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The Honorable Adam Smith  
Chairman  
The Honorable Mac Thornberry  
Ranking Member  
Committee on Armed Services  
House of Representatives

**Missile Defense: Observations on Ground-based Midcourse Defense Acquisition Challenges and Potential Contract Strategy Changes**

The Missile Defense Agency (MDA) is developing the Ground-based Midcourse Defense (GMD) system to defend the United States against a limited intermediate and intercontinental ballistic missile attack from rogue states such as North Korea and Iran. Over the past 25 years, the Department of Defense (DOD) has spent approximately \$53 billion acquiring the GMD system and plans to spend approximately \$10 billion more over the next 5 years to continue developing, producing, and sustaining the system.<sup>1</sup> Since the late 1990s, DOD has executed the GMD program through a prime contractor, Boeing, as the lead system integrator, but MDA is considering changing this approach. A lead system integrator generally refers to a contractor that has been designated with the responsibility for developing and integrating a large, complex defense-related acquisition program within a given budget and schedule. Under this contract strategy, Boeing is primarily responsible for GMD system-level performance and integration, which includes development, fielding, test, systems engineering, integration, manufacturing, training, operations, and sustainment.

MDA is the agency within DOD responsible for developing an integrated and layered Missile Defense System to defend the United States, allies, and friends from missile attacks in all phases of flight. To defend the United States homeland, MDA developed and fielded a fleet of 44 Ground-Based Interceptors (GBI) while meeting some challenging priorities, such as: a 2002 presidential directive to begin deploying GBIs in 2004, and a 2013 statement by the Secretary of Defense that DOD would field 14 GBIs by the end of 2017.<sup>2</sup> The GMD program also encountered a number of technical setbacks that led to significant cost increases, schedule delays, and fleet reliability issues. In 2015, MDA began to take a more active role than previously in determining the technical direction of the program, primarily with the development of a new GBI kill vehicle, called the Redesigned Kill Vehicle (RKV).<sup>3</sup> However, MDA

<sup>1</sup>The total for the past 25 years includes GMD program costs from fiscal year 1996 through fiscal year 2020 that have been converted from base-year to 2019 dollars.

<sup>2</sup>National Security Presidential Directive-23 directed the Department of Defense to begin executing the deployment of GBIs and other initial missile defense capabilities in 2004. On March 15, 2013, the Secretary of Defense announced that the department would increase the total number of deployed GBIs from 30 to 44 by the end of 2017.

<sup>3</sup>The kill vehicle is the weapon component of the interceptor that detects and destroys an incoming missile through a hit-to-kill impact.

experienced major technical challenges developing the RKV, and DOD decided to terminate the program in August 2019. MDA subsequently announced its intention to pursue a new GMD interceptor, called the Next Generation Interceptor (NGI). MDA also began conducting market research to inform the acquisition strategy for the next phase of the GMD program after the current GMD Development and Sustainment Contract (DSC) ends. As part of the market research, MDA is assessing the benefits and risks of pursuing a new approach with multiple prime contracts to cover the various components of the GMD program, potentially with MDA performing lead system integration responsibilities. As of October 2020, MDA has not yet determined an acquisition strategy for the next phase of the GMD program.

The House Armed Services Committee report on H.R. 2500 contained a provision for us to assess the GMD contract structure and identify potential opportunities to improve government management and contractor accountability.<sup>4</sup> This report addresses (1) the lessons learned from challenges MDA encountered acquiring the GMD system and (2) the potential benefits and risks of MDA possibly taking over as system integrator for GMD.

To identify lessons learned from GMD acquisition challenges and potential benefits and risks of MDA possibly taking over as system integrator for GMD, we reviewed: (1) prior GAO reports on defense acquisitions; (2) records of interviews with various DOD components, such as MDA, U.S. Northern Command, and GMD contractors; and (3) DOD component responses to questionnaires we developed for our annual missile defense assessment.<sup>5</sup> We also reviewed reports from expert panels and GMD program documents, such as MDA Director's program review briefings, acquisition strategies, budget documents, test plans, contracts, and requests to industry for information and proposals. In addition, we met with officials from MDA, the offices of the Under Secretary of Defense (USD) for Research and Engineering (R&E) and USD for Acquisition and Sustainment (A&S), and warfighters from the U.S. Indo-Pacific Command.

We conducted this performance audit from November 2019 to October 2020 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

## Background

Since MDA was established in January 2002, we have issued 60 reports assessing missile defense acquisition efforts, including the GMD system (see the enclosure for a list of reports). In addition, missile defense acquisitions have been the subject of several DOD-sponsored studies and expert panel reviews. These reviews generally provide the status of MDA's progress acquiring the GMD system, but they also identify challenges the program has encountered:

- **Schedule pressure and fielding deadlines.** In 2003, we found that a presidential directive to begin fielding a missile defense capability by 2004 placed MDA at risk of getting off track early and impairing the effort over the long term.<sup>6</sup> In order to meet the

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<sup>4</sup>H. Rept. No. 116-120, at 267, 268 (2019).

<sup>5</sup>See the enclosure for a full list of GAO reports on MDA acquisitions.

<sup>6</sup>GAO, *Missile Defense: Knowledge-Based Practices Are Being Adopted, but Risks Remain*, [GAO-03-441](#) (Washington, D.C.: Apr. 30, 2003).

directive, MDA employed some practices that increased risk, such as beginning system integration with immature technologies and limited testing, rather than implementing knowledge-based practices. In 2014, an Independent Expert Panel found that the GMD program continued to manage to short-term horizons that focus on preserving flight test and fielding schedules.

- **Limited stakeholder involvement.** In our prior work on missile defense, we found that MDA had not always fully engaged stakeholders from the warfighting, test and evaluation, intelligence communities, and other DOD components on its acquisition efforts.<sup>7</sup> For example, in May 2017, we found that the RKV program lacked department-wide support because organizations within DOD did not fully agree with the program’s acquisition strategy and many of their concerns went unaddressed by MDA, placing the program at risk of being terminated if major problems arose.<sup>8</sup> MDA told us in October 2020 that the agency executed the RKV program under the acquisition strategy approved by the Under Secretary of Defense for Acquisition, Technology, and Logistics, and that technical issues, rather than a lack of department-wide support, led to the program’s cancellation. Although MDA obtained departmental approval for the RKV acquisition strategy, several DOD organizations raised serious concerns about risks associated with RKV’s design and development method. To this end, the Office of Cost Assessment and Program Evaluation recommended that MDA develop multiple design solutions for subcomponents until the program confirmed the RKV baseline design performed as required. As we reported in May 2017, MDA declined to implement the recommendation because, according to the agency, it would lengthen RKV’s development and likely delay initial deliveries.

In July 2020, we also found that MDA and contractors did not adequately address RKV technical risks despite numerous warnings from subject matter experts and officials within and outside of the RKV program about performance issues.<sup>9</sup> These technical issues ultimately led to RKV’s termination. MDA told us in October 2020 that GMD program officials’ active risk management allowed the agency to maintain awareness of RKV’s technical challenges until it was clear the contractor was not able to overcome the challenges. MDA also stated that it took several steps to address the technical concerns that ultimately led to the program’s termination, including: confirming requirements were correct, assessing parts for requirements compliance, and identifying design changes. However, as the design authority for RKV, MDA selected components with known performance risks, approved how the contractor complied with requirements, and provided direction to the contractor on how to proceed.

- **Contract strategy challenges.** In 2006, a GMD Mission Readiness Task Force reported that its first impression was that the program’s strategy, objectives, execution, organization, and contract structure were “seriously misaligned.” MDA officials and internal briefings have also indicated challenges associated with executing the GMD program under the Development and Sustainment Contract (DSC), such as difficulties with controlling cost and negotiating contract modifications in a timely manner to be

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<sup>7</sup>For examples, see GAO, *Missile Defense: Lessons Learned from Acquisition Efforts*, GAO-20-490T (Washington, D.C.: Mar. 12, 2020); and *Missile Defense: The Warfighter and Decision Makers Would Benefit from Better Communication about the System’s Capabilities and Limitations*, GAO-18-324 (Washington, D.C.: May 30, 2018).

<sup>8</sup>GAO, *Missile Defense: Some Progress Delivering Capabilities, but Challenges with Testing Transparency and Requirements Development Need to Be Addressed*, [GAO-17-381](#) (Washington, D.C.: May 30, 2017).

<sup>9</sup>[GAO-20-432](#).

responsive to changes in the threat. MDA officials indicated that promoting competition among industry could mitigate these challenges.

- **Testing limitations.** In 2005, the GMD Mission Readiness Task Force found that the GMD program’s qualification testing to characterize the system’s design and performance margins was insufficient. In 2016, the Institute for Defense Analyses found that MDA did not have a comprehensive plan that describes all necessary GMD testing and how the tests fit together. The Director, Operational Test and Evaluation has also reported for over a decade that it could not perform a quantitative evaluation of GMD’s operational effectiveness because of flight and ground testing shortfalls.<sup>10</sup>

Since the late 1990s, Boeing has been the GMD prime contractor, performing the role of lead system integrator for the program. Table 1 provides an overview of some of the major contract events that have occurred for the GMD program.

**Table 1: Significant Ground-based Midcourse Defense (GMD) Contracting Events**

Year	Event
1998	The Department of Defense (DOD) competitively awarded Boeing a contract designating it as the lead system integrator for the National Missile Defense system. The system consisted of sensors, interceptors, and command and control functions and was later re-designated as the GMD system.
2001	DOD awarded Boeing a non-competitive contract continuing the work in progress under the 1998 contract. Boeing was responsible for GMD’s design, development, test, evaluation, and system performance.
2010	Missile Defense Agency (MDA) awarded Boeing a non-competitive contract modification, called the Core Completion Contract, to complete the remaining work under the 2001 contract. Officials stated that the modification was intended, in part, to enable more effective contract administration.
2011	MDA competitively awarded Boeing a follow-on GMD contract, called the Development and Sustainment Contract (DSC), to continue its role as the GMD prime contractor.
2015	MDA issued a task instruction—a short term MDA contract vehicle—initiating development for the Redesigned Kill Vehicle (RKV), retaining design authority over the effort.
2016	MDA approved the Development, Operations and Sustainment, and Production (DOSP) acquisition strategy to end the DSC and pursue a new approach with multiple, distinct contracts that are competitively awarded.
2017	MDA stopped pursuing the DOSP strategy and implemented a new plan to accelerate the RKV program under the DSC. MDA entered into an undefinitized contract action with Boeing that modified the DSC to authorize RKV design, development, and initial production. MDA later definitized the modification in 2018.
2018	MDA entered into another undefinitized contract action with Boeing, which modified the DSC to extend the DSC and include enhancements to the GMD program, such as the construction of a new missile field. MDA later definitized the modification in 2019.
2019	DOD terminated the RKV, and MDA began conducting market research to explore an alternative contracting approach to the DSC.
2020	MDA released a formal request for proposals from industry for the Next Generation Interceptor. According to MDA, contract awards are planned to occur in December 2020. MDA also continued to perform market research on a future GMD contract(s) to succeed the DSC.
2022	MDA plans to award a future GMD contract(s) between January and March 2022, according to the agency’s fiscal year 2021 budget information.

Source: DOD, MDA, and GAO. | GAO-21-135R

<sup>10</sup>For the most recent report, see Director, Operational Test and Evaluation, *FY 2019 Annual Report* (Dec. 20, 2019).

A lead system integrator (LSI) generally refers to a contractor that has been designated with the responsibility for developing and integrating a large, complex defense-related acquisition program within a given budget and schedule. The U.S. Air Force refers to the LSI role as Total System Performance Responsibility, which can include determining the technical direction of the program. Throughout much of the late 1990s and into the early 2000s, the military services used LSIs to acquire major weapon systems—the Future Combat System is a notable example.<sup>11</sup> The perceived advantage of using an LSI was that it could reduce the program management burden on the government while leveraging technical innovations and management expertise from the private sector.

Although the LSI approach offers some potential benefits, findings from our prior reports, as well as those from other government and academic organizations, indicate that the LSI approach has contributed to poor acquisition outcomes and diminished government oversight, transparency, and engineering acumen in the acquisition community.<sup>12</sup> For example, the Congressional Research Service found that the LSI approach can create transparency issues that could make it more difficult for the federal agency or Congress to adequately manage and conduct effective oversight and potentially increase the risk of cost overruns, schedule slippage, poor product quality, and inadequate system performance.<sup>13</sup> Starting in the mid-2000s, Congress enacted legislation that placed limits on DOD’s use of LSIs, including a prohibition on contracting with new LSIs in the acquisition of major systems.<sup>14</sup>

MDA has encountered challenges taking ownership of the GMD technical baseline and leading system integration. For example, MDA established itself as the design authority for the RKV development effort and implemented a “best-of-breed” approach that merged multiple contractors’ kill vehicle concepts into a single design. However, MDA later terminated the RKV effort because of fundamental problems with the system’s design. In addition, MDA began implementing the Development, Operations and Sustainment, and Production (DOSP) acquisition strategy in 2016 to take over system integration. However, a subsequent review team identified gaps and risks implementing the strategy, such as insufficient staffing and planning. According to a public notice MDA issued in January 2018, the MDA director determined that the review team’s results, in combination with a rapidly advancing missile threat and presidential and Secretary of Defense direction to accelerate GMD capabilities, created unacceptable levels of risk for implementing the DOSP strategy at that time. The director decided to instead continue executing the program through the incumbent prime contractor

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<sup>11</sup>The Future Combat System was intended to replace most of the U.S. Army’s combat systems with a family of manned and unmanned vehicles and systems linked by an advanced information network. The program was cancelled in 2009 due to cost increases, schedule delays, and other issues. See GAO, *Defense Acquisitions: Role of Lead Systems Integrator on Future Combat Systems Program Poses Oversight Challenges*, [GAO-07-380](#) (Washington, D.C.: June 6, 2007).

<sup>12</sup>For examples, see [GAO-07-380](#); Congressional Research Service (CRS), *Defense Acquisitions: Use of Lead System Integrators (LSIs)—Background, Oversight Issues, and Options for Congress*, 7-5700 (Oct. 8, 2010); and Kathlyn Hopkins Loudin, “Lead Systems Integrators: A Post-Acquisition Reform Perspective,” *Defense Acquisition Research Journal*, vol. 17, no. 1 (January 2010).

<sup>13</sup>CRS, *Defense Acquisition: Use of LSIs*.

<sup>14</sup>See National Defense Authorization Act for Fiscal Year 2008, Pub. L. No. 110-181, § 802 (Jan. 28, 2008) (stating, among other things, that DOD may “not award a new contract for lead systems integrator functions in the acquisition of a major system to any entity that was not performing lead systems integrator functions in the acquisition of the major system prior to the date of the enactment of this Act.”); see also Duncan Hunter National Defense Authorization Act for Fiscal Year 2009, Pub. L. No. 110-417, § 112 (Oct. 14, 2008).

(Boeing) under the DSC. According to MDA, under the DOSP strategy, the agency planned to conduct multiple competitive source selections followed by a transition period to qualify GMD vendors. MDA told us in October 2020 that the lead-time associated with these efforts precluded the agency from meeting its directive to accelerate GMD capabilities. MDA also told us that it decided not to assume the role of lead system integrator based on the results of the review team, which was a related but separate decision to that of putting aside the DOSP strategy, which occurred later when the agency was directed to accelerate GMD capabilities.

## Lessons Learned from GMD Acquisition Challenges

MDA made progress in developing and fielding GMD capabilities, improving system reliability, and demonstrating performance through testing. The program, however, continues to experience significant setbacks, as indicated by the recent RKV termination. We have reported extensively on these issues over the past 2 decades (see the enclosure). In our prior work on missile defense acquisitions, we have also identified leading practices that successful programs have implemented to achieve desirable product development outcomes. This body of work provides a foundation for identifying lessons learned from some of the challenges described above that MDA has encountered acquiring the GMD system. Some of these lessons learned from our prior work include:

- **Utilize knowledge-based acquisition practices.** In October 2015, we found that implementing a knowledge-based acquisition approach that couples rigorous systems engineering with well-informed requirements is essential to achieving faster delivery of needed capabilities to the warfighter.<sup>15</sup> Examples of knowledge-based practices include demonstrating that technologies are mature, designs are stable, and production processes are in control before transitioning between acquisition phases. Our body of work has shown that attaining high levels of knowledge before significant commitments are made during product development drives positive acquisition outcomes.<sup>16</sup> In June 2019, we found that MDA's recovery plan for the RKV program prioritized controlling technical risks over preserving the 2023 fielding directive—a strategy that aligns with knowledge-based practices.<sup>17</sup> In July 2020, we also found that MDA plans to use event driven, performance-based knowledge points to assess NGI contractors' progress—an approach that also aligns with knowledge-based acquisition practices.<sup>18</sup>
- **Involve stakeholders early and often.** In April 2003 and May 2017, we found that DOD missile defense stakeholders should be involved throughout a program's development.<sup>19</sup> In doing so, we found that MDA would increase the likelihood that the capabilities it pursues are needed, affordable, effective, and delivered to the warfighter

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<sup>15</sup>GAO, *Defense Acquisitions: Joint Action Needed by DOD and Congress to Improve Outcomes*, [GAO-16-187T](#) (Washington, D.C.: Oct. 27, 2015).

<sup>16</sup>For examples, see GAO, *Best Practices: DOD Can Achieve Better Outcomes by Standardizing the Way Manufacturing Risks Are Managed*, [GAO-10-439](#) (Washington, D.C.: Apr. 22, 2010); and *Defense Acquisitions: A Knowledge-Based Funding Approach Could Improve Major Weapon System Program Outcomes*, [GAO-08-619](#) (Washington, D.C.: July 2, 2008).

<sup>17</sup>GAO, *Missile Defense: Delivery Delays Provide Opportunity for Increased Testing to Better Understand Capability*, [GAO-19-387](#) (Washington, D.C.: June 6, 2019).

<sup>18</sup>[GAO-20-432](#).

<sup>19</sup>[GAO-17-381](#) and [GAO-03-441](#).

as quickly as feasible. In December 2019, we found that MDA had undertaken a number of efforts over the past few years to increase stakeholder involvement, such as allowing for more warfighter input on operational requirements.<sup>20</sup> In March 2020, we also found that officials from several DOD organizations we met with over the past 2 years observed that MDA's engagement with their respective organizations was improving.<sup>21</sup>

- **Provide effective oversight and promote competition.** In May 2018, we found that MDA had the potential to improve acquisition outcomes by taking over system integration, but this also carried significant risks if the agency was not fully prepared to take on the responsibility.<sup>22</sup> In our prior work, we also found that promoting competition in the GMD program had the potential to reduce cost and promote industry innovation.<sup>23</sup> MDA officials told us that they believe they now have a significant amount of technical insight into the GMD system, which will be further enhanced once the program takes full ownership of ground testing capabilities that emulate GMD operations in a simulated environment. In July 2020, we also found that MDA's plan to award two NGI development contracts will leverage competition among the awardees prior to preliminary design review and possibly through critical design review.<sup>24</sup>
- **Perform robust testing.** In June 2019, we found that performance issues uncovered in pre-test planning for the March 2019 salvo test demonstrated the value of frequent and rigorous GMD flight testing.<sup>25</sup> Also, our June 2011 report on parts quality in missile defense and other space systems found that parts issues are sometimes more easily addressed without major disruptions to the program if they are discovered earlier in the design and development process.<sup>26</sup> In July 2020, we found that MDA plans to reduce NGI technical risk by performing parts testing before the preliminary design review, rather than after, as was the case for RKV.<sup>27</sup>

Applying these lessons learned, in conjunction with implementing our prior recommendations on missile defense, provide opportunities for DOD to improve the acquisition outcomes for future GMD initiatives, such as the NGI. We have previously made numerous recommendations aimed at assisting MDA in improving its acquisition outcomes and minimizing risk, such as implementing a knowledge-based acquisition approach, engaging stakeholders on key acquisition processes and decisions, and aligning production decisions with flight testing. Since 2002, we have made 134 missile defense-related recommendations. DOD concurred with most

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<sup>20</sup>[GAO-20-177](#).

<sup>21</sup>[GAO-20-490T](#).

<sup>22</sup>[GAO-18-324](#).

<sup>23</sup>For examples, see [GAO-17-381](#) and [GAO-16-254R](#).

<sup>24</sup>[GAO-20-432](#).

<sup>25</sup>[GAO-19-387](#).

<sup>26</sup>GAO, *Space and Missile Defense Acquisitions: Periodic Assessment Needed to Correct Parts Quality Problems in Major Programs*, [GAO-11-404](#) (Washington, D.C.: June 24, 2011).

<sup>27</sup>[GAO-20-432](#).

of our recommendations and has implemented about half. As of July 2020, we currently have 17 open missile defense-related recommendations that DOD has yet to implement. The remaining 48 recommendations were closed because the department did not implement them for various reasons. For example, in some cases, the recommendation was no longer relevant due to significant programmatic changes, such as cancelling a program. In other instances, DOD agreed to take action in response to the recommendation but did not follow through in completing planned actions, or we did not agree that the action taken was sufficient to address the recommendation.

In May 2020, we sent a letter to the Secretary of Defense, in part, to call attention to areas in which two of our 17 open recommendations on missile defense should be given high priority by DOD.<sup>28</sup> One of those recommendations included stabilizing baselines and clearly tracking any revisions for missile defense programs, including GMD. For many years, we have also reported on the risks associated with MDA overlapping product development, testing, and production activities in order to maintain schedule.<sup>29</sup> In March 2020, we found that MDA had taken steps to reduce concurrency, as we have previously recommended, but the agency continued to turn to this practice when experiencing developmental delays or schedule pressures, as was the case when MDA attempted to accelerate the RKV program in 2017.<sup>30</sup>

Recently, DOD has taken steps to address some of our 17 open recommendations, but opportunities remain for further actions. For example, MDA officials indicated that they are working closely with stakeholders on NGI's requirements and acquisition strategy. To this end, DOD approved an NGI acquisition strategy in April 2020 that was subject to approval by the USD (R&E) and USD (A&S), which is consistent with a recommendation we made in May 2017.<sup>31</sup> We also recommended in May 2017 that the Director, Cost Assessment and Program Evaluation perform a comprehensive review of the RKV acquisition strategy. Although DOD initially did not concur with the recommendation, in 2019, USD (R&E) directed an Independent Technical Advisory Panel on Kinetic Kill Vehicles to review the RKV program. The panel recommended to USD (R&E), in June 2019, that it terminate RKV and start over with a robust, requirements-driven system engineering process. We believe this review met the intent of our recommendation. Although DOD has taken actions to address several of our other open recommendations, it has not yet implemented all of our recommendations intended, in part, to improve how MDA acquires the GMD system.

### **Potential Benefits and Risks of MDA Taking Over as System Integrator**

MDA has the potential to improve acquisition outcomes by assuming technical and system integration responsibilities for GMD, but this also carries significant risks if the agency is not fully prepared to take on the responsibility. In late 2019, MDA began conducting market research to inform the acquisition strategy for the next phase of the GMD program after the current DSC ends. According to MDA, the agency is exploring a range of options for the future GMD acquisition strategy, including pursuing a new approach with multiple prime contracts to cover

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<sup>28</sup>GAO, *Priority Open Recommendations: Department of Defense*, [GAO-20-446PR](#) (Washington, D.C.: May 4, 2020).

<sup>29</sup>For examples, see [GAO-19-387](#) and *Missile Defense: Opportunity Exists to Strengthen Acquisitions by Reducing Concurrency*, [GAO-12-486](#) (Washington, D.C.: Apr. 20, 2012).

<sup>30</sup>[GAO-20-490T](#).

<sup>31</sup>[GAO-17-381](#).

the various components of the program (e.g., interceptor development, fleet sustainment, ground systems). If MDA were to take this approach, it could be responsible for determining the technical direction of the GMD program and leading system integration. This approach offers some potential benefits to the agency, such as more direct control over and greater insight into GMD's cost, schedule, and performance. However, the approach has some challenges that, if not addressed, could outweigh the benefits. For example, the program may encounter challenges obtaining the technical data and staffing levels necessary to manage the technical baseline and integrating the multiple prime contractors, which could ultimately affect GMD's availability or readiness. As of October 2020, MDA has not yet determined an acquisition strategy for the next phase of the GMD program.

DOD officials provided us varying perspectives on MDA assuming technical and system integration responsibilities for GMD. For example, officials from USD (A&S) and USD (R&E)'s Advanced Capabilities directorate told us in January 2020 that they believed MDA was qualified to act as the system integrator for the GMD program. Warfighters from U.S. Indo-Pacific Command we met with in December 2019 told us that they interact almost exclusively with MDA personnel on the Aegis Ballistic Missile Defense system and are very satisfied with the support they receive. However, officials we met with in October 2019 from the offices of the USD (R&E) Developmental Test and Evaluation directorate and Office of Cost Assessment and Program Evaluation cited MDA's role as the design authority for RKV and the program's termination as a result of technical issues as an indicator that MDA may not be prepared to take on the technical and system integration responsibilities for the GMD program. When MDA was pursuing the DOSP strategy, warfighters from U.S. Northern Command told us they were concerned that MDA may lack the ability to surge support when major issues arise similar to the support Boeing provides. In October 2020, U.S. Northern Command told us that it is very satisfied with the support it receives from Boeing and MDA.

The potential benefits and risks we identify below are based on a general approach of MDA taking ownership of the GMD technical baseline and leading system integration, similar to that of the DOSP strategy, and are not based on any specific plan MDA is currently considering. Any such plan would likely entail its own unique set of benefits and challenges, contingent upon how the plan is implemented.

#### Potential Benefits of MDA Taking Over as System Integrator for GMD

- **Direction.** As MDA was considering the DOSP strategy in 2016 and starting to take ownership of the GMD technical baseline, the GMD program indicated that it would be better positioned to directly control and manage the GMD system throughout its life cycle, possibly in a more agile, efficient, and cost-effective manner. According to MDA's November 2019 response to a questionnaire we previously sent to the agency, the steps the agency has taken so far to obtain ownership of the technical baseline has allowed it to exercise direct control over performance specifications and ensure that requirements are aligned with the capabilities of other missile defense systems.
- **Accountability and oversight.** The GMD program indicated in a September 2016 MDA director's program review briefing that owning the technical baseline would allow it to assess system performance independent of the product developer (Boeing) and eliminate a potential organizational conflict of interest issue that may arise when the prime contractor designs, tests, and delivers capabilities based on requirements it wrote. The briefing also indicated that MDA leading system integration would allow the agency to have greater insight into and earlier awareness of changes in the program's cost, schedule, and performance. MDA officials told us in March 2020 that taking over system

integration would provide the agency with greater ability to oversee execution of the program, improve cost awareness, and potentially produce savings by eliminating inefficiencies.

- **Competition.** According to an October 2016 GMD DOSP briefing, ending the DSC would create multiple opportunities for industry to compete for contracts. Our prior work on defense acquisitions indicates that competition may provide the government with increased ability to control cost, motivate and hold contractors accountable, incentivize productivity, and leverage innovation across the defense industry. The GMD program also indicated in a September 2016 briefing that leading system integration would allow the agency to eliminate a layer of management and associated pass-through costs and directly communicate with industry partners, which could improve efficiency, oversight, and responsiveness to changes in the missile threat.

#### Potential Risks of MDA Taking Over as System Integrator for GMD

- **Resources.** A review team chartered by MDA to assess the DOSP strategy reported in July 2017 that the size and scale of the GMD weapon system may require staffing levels and expertise that the government did not have at that time. The review team also reported that it may be difficult for MDA to obtain the necessary staff over a short time span. In October 2020, U.S. Northern Command told us that MDA has been pressured several times to reduce the number of personnel employed by the agency, which could add risk if MDA were to take over as system integrator for GMD. In addition, Boeing officials told us that if it were no longer the system integrator, the company would not likely be able to retain the current team supporting the program. Boeing officials also told us that they may lose some personnel whose experience and expertise with GMD is irreplaceable. MDA officials told us in March 2020 that the program is currently not ramping up staff but, is instead considering how to identify the “right” people and place them in appropriate positions. MDA officials also stated that they are looking at the entirety of the GMD program and making plans to ensure the program has processes and plans in place if the agency chooses to end the current DSC. To this end, MDA told us in October 2020 that it has taken several actions to address critical issues raised by the review team which assessed the DOSP strategy, including: clearly differentiating system integration and engineering roles and responsibilities within the program; and transitioning ownership, operations, and execution of a key GBI development and integration laboratory from industry to the government.
- **Information gaps and barriers.** The 2017 review team that assessed the DOSP strategy also found that limited access to or understanding of historical, contemporary, and future technical data could diminish MDA’s ability to effectively manage the system’s architecture. A 2014 expert panel review of the GMD fleet also found that there was no fully characterized design baseline due to a truncated design review process following the 2002 presidential directive to begin deploying capabilities. As such, it may be impossible for the government to fully reconstitute the GMD technical baseline to date—a concern which MDA indicated that it is addressing for current and future GMD capabilities. MDA told us in October 2020 that technical baseline information for GMD products is now compiled into a virtual library and delivered to the government as part of the agency’s design review process. Moreover, in our prior work on defense acquisitions, we have identified examples where DOD encountered challenges when it learned it needed to obtain certain rights to technical data late in the acquisition life cycle. Challenges included the government obtaining incomplete data or unclear data

rights, and contractors declining to provide the data or quoting prices for data rights that the government found to be too expensive.<sup>32</sup>

- **Transition and industry collaboration.** MDA officials told us in March 2020 that there is no weapon system comparable to GMD. MDA officials also told us that there is no model to follow on how best to structure the GMD program or transition away from a prime contractor that has led system integration for over two decades. The 2017 review team that assessed the DOSP strategy found that the GMD program was not fully prepared at the time to lead system integration because of shortcomings in the program's transition plans and insufficient staffing levels. A GMD contractor also told us that MDA experienced challenges when it first began to define and convey requirements to industry but noted that adjusting to MDA's new role has also been a learning process for them as well. MDA officials also told us that they experienced challenges with industry partners not fully collaborating with one another on the RKV out of fear of losing technical data or competitive advantages.

### Agency Comments

We provided a draft of this report to DOD for review and comment. DOD provided technical comments, which we incorporated as appropriate.

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We are sending copies of this report to the appropriate congressional committees and the Director, Missile Defense Agency. In addition, the report is available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-4841 or [RussellW@gao.gov](mailto:RussellW@gao.gov). Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are: LaTonya Miller, Assistant Director; Pete Anderson; Jasmina Clyburn; Lori Fields; Jonathan Meyer; Miranda Riemer; and Brian Tittle.



W. William Russell  
Director, Contracting and National Security Acquisitions

Enclosure

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<sup>32</sup>For examples, see GAO, *Weapon System Sustainment: DOD Needs to Better Capture and Report Software Sustainment Costs*, [GAO-19-173](#) (Washington, D.C.: Feb. 25, 2019); and *Weapons Acquisition: DOD Should Strengthen Policies for Assessing Technical Data Needs to Support Weapon Systems*, [GAO-06-839](#) (Washington, D.C.: July 14, 2006).

## **Enclosure: Prior GAO Reports on Missile Defense Acquisitions, 2002 through Present**

Missile Defense: Assessment of Testing Approach Needed as Delays and Changes Persist. [GAO-20-432](#). Washington, D.C.: July 23, 2020.

Missile Defense: Lessons Learned from Acquisition Efforts. [GAO-20-490T](#). Washington, D.C.: March 12, 2020.

Missile Defense: Further Collaboration with the Intelligence Community Would Help MDA Keep Pace with Emerging Threats. [GAO-20-177](#). Washington, D.C.: December 11, 2019.

Missile Defense: Delivery Delays Provide Opportunity for Increased Testing to Better Understand Capability. [GAO-19-387](#). Washington, D.C.: June 6, 2019.

Missile Defense: Air Force Report to Congress Included Information on the Capabilities, Operational Availability, and Funding Plan for Cobra Dane. [GAO-19-68](#). Washington, D.C.: December 17, 2018.

Missile Defense: The Warfighter and Decision Makers Would Benefit from Better Communication about the System's Capabilities and Limitations. [GAO-18-324](#). Washington, D.C.: May 30, 2018.

Missile Defense: Some Progress Delivering Capabilities, but Challenges with Testing Transparency and Requirements Development Need to Be Addressed. [GAO-17-381](#). Washington, D.C.: May 30, 2017.

Missile Defense: Ballistic Missile Defense System Testing Delays Affect Delivery of Capabilities. [GAO-16-339R](#). Washington, D.C.: April 28, 2016.

Missile Defense: Assessment of DOD's Reports on Status of Efforts and Options for Improving Homeland Missile Defense. [GAO-16-254R](#). Washington, D.C.: February 17, 2016.

Missile Defense: Opportunities Exist to Reduce Acquisition Risk and Improve Reporting on System Capabilities. [GAO-15-345](#). Washington, D.C.: May 6, 2015.

Missile Defense: Cost Estimating Practices Have Improved, and Continued Evaluation Will Determine Effectiveness. [GAO-15-210R](#). Washington, D.C.: December 12, 2014.

Regional Missile Defense: DOD's 2014 Report Generally Addressed Required Reporting Elements, but Excluded Additional Key Details. [GAO-15-32](#). Washington, D.C.: December 1, 2014.

Missile Defense: DOD's Report Provides Limited Insight on Improvements to Homeland Missile Defense and Acquisition Plans. [GAO-14-626R](#). Washington, D.C.: July 17, 2014.

Missile Defense: DOD's Report Provides Limited Insight on Testing Options for the Ground-based Midcourse Defense System. [GAO-14-350R](#). Washington, D.C.: April 30, 2014.

Ballistic Missile Defense: Actions Needed to Address Implementation Issues and Estimate Long-Term Costs for European Capabilities. [GAO-14-314](#). Washington, D.C.: April 11, 2014.

Missile Defense: Mixed Progress in Achieving Acquisition Goals and Improving Accountability. [GAO-14-481T](#). Washington, D.C.: April 2, 2014.

Regional Missile Defense: DOD's Report Provided Limited Information; Assessment of Acquisition Risks is Optimistic. [GAO-14-248R](#). Washington, D.C.: March 14, 2014.

Missile Defense: Precision Tracking Space System Evaluation of Alternatives. [GAO-13-747R](#). Washington, D.C.: July 25, 2013.

Missile Defense: Opportunity to Refocus on Strengthening Acquisition Management. [GAO-13-604T](#). Washington, D.C.: May 9, 2013

Missile Defense: Opportunity to Refocus on Strengthening Acquisition Management. [GAO-13-432](#). Washington, D.C.: April 26, 2013.

Standard Missile-3 Block IIB Analysis of Alternatives. [GAO-13-382R](#). Washington, D.C.: February 11, 2013.

Schedule Best Practices Provide Opportunity to Enhance Missile Defense Agency Accountability and Program Execution. [GAO-12-720R](#). Washington, D.C.: July 19, 2012.

Missile Defense: Opportunities Exist to Strengthen Acquisitions by Reducing Concurrency and Improving Parts Quality. [GAO-12-600T](#). Washington, D.C.: April 25, 2012.

Missile Defense: Opportunity Exists to Strengthen Acquisitions by Reducing Concurrency. [GAO-12-486](#). Washington, D.C.: April 20, 2012.

Missile Defense: Actions Needed to Improve Transparency and Accountability. [GAO-11-555T](#). Washington, D.C.: April 13, 2011.

Missile Defense: Actions Needed to Improve Transparency and Accountability. [GAO-11-372](#). Washington, D.C.: March 24, 2011.

Ballistic Missile Defense: DOD Needs to Address Planning and Implementation Challenges for Future Capabilities in Europe. [GAO-11-220](#). Washington, D.C.: January 26, 2011.

Missile Defense: European Phased Adaptive Approach Acquisitions Face Synchronization, Transparency, and Accountability Challenges. [GAO-11-179R](#). Washington, D.C.: December 21, 2010.

Defense Acquisitions: Missile Defense Program Instability Affects Reliability of Earned Value Management Data. [GAO-10-676](#). Washington, D.C.: July 14, 2010.

Defense Acquisitions: Missile Defense Transition Provides Opportunity to Strengthen Acquisition Approach. [GAO-10-311](#). Washington, D.C.: February 25, 2010

Missile Defense: DOD Needs to More Fully Assess Requirements and Establish Operational Units before Fielding New Capabilities. [GAO-09-856](#). Washington, D.C.: September 16, 2009.

Ballistic Missile Defense: Actions Needed to Improve Planning and Information on Construction and Support Costs for Proposed European Sites. [GAO-09-771](#). Washington, D.C.: August 6, 2009.

Defense Management: Key Challenges Should be Addressed When Considering Changes to Missile Defense Agency's Roles and Missions. [GAO-09-466T](#). Washington, D.C.: March 26, 2009.

Defense Acquisitions: Production and Fielding of Missile Defense Components Continue with Less Testing and Validation Than Planned. [GAO-09-338](#). Washington, D.C.: March 13, 2009.

Defense Acquisitions: Charting a Course for Improved Missile Defense Testing. [GAO-09-403T](#). Washington, D.C.: February 25, 2009.

Defense Acquisitions: Sound Business Case Needed to Implement Missile Defense Agency's Targets Program. [GAO-08-1113](#). Washington, D.C.: September 26, 2008.

Missile Defense: Actions Needed to Improve Planning and Cost Estimates for Long-Term Support of Ballistic Missile Defense. [GAO-08-1068](#). Washington, D.C.: September 25, 2008.

Ballistic Missile Defense: Actions Needed to Improve Process for Identifying and Addressing Combatant Command Priorities. [GAO-08-740](#). Washington, D.C.: July 31, 2008.

Defense Acquisitions: Assessment of Progress Made on Block 2006 Missile Defense Capabilities and Oversight. [GAO-08-608T](#). Washington, D.C.: April 1, 2008.

Defense Acquisitions: Progress Made in Fielding Missile Defense, but Program Is Short of Meeting Goals. [GAO-08-448](#). Washington, D.C.: March 14, 2008.

Defense Acquisitions: Assessment of DOD Efforts to Enhance Missile Defense Capabilities and Oversight. [GAO-08-506T](#). Washington, D.C.: February 26, 2008.

Defense Acquisitions: Missile Defense Agency's Flexibility Reduces Transparency of Program Cost. [GAO-07-799T](#). Washington, D.C.: April 30, 2007.

Missile Defense: Actions Needed to Improve Information for Supporting Future Key Decisions for Boost and Ascent Phase Elements. [GAO-07-430](#). Washington, D.C.: April 17, 2007.

Defense Acquisitions: Missile Defense Needs a Better Balance between Flexibility and Accountability. [GAO-07-727T](#). Washington, D.C.: April 11, 2007.

Defense Acquisitions: Missile Defense Acquisition Strategy Generates Results but Delivers Less at a Higher Cost. [GAO-07-387](#). Washington, D.C.: March 15, 2007.

Defense Management: Actions Needed to Improve Operational Planning and Visibility of Costs for Ballistic Missile Defense. [GAO-06-473](#). Washington, D.C.: May 31, 2006.

Defense Acquisitions: Missile Defense Agency Fields Initial Capability but Falls Short of Original Goals. [GAO-06-327](#). Washington, D.C.: March 15, 2006.

Defense Acquisitions: Actions Needed to Ensure Adequate Funding for Operation and Sustainment of the Ballistic Missile Defense System. [GAO-05-817](#). Washington, D.C.: September 6, 2005.

Defense Acquisitions: Status of Ballistic Missile Defense Program in 2004. [GAO-05-243](#). Washington, D.C.: March 31, 2005.

Uncertainties Remain Concerning the Airborne Laser's Cost and Military Utility. [GAO-04-643R](#). Washington, D.C.: May 17, 2004.

Missile Defense: Actions Are Needed to Enhance Testing and Accountability. [GAO-04-409](#). Washington, D.C.: April 23, 2004.

Missile Defense: Actions Being Taken to Address Testing Recommendations, but Updated Assessment Needed. [GAO-04-254](#). Washington, D.C.: February 26, 2004.

Missile Defense: Additional Knowledge Needed in Developing System for Intercepting Long-Range Missiles. [GAO-03-600](#). Washington, D.C.: August 21, 2003.

Missile Defense: Alternate Approaches to Space Tracking and Surveillance System Need to Be Considered. [GAO-03-597](#). Washington, D.C.: May 23, 2003.

Information on Cancelled Integrated Flight Test-16 for Ground-Based Midcourse Defense Element. [GAO-03-767R](#). Washington, D.C.: May 8, 2003.

Missile Defense: Knowledge-Based Practices Are Being Adopted, but Risks Remain. [GAO-03-441](#). Washington, D.C.: April 30, 2003.

Missile Defense: Knowledge-Based Process Would Benefit Airborne Laser Decision-Making. [GAO-02-949T](#). Washington, D.C.: July 16, 2002.

Missile Defense: Knowledge-Based Decision Making Needed to Reduce Risks in Developing Airborne Laser. [GAO-02-631](#). Washington, D.C.: July 12, 2002.

Missile Defense: Review of Allegations about an Early National Missile Defense Flight Test. [GAO-02-125](#). Washington, D.C.: February 28, 2002.

Missile Defense: Review of Results and Limitations of an Early National Missile Defense Flight Test. [GAO-02-124](#). Washington, D.C.: February 28, 2002.

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