIGATION'S IMPLEMENTATION OF THE SENTINEL PROJECT**

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## Introduction

This report is the seventh in the series of reviews that the Office of the Inspector General (OIG) has conducted to examine the Federal Bureau of Investigation's (FBI) progress in developing and implementing Sentinel, its new information and investigative case management system.

According to the FBI's original plan, established in March 2006, Sentinel would be developed in four phases with the total cost estimated at \$425 million and the completion date was estimated to be December 2009. Our prior reports examined the development and implementation of Sentinel, and in those reports we expressed concerns about Sentinel's overall progress, schedule, increased costs, and inability to satisfy user requirements.

In our most recent report before this one, issued in March 2010, we described how the FBI had issued a partial stop-work order to Lockheed Martin Services Incorporated (Lockheed Martin), the primary contractor on the Sentinel project, for portions of Sentinel's Phase 3 and all of the project's Phase 4 because of significant issues regarding performance, usability, and quality of work delivered by Lockheed Martin.<sup>1</sup> In that report, we also expressed serious concerns about the progress of the Sentinel project.

In this report, we examine the current status of the Sentinel project. We discuss the deployment of Sentinel's Phase 2 as of July 2010, and we assess the functionality of the system delivered by Phase 2 of Sentinel, including comparing what the FBI intended to deliver to its agents and analysts and what was actually delivered. We also describe the FBI's recent decision to change the partial stop-work order for Phases 3 and 4 to a full stop-work order. We discuss our concerns that the implementation of Sentinel is delayed, over budget, and in danger of not delivering a fully functioning automated case management system. Finally, we discuss the status of the FBI's newly announced plans to complete Sentinel, and our initial questions and concerns about that new strategy.

## Background

The FBI's attempt to move from a paper-based to an electronic case management system began in 2001 with the Virtual Case File (VCF), a major

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<sup>1</sup> U.S. Department of Justice Office of the Inspector General, *Status of the Federal Bureau of Investigation's Implementation of the Sentinel Project*, Report 10-22 (March 2010).

component of the FBI's Trilogy information technology (IT) modernization project. Designed to replace the obsolete Automated Case Support (ACS) system, the FBI abandoned the VCF project in 2005 after spending \$170 million. As detailed in the OIG's February 2005 audit report, the VCF project failed for a variety of reasons, including poorly defined design requirements, a lack of mature management processes, high management turnover, and poor oversight.<sup>2</sup>

On March 16, 2006, the FBI announced the award of a \$305 million contract to Lockheed Martin as part of a \$425 million project to develop a new system – called Sentinel. The FBI expected to implement Sentinel in four overlapping phases, each lasting 12 to 16 months. Each phase was intended to provide a stand-alone set of capabilities upon which subsequent phases would add further capabilities. The fourth and final phase of Sentinel was originally scheduled to be completed by December 2009.

The FBI intended that Sentinel, when fully implemented, would provide FBI agents and analysts with a user-friendly, web-based electronic case management system that would give them the ability to manage evidence and automate the document review and approval process. Additionally, Sentinel was designed to be the official FBI records repository and provide users with expanded search capabilities, enhancing agents' ability to link cases with similar information. The FBI planned to migrate all data from ACS to Sentinel and eventually retire ACS.<sup>3</sup>

On June 19, 2007, the FBI announced that it had fully deployed Phase 1 of Sentinel. Phase 1 delivered two key project components: a web-based portal to ACS and workboxes for FBI agents and supervisors that summarized case information.

As a result of lessons learned during the development of Phase 1, the FBI and Lockheed Martin replanned the remaining three phases of Sentinel. During this replanning, the FBI estimated that the total cost of Sentinel would increase from \$425 million to \$451 million and the projected completion date was extended from December 2009 to June 2010. Also, the FBI and Lockheed Martin adopted an incremental development methodology for the remaining portions of Sentinel that divided Phases 2 through 4 into

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<sup>2</sup> The Department of Justice, Office of the Inspector General, *The Federal Bureau of Investigation's Management of the Trilogy Information Technology Modernization Project*, Audit Report 05-07 (February 2005).

<sup>3</sup> Implemented in October 1995, ACS is the FBI's current case management system. As of August 2010, the paper-based ACS contains records for over 8.3 million cases.

segments, which were further divided into increments. A major reason for switching to this incremental development model was the FBI's desire to deliver new capabilities to users every 3 to 6 months. Phase 2 was divided into four segments.

By July 2009, Lockheed Martin had delivered the first three segments of Phase 2.

On December 2, 2009, the FBI conditionally accepted delivery of Sentinel's Phase 2, Segment 4, which included three of the eight electronic forms expected to be delivered in Segment 4, and their associated workflow.<sup>4</sup> The FBI conditionally accepted this segment despite knowing that what was delivered had serious performance and usability issues and had received overwhelmingly negative user feedback during testing with FBI agents and analysts. As a result, the FBI did not deploy Segment 4 to the FBI's agents and analysts when it conditionally accepted it in December 2009.

Then, on March 3, 2010, the FBI issued a partial stop-work order to Lockheed Martin for portions of Phase 3 and all of Phase 4, and also returned Phase 2, Segment 4 to the development phase from the operations and maintenance phase. FBI officials stated that the purpose of the partial stop-work order for Phases 3 and 4 was to focus Lockheed Martin's efforts on delivering Phase 2, Segment 4 in a form that the FBI would find acceptable.

On July 26, 2010, the FBI deployed Segment 4 to FBI agents and analysts.

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<sup>4</sup> The three forms delivered were: (1) Electronic Communication, (2) Lead Request, and (3) Report of Information That May Become the Subject of Testimony. The forms not delivered were: (1) Intelligence Bulletin, (2) Search Results Document, (3) Payment Authorization, (4) Export Form, and (5) Import Form. In addition, Lockheed Martin delivered the capability to transfer all of the administrative case files – approximately 2 percent of all FBI case files – from ACS to Sentinel, an on-line user help tool, and interfaces to two FBI IT systems, the Document Conversion Laboratory and the Financial Management System.

## Results in Brief of this OIG Review

This OIG review examined the progress of Sentinel since our last report in March 2010. In this review, we found significant additional issues that we believe can affect the full and successful implementation of Sentinel.<sup>5</sup>

Our review found that as of August 2010, after spending about \$405 million of the \$451 million budgeted for the Sentinel project, the FBI has delivered only two of Sentinel's four phases to its agents and analysts.<sup>6</sup> Moreover, we believe that the most challenging development work for Sentinel still remains.

In addition, we found that while Sentinel has delivered some improvements to the FBI's case management system, it has not delivered much of what it originally intended. In July 2010, the FBI deployed Phase 2 of Sentinel, which provides the FBI's agents and analysts with the beginnings of an electronic case management system. Yet, by July 2010 Sentinel was intended to generate and securely process 18 paperless case-related forms through the review and approval process. Sentinel now only has the capability to generate and process 4 of the 18 forms.<sup>7</sup> Moreover, even these four forms still are not fully automated. Because Sentinel's four phases have not been completed, FBI agents and analysts can use Sentinel to generate the four forms, but they must still print the forms to obtain approval signatures, and they must maintain hard copy files with the required approval signatures.

Additionally, because the FBI has not finished the third and fourth Phases of Sentinel, FBI agents and analysts do not have the planned expanded capabilities to search the FBI's case files. Nor can they use Sentinel to manage evidence, as originally intended. Sentinel also has not

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<sup>5</sup> Because of the significance of these issues and the recent actions taken by the FBI regarding Sentinel, we are reporting on these issues in this technical advisory report. A technical advisory report is not intended to comply with generally accepted government auditing standards, as a full-scale audit report would.

<sup>6</sup> The FBI has estimated that, by the end of September 2010, it will have spent approximately \$405 million.

<sup>7</sup> The four forms delivered in Phase 2 were: (1) Report of Information That May Become the Subject of Testimony, (2) Import Form, (3) Lead Request Form, and (4) Electronic Communication Form. The FBI stated that these forms are considered the most essential of the 18 forms to the work performed by the FBI's agents and analysts. However, the remaining 14 forms include important forms, such as those that are intended to share intelligence information and track payments to informants.

replaced ACS, and Sentinel has not yet become the FBI's official records repository.

In addition, because of Sentinel's delays and cost increases, in July 2010 the FBI issued another stop-work order that directed Lockheed Martin to stop all work on the remaining phases of Sentinel – Phases 3 and 4. As of August 1, 2010, the FBI had not decided on an approach for completing Sentinel, and FBI officials did not provide the OIG with detailed descriptions of the alternatives under consideration for completing Sentinel. At that time, however, the FBI Chief Technology Officer stated that the alternatives under consideration would allow the FBI to complete Sentinel within its \$451 million budget by re-using portions of successful FBI IT projects, including Sentinel, taking advantage of technological advances and industry best practices, and increasing the reliance on FBI personnel to develop Sentinel. Yet, the Chief Technology Officer acknowledged that his estimate did not include the cost of maintaining Sentinel for 2 years after its completion – costs which had been included in all previous Sentinel budgets. In addition, an independent assessment conducted in July 2010 at the FBI's request by Mitre estimated that completing Sentinel under the FBI's current development approach would, at a minimum, cost an additional \$351 million and take an additional 6 years.

After we provided the FBI a copy of our draft report for its comment in September 2010, the FBI requested an opportunity to brief us on its new approach for completing the Sentinel project. On September 16, 2010, the FBI described this new approach, which is still evolving and has not yet been formally approved. Under this new approach, the FBI will assume direct management of Sentinel development and significantly reduce the role of Lockheed Martin in developing Sentinel. In the final section of this report we provide a summary of the approach that the FBI described to us, and our questions and concerns about it.

However, regardless of the new development approach, it is important to note that Sentinel's technical requirements are now 6 years old, and there have been significant advances in technology and changes to the FBI's work processes during that time. We believe that the FBI needs to carefully reassess whether there are new, less costly ways of achieving the functionality described in Sentinel's original requirements, including the requirement to migrate all case data from ACS into Sentinel. The FBI stated that it is reexamining these issues in its new approach to Sentinel. In any new approach, we believe that the FBI should prioritize the remaining requirements to focus on meeting its highest priorities. Finally, we believe that the FBI should reinstitute or expand many of the project management activities that have been either limited in scope or eliminated during the

course of the project, such as Project Health Assessments, which are independent monthly analyses of Sentinel's progress.

The following sections of this report provide further description of the findings of our review.

## **Sentinel's Budget**

As noted above, when the FBI began development of the Sentinel case management system in March 2006, it estimated the entire project would be finished in December 2009 and cost \$425 million. In October 2007, the FBI increased the cost estimate for Sentinel from \$425 million to \$451 million.

Our concerns about the progress of the project have intensified because Sentinel is approximately \$100 million over budget and 2 years behind schedule. The FBI has estimated that, by the end of September 2010, it will have spent approximately \$405 million of the \$451 million currently budgeted for the entire program, but it will have delivered only two of the program's four phases to its agents and analysts.<sup>8</sup> When Sentinel's current \$451 million budget was adopted, the combined cost of Phases 1 and 2 of Sentinel was approximately \$306 million. As result, at this stage of the project, Sentinel is approximately 32 percent over budget.

In August 2010, FBI officials told us that they were considering a plan that would allow the FBI to complete Sentinel development within its current \$451 million budget. They said this plan would achieve efficiencies and reduce costs by re-using portions of FBI IT projects, including Sentinel, taking advantage of technological advances and industry best practices, and increasing reliance on FBI personnel to develop Sentinel.

However, the FBI's Chief Technology Officer acknowledged to us that this plan did not account for the government personnel that would be assigned to the Sentinel project or for 2 years of operations and maintenance activities after Sentinel is completed to cover services that

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<sup>8</sup> The FBI made this estimation in August 2010. The \$451 million currently budgeted for the entire program includes operations and maintenance costs for 2 years after full implementation of all four phases of the project. The FBI has also estimated that it will likely not complete the project until at least 2011, or approximately 2 years later than originally planned.

originally were to be provided by Lockheed Martin as part of the \$451 million budget.<sup>9</sup> In addition, neither the FBI's Chief Information Officer nor Chief Technology Officer provided us with a schedule estimate for the work required to complete Sentinel development using the approach they were considering.<sup>10</sup>

Moreover, as a result of concerns about Sentinel's cost and schedule, in July 2010, the FBI obtained an independent assessment for completing Sentinel from Mitre, a federally funded research and development center.<sup>11</sup> Mitre estimated that completing Sentinel under the FBI's development approach at that time would, at a minimum, cost an additional \$351 million and take an additional 6 years.

In addition, it is important to recognize that extensions of Sentinel's schedule increases the likelihood that some of the hardware and software already implemented will become obsolete, which would further increase the cost of the Sentinel upgrade.

## **Status of Sentinel Phase 2 Implementation**

In July 2010, the FBI deployed Segment 4 of Phase 2 to FBI users. The FBI informed us that it anticipates formally accepting Phase 2 from Lockheed Martin on October 15, 2010.

Phase 2 of Sentinel provided important benefits to FBI users, such as an improved Sentinel user interface, the ability to search ACS through Sentinel, and the beginnings of an electronic case management system. However, we also found that Phase 2 delivered significantly less functionality to FBI users than originally planned. For example, Lockheed Martin delivered in Phase 2 the capability to create four forms and manage their

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<sup>9</sup> According to the FBI, the \$451 million would fund the operations and maintenance of Sentinel through May 2012. However, because Sentinel is behind schedule, the \$451 million would not fund the operations and maintenance of Sentinel for 2 years after its completion, as originally intended.

<sup>10</sup> As noted above, additional information on the FBI's planned approach for completing Sentinel was received after this report was issued in draft. A summary of this information is on page 18 of this report.

<sup>11</sup> The Mitre assessment was performed from March through June 2010. Mitre is a federally funded research and development center that assists the government with scientific research and analysis; development and acquisition of large, complex systems; and systems engineering and integration.



approval processes entirely within Sentinel. Yet, the FBI expected delivery of eight forms with that capability during Phase 2.<sup>12</sup>

In addition, Sentinel was intended to have the capability to share information through interfaces with 10 other FBI IT systems external to Sentinel instead of the 8 interfaces that Lockheed Martin delivered.<sup>13</sup>

The FBI also expected that Sentinel would give users the capability to open, manage, and close administrative cases, and also create, manage, and store all of their related documents entirely within Sentinel. FBI personnel use administrative cases to manage non-investigation activities, including activities that support investigations such as adjustments to personnel field office assignments and travel management in support of investigative cases. However, in some instances Lockheed Martin failed to deliver the anticipated capabilities for even administrative cases, such as the ability to produce standardized management reports and also to electronically index all of the documentation stored in Sentinel.

In addition, the FBI decided not to make some capabilities delivered by Lockheed Martin available to Sentinel users. For example, FBI officials decided not to deploy the new capabilities to manage administrative cases within Sentinel and store this case data in Sentinel as planned. The FBI said it made this decision because it was reassessing its approach for completing Sentinel development. The FBI's Chief Technology Officer stated that deploying the new administrative case management capabilities to users would commit the FBI to moving forward on Sentinel using the current technical design, which a study by a team of representatives from the developers of Sentinel's software components recommended be revised to improve the performance and reliability of Sentinel.

Thus, at this stage of the Sentinel project, FBI users have received far less functionality than was planned. Sentinel largely remains a more user-friendly way to search ACS rather than the state of the art, stand-alone case management system that it was envisioned to provide by now.<sup>14</sup>

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<sup>12</sup> The four forms deployed to FBI users in Phase 2 were: (1) Report of Information That May Become the Subject of Testimony, (2) Import Form, (3) Lead Request, and (4) Electronic Communication. The forms not delivered were: (1) Intelligence Bulletin, (2) Search Results Document, (3) Payment Authorization, and (4) Export Form.

<sup>13</sup> The two interfaces not delivered are: (1) Document Conversion Laboratory and (2) Financial Management System.

<sup>14</sup> As of August 2010, no case data is stored in Sentinel. Rather all case data is stored in ACS, and Sentinel currently can access ACS for case data. The FBI had planned by the end of Phase 4 to migrate all data from ACS to Sentinel and eventually retire ACS.

## *Sentinel Phase 1 and 2 Deliverables*

The deployment of additional functionality to the FBI's agents and analysts has been increasingly delayed as the technical challenge of the program increased in Phase 2. In June 2007, the FBI had fully deployed Phase 1 of Sentinel, providing FBI employees with user-friendly, web-based access to information in ACS, as well as improved search capabilities. Phase 1 also featured a case management workbox that presented a summary of all cases a user is involved with, rather than requiring the user to perform a series of queries to find cases. The FBI deployed Phase 2, Segment 1 in July 2008 and on July 26, 2010, the FBI deployed Segment 4, the last segment of Phase 2, to all Sentinel users.

Segment 4 of Phase 2 was scheduled to be deployed in October 2009, but Lockheed Martin did not deliver it until December 2009. The FBI did not deploy Segment 4 as delivered because Lockheed Martin could not resolve several key functionality and performance issues.

In October 2009, the FBI's Chief Information Officer directed the Sentinel Program Management Office (PMO) to conduct pilot deployments of Phase 2, Segment 4 before deploying Segment 4 to all FBI users. The pilot was designed to assess the performance of the four forms delivered in Segment 4, to obtain additional FBI user feedback, and to allow for any critical changes to the system or training materials before deploying the segment to the entire FBI user community.

However, the pilot deployments were delayed 5 months – from December 2009 to May 2010 – because Lockheed Martin did not deliver Segment 4 until December 2009 and because it could not resolve several key functionality and performance issues.<sup>15</sup> The Segment 4 pilots were eventually conducted at the FBI field offices in Richmond, Virginia, and Tampa, Florida, from May 12, 2010, through June 10, 2010. Major issues surfaced at both pilot sites. For example, users at both pilot sites expressed concerns about the lack of an auto-save capability, difficulties with using the text editor, and the absence of an integrated spell checker. As a result of the lack of an auto-save capability, several users lost partially completed forms and hours of work while using Sentinel. Users also found the lack of an integrated spell checker unacceptable because most current word processing software includes this feature.

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<sup>15</sup> As noted above, the FBI conditionally accepted Phase 2, Segment 4 on December 2, 2009. At that time, however, the FBI directed Lockheed Martin to correct 26 critical performance and usability issues before the FBI would initiate the pilot deployment of Segment 4.

As of August 2010, the FBI anticipated that it would complete Segment 4 deployment and formally accept Segment 4 at the Segment Acceptance Review on October 15, 2010, approximately 1 year later than planned when Segment 4 began.<sup>16</sup>

The following table shows the status of major deliverables planned for all of Phase 2.

### Major Phase 2 Deliverables

| Functionality  | Planned | Delivered | Deployed |
|--|---------|-----------|----------|
| <b>Administrative and Investigative Forms</b><br>Including electronic workflows, digital signatures, and serialization <sup>17</sup> | 8       | 4         | 4        |
| <b>System Interfaces</b>   | 10      | 8         | 8        |
| <b>Enhanced User-Friendly Interface</b>  | Yes     | Yes       | Yes      |
| <b>Case Management Workbox</b><br>User access to assigned cases and leads  | Yes     | Yes       | Yes      |
| <b>Administrative Case Management</b>  |         |           |          |
| Open/Manage/Close Cases Using Sentinel   | Yes     | Yes       | No       |
| Enhanced Search of Administrative Cases  | Yes     | Yes       | No       |
| Data Migration   | Yes     | Yes       | No       |
| Standardized Management Reports  | Yes     | No        | No       |

Source: OIG analysis

<sup>16</sup> A Segment Acceptance Review is a milestone used by the Sentinel PMO to review the work accomplished in a segment to determine whether the planned tasks have been completed and whether they met the goals of the segment.

<sup>17</sup> Workflow is the automation of a business process, in whole or part, during which documents, information, or tasks are passed from one participant (human or machine) to another for action, according to a set of procedural rules. Although Sentinel users can digitally sign the new Sentinel forms, they must also print and sign the forms because paper remains the official system of records.

When a document is serialized, it is assigned a unique identifying sequential number within the case along with a unique case number. Once a document is serialized, it is placed into the official case file and becomes an official record.

## What Was Not Delivered During Phase 2

As noted above, Sentinel Phase 2 did not deliver all that was originally intended. According to the initial plan for Phase 2, Lockheed Martin did not deliver four additional forms and their associated workflow. Those forms were the: (1) Intelligence Bulletin, (2) Search Results Document, (3) Payment Authorization, and (4) Export Form. Incorporating these forms into Sentinel would have significantly increased the usefulness of Sentinel to the FBI's agents and analysts. For example, the Intelligence Bulletin is the FBI's most widely disseminated intelligence product and is especially valuable to state and local law enforcement agencies. FBI agents also routinely use the Payment Authorization Form to pay informants. The Search Results Document would have given Sentinel users the ability to save part or all of the results of one or more searches to a newly created document. The Export Form would have allowed Sentinel users to transmit case documents and information to other FBI IT systems. None of these forms were provided to FBI users in Phase 2 of Sentinel, as originally intended.

In addition, Phase 2 did not deliver the interfaces between Sentinel and two additional FBI IT systems, the Document Conversion Laboratory and the Financial Management System. These interfaces would allow the transfer of information between FBI IT systems so that more complete information can be furnished to IT users no matter which system they are logged into -- in essence, allowing users to more easily access information on related IT systems.<sup>18</sup>

Lockheed Martin also did not deliver the ability to create standardized management reports based on the data stored in Sentinel. These reports, which are not available in ACS, would assist FBI case agents and supervisors in monitoring the status of FBI cases, allowing them to manage cases and resources more effectively. For example, some Sentinel management reports focused on lead management, including the capability to view or print reports related to leads and lead activity. Yet, during system testing of the Phase 2 reporting capabilities, Sentinel PMO and Lockheed Martin personnel identified significant functional challenges with the capabilities of these reports such as the display of a single record multiple times in a report, the inability to display multiple pages, and the inability to rename an existing report to aid in quick identification of the report. As a result,

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<sup>18</sup> For two IT systems to exchange data, both systems must build an interface for the other. Our review did not assess the progress of interface development from other FBI systems to Sentinel.

Lockheed Martin did not successfully deliver this reporting capability in Phase 2, as originally intended.

#### Deliverables Not Deployed by the FBI

While Lockheed Martin did not provide all deliverables planned for Phase 2, it delivered some capabilities that the FBI decided not to deploy because of concerns the FBI had with the technical design of Sentinel. Specifically, during the development of Segment 4, Lockheed Martin migrated administrative case data from ACS to Sentinel (approximately 2 percent of the data in ACS). Lockheed Martin also delivered planned case management capability for administrative cases, including the ability to open administrative cases, add case documents to them, store the related data within Sentinel (as opposed to ACS), and search the data stored within Sentinel. As noted above, FBI personnel use administrative cases to manage all non-investigation activities, including activities that support investigations such as adjustments to personnel field office assignments and travel management in support of investigative cases. The capability for managing administrative cases was intended to be a prototype of the paperless case management functionality Sentinel is ultimately intended to deliver for all FBI cases. However, in July 2010, FBI officials decided not to deploy the new case management functionality for administrative cases because the FBI is currently reassessing its plan for completing Sentinel, which includes an assessment of Sentinel's design.

Because the FBI had not determined the approach it will use to complete Sentinel, it could not provide us with data on what portion of the administrative case management functionality will be reused, if any. Also, FBI officials stated that the FBI could not determine the cost or amount of time spent on the portion of Sentinel that Lockheed Martin had delivered but that the FBI decided not to deploy due to concerns about its design.

In addition, as a result of not deploying the administrative case management functionality, the FBI does not have the opportunity to refine its new paperless case management capability on administrative cases before deploying it for FBI investigative cases, when the impact of any problems will be much greater.

#### *Percent of Functionality Delivered by Phase 2 Segment 4*

As noted above, an independent assessment performed by Mitre at the request of the FBI in July 2010 reviewed the Phase 2, Segment 4 functionality delivered by Lockheed Martin. According to Mitre's assessment, as of June 16, 2010, the as-built Segment 4 system contained approximately

80 percent of the functionality planned for the end of the segment. However, the report also noted that key functionality planned for Segment 4 was incomplete, including the ability to serialize documents, complete electronic forms, and generate reports for administrative cases.<sup>19</sup>

FBI officials disagreed with Mitre's assessment of how much of Segment 4's functionality had been delivered. The FBI's Sentinel PMO conducted its own assessment of Segment 4 as of July 22, 2010, using one of the six methodologies employed by Mitre and concluded that Segment 4 had delivered 94 percent of its planned functionality.<sup>20</sup>

### *Phase 2 Segment 4 User Acceptance*

It appears that FBI employees have been slow to adopt Sentinel's new forms and work flows. FBI personnel with access to Sentinel have not yet begun to use the system as frequently as they currently use ACS. We determined that from July 26, 2010, through August 31, 2010, approximately the first 5 weeks after Phase 2, Segment 4 was deployed, an average of 2,309 of the FBI's 35,000 employees logged on to Sentinel at least once each day and created a total of 132 new Sentinel forms. In comparison, during the same period an average of 7,581 FBI employees logged onto ACS each day and created an average of 14,831 documents.

It is too early to fully assess or identify the reason Sentinel is not used more frequently. In response to our draft report, the FBI stated that it was premature to draw any conclusions about FBI employees' willingness to use Sentinel based on the first 5 weeks of deployment. The FBI also noted that ACS-user statistics include functionality not yet offered by Sentinel. We agree that the data does not allow for any conclusions about user acceptance of Sentinel, but we also believe the data shows that FBI users have been slow to adopt the new the features of Sentinel.

In addition, because so few documents are being created in Sentinel, the FBI has not obtained meaningful real-world data about Sentinel's reliability and performance when the number of users increases to the level of ACS.

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<sup>19</sup> When a document is serialized, it is assigned a unique identifying sequential number within the case, along with a unique case number. Once a document is serialized, it is placed into the official case file and becomes an official record.

<sup>20</sup> We attributed the difference between the FBI's and Mitre's estimate to differences in the methodology and updates to the software made between the dates of the two assessments.

Nevertheless, while Segment 4 has not been deployed to users long enough to allow us to fully analyze the use of Segment 4 or assess user feedback on the segment's functionality, it appears that Sentinel users, while curious enough about the system to log on, have not yet embraced the available functionality and workflow. We believe that the four forms available in Sentinel and their associated electronic workflows, if they function as designed, should eventually offer FBI agents and analysts the ability to complete commonly used forms with a modern, user-friendly interface without having to enter ACS. Also, the electronic workflow feature allows FBI employees to view the approval status of any document that they have prepared.

The FBI has adopted a cautious approach to requiring its agents and analysts to use Sentinel. Therefore, even after the final deployment of Phase 2 Segment 4 in September 2010, use of Sentinel will be optional. A Sentinel PMO official informed us in July 2010 that the use of Sentinel to create the four forms available in Sentinel will be optional until Sentinel is completed and all the data from ACS is migrated. As previously noted, however, this could take several more years. As a result, FBI personnel must still perform many ACS work processes when they complete a form using Sentinel, such as printing and signing it. In addition, if the document contains any indexing, an additional copy has to be printed, annotated by hand, and forwarded to an administrative assistant so the indexed data can be manually entered into ACS.<sup>21</sup>

Based on this redundant process, it does not appear that Phase 2 has substantially improved the efficiency with which FBI employees can create case documents. Thus, users may have little incentive to use Sentinel and may continue to use ACS for the foreseeable future.

### **Phases 3 and 4 of Sentinel**

As noted above, in July 2010 the FBI directed Lockheed Martin to stop all work not associated with Phase 2. Specifically, the FBI issued a 90-day full stop-work order for all Phases 3 and 4 activities, effective July 24, 2010, through October 21, 2010, because Lockheed Martin was unable to close

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<sup>21</sup> Names and other information can be "indexed" in the FBI's computer system, thereby allowing FBI personnel to determine, for example, whether an individual has been the subject of or involved in other investigations.

outstanding Defect Reports associated with Phase 2 development in a timely manner.<sup>22</sup>

The following table shows the current status of the major functions originally planned for Phases 3 and 4.

**Planned Functionality for Phases 3 and 4**

| <b>Phase 3</b>                               | <b>Planned</b> | <b>Delivered</b> | <b>Deployed</b> |
|--|----------------|------------------|-----------------|
| Case Management for all Cases                | Yes            | No               | No              |
| Advanced Search Capability                   | Yes            | No               | No              |
| Standardized Reports                         | Yes            | No               | No              |
| Document and Case Indexing                   | Yes            | No               | No              |
| Full Leads Management                        | Yes            | No               | No              |
| Collected Items Management                   | Yes            | No               | No              |
| Additional External Interfaces               | Yes            | No               | No              |
| Automated Redaction of Sensitive Information | Yes            | No               | No              |
| <b>Phase 4</b>                               |                |                  |                 |
| Migrate all Data from ACS to Sentinel        | Yes            | No               | No              |
| Additional Electronic Forms                  | Yes            | No               | No              |
| Additional Standardized Reports              | Yes            | No               | No              |
| Additional External Interfaces               | Yes            | No               | No              |
| Complete Indexing                            | Yes            | No               | No              |
| Certified Records Management                 | Yes            | No               | No              |

**Source:** OIG Analysis

Thus, while major functionality included in Phases 3 and 4 was planned for delivery by September 2010, none of it from Phases 3 and 4 has been delivered or deployed. Moreover, the planned requirements are now over 6 years old and need to be re-evaluated because of changing technology.

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<sup>22</sup> Although not stated in the stop work order, the FBI's response to our draft report said that advances in technology also contributed to the decision to issue the stop work order.



## Cost of Completing Sentinel Development

As of the beginning of August 2010, the reassessment of Sentinel was not complete and the FBI would not provide detailed descriptions of the alternatives under consideration. The FBI Director stated in July 28, 2010, testimony before the Senate Judiciary Committee that the FBI was assessing the possibility of completing Sentinel development using primarily FBI personnel instead of contractors, and he stated that this development approach could allow the FBI to complete the Sentinel project within its current estimate of \$451 million. The FBI's Chief Technology Officer said to us that the alternatives under consideration would re-use portions of successful FBI IT projects, including Sentinel, and take advantage of technological advances and industry best practices to complete Sentinel within its current \$451 million budget.

However, the FBI's Chief Technology Officer told us that the FBI's current estimate for completing Sentinel does not include the cost of operating and maintaining Sentinel for 2 years after its completion, which was part of the original costs included in the \$451 million budgeted for Sentinel. The FBI currently is budgeting \$31 million of the \$451 million for this maintenance cost.

We believe the cost to complete and maintain Sentinel for 2 years, as originally planned, will be significantly more than the \$451 million currently budgeted and significantly more than what the FBI projects as its costs.

In March 2010, the FBI had requested an independent assessment from Mitre of what it would cost to complete Sentinel under the FBI's current development approach. Mitre concluded that the additional cost would be between \$351 and \$453 million and take between 6 and 8 years. At about the same time, Lockheed Martin provided a completion cost and schedule estimate of \$194 million and February 2013 for completing Sentinel that were significantly less than Mitre's estimate, but still substantially greater than the FBI's last official estimates.

We believe that Mitre's July 2010 assessment, which estimated that completing Sentinel under the FBI's current development approach would cost an additional \$351 million and take an additional 6 years, is a reasonable starting point for cost projections of the work required to complete Sentinel. However, as detailed below, the FBI has recently proposed to reduce the cost and time required for completing the functionality of Sentinel by sharply reducing the contractor and FBI staff assigned to work on Sentinel, by bringing development of Sentinel largely in-house at the FBI, and by foregoing or revising some of the remaining

requirements that were intended to be provided by Sentinel. Our questions and concerns about the FBI's proposed new approach to Sentinel completion are discussed below.

## **Monitoring Sentinel Program Status**

We found that the FBI has either limited in scope or eliminated several project management activities that were designed to help it monitor the progress of Sentinel's development. We believe the FBI should reinstate these project management activities. For example, in December 2009, the FBI discontinued Sentinel's Project Health Assessments. Performed by the FBI's Enterprise Requirements and Assessment Unit, these assessments provided an independent assessment of Sentinel's cost, schedule, and scope. We believe the FBI should resume issuing these monthly assessments.

The FBI should also resume Earned Value Management (EVM) reporting on all Sentinel development activities in accordance with OMB guidance. The FBI stopped EVM reporting for Phase 2 in December 2009, and the EVM reporting for Phase 3 has not complied with OMB guidance since May 2010. EVM is an important risk management tool for major capital investments that measures the performance of a project by producing cost estimates, evaluating progress, and analyzing cost and schedule performance trends.

In response to our draft report, the FBI said that EVM and Project Health Assessments were discontinued as a result of the March 2010 partial stop work order because there was no schedule or baseline against which the FBI could measure its progress. While we agree there was not baseline to measure against, according to DOJ policy on implementing EVM, once the FBI realized that Sentinel was significantly behind schedule and over budget, the FBI should have established a new baseline for measuring Sentinel's cost and schedule performance.

The FBI should also expand the scope of Sentinel's independent verification and validation. Independent verification and validation is a standard information technology investment management process in which an independent entity assesses the system as it is developed to evaluate whether the software will perform as intended. Throughout the project, the Sentinel independent verification and validation team has provided useful recommendations, and early warnings of foreseeable program issues. However, because of funding constraints, Sentinel's independent verification and validation efforts do not cover all aspects of the program. For example, the independent verification and validation team does not assess Sentinel's EVM processes, data, or reports.

## **FBI's Potential Approach to Complete Sentinel**

After we provided to the FBI in September 2010 a copy of our draft report for its review and comment, the FBI requested an opportunity to provide us with a briefing that outlined the FBI's new approach for completing the Sentinel project. The FBI briefed us on its new approach on September 16, 2010.

Under this approach, the FBI is planning to assume direct management of Sentinel development and reduce the role of Lockheed Martin as the prime contractor. The FBI stated that it will employ an "agile methodology" to complete the development of Sentinel, using fewer employees from the FBI, Lockheed Martin, and the companies that have supplied the major off-the-shelf components of Sentinel. Overall, the FBI plans to reduce the number of contract employees working on Sentinel from approximately 220 to 40. The FBI said that, at the same time, the number of FBI employees assigned to the project will also decrease from 30 to 12.

The FBI asserted that this new, agile approach will streamline decision-making processes and allow the FBI to deliver Sentinel within budget. The FBI stated that there is approximately \$45 million remaining of the current \$451 Sentinel budget. The FBI stated that about \$25 million of the remaining \$45 million will be used to support the operation and maintenance of deployed Sentinel functions. The FBI told us that it believes it can complete Sentinel with the approximately \$20 million remaining in the Sentinel budget and within 12 months of beginning this new approach.

The FBI's Chief Technology Officer stated that, under this approach, he anticipates deploying updated Sentinel functionality to FBI users approximately every 3 months. However, the Chief Technology Officer acknowledged that the FBI had not yet conducted a full technical assessment of what has already been delivered by Lockheed Martin to determine what portions could be utilized in the remaining development of Sentinel.

Moreover, the FBI's new approach does not include migrating ACS data into Sentinel, which has been a major development assumption throughout the Sentinel project. Instead, the FBI believes it can enhance ACS search functions through Sentinel, which would provide search results in Sentinel similar to those that would be provided if the data from ACS was actually migrated into Sentinel. However, as a result, the FBI will have to maintain two case management systems simultaneously.

According to the FBI, the FBI's new approach to complete Sentinel is still in a development phase and still requires the FBI Director's final

approval. It also requires approval from the Justice Department's Investment Review Board (the DIRB), as well as certification from OMB, before the FBI can expend any FY 2011 funding for the Sentinel project.

Additionally, this new approach will require revised contract agreements with Lockheed Martin. The FBI acknowledged that the remaining costs for Sentinel development must also include any settlement costs for modifying the current contractual relationship with Lockheed Martin.

The FBI's new plan to develop Sentinel is still evolving, is not officially approved, and is undocumented. Our initial consideration of the FBI's new and evolving plan raises several immediate concerns and questions, including:

- (1) the undocumented 1-year estimate for system completion appears to us to be optimistic based on the FBI's past history with IT projects;
- (2) the undocumented \$20 million cost estimate for Sentinel completion also appears optimistic given the cost to date of partially implementing Sentinel, and given that \$20 million is approximately 90 percent less than what Lockheed Martin estimated was needed to complete the Sentinel project;
- (3) the FBI has not fully assessed what portions of Sentinel, or other FBI systems, can or will be used in further developing the project;
- (4) the large reduction in the level of manpower to develop and oversee Sentinel, from about 250 FBI and contractor personnel to approximately 50, while useful in keeping costs down, may not be sufficient to complete the system;
- (5) we believe that reduced functionality for Special Agents and other users is likely, given the FBI's reduced resources for developing Sentinel and the aggressive implementation schedule;
- (6) it is unclear what role FBI user feedback will have in the development process;
- (7) the FBI has little experience using this new development approach;
- (8) the full development of Sentinel's workflow process, which has been troublesome to this point, remains to be completed; and

(9) although the FBI no longer plans to migrate data from ACS into Sentinel, the FBI will still have to implement a modern search capability for the over 8 million ACS cases, a task that could prove costly and problematic given the volume of the data and the FBI's inexperience with that approach.

Additionally, in September 2010 Carnegie Mellon's Software Engineering Institute (SEI) performed an independent review of the FBI's new approach for completing Sentinel.<sup>23</sup> The SEI stated that the FBI's decision to attempt an agile approach is "a positive step toward improvement over the prior development approach." However, SEI expressed similar concerns to ours, including the largely undocumented details of the FBI's new plan, the FBI's inexperience in using an agile development methodology, and the unknowns concerning the viable state of and path forward for the technical design of Sentinel.

In sum, we have significant concerns and questions about the ability of this new approach to complete the Sentinel project within budget, in a timely fashion, and with similar functionality as what the Sentinel project previously sought to provide. As the planning process for the completion of the Sentinel project continues to evolve and as it is implemented, we will continue to evaluate and report on Sentinel's progress.

## **Conclusion**

In March 2006, the FBI launched development of Sentinel in an attempt to implement a paperless case management system throughout the FBI. Sentinel was originally planned to cost \$425 million and be fully deployed by December 2009. Sentinel's development followed an earlier failed attempt at a case management system called the Virtual Case File (VCF), a part of the Trilogy project that was initiated in 2001 and terminated in 2005 after the FBI spent \$170 million on the development of the VCF. Each of these systems was supposed to move the FBI away from ACS, an antiquated 15-year-old paper-based case management system, and to provide over 30,000 FBI agents, analysts, and administrative employees with state of the art ability to investigate violations of federal criminal statutes.

As of August 2010, the FBI's Sentinel system is at least 2 years behind schedule and at least \$100 million over budget. According to its original

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<sup>23</sup> SEI is a federally funded research and development center based at Carnegie Mellon University that works with defense and government organizations to improve software-intensive systems, such as Sentinel.

system plan, Sentinel was to be fully completed by now. However, only two of Sentinel's intended four phases have been substantially completed, and some of the most difficult tasks are still to come. The FBI has spent about \$405 million for the development of the functionality that it has provided to date, along with aspects of the project that may or may not be implemented depending on a reassessment the FBI is now performing in an effort to complete Sentinel within its defined budget of \$451 million.

Based on Sentinel's progress and spending to date, as well as other cost estimates, we believe that if implemented as it was originally intended, Sentinel would cost much more than the \$451 million it was budgeted for and will take far longer to complete.

We are also concerned that the longer the full implementation of Sentinel takes, the more likely it is that already implemented hardware and software features will become obsolete.

Further, the development strategy that the FBI is now proposing to keep Sentinel within its "defined budget" does not reflect Sentinel's true costs because it does not provide the cost for maintaining Sentinel for 2 years after the system is fully developed as the original plan included. This distorts any assessment of whether the system will remain within its current budget.

Sentinel's budget and schedule overruns affect the daily work of the FBI's 35,000 employees. If Sentinel had stayed on schedule, FBI agents, analysts, and other employees would now have a complete electronic case management system, including streamlined workflows for managing and assigning work, advanced name and document search capabilities, and paperless case files. Instead, they have to continue to rely on ACS and its time consuming paper-based case management processes. The manual processes required by ACS are susceptible to errors and limit information sharing, inhibiting the FBI's ability to "connect the dots" using information stored in its case files.

Further, the FBI is now considering abandoning its requirement to migrate records for over 8.3 million current and closed cases into Sentinel from ACS. While we understand that this requirement may fall victim to cost containment and technical implementation obstacles, it would raise questions about the cost and complexities of the FBI having to maintain two separate case management systems for the foreseeable future – an obsolete system for old cases (ACS) and another system for new cases (Sentinel).

The FBI's implementation of Phase 2 has not gone smoothly. Because of changes in the FBI's overall approach for completing Sentinel, as well as continued concerns about Lockheed Martin's design of Sentinel, the FBI decided to not make certain case management capabilities available to Sentinel users because it would commit the FBI to a particular approach to completing Sentinel. As a result, FBI employees must continue to use ACS business processes related to those functions.

It is also too early to judge whether FBI users are embracing the functionality Phase 2 provided because the users are not required to enter information into Sentinel and still have the option of using ACS exclusively. We have seen only a limited number of users begin to use and create documents within the system. As a result, we cannot determine whether the system will be able to adequately function if most users are logged in simultaneously.

The FBI is at a crossroads on the system's future. In July 2010, the FBI issued a stop-work order to Lockheed Martin on Sentinel's Phases 3 and 4. The FBI recently announced a new plan for completing Sentinel. Under this new plan, the FBI would employ a new, "agile methodology" and assume direct management of Sentinel development, reducing the role of Lockheed Martin as the prime contractor.

The FBI's plan for completing Sentinel is still evolving, and is not yet fully developed or officially approved. However, our initial consideration of the plan, after an oral briefing, raises significant concerns and questions about the FBI's planned approach, including ones relating to the cost, schedule, and amount of work to complete Sentinel. We are also concerned that budget and schedule constraints might reduce the functionality ultimately delivered to the FBI's agents and analysts. In addition, the FBI has little experience using this new development methodology.

We believe that these issues and these concerns affect whether Sentinel will ultimately provide, in a timely manner and within a reasonable budget, the automated case management system that FBI employees need to most effectively perform their vital mission.

## Recommendations

We recommend that the FBI:

1. Reassess the functionality described in Sentinel's requirements, including the requirement to migrate all case data from ACS into Sentinel, and update the requirements as necessary.
2. Prioritize the remaining requirements so that if the FBI cannot afford to meet all of them, it can focus on those requirements that have the greatest impact on its agents and analysts.
3. Reinstitute Project Health Assessments and EVM for Sentinel, and expand the scope of Sentinel's independent verification and validation efforts.





U.S. Department of Justice

Federal Bureau of Investigation

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Washington, D. C. 20535-0001

October 14, 2010

Honorable Glenn A. Fine  
Office of the Inspector General  
U.S. Department of Justice  
Suite 4706  
950 Pennsylvania Avenue, N.W.  
Washington, D.C. 20530

Dear Mr. Fine:

The Federal Bureau of Investigation (FBI) appreciates the opportunity to review and respond to your interim technical assistance report entitled, "Status of the Federal Bureau of Investigation's Implementation of Sentinel Project" (hereinafter "Report").

Based upon a review of the Report, the FBI concurs with the three recommendations directed to the FBI and has already taken steps to implement them. Please feel free to contact me at 202-324-6165 should you have any questions.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Chad L. Fulgham", is written over a horizontal line.

Chad L. Fulgham  
Executive Assistant Director  
Information and Technology Branch

**OIG Review of the FBI's Sentinel Program VI**  
**FBI Response to Recommendations within the Final Draft**

**Recommendation 1:** Reassess the functionality described in Sentinel's requirements, including the requirement to migrate all case data from ACS into Sentinel, and update the requirements as necessary.

**FBI Response to Recommendation #1:**

Concur. Sentinel's System Requirements Specification (SRS) have already been assessed by FBI IT executive management. In this regard, the FBI has reviewed each and every requirement set forth in the current Sentinel SRS document. This review has focused on assessing both the importance and feasibility of meeting each particular requirement. With respect to the migration of all case data from ACS to Sentinel, it should be noted that this was not ever an SRS. The FBI has re-assessed the plan to migrate all case data from ACS to Sentinel using all the information gained during Phases I and II of Sentinel, in conjunction with advances in technology over the past seven years, and has determined that it may be more efficient and equally effective to go forward from a selected date wherein all new case data will be entered into Sentinel. Sentinel will still have the capability of accessing ACS data via search tools within Sentinel. The re-evaluation of the plan to migrate all case data from ACS to Sentinel, and the decision that the migration is not necessary, is reflective of the FBI's re-assessment of every aspect of this project prior to embarking on the Agile approach currently being undertaken.

The requirements within the SRS fall into several categories. Over 500 of the requirements fall into standard requirements that any application would have, such as security, performance, operating/browser environment, records management, interface, and training. The other detailed requirements are being broken into four main areas: Forms; Workflow/Leads; Serialization; Reporting/Searching/Alerting. The plan forward using the Agile development methodology will allow the FBI to improve the delivery of the requirements.

**Recommendation 2:** Prioritize the remaining requirements so that if the FBI cannot afford to meet all of them, it can focus on those requirements that have the greatest impact on its agents and analysts.

**FBI Response to Recommendation #2:**

Concur. As noted above, all Sentinel requirements have been categorized into functional requirements and non-functional requirements.

The functional requirements have been prioritized and sequenced to focus on the most valuable requirements. The functional requirements have been prioritized and will be developed as follows:

- Forms;
- Workflow/Leads;
- Serialization; and
- Reporting/Searching/Alerting.

The non-functional requirements need to be met with each delivery. The non-functional requirements include areas such as: security, performance, operating/browser environment, records management, interface, and training.

At every step of the way, as the functional requirements are tested, utilizing automated testing tools, the non-functional requirements will be tested as well, ensuring that as we add functional requirements, the non-functional requirements are never overlooked.

**Recommendation 3:** Reinstitute Project Health Assessments and EVM for Sentinel, and expand the scope of Sentinel’s independent verification and validation efforts.

**FBI Response to Recommendation #3:**

Concur. Project Health Assessments and Earned Value Management were suspended when independent assessments revealed that defects existed that impacted baseline requirements, a stop-work order was issued, and the FBI began to assess a new way forward. Both these mechanisms are being reinstated with the Agile approach. Project Health Assessments are critical to Agile methodology and will be conducted as part of each quarterly delivery review. Earned Value Management will be monitored in a manner consistent with Agile processes and will be reviewed by the Department of Justice. The FBI will also continue its practice of obtaining independent verifications of the project through IV&V reviews by BAH to ensure that course corrections can be implemented as appropriate.

**OFFICE OF THE INSPECTOR GENERAL  
ANALYSIS AND SUMMARY OF ACTIONS  
NECESSARY TO CLOSE THE REPORT**

The OIG provided a draft of this report to the FBI. The FBI's response is incorporated in Appendix I of this final report. The following provides the OIG analysis of the response and summary of actions necessary to close the report.

**Recommendation Number:**

1. **Resolved.** The FBI concurred with our recommendation to reassess the functionality described in Sentinel's requirements, including the requirement to migrate all case data from ACS into Sentinel, and update the requirements as necessary. The FBI stated that its information technology executive management reviewed all Sentinel requirements in Sentinel's System Requirements Specification (SRS). The FBI's response also stated that data migration from ACS into Sentinel had not been assigned an SRS requirement number.

However, the SRS did identify ACS data migration as a planned project activity, and ACS data migration has been a major project assumption affecting Sentinel development design. As a result, we believe the FBI should ensure that the data remaining in ACS is compatible with all Sentinel functionality, whether ACS data is migrated into Sentinel or is searchable through Sentinel.

This recommendation can be closed when we receive documentation demonstrating the FBI's review of all SRS requirements has been completed, and when we receive documentation identifying the satisfactory disposition of all SRS requirements and major project assumptions, including whether ACS is migrated into Sentinel or searchable through Sentinel.

2. **Resolved.** The FBI concurred with our recommendation to prioritize the remaining requirements of Sentinel so that if the FBI cannot afford to meet all of them, it can focus on those requirements that have the greatest impact on its agents and analysts. The FBI stated that Sentinel's requirements have been categorized into functional and non-functional requirements, which the FBI has prioritized and sequenced to focus on the most valuable requirements. This

recommendation can be closed when we receive documentation identifying the FBI's prioritization of Sentinel's requirements.

3. **Resolved.** The FBI concurred with our recommendation to reinstitute Project Health Assessments and Earned Value Management (EVM) for Sentinel, and expand the scope of Sentinel's independent verification and validation (IV&V) efforts. The FBI stated that Project Health Assessments and EVM reports are being reinstated with the Agile approach, and that IV&V reviews will continue. This recommendation can be closed when we receive documentation demonstrating that Project Health Assessments and EVM reports have been reinstated, and the scope of IV&V reviews have been expanded.