

Seeking Alignment

Missile Defense and Defeat in the 2022 Budget

By Wes Rumbaugh and Tom Karako

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THE ISSUE

- **The 2022 budget request for missile defense and defeat seeks, but does not yet achieve, alignment with the reality of long-term strategic competition.** Progress is reflected in greater attention to newer capability and mission areas.
- **Projected flat top lines undermine the promise of next-generation capabilities such as space sensors,** the defense of Guam, and hypersonic strike and defense.
- **Changes to the 2022 budget from prior projections remain relatively modest, reflecting a transitional quality, as the Biden administration's first.** More adjustments may be expected from congressional modifications and from future requests informed by a new National Defense Strategy and Missile Defense Review.

INFLECTING TOWARD WHAT?

On May 28, 2021, the new Biden administration released its first President's Budget (PB), including its request for the Department of Defense (DoD). In subsequent months, the four congressional defense committees initiated draft legislative and appropriations bill language for fiscal year (FY) 2022. With a few exceptions, the budget request largely retains the programmatic priorities inherited from the previous administration. That relatively modest degree of change is to be expected in advance of the forthcoming National Defense Strategy and Missile Defense Review.

Nevertheless, a few changes suggest that the missile defense and defeat enterprise is slowly moving into closer alignment with the reality of renewed, long-term strategic competition. Growing investment in space sensors, hypersonic strike and defense, homeland cruise missile defense, and the defense of Guam signals special attention to high-end air and missile threats. Past years' emphasis on capacity and readiness appears to have transitioned

to a new focus on research and development of next-generation capabilities.

The 2021 defense budget represented something of an inflection point for the missile defense enterprise.¹ At first blush, the 2022 request for missile defense and defeat reflects a choice to prioritize capability over capacity, but it remains transitional given its context.² A question to be answered by the next Missile Defense Review and the 2023 budget is which direction this inflection will take.

BROADER BUDGETARY CONTEXT

The new administration has had limited time to confirm new Pentagon leadership and review major budget decisions; thus, the 2022 budget exhibits considerable continuity with the previous budget's Future Years Defense Program (FYDP). Some decisions will have to wait for FY 2023 or 2024 for implementation, informed by new policy reviews. This year's submission, on May 28, is the latest submission of the annual budget request in history. The

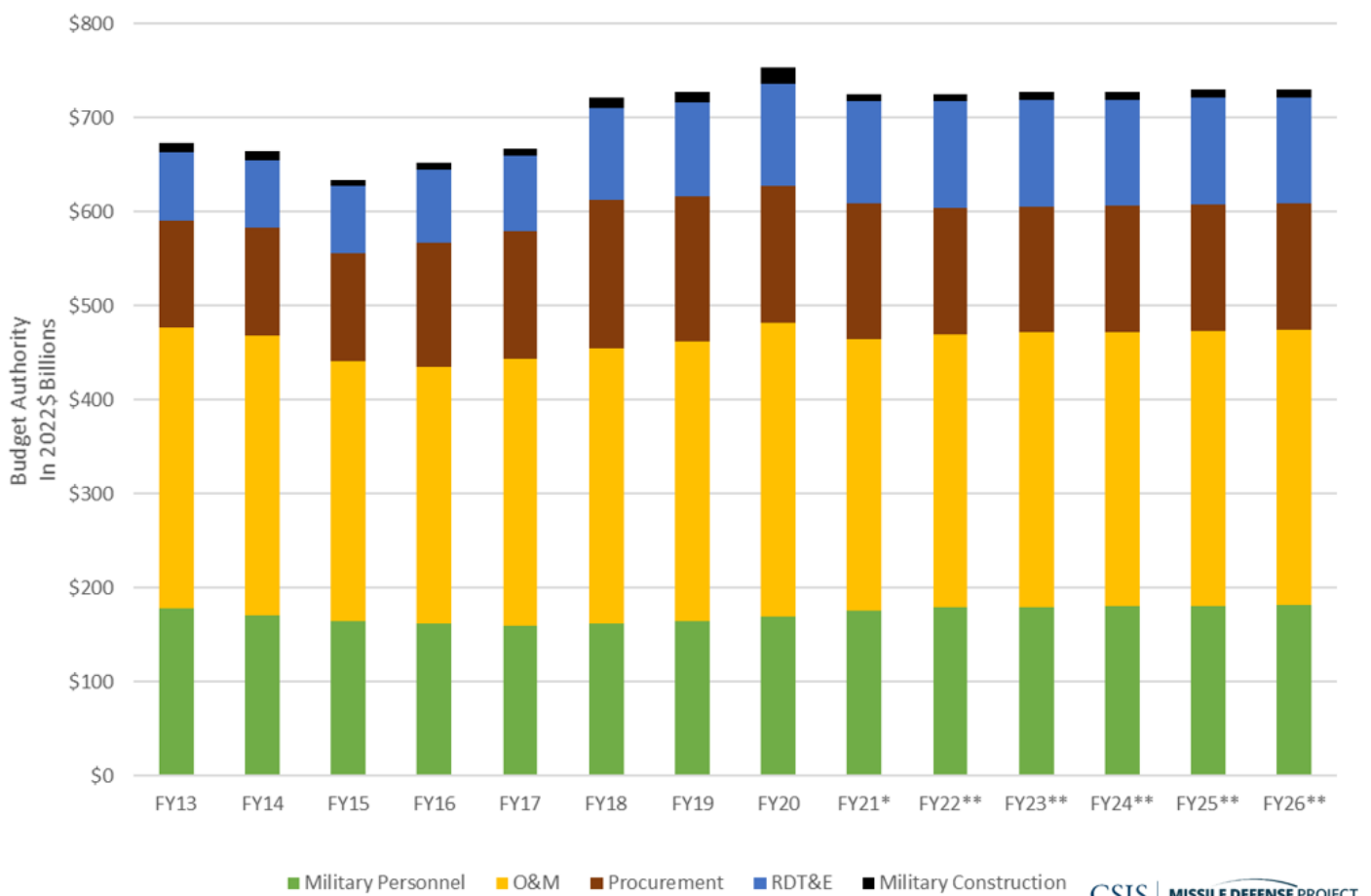
timeline for Congress to work on its authorization and appropriations bills was significantly compressed, both delaying the National Defense Authorization Act (NDAA) and setting up what could become a long Continuing Resolution for FY 2022.³

Consistent with the first budget submissions of past administrations, the 2022 budget did not include the full, five-year FYDP. Its absence both obscures future spending plans and suggests the desire to have flexibility to adjust them. Some modest insight is provided by the projections of the Office of Management and Budget (OMB), which showed nominal projected DoD top-line growth of about 2 percent per year out to 2026 (Figure 1). The OMB projection is in line with standard inflation forecasts, hinting that future defense budgets will remain flat in real dollars. If inflation significantly increases, these

assumptions will eat into buying power and effectively create a budget decline.

Signaling continuity with the 2018 National Defense Strategy, DoD's 2022 request highlighted China as its pacing challenge and focused on modernization to meet it. The request's overview document emphasizes "leveraging our technological advantages and investing in cutting edge technologies that will deliver new warfighting advantages to our forces, including artificial intelligence, hypersonic technology, cyber, and quantum computing, among others."⁴ To support this effort, the Pentagon's budget request proposes over \$113 billion in research, development, testing, and evaluation (RDT&E) spending—the highest in history and about a 4 percent increase in real dollars compared to 2021 appropriations (all figures in constant 2022 dollars). During the budget

Figure 1: DoD Budget Authority by Title, 2013–2026



*Appropriated dollars, **Based on 2022 PB

Source: Office of Management and Budget, "Historical Table 5-1—Budget Authority by Function and Subfunction: 1976–2026" (2013–2022), Historical Tables, The White House, <https://www.whitehouse.gov/omb/historical-tables/>; and Office of Management and Budget, "Table 20-1. Budget Authority and Outlays by Function, Category, and Program" (2023–2026), Analytical Perspectives, The White House, <https://www.whitehouse.gov/omb/analytical-perspectives/>.

rollout, Biden administration officials emphasized a choice for next-generation capabilities as opposed to legacy systems.⁵ This choice for capability over capacity is evident in several program element decisions, but declining top lines could impair the ability to realize and field such capabilities at the speed of relevance.

MISSILE DEFENSE AND DEFEAT

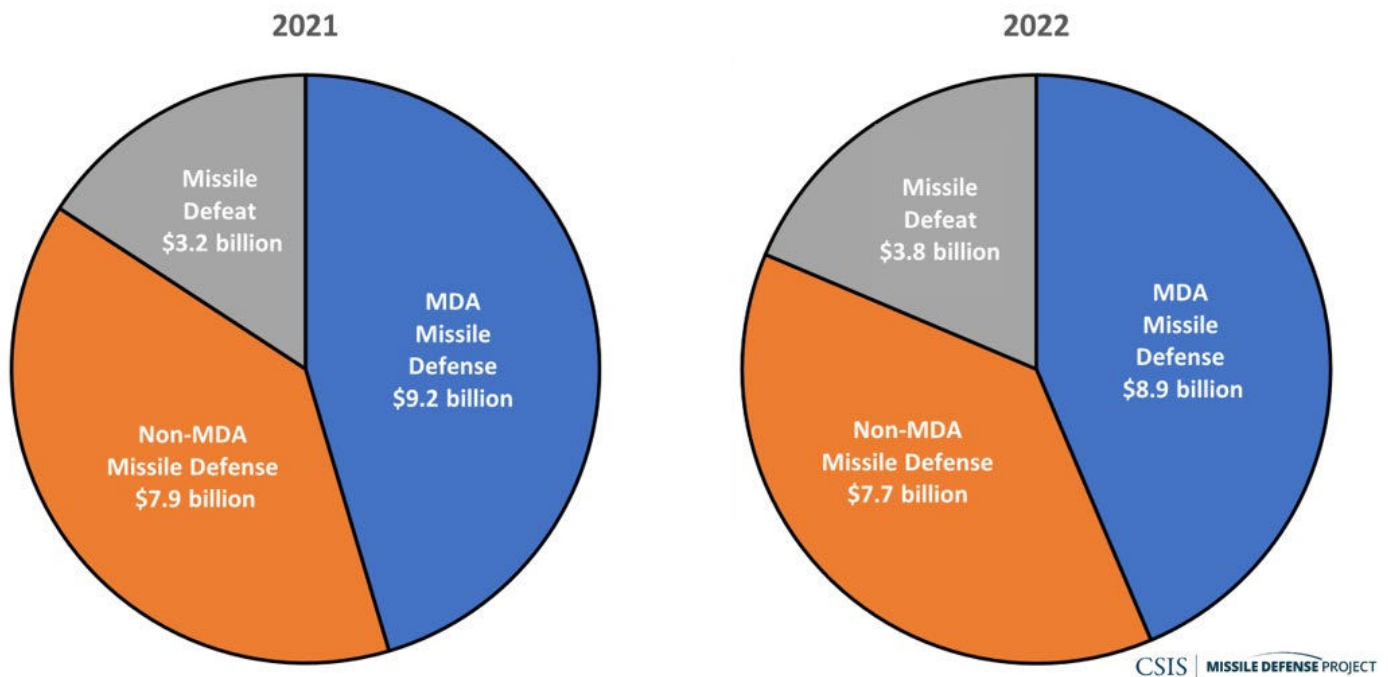
As summarized in the Defense Budget Overview, the 2022 budget requests \$20.4 billion for combined missile defense and defeat, a slight increase from the \$20.3 billion requested in 2021 (Figure 2).⁶ As defined in this reporting function to Congress, missile defense and defeat includes active air and missile defenses for the Missile Defense Agency (MDA) and the services, plus various service and Defense-wide spending on capabilities designed to defeat missile threats prior to launch, whether by kinetic or nonkinetic means. The \$20.4 billion for 2022 breaks down to \$3.8 billion for missile defeat activities, \$7.7 billion for non-MDA missile defense, and \$8.9 billion for MDA. Compared to the 2021 budget, the 2022 request includes about a

\$600-million increase in missile defeat budgets, which offsets smaller declines of about \$300 million for MDA and \$200 million for non-MDA missile defense. Direct year-to-year comparisons are somewhat challenging, as the list of items in the missile defense and defeat reporting category has likely changed over time.⁷

HYPERSONIC STRIKE

One major area of growth in missile defeat is the relative maturation of the variety of hypersonic strike programs. According to the Government Accountability Office, there are some 70 programs spread out across the Pentagon.⁸ The number of discrete, publicly identifiable programs designed to field capability, however, is much smaller (Figure 3). In this year's budget, the Air Force advised initial procurement of its Air-launched Rapid Response Weapon (ARRW) and the Army proposed a new program element for its Long-Range Hypersonic Weapon (LRHW) to focus on engineering and manufacturing development, both critical steps to transitioning the programs from prototypes to fielded weapons systems.

Figure 2: 2021 and 2022 PB Missile Defense and Defeat Breakdown



Source: Office of the Under Secretary of Defense (Comptroller)/Chief Financial Officer, *Defense Budget Overview: Irreversible Implementation of the National Defense Strategy* (Washington DC: Department of Defense, May 2020), 1-7, https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2021/fy2021_Budget_Request_Overview_Book.pdf; Office of the Under Secretary of Defense (Comptroller)/Chief Financial Officer, *Defense Budget Overview: United States Department of Defense Fiscal Year 2022 Budget Request* (Washington DC: Department of Defense, May 2021), 2-14, https://comptroller.defense.gov/Portals/45/Documents/defbudget/FY2022/FY2022_Budget_Request_Overview_Book.pdf.

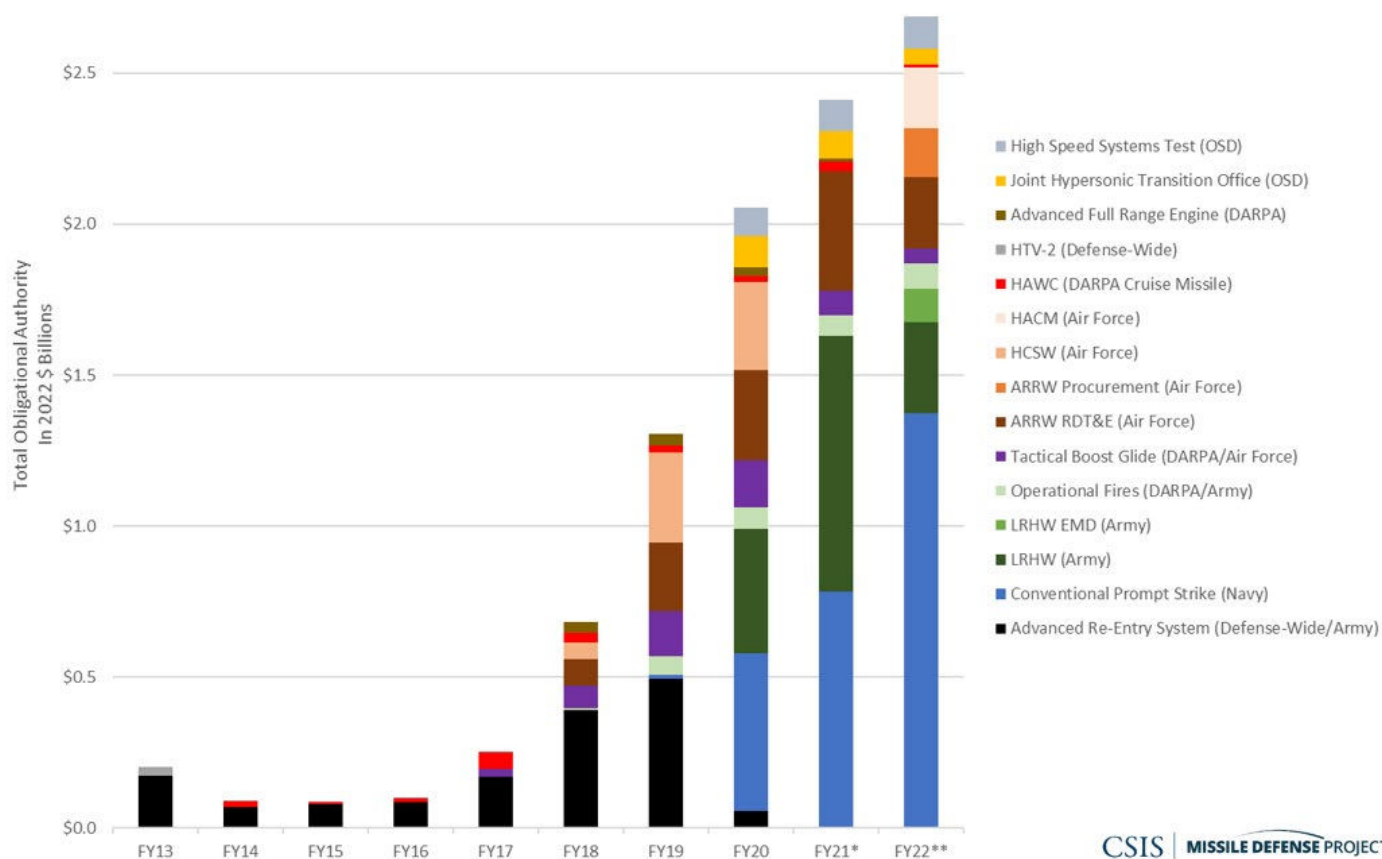
The Air Force is nominally slated to field its first ARRW missiles in FY 2022, although several recent failed tests raise questions about its timeline.⁹ Air Force and Pentagon officials have both highlighted the Hypersonic Conventional Strike Weapon (HCSW) program as a potential fallback should ARRW stumble.¹⁰ Testing issues and similar concerns may have informed the cuts to ARRW procurement in three congressional defense committees. The Air Force also proposed a new start in its 2022 budget for the Hypersonic Attack Cruise Missile (HACM), which could be the first hypersonic cruise missile fielded by the United States.

The Army is scheduled to be the second service to field a hypersonic missile, with the LRHW slated to deploy as an operational prototype in 2023. LRHW funding is now split between two program elements: one funding the ongoing Rapid Capabilities and Critical Technologies

Office (RCCTO) efforts and the other funding new engineering and manufacturing development efforts, located in the Program Executive Office (PEO), Missiles and Space. The RCCTO funding line for the LRHW was reduced by about \$225 million compared to the FYDP estimate in the 2021 budget for 2022, mostly a result of a \$190-million reallocation of funds to the Army's Mobile Medium Range Missile line for the Mid-Range Capability (MRC). The Army also reallocated \$32 million to the new PEO Missiles and Space LRHW budget account. The result of this internal reshuffling is a reduction of about \$114 million for the two total LRHW programs in the 2022 budget compared to 2021 projections.

The redirection of funds to the MRC, which includes the Army's development and deployment of ground-launched Standard Missile-6 and Tomahawk missiles in what is now known as the Typhon program, reflects the Army's

Figure 3: Selected DoD Hypersonic Weapons Programs, 2013–2022



*Appropriated dollars, **Based on 2022 PB

Source: DoD Comptroller and CSIS analysis.

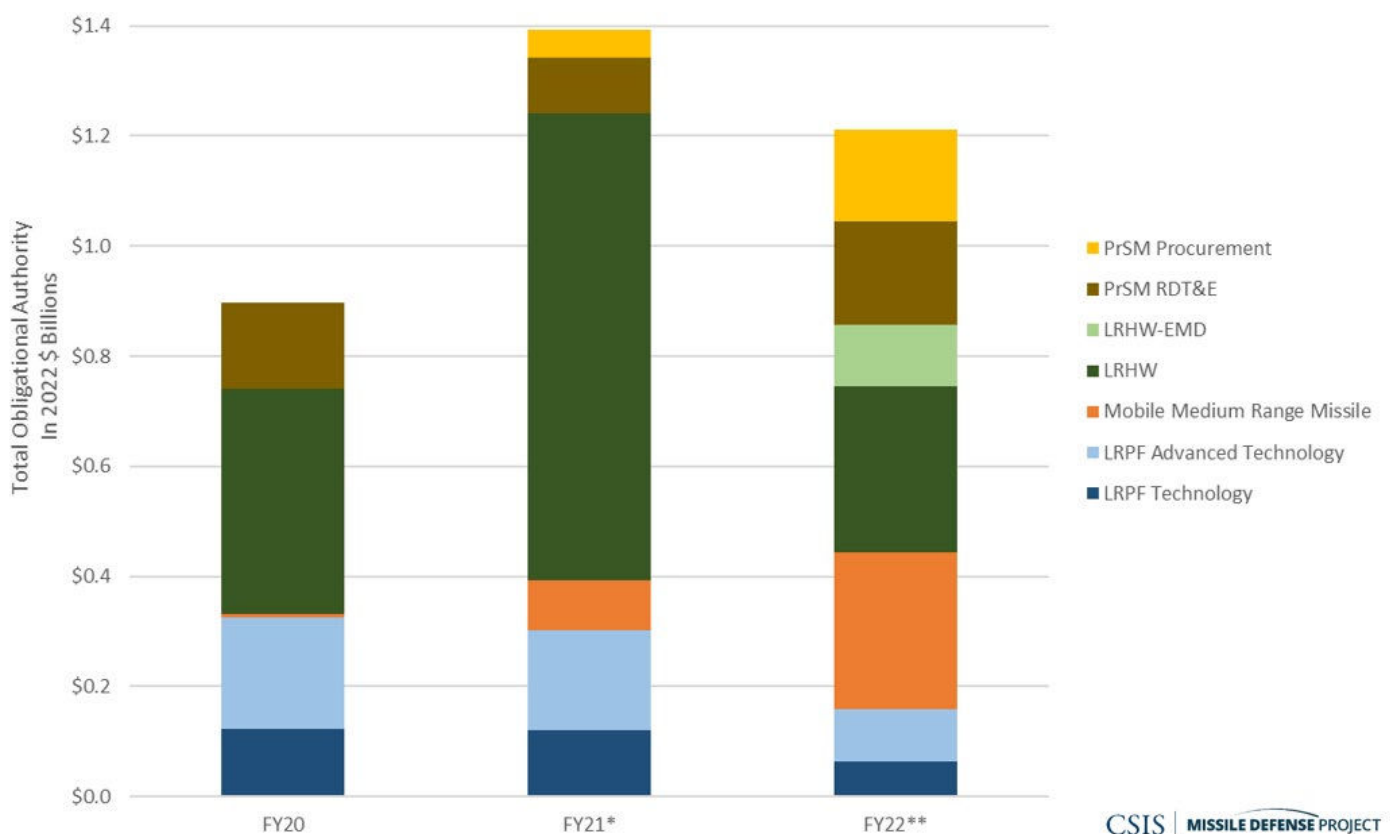
pursuit of a more diverse long-range strike portfolio (Figure 4). This portfolio also includes the Long Range Precision Fires Cross Functional Team development of the Precision Strike Missile (PrSM), which recently conducted a test beyond 499 km in range.¹¹

The Marine Corps is advancing its Navy/Marine Expeditionary Ship Interdiction System (NMESIS). The 2022 request includes funding for continued RDT&E of NMESIS and procurement of long-lead materials to facilitate the deployment of the initial Marine Littoral Regiment with Naval Strike Missiles in 2024.¹² The Marine Corps unfunded requirements list contains funding for additional Naval Strike Missiles, as well as \$96 million for Tomahawk missiles.¹³ In addition to the U.S. Navy, two other services have a desire to acquire the Tomahawk missile to contribute to long-range, multidomain fires.

The largest hypersonic strike program in the 2022 budget request is the Navy's Conventional Prompt Strike (CPS)

hypersonic missile, which the service plans to deploy on Virginia-class submarines and now Zumwalt-class destroyers. The \$1.4-billion request for Navy CPS in 2022 is an increase of about \$70 million over the projected request from the 2021 budget, driven mostly by the decision to add Zumwalt integration to the program. The Navy added Zumwalt integration to replace planned integration with the Ohio-class submarines to meet its initial 2025 deployment deadline, with fielding on Virginia-class subs planned for 2028.¹⁴ According to the FYDP from the 2021 budget, 2022 was projected to be the peak year for Navy CPS spending, although new integration efforts could increase the program's out-year profile. Both congressional authorizing committees increased the CPS funding by \$125 million, but both appropriation committees trimmed it, calling into question the ability to execute a more ambitious timeline. The shift from initial deployment on Ohio-class submarines to the Zumwalt was driven by a failure to fund a critical underwater launch test facility.

Figure 4: Army Long Range Precision Fires, 2020–2022



*Appropriated dollars, **Based on 2022 PB

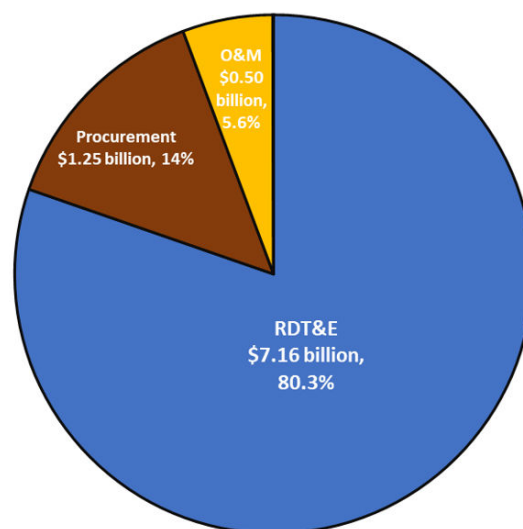
Source: DoD Comptroller and CSIS analysis.

MISSILE DEFENSE AGENCY TOP-LINE TRENDS

One area where the Biden administration made some significant changes was MDA. During the 2022 budget briefing, MDA officials stressed that research and development efforts comprised 80 percent of the agency's budget request.¹⁵ This would be the highest percentage of its budget going to RDT&E since 2012. This point, supported by a pie chart keyed to percentages (Figure 5), reflects the Pentagon-wide emphasis on increasing RDT&E.

Looking only at the RDT&E percentage share of MDA's budget does not tell the whole story, however. The higher percentage of RDT&E funding masks an overall decline in funding, both in its top line and within the RDT&E account (Figure 6). MDA's top line decreased from about \$10.5 billion appropriated for 2021 to \$8.9 billion proposed in 2022. As compared to the 2021 PB's projection for 2022, however, the MDA top line is nearly the same as that expected from the last year of the Trump administration. Instead, the increased percentage of RDT&E funding is accomplished due to an even steeper decline in procurement, from over \$2 billion to around \$1.25 billion between 2021 and 2022.

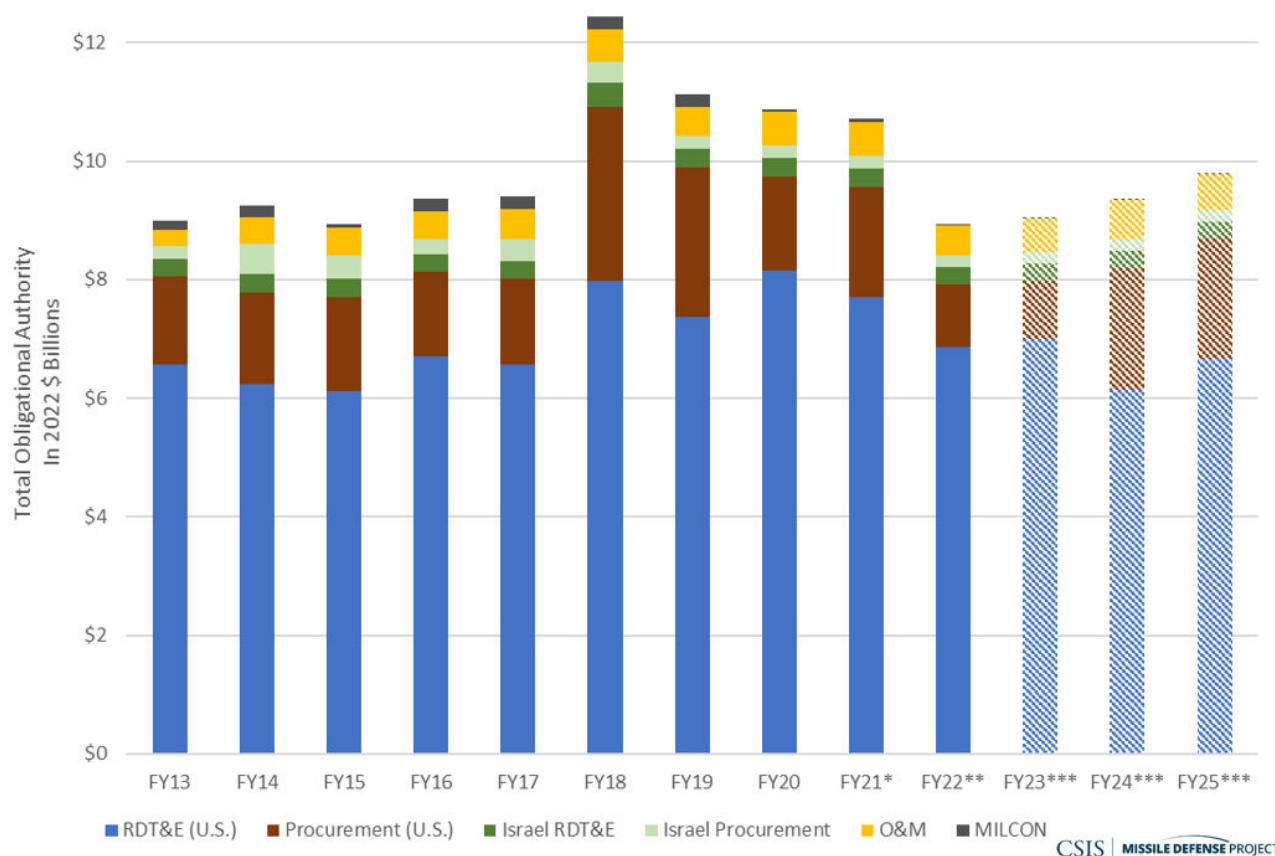
Figure 5: MDA Budget Categories, 2022



CSIS | MISSILE DEFENSE PROJECT

Source: U.S. Department of Defense, *Department of Defense Fiscal Year (FY) 2022 Budget Estimates: Missile Defense Agency Defense-Wide Justification Book*, Volume 2a of 5 Research, Development, Test & Evaluation, Defense-Wide (Washington DC: Department of Defense, May 2021), xliii, https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2022/budget_justification/pdfs/03_RDT_and_E/RDTE_Vol2_MDA_RDTE_PB22_Justification_Book.pdf.

Figure 6: MDA Budget Categories, 2013–2025



CSIS | MISSILE DEFENSE PROJECT

*Appropriated dollars, **Based on 2022 PB, ***Based on 2021 PB

Source: DoD Comptroller and CSIS analysis.

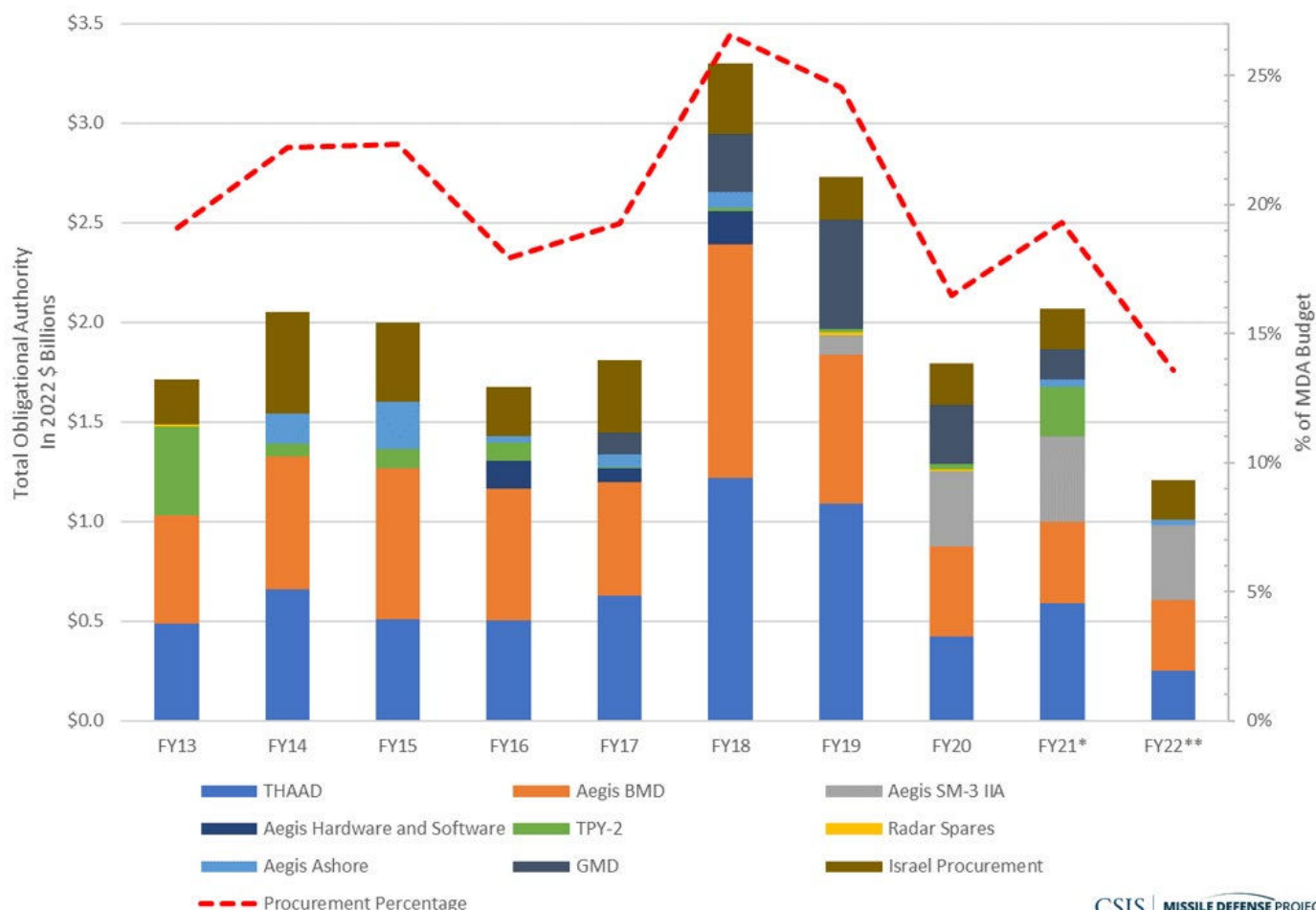
This top-line reduction looks more dramatic in comparison to the 2021 appropriations due to the actions of Congress. The 2021 budget request proposed \$9.2 billion in MDA funding, with Congress adding over \$1.3 billion in additional spending. MDA's top line will likely rise in the conference authorization and appropriations bills, but almost entirely due to missile defense-related aid for Israel.¹⁶ Actions in both houses of Congress added a billion dollars for Iron Dome, which would be a significant increase above the standard amount of \$500 million in annual missile defense-related support.¹⁷ Should this funding level hold and should the full figure remain in the MDA budget, \$1.5 billion of MDA's top line would be going to Israel.

Relative to other accounts, procurement saw the sharpest decline in the 2022 submission, falling to its lowest percentage of MDA spending since 2011, at 13.5 percent (Figure 7). This trend was driven by two decisions, both

related to the Terminal High Altitude Area Defense (THAAD) system. The THAAD interceptor buy was reduced from a 26-interceptor projection in the 2021 budget to 18 interceptors in the 2022 request. As a result, the requested THAAD interceptor procurement budget fell about 57 percent from the 2021 appropriation. The other major decline in procurement budgets from 2021 to 2022 comes in the procurement of AN/TPY-2 radars, although the 2021 spike there was added by appropriators to support an eighth THAAD battery rather than something the 2021 budget requested.

The procurement dip seems unlikely to hold through the appropriations process. Three of the four defense committees acted to increase THAAD interceptor procurement between \$110–125 million above the requested sum. Both the House and Senate NDAA drafts also added about \$41 million for increased Standard

Figure 7: MDA Procurement Appropriations, 2013–2022



*Appropriated dollars, **Based on 2022 PB

Source: DoD Comptroller and CSIS analysis.

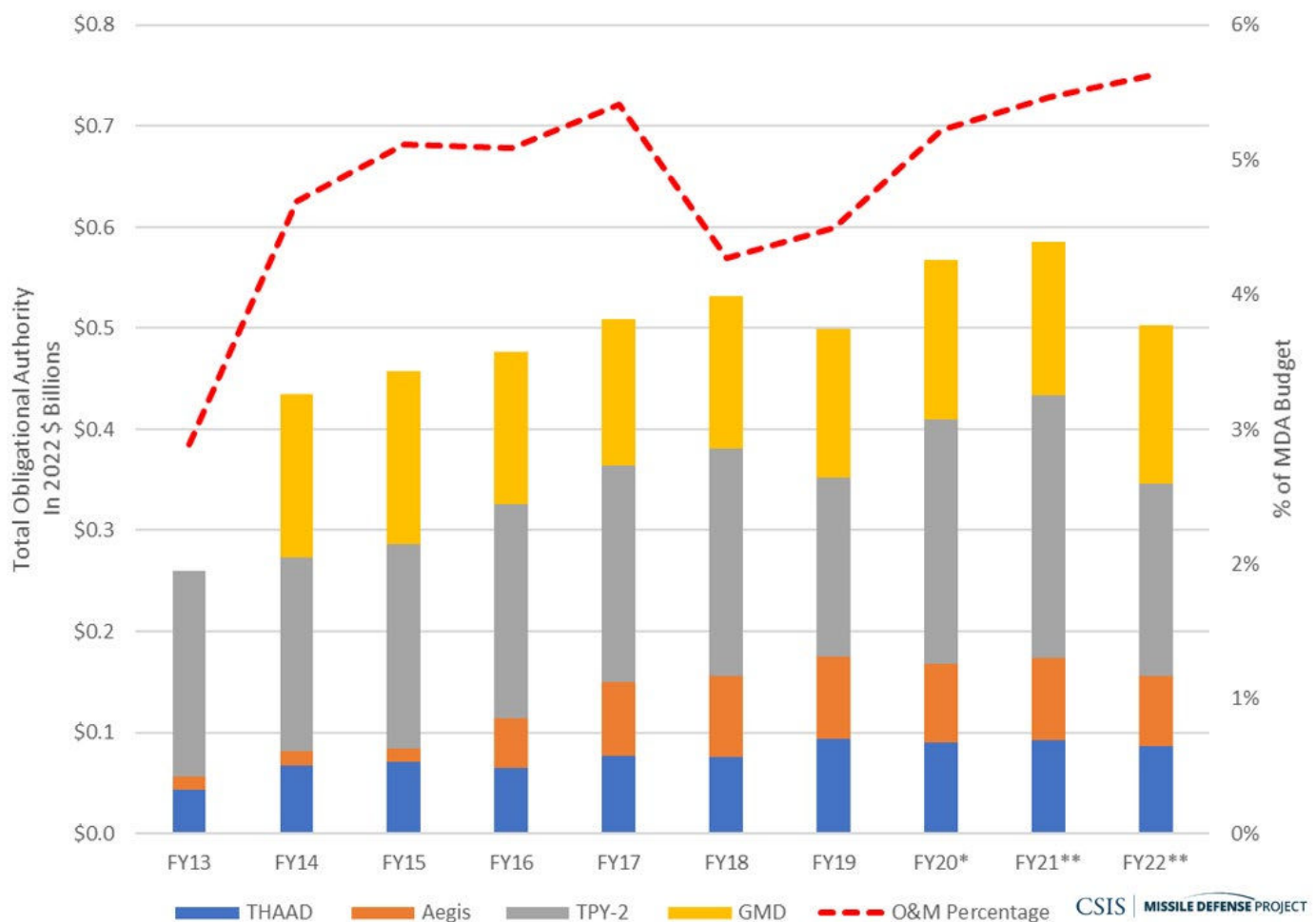
Missile-3 Block IIA (SM-3 IIA) procurement, and Senate appropriators added \$192.7 million for the same. Combined with the \$1-billion procurement boost for Iron Dome, these additions should leave MDA with a relatively flat top line at the end of the appropriations process.

The 2022 MDA budget also includes a reduction in operations and maintenance (O&M) funding, despite growing operational deployments of MDA assets that are themselves the tail from previous procurement spikes. While MDA's O&M accounts have always been relatively modest and the decision follows the department-wide trend of prioritizing modernization over operations, this appears to be an area in which MDA has assumed some risk. The FY 2022 request of \$502 million is more than a 9 percent reduction from last year's \$553-million projection for 2022 (Figure 8).

TRANSITION FROM STUDIES TO PROGRAMS

The color of money trends within MDA reflects a transition from early-stage research and development and studies to programs with a more defined acquisition strategy. A clear example of this is the Next Generation Interceptor (NGI) program, which at about \$926 million for 2022 is the largest single RDT&E program in MDA. The Biden Pentagon made a major decision on the NGI program in March 2021, awarding two development contracts, both of which could continue full-scale competition through critical design review.¹⁸ Relative to MDA's top line, future funding for NGI is likely to remain substantial, but the option does exist to cut short the competition phase and downselect to a single interceptor design, perhaps after FY 2024, to save out-year dollars. The budget justification documents suggest that MDA plans to begin advance procurement of NGI components before FY 2026.¹⁹

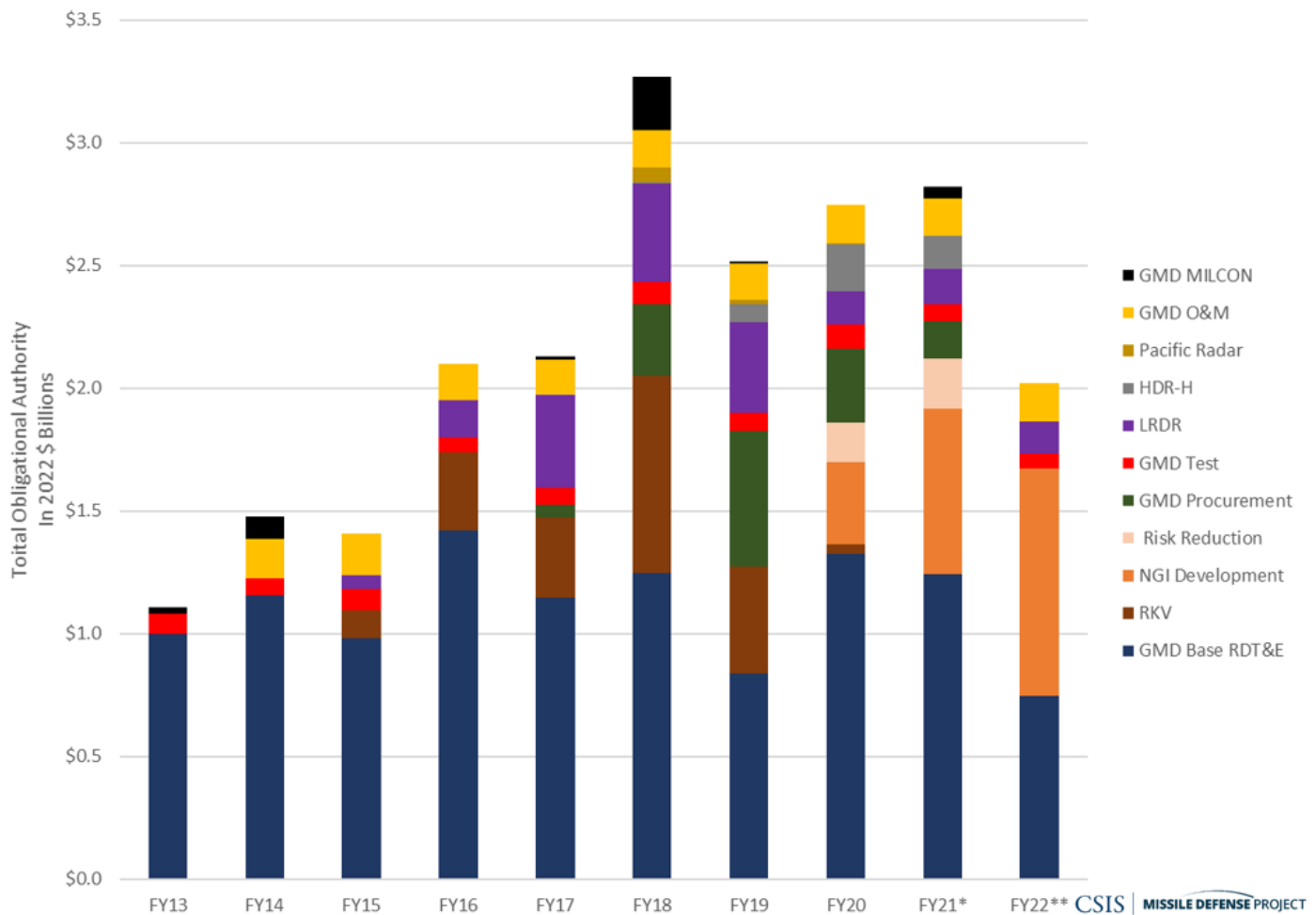
Figure 8: MDA O&M Appropriations, 2013–2022



*Appropriated dollars, **Based on 2022 PB

Source: DoD Comptroller and CSIS analysis.

Figure 9: GMD-Related Program Elements, 2013–2022



*Appropriated dollars, **Based on 2022 PB

Source: DoD Comptroller and CSIS analysis.

While NGI development is up, other Ground-based Midcourse Defense (GMD) modernization is down. The decline in GMD-related spending is driven by reductions to its base RDT&E account, for which MDA requested \$745 million in 2022, down from \$1.2 billion appropriated in 2021—but down only \$31 million from the Trump administration's 2021 projections (Figure 9). Higher spending levels in 2020 and 2021 were largely driven by a surge in funding for Ground-Based Interceptor (GBI) service-life extension programs, an action effectively required by the Trump administration's cancellation of the RKV program (Figure 9).²⁰ The Biden administration also followed its predecessor in attempting to cancel the Homeland Defense Radar-Hawaii. Congress reinserted this into MDA's budget during the 2021 appropriations process and seems likely to do so again for 2022.²¹ The solid-state digital radar will apparently be built, even if one piece at a time. Should deployment in Hawaii

again face local opposition, however, its modules and several faces being produced could be repurposed and relocated elsewhere—such as Guam.

MDA proposed nearly \$14 million in its 2022 budget to begin studies on a homeland cruise missile defense architecture, an important but still modest level of effort. Vice Admiral James Winnefeld, then vice chairman of the Joint Chiefs of Staff, highlighted the requirement for homeland cruise missile defense as far back as 2015, but this appears to be the first dedicated funding for MDA to take on a portion of the mission.²² The most recent Missile Defense Review tasked DoD with determining a lead agency for the acquisition of a homeland cruise missile defense capability.²³ No such designation has yet been made, but MDA could well lead that effort.²⁴ Both MDA and NORTHCOM's unfunded requirements lists requested an additional \$27 million for an elevated sensor to support

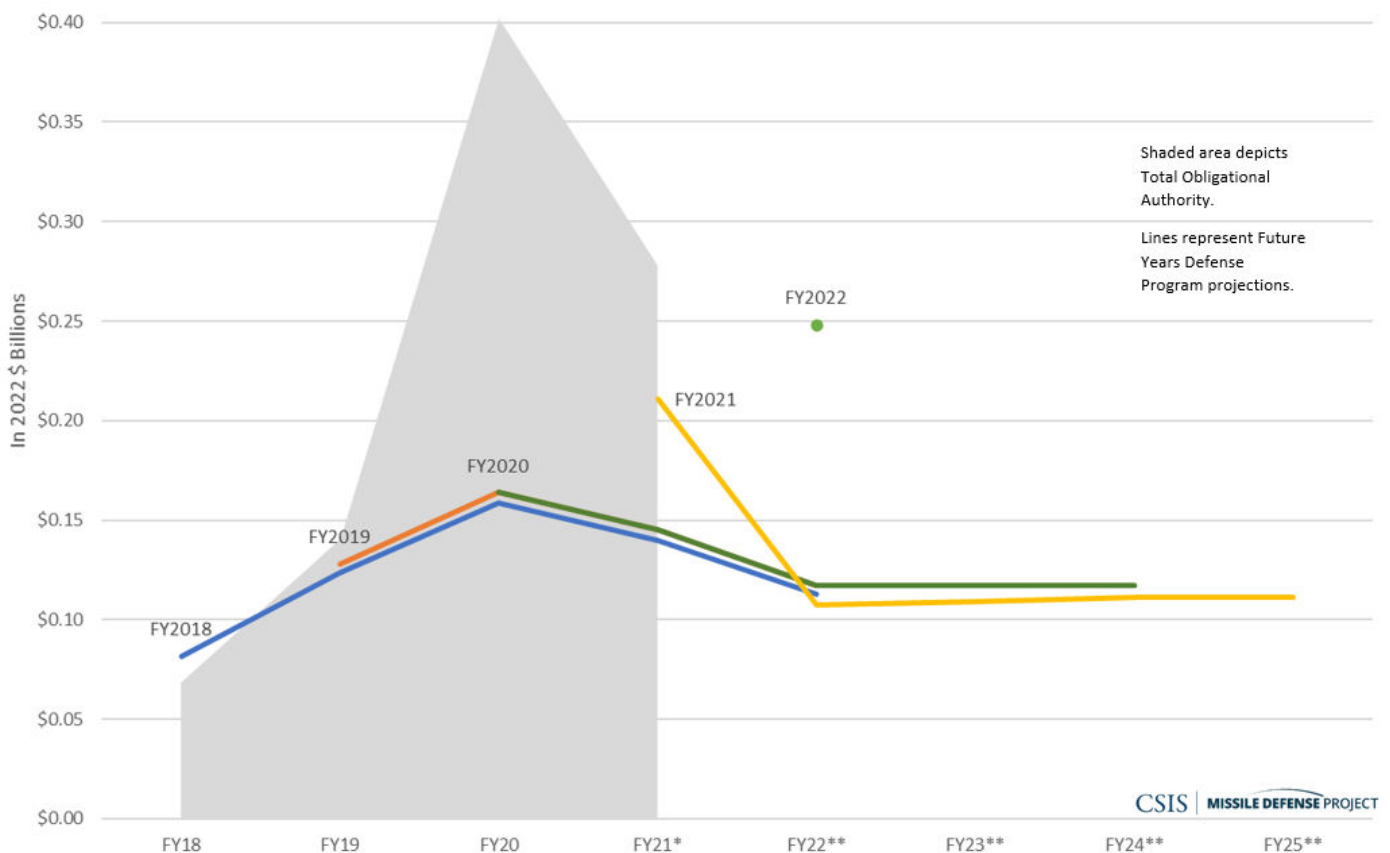
existing cruise missile defense systems in the National Capital Region, another critical but modest contribution to sensing cruise missile threats.²⁵

The 2022 budget proposed to fund efforts to evolve the Aegis and THAAD systems to support a homeland defense underlay, including \$65 million for development of an evolved THAAD interceptor and \$99 million for modifications to the Aegis Weapons System and SM-3 IIA interceptor. In November 2020, MDA successfully intercepted a simple ICBM-representative target with an SM-3 IIA, thereby fulfilling a congressional requirement.²⁶ During the appropriations process in both 2021 and 2022, Congress has cut proposed funding for homeland underlay efforts due to lack of an acquisition strategy for the systems. During his 2022 budget briefing, MDA director Vice Admiral Jon Hill suggested the development of these programs would be contingent on policy decisions and whether the service-life extension of GMD reduces the need for an additional homeland defense layer to meet reliability needs.²⁷ Should the plan go forward, budget

tables in the justification documents included a line for procurement of layered homeland defense components, suggesting plans for a transition to procurement in the unreleased FYDP.

Another instance of a transition from studies to a more advanced acquisition strategy is the Hypersonic Defense program. The 2022 budget request for the Hypersonic Defense program is over \$140 million greater than the 2021 budget projected for 2022, suggesting that the program has moved toward a more defined development effort. Vice Admiral Hill echoed this sentiment at his budget press briefing, explaining that the 2022 budget will prepare MDA for a System Requirements Review to set requirements for a more mature development program based on existing Aegis capabilities and the Glide Phase Interceptor (GPI) proposals.²⁸ This trend suggests that the budgets for the Hypersonic Defense program are likely to grow in future budgets relative to the modest FYDP projections from previous budgets (Figure 10). In November 2021, MDA awarded three contracts for initial

Figure 10: Hypersonic Defense Budget and FYDP Trends, 2018–2025



*Appropriated dollars, **Based on previous FYDPs

Source: DoD Comptroller and CSIS analysis.

GPI development work.²⁹ In addition to GPI, MDA is also pursuing the Sea Based Terminal program, which could deliver an early operational hypersonic defense capability to the fleet around mid-decade.

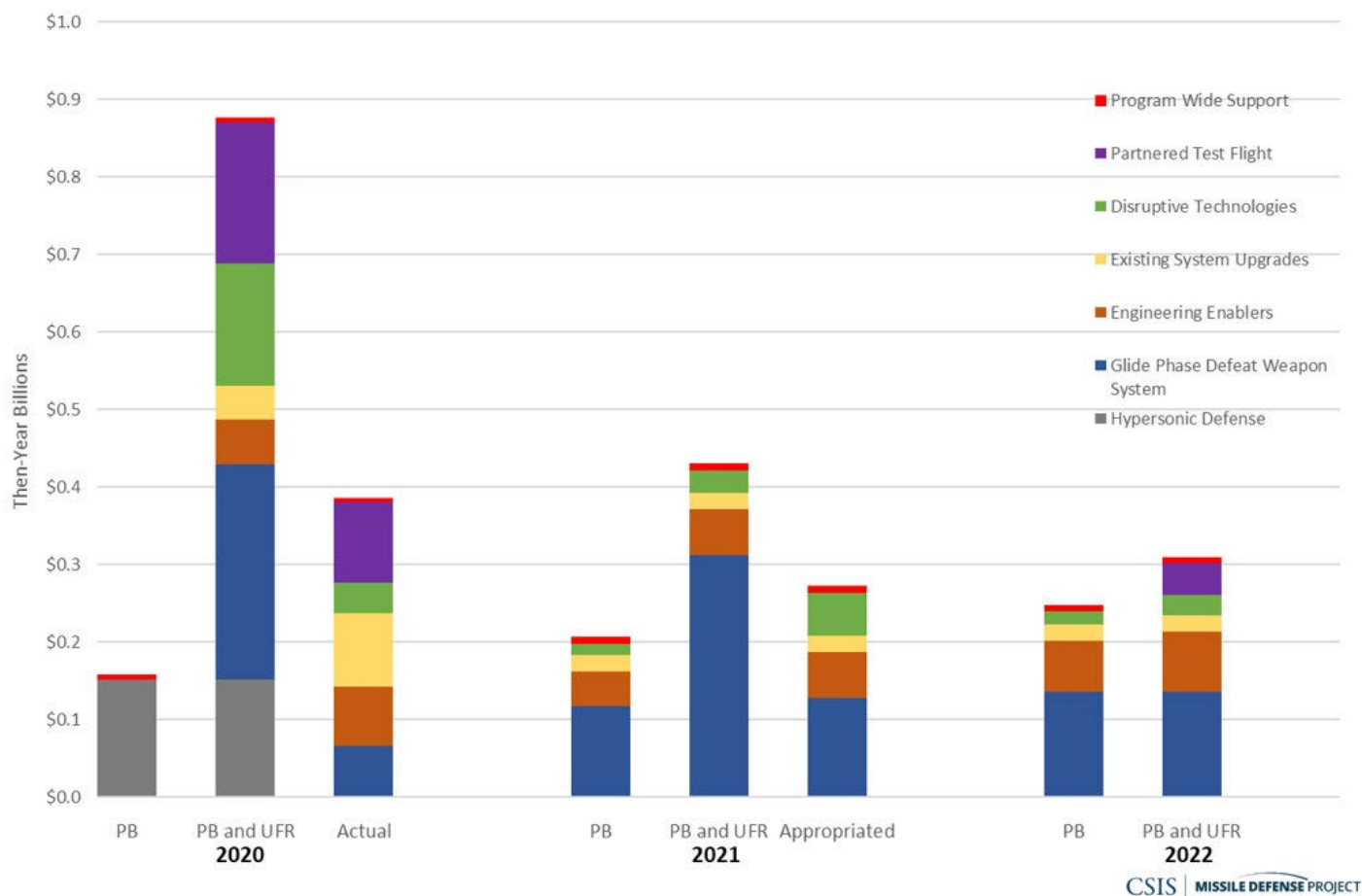
The expectation of greater investment in future years stands in contrast with the relatively small unfunded requirement request for hypersonic defense. The 2022 MDA unfunded requirements list is altogether much smaller than in previous years: only \$367 million in 2022 compared to \$1.1 billion in 2021 and \$1.9 billion in 2020. The largest items on this list were \$41 million for SM-3 IIA interceptors and \$109 million to buy back THAAD interceptors that were cut during the 2022 PB process. As noted above, both THAAD and SM-3 IIA procurement received attention in the congressional marks. Hypersonic defense was the third request in the 2022 unfunded requirement list, totaling about \$62 million for partnered flight tests, engineering enablers, and future disruptive technologies (Figure 11).

Three of the four congressional marks increased the hypersonic defense line by this amount.

SPACE AND ADVANCED PROGRAMS

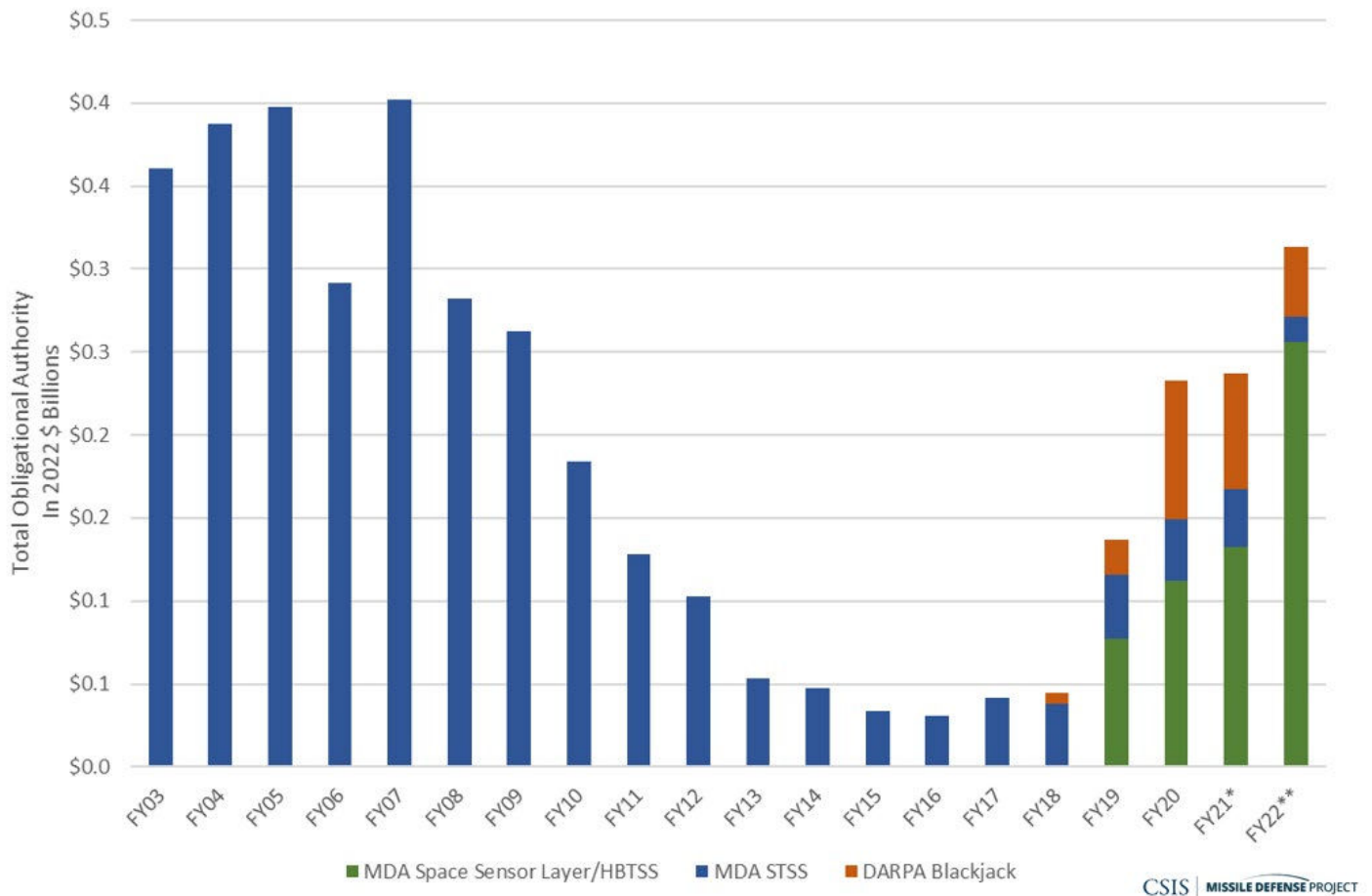
One of the most important capability improvements in the 2022 budget is space-based tracking sensors, which will be critical for fire control quality data to support both hypersonic and ballistic missile defense. After years of institutional wrangling about the development of the Hypersonic and Ballistic Tracking Space Sensor (HBTSS) program, the 2022 request notably proposes to fund initial HBTSS development within MDA rather than within the Space Development Agency (SDA). The Trump administration had tried to move HBTSS development to SDA, but Congress rejected the move for three consecutive years, and last year's defense authorization bill directed its location in MDA.³⁰ SDA continues to develop the larger architecture within which HBTSS will operate.

Figure 11: Comparison of MDA 2020–2022 Hypersonic Defense PBs, Unfunded Requirements (UFRs), and Appropriations



Source: DoD Comptroller, MDA Unfunded Requirements Lists, and CSIS analysis.

Figure 12: Selected Defense-Wide Space Programs, 2003–2022



*Appropriated dollars, **Based on 2022 PB

Source: DoD Comptroller and CSIS analysis.

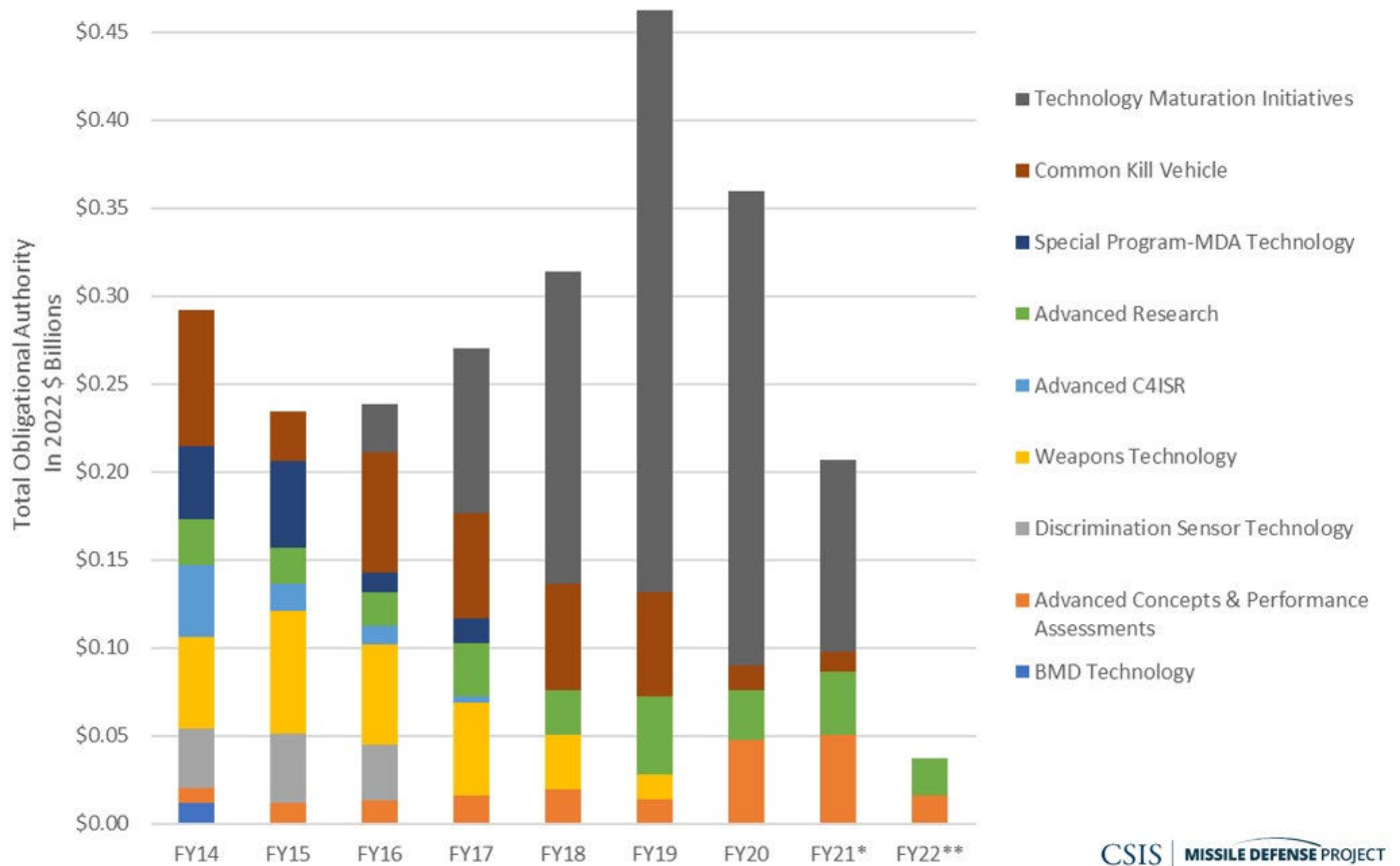
The large increase in SDA funding, up to a requested \$809 million in 2022, was expected by prior budgets as the new agency would move from architectural studies to developing and fielding an actual constellation. Over the longer term, the planned proliferated Low Earth Orbit (pLEO) satellite constellation would contribute to both missile defense and defeat. The 2022 request for SDA is a \$60-million cut from the funding projected in the 2021 budget, but this difference does not account for the temporary transition of HBTSS to MDA to support flight demonstrations of a few HBTSS payloads. The MDA proposal for HBTSS funding is \$256 million, which seems to accelerate the program beyond what Congress had appropriated for it in each of the last two years. That increased funding will allow MDA to launch two interoperable prototype satellites by July 2023, suggesting the HBTSS budget will grow as the constellation expands. MDA will also get small

savings from the deorbiting of its previous space sensor prototypes, the Space Tracking and Surveillance System (STSS) satellites, in March 2022.³¹

One place MDA attempted to find savings to fund these new initiatives is more traditional research and development efforts not tied to specific systems (Figure 13). For instance, the 2022 budget proposes zeroing out the MDA Technology Maturation Initiatives program as a result of a broader shift within DoD directed energy priorities. The Technology Maturation Initiatives program previously included MDA efforts related to directed energy and discrimination sensor demonstrators that would provide the basis for future capabilities.

These proposed cuts or shifts to elsewhere in the Pentagon may not hold up in the face of congressional wishes, in particular on directed energy development. The 2021 PB

Figure 13: Selected MDA Advanced Technology Programs, 2014–2022



*Appropriated dollars, **Based on 2022 PB

Note: Advanced technology program elements depicted here include all Budget Activity 3 (BA 3) MDA RDT&E programs and the Technology Maturation Initiatives program, which was comprised of multiple research efforts that were previously categorized as BA 3.

Source: DoD Comptroller and CSIS analysis.

also attempted to eliminate MDA funding for directed energy prototyping as part of the Technology Maturation Initiatives, but Congress reinserted \$42 million during the appropriations process. Advanced technology could again be a target for appropriators to add funds, but if the top line remains unchanged, that could mean reductions for other administration priorities.

DEFENSE OF GUAM

One of the biggest new muscle movements in the Biden administration's 2022 budget for MDA is the defense of Guam. Active air and missile defense for the island, and more specifically for the thousands of U.S. forces there, is a critical component of the larger realignment to long-term strategic competition. Protection of Guam and a small number of other hubs of U.S. regional force projection

nearby would contribute significantly to meeting the growing, disproportionately missile-centric military challenge from the People's Republic of China. Despite the 2018 National Defense Strategy and repeated expressions of desire from U.S. Indo-Pacific Command (INDOPACOM) to address this capability gap, neither the Trump Missile Defense Review nor its four budget submissions broached the subject. In spring of 2021, INDOPACOM released a document specifying that 360-degree air and missile defense capability for Guam was its highest priority.³² As such, the presence of the Defense of Guam in the 2022 budget represents a major step forward to implementing the U.S. military strategy for INDOPACOM.

This year's budget request includes air and missile defense for Guam for the first time. The Pentagon continues to review the analysis of alternatives to determine the right

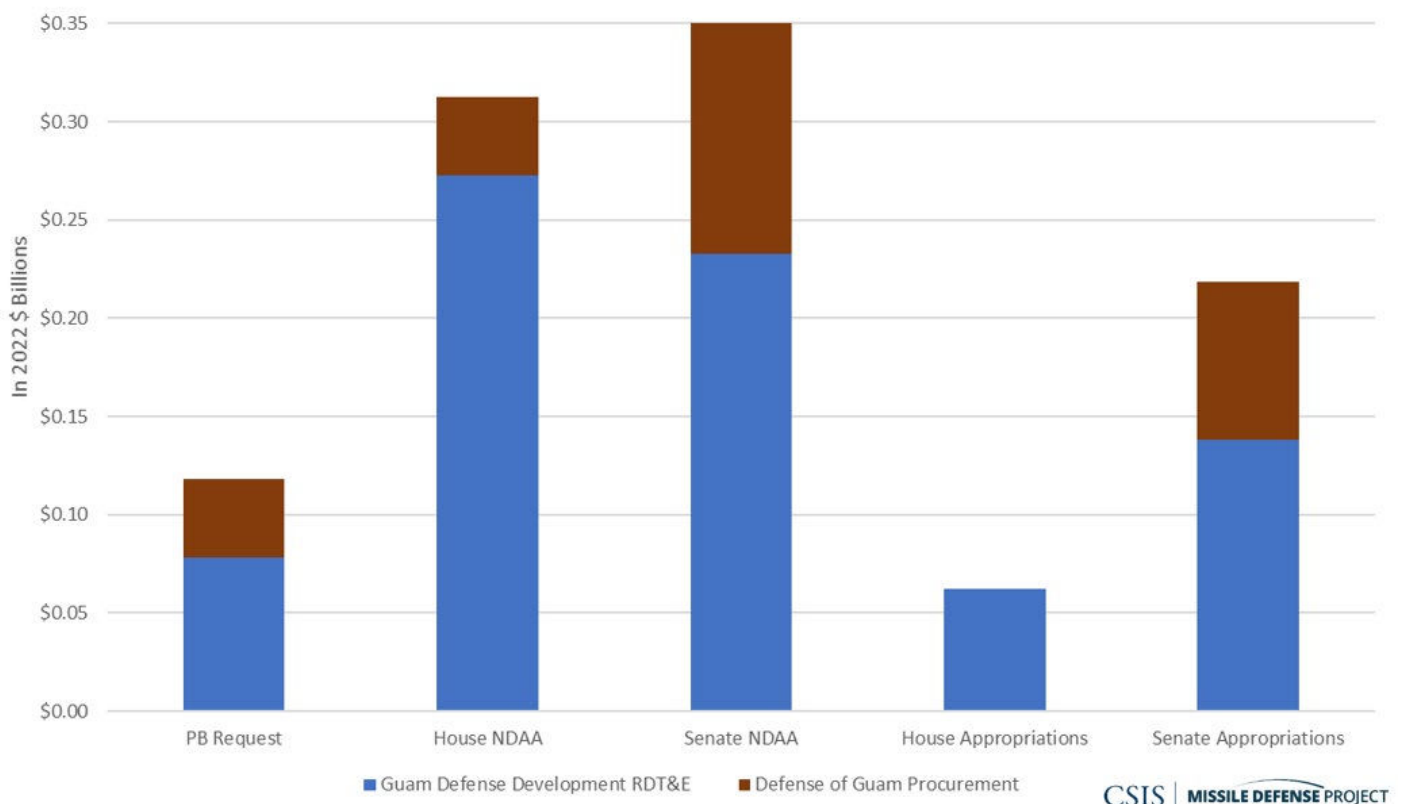
architecture, but it seems reasonable that a mix of various Navy and Army systems will be involved in a broader, hybrid approach.³³ The budget request includes \$40 million for procurement of long-lead materials, which suggests that the Guam system will leverage existing systems with known components, even if in some new configuration.

Former INDOPACOM commander Admiral Phil Davidson testified to the Senate Armed Services Committee (SASC) in March 2021 about the need for a 360-degree air and missile defense for Guam, which likely establishes some of the baseline requirements for the Guam Defense System.³⁴ MDA justification documents further point to a requirement to provide defense against air-breathing, ballistic, and hypersonic threats.³⁵ The \$78 million of RDT&E funding requested includes planned architecture studies that include connections between the Army's Integrated Air and Missile Defense Battle Command System (IBCS) and Navy Aegis Weapons System, leaving open multiple options for the final architecture and potentially a mixed architecture. Guam could be an operational test bed of sorts for future integrated

air and missile defense-focused architectures, including not only active defense systems but also long-range missile defeat systems to counter missiles prior to launch.

As such, the significance of air and missile defense for Guam in the realignment of U.S. air and missile defense can hardly be overstated. Should it go forward, it could become a centerpiece for the evolution of these efforts and for the Pacific Deterrence Initiative. Reflecting this salience, three of the four congressional defense committees increased funding for the program (Figure 14). In total, SASC proposed a total of \$231 million, and the House Armed Services Committee (HASC) authorized \$234 million. Senate appropriators added a total of \$80 million for the same. House appropriators, by contrast, zeroed out procurement entirely and reduced RDT&E by \$15.9 million on the grounds that the report to Congress for the architecture study had not been delivered. That report has since been submitted, suggesting the conference bills will include some amount of increased Guam defense funding.³⁶

Figure 14: Defense of Guam 2022 Funding Proposals



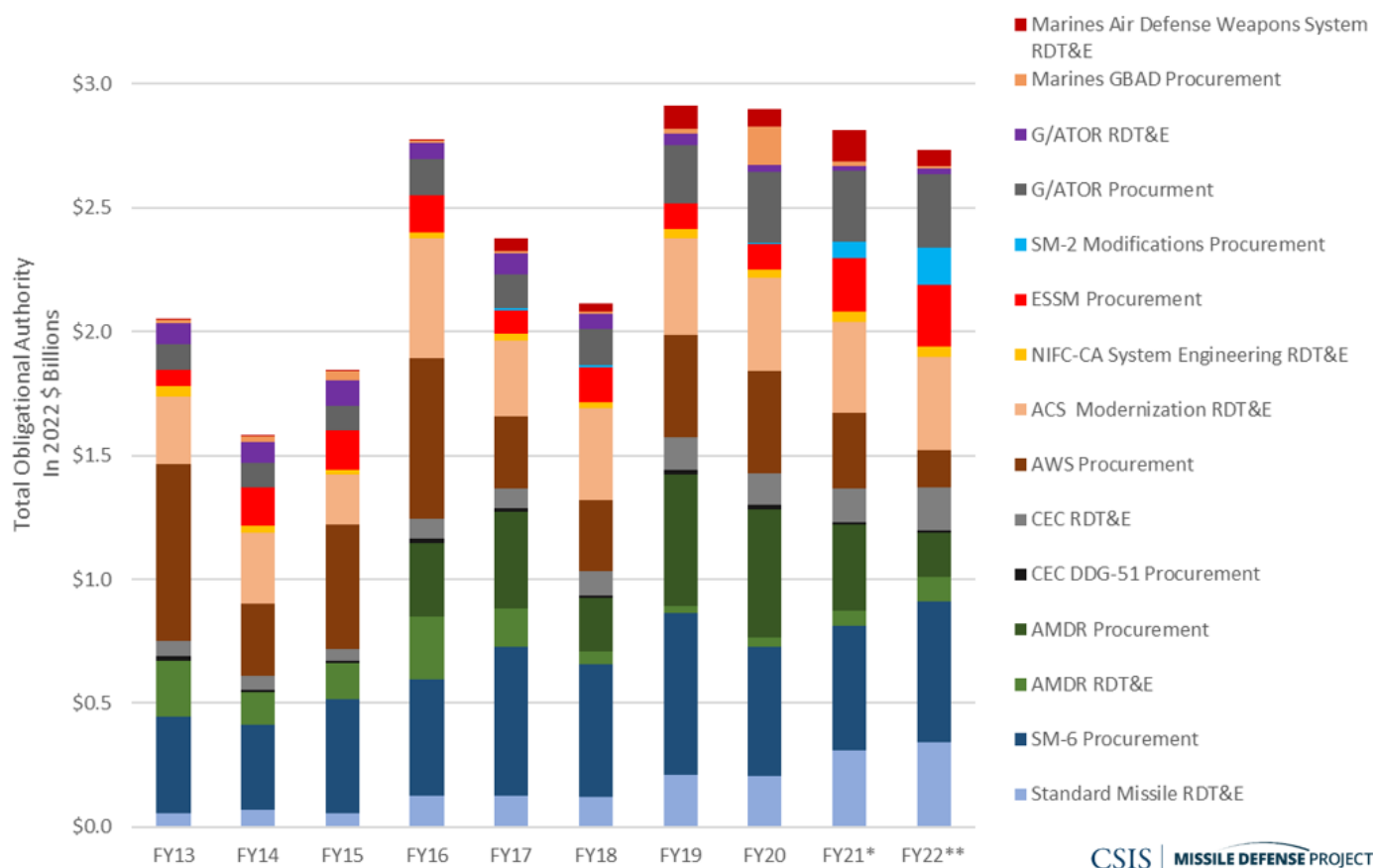
Source: Wes Rumbaugh, "FY 2022 Missile Defense and Defeat Budget Tracker," CSIS, *Missile Threat*, last updated October 29, 2021, <https://missilethreat.csis.org/fy-2022-missile-defense-and-defeat-budget-tracker/>.

SERVICE AIR AND MISSILE DEFENSE

Service air and missile defense budgets were relatively flat in the 2022 PB. The most notable change in Navy air and missile defense was the decision to procure one rather than the expected two Arleigh Burke-class destroyers, though all four defense committees have restored the original two-ship procurement. Of particular note, three defense committees nearly doubled procurement for the Marines' Ground/Air Task

Oriented Radar (G/ATOR), from \$297 million to about \$643 million (Figure 15). The Air Force has successfully transferred most of its missile-warning satellite programs to the Space Force. Its most notable budget movement was an increase of around \$160 million for the polar component of its Next Generation Overhead Persistent Infrared (OPIR) satellite constellation, which was offset slightly by a \$30-million reduction for inflation adjustments.

Figure 15: Selected Navy and Marine Corps Air and Missile Defense Modernization, 2013–2022



*Appropriated dollars, **Based on 2022 PB

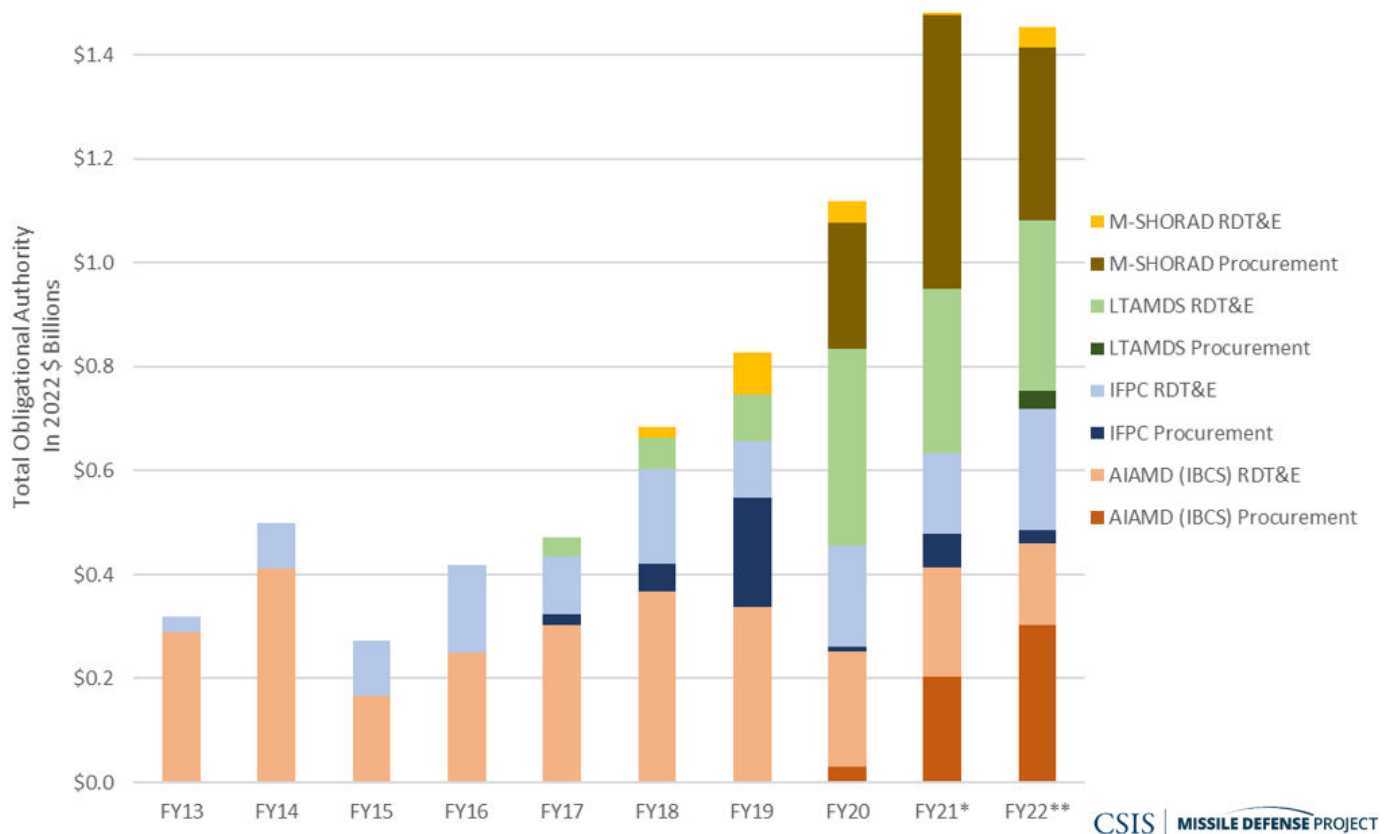
Source: DoD Comptroller and CSIS analysis.

The Army portfolio saw relatively more change in its budget submission than the other services (Figure 16). These changes reflect the transition in many of the Army's priority air and missile defense programs from initial research and development to fielded capabilities (Figure 16). For the first time in program history, the 2022 budget requests more funding for the IBCS system in procurement rather than in RDT&E, following the

completion of Milestone C review.³⁷ The Lower Tier Air and Missile Defense Sensor (LTAMDS) program has its first procurement request in the 2022 budget, although the small request suggests it is for long-lead materials rather than full procurement of initial radars.

One Army modernization priority that contained cuts was the Indirect Fires Protection Capability (IFPC), a follow-

Figure 16: Selected Army Air and Missile Defense Modernization, 2013–2022



*Appropriated dollars, **Based on 2022 PB

Source: DoD Comptroller and CSIS analysis.

on to the Counter-Rocket Artillery and Mortar (C-RAM) program and the precursor of an enhanced cruise missile defense capability. In terms of appropriations, the reductions from 2021 to 2022 are modest, but the 2022 request is a significant drop-off from previous projections. The 2021 budget had projected \$238 million in procurement funding and \$341 million in RDT&E for IFPC for the 2022 budget. The 2022 budget requests \$25 million for procurement and \$234 million for RDT&E, respectively. These cuts are likely the result of the reorientation of the program after purchasing the interim Iron Dome batteries. Following a recent shoot-off, the Army awarded an initial contract in September 2021, with the goal of delivered prototypes in 2022 and a complete system by 2023.³⁸ Senate appropriators cut IFPC RDT&E by \$70 million, perhaps reflecting concern about the timeline.

The Army is working to transition early-technology research programs on directed energy and high-powered microwaves toward an operational capability. The Air and

Missile Defense Advanced Technology program includes a \$26-million request for a high-energy laser tactical vehicle demonstration. Three of the four congressional defense committees significantly increased funding for the Army's directed energy efforts. Two further efforts fall under IFPC, although their funding comes from a distinct program element, misleadingly titled as the Expanded Mission Area Missile. Directed by the Army RCCTO office, this program line includes a proposed \$15 million of funding for high-energy lasers and \$36 million for high-powered microwave efforts.

PRIORITIZING CAPABILITY OVER CAPACITY

The 2019 Missile Defense Review observed that “the scale and urgency of change required to renew our conventional and missile defense overmatch should not be underestimated.”³⁹ The last administration also chose to prioritize capacity over capability, and its missile defense posture and investments remained too focused on rogue state intercontinental ballistic missiles. The previous

administration's missile defense and defeat efforts were in that respect insufficiently aligned with what its own National Defense Strategy called "the central challenge of our time."⁴⁰

Addressing this central challenge with regards to missile defense and defeat will require a greater scale and urgency of change. Such realignment demands, among other things, a relatively greater preference for capability over capacity. Critical mission areas include space sensors, active air and missile defense for Guam, homeland and regional cruise missile defense, improved offense-defense integration, and continued progress on a next-generation capability to defend the homeland against rogue state ballistic missiles. These shifts are sufficiently necessary that they should be prioritized even at the cost of accepting and managing risk in the near term. The 2022 budget request continues to seek alignment with this broader set of goals and capabilities, even if it does not quite achieve it. ■

Wes Rumbaugh is an associate fellow with the Missile Defense Project at the Center for Strategic and International Studies (CSIS) in Washington, D.C. **Tom Karako** is a senior fellow with the International Security Program and the director of the Missile Defense Project at CSIS.

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ENDNOTES

- 1 Tom Karako and Wes Rumbaugh, “Inflection Point: Missile Defense and Defeat in the 2021 Budget,” CSIS, *CSIS Briefs*, March 22, 2020, <https://www.csis.org/analysis/inflection-point-missile-defense-and-defeat-2021-budget>; Brad Roberts ed., *Fit for Purpose? The U.S. Strategic Posture in 2030 and Beyond* (Livermore, CA: Center for Global Security Research Lawrence Livermore National Laboratory, October 2020), <https://cgsr.llnl.gov/content/assets/docs/The-US-Strategic-Posture-in-2030-and-Beyond.pdf>; and Sarah Miniero, “Next Generation Defense Strategy: Missile Defense,” Center for a New American Security, November 16, 2020, <https://www.cnas.org/publications/commentary/next-generation-defense-strategy-missile-defense>.
- 2 Tom Karako and Wes Rumbaugh, “Trump’s 2019 Missile Defense Budget: Choosing Capacity over Capability,” CSIS, *CSIS Briefs*, February 28, 2018, <https://www.csis.org/analysis/trumps-2019-missile-defense-budget-choosing-capacity-over-capability>.
- 3 Jon Harper, “Continuing Resolutions Could Extend Well into 2022,” *National Defense Magazine*, September 27, 2021, <https://www.nationaldefensemagazine.org/articles/2021/9/27/continuing-resolutions-could-extend-well-into-2022>.
- 4 Office of the Under Secretary of Defense (Comptroller)/Chief Financial Officer, *Defense Budget Overview* (Washington DC: Department of Defense, May 2021), 1-1, https://comptroller.defense.gov/Portals/45/Documents/defbudget/FY2022/FY2022_Budget_Request_Overview_Book.pdf.
- 5 Kathleen Hicks, “Deputy Secretary Of Defense Dr. Kathleen Hicks Remarks on President Biden’s Fiscal Year 2022 Defense Budget Request” (press briefing, Pentagon, May 28, 2021), <https://www.defense.gov/News/Transcripts/Transcript/Article/2639229/deputy-secretary-of-defense-dr-kathleen-hicks-remarks-on-president-bidens-fisca/>.
- 6 Office of the Under Secretary of Defense (Comptroller)/Chief Financial Officer, *Defense Budget Overview*, 2-14.
- 7 Because DoD does not release a list of programs that compose the two non-MDA categories of the missile defense and defeat category, some caution is required in comparing the year-to-year movement in this grouping. The closer estimates between 2021 and 2022 suggest relative continuity in the list of programs. Past evidence suggests that this reporting list can change substantially from budget to budget. For example, the 2020 Defense Budget Overview reported a \$13.6 billion request for missile defeat and defense, but the 2021 version reported that \$21.5 billion was enacted. While MDA’s 2020 budget increased by about \$1 billion through the appropriations process, it is unlikely that appropriators added an additional \$7 billion to a constant group of non-MDA missile defense and defeat programs. It seems likely that the list of programs used to calculate the missile defense and defeat totals changed between those two years to account for the change. This inconsistent accounting could affect DoD and Congress’ ability to effectively monitor and prioritize missile defeat and defense efforts.
- 8 Government Accountability Office, *Hypersonic Weapons: DoD Should Clarify Roles and Responsibilities to Ensure Coordination Across Development Efforts* (Washington DC: GAO, March 2021), <https://www.gao.gov/assets/gao-21-378.pdf>.
- 9 Brian W. Everstine, “Hypersonic ARRW Booster Flight Test Fails,” *Air Force Magazine*, April 6, 2021, <https://www.airforcemag.com/hypersonic-arrw-booster-flight-test-unsuccessful/>; John A. Tirpak, “Air Force Will Try Again to Launch ARRW Hypersonic Missile in July,” *Air Force Magazine*, June 3, 2021, <https://www.airforcemag.com/air-force-july-launch-arrw-hypersonic-missile/>; and Valerie Insinna, “After Latest Flight Test Failure, US Air Force Hopes to Keep First Hypersonic Missile on Track for Production” *Defense News*, August 4, 2021, <https://www.defensenews.com/air/2021/08/04/after-latest-flight-test-failure-us-air-force-hoping-to-keep-first-hypersonic-missile-on-track-for-production/>.
- 10 Mike White, “Hypersonic Strike and Defense: A Conversation with Mike White” (speech, CSIS, Washington DC, June 2, 2021), <https://www.csis.org/analysis/hypersonic-strike-and-defense-conversation-mike-white>; and Heath Collins cited in Theresa Hitchens, “ARRW Schedule Still On Track Pending Failure Review,” *Breaking Defense*, August 4, 2021, <https://breakingdefense.com/2021/08/arrw-schedule-still-on-track-pending-failure-review/>.
- 11 Jen Judson, “US Army’s Precision Strike Missile Breaks Distance Record in Test Flight,” *Defense News*, October 14, 2021, <https://www.defensenews.com/digital-show-dailies/ausa/2021/10/14/us-armys-precision-strike-missile-breaks-distance-record-in-flight-test/>.
- 12 Sam LaGrone, “Anti-Ship Missiles Top Marines \$2.95B Fiscal Year 2022 Wishlist,” *USNI News*, June 2, 2021, <https://news.usni.org/2021/06/02/anti-ship-missiles-top-marines-2-95b-fiscal-year-2022-wishlist>.
- 13 Megan Eckstein, “US Marines Request More Missiles, Radars in FY22 Wish List,” *Defense News*, June 2, 2021, <https://www.defensenews.com/congress/budget/2021/06/02/us-marines-request-more-missiles-radars-in-fy22-wish-list/>.
- 14 Megan Eckstein, “Navy Looks to Get Back on Schedule for Fielding Hypersonic Missiles on Submarines,” *Defense News*, November 18, 2021, <https://www.defensenews.com/naval/2021/11/18/navy-looks-to-get-back-on-schedule-for-fielding-hypersonic-missiles-on-submarines/>.
- 15 Jon Hill and Michelle Atkinson, “Department of Defense Press Briefing on the President’s Fiscal Year 2022 Defense Budget for the Missile Defense Agency” (press briefing, Pentagon, May 28, 2021), <https://www.defense.gov/News/Transcripts/Transcript/Article/2639375/departement-of-defense-press-briefing-on-the-presidents-fiscal-year-2022-defense/>.
- 16 See Wes Rumbaugh, “FY 2022 Missile Defense and Defeat Budget Tracker,” CSIS, *Missile Threat*, last updated October 29, 2021, <https://missilethreat.csis.org/fy-2022-missile-defense-and-defeat-budget-tracker/>.
- 17 Tom Karako, “The Dirty Secret of US-Israel Missile Defense Cooperation,” *Defense One*, July 28, 2016, <https://www.defenseone.com/ideas/2016/07/dirty-secret-us-israel-missile-defense-cooperation/130297/>.
- 18 Jen Judson, “Here’s Who Will Compete Head-to-Head to Build the Next Homeland Missile Defense Interceptor,” *Defense News*, March 23, 2021, <https://www.defensenews.com/breaking-news/2021/03/23/heres-who-will-compete-head-to-head-to-build-the-next-homeland-missile-defense-interceptor/>.
- 19 MDA includes a summary table of its budget request in each year’s RDT&E justification book. This year’s table included two procurement lines for Advanced Procurement NGI and Layered Homeland Defense Procurement that included no appropriations on the table, suggesting that the unreleased FYDP would include funding for the programs. U.S. Department of Defense, *Department of Defense Fiscal Year (FY) 2022 Budget Estimates: Missile Defense Agency Defense-Wide Justification Book, Volume 2a of 5* (Washington DC: Department of De-

- fense, May 2021), xliii, https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2022/budget_justification/pdfs/03_RDT_and_E/RDTE_Vol2_MDA_RDTE_PB22_Justification_Book.pdf.
- 20 Wes Rumbaugh, "A New Generation of Homeland Missile Defense Interceptors," CSIS, *Critical Questions*, November 12, 2019, <https://www.csis.org/analysis/new-generation-homeland-missile-defense-interceptors>.
- 21 See Wes Rumbaugh, "FY 2022 Missile Defense and Defeat Budget Tracker," CSIS, *Missile Threat*, last updated October 29, 2021, <https://missilethreat.csis.org/fy-2022-missile-defense-and-defeat-budget-tracker/>.
- 22 James A. Winnefeld Jr., "Missile Defense and U.S. National Security" (speech, CSIS, Washington DC, May 9, 2015), <https://www.csis.org/events/missile-defense-and-us-national-security>.
- 23 Department of Defense, *Missile Defense Review Report* (Washington, DC: Department of Defense, 2019), 44, <https://media.defense.gov/2019/jan/17/2002080666/-1/-1/1/2019-MISSILE-DEFENSE-REVIEW.PDF>.
- 24 Glen D. VanHerck, "Rethinking Homeland Defense: Global Integration, Domain Awareness, Information Dominance and Decision Superiority" (speech, CSIS, Washington DC, August 17, 2021), <https://www.csis.org/events/rethinking-homeland-defense-domain-awareness-information-dominance-and-decision-superiority>.
- 25 Jen Judson, "DoD Wish List Seeks More Funds to Boost Pacific Missile Defense, Weapons Cybersecurity," *Defense News*, June 10, 2021, <https://www.defensenews.com/pentagon/2021/06/10/dod-desires-more-funding-to-boost-missile-defense-in-the-pacific-in-wish-list-to-congress/>.
- 26 Department of Defense, "U.S. Successfully Conducts SM-3 Block IIA Intercept Test Against an Intercontinental Ballistic Missile Target," Press Release, November 17, 2020, <https://www.defense.gov/News/Releases/Release/Article/2417334/us-successfully-conducts-sm-3-block-ii-a-intercept-test-against-an-intercontinen/>.
- 27 Hill and Atkinson, "Department of Defense Press Briefing."
- 28 Hill and Atkinson, "Department of Defense Press Briefing."
- 29 Jen Judson, "Here are the Three Companies Selected to Design Hypersonic Missile Interceptors for MDA" *Defense News*, November 20, 2021, <https://www.defensenews.com/pentagon/2021/11/20/heres-the-three-companies-selected-to-design-hypersonic-missile-interceptors-for-mda/>.
- 30 Wes Rumbaugh, "Bad Idea: Ignoring Congressional Oversight on Space Sensor Development," CSIS, *Defense360*, Bad Ideas in National Security Series, December 4, 2020, <https://defense360.csis.org/bad-idea-ignoring-congressional-oversight-on-space-sensor-development/>.
- 31 Nathan Strout, "After More than a Decade, Agency to Retire Experimental Missile Warning Satellites," *C4ISRNet*, May 13, 2021, <https://www.c4isrnet.com/battlefield-tech/space/2021/05/13/after-more-than-a-decade-agency-to-retire-experimental-missile-warning-satellites/>.
- 32 Judson, "DoD Wish List."
- 33 Jon Hill, "MDA and the 2022 Budget" (speech, CSIS, Washington DC, June 22, 2021), <https://www.csis.org/events/mda-and-2022-budget>.
- 34 Todd South, "Guam, Missiles, and Missile Defense Top INDOPACOM Commander's Funding Priorities," *Military Times*, March 9, 2021, <https://www.militarytimes.com/news/your-military/2021/03/09/guam-missiles-and-missile-defense-top-indopacom-commanders-funding-priorities/>.
- 35 U.S. Department of Defense, *Department of Defense Fiscal Year (FY) 2022 Budget Estimates: Missile Defense Agency Defense-Wide Justification Book*, Volume 2a of 5, 527.
- 36 Jason Sherman, "DoD Sends Congress Classified Blueprint for Potential Guam Defense System," *Inside Defense*, October 29, 2021, <https://insidedefense.com/daily-news/dod-sends-congress-classified-blueprint-potential-guam-defense-system>.
- 37 Jen Judson, "US Army's Future Battle Command System is Cleared for Production," *Defense News*, January 13, 2021, <https://www.defense-news.com/land/2021/01/13/us-armys-future-battle-command-system-is-cleared-for-production/>.
- 38 Jen Judson, "US Army Mints Deal with Dynetics to Build System to Counter Drones and Cruise Missiles," *Defense News*, September 24, 2021, <https://www.defensenews.com/land/2021/09/24/us-army-mints-deal-with-dynetics-to-build-system-to-counter-drones-and-cruise-missiles/>.
- 39 Department of Defense, *Missile Defense Review Report* (Washington, DC: Department of Defense, 2019), II, <https://media.defense.gov/2019/jan/17/2002080666/-1/-1/1/2019-MISSILE-DEFENSE-REVIEW.PDF>.
- 40 Tom Karako, "The Missile Defense Review: Insufficient for Complex and Integrated Attack," *Strategic Studies Quarterly* 13, no. 2 (Summer 2019): 3–15, https://www.airuniversity.af.edu/Portals/10/SSQ/documents/Volume-13_Issue-2/Karako.pdf.