Golden Dome Capstone:

"Golden Dome for America"

Comparative Analysis and Recommendations for Success: Integrate to Dominate

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Executive Summary

On January 27, 2025, President Donald J. Trump issued the executive order titled "The Iron Dome for America," later renamed "Golden Dome," initiating a transformative national missile defense program. This policy aims to create a multi-layered, next-generation defense system capable of intercepting a wide range of advanced missile threats, including ballistic, hypersonic, cruise, fractional-orbit bombardment systems, and multi-orbit bombardment systems, from peer and near-peer adversaries. The executive order mandates rapid action, including the development of space-based interceptors, boost-phase capabilities, advanced sensor networks, and directed-energy weapons.

This capstone evaluates technological hurdles such as the demand for rapid advancement and integration of space-based sensors, boost phase interceptors, and directed energy weapons, much of which the technology is still immature or face significant cost, software, and integration challenges. A policy comparison between the 2022 Biden-era Missile Defense Review and Trump's 2025 Golden Dome executive order identified a significant pivot from incremental development focus on regional threats to inclusion of peer conventional and advanced threats and a need to leverage transformational leaps in missile defense. A comparative analysis of Trump's 2025 executive order against Reagan's Strategic Defense Initiative and the on-going Defense of Guam effort identified lingering technical and fiscal constraints along with systems engineering and leadership challenges that will need to be properly addressed to maximize likelihood of success. Treaty and strategic stability implications were also evaluated and determined that this initiative does not violate any pertinent treaties but may strain the spirit of arms control normalcies and possibly affect global strategic equilibrium with peer countries.

Recommendations are discussed based on lessons learned from similar previous efforts to streamline integration, clarify leadership, and set realistic timelines. Recommendations to pursue incremental development, while investing in advanced technologies for mid and far-term epochs were provided.

Introduction

On January 27, 2025, President Donald J. Trump signed an executive order titled "The Iron Dome for America," directing the development of a next-generation missile defense shield to protect the United States from advanced aerial threats. The effort was subsequently re-named from Iron Dome to Golden Dome due to copyright limitations.

The executive order outlines the following key directives:

- Acknowledges the escalating threats posed by ballistic, hypersonic, and cruise missiles, emphasizing the need for a robust defense system to protect the homeland and directs the pivot from rogue nation threats to peer and near-peer missile threats to the U.S. homeland.
- Establishes the United States' commitment to deploying and maintaining a next-generation missile defense shield to deter and defend against foreign advanced aerial attacks and ensuring a secure second-strike capability.
- Within 60 days, the Secretary of Defense is tasked with submitting a comprehensive plan that includes:
    - Accelerating the deployment of the Hypersonic and Ballistic Tracking Space Sensor (HBTSS) layer.
    - Developing and deploying space-based interceptors capable of boost-phase interception.

    - Deploying underlayer and terminal-phase intercept capabilities to counter significant attacks.
    - Establishing a custody layer within the Proliferated Warfighter Space Architecture.
    - Developing capabilities to neutralize missile threats prior to launch and during the boost phase.
    - Ensuring a secure supply chain for all components with advanced security features.
    - Developing non-kinetic capabilities to support the defeat of various missile threats.
- Calls for a review to enhance cooperation with allies and partners on missile defense technology, improve defenses for deployed U.S. troops and allied territories, and accelerate the provision of U.S. missile defense capabilities to allies.

The current Director of the Missile Defense Agency (MDA), Lt. Gen. Heath Collins, at the Air and Space Forces Association's Warfare Symposium in March, recently called this effort the "third revolution of missile defense". Lt. Gen. Collins noted that since the Strategic Defense Initiative, we have lost focus and priority numerous times but the recent Trump initiative has returned focus and authority and "now is our third revolution" (Heckmann, 2025).

This capstone will provide a comparative analysis between the recent Trump executive order, the Biden Administrations 2022 Missile Defense Review (MDR), the on-going Defense of Guam effort, and Reagan's Strategic Defense Initiative (SDI). There will also be an analysis of the policy implications and treaty considerations for implementing Golden Dome. The document will close with a summary of the lessons learned from the Defense of Guam and SDI efforts and recommendations to bolster success will be provided.

Problem Statement

President Trump's recently released "Irone Dome for America" executive order aims to address the increasing U.S homeland vulnerability to advanced missile threats from peer and near-peer actors, increase deterrent effect, ensure a second-strike capability, and advance technologies that will contribute to an effective missile defense system to defend the homeland. The President has cited missile attacks as "the most catastrophic threat facing the United States". The executive order identifies growing and exigent threats to the U.S. homeland from ballistic missiles, hypersonic glide vehicles, advanced cruise missiles, Fractional Orbital Bombardment Systems (FOBS)/Multi-Orbit Bombardment Systems (MOBS), and growing risk of nuclear blackmail by adversaries. Increasing inventory of missile threats, increased threat vectors, rapid deployment of space-based capabilities, and advanced methods of weapon delivery to the homeland also contribute to the stated need for a next-generation missile defense system. The central argument is that current U.S. missile defenses are insufficient to protect American cities from these evolving threats, especially those from peer competitors like Russia and China; not just rogue states like North Korea, which has been the focus of deployment of homeland missile defense systems in the past. The stated deficiency presents a strategic liability that emboldens adversaries by overwhelming our current deterrence posture and limits U.S. freedom of action in crises. The Golden Dome effort breaks from past U.S. doctrine, which aimed to defend against limited missile attacks from rogue nations, and revives Reagan-era ambitions of bolstering deterrence, and challenges past limitations and assumptions of past missile defense policy that such a system is too expensive or technically unachievable. This document will analyze multiple facets of this effort exploring the feasibility, challenges, and comparisons to past similar efforts.

Research Methodology

The research team plans to utilize a first principles approach and descriptive qualitative research to analyze the recent Trump "Iron Dome for America" executive order, most recent Missile Defense Review (MDRs), and relevant publications. This analysis will drive the emphasis of strong points of recent policy re-vectoring and highlight areas of improvement in the new policy direction, resource allocations, and effort leadership. Relevant publications will be leveraged to conduct an analysis of lessons learned from similar past efforts such as the Defense of Guam and Reagan's Strategic Defense Initiative (SDI). These points will inform several recommendations to increase the likelihood of success of the Golden Dome effort.

Analysis and Findings

Trump's 2025 "Iron Dome for America"

President Donald Trump's January 27, 2025, executive order, "The Iron Dome for America", directed the Pentagon to develop a next-generation missile defense shield to protect the entire United States. The directive called for defending against "ballistic, hypersonic, advanced cruise missiles, and other next-generation aerial attacks" from any adversary, including major nuclear powers, marking a bold departure from past U.S. policy detailed in the last several Missile Defense Reviews (MDRs), which focused on interception of limited rogue-nation missile strikes. Recently renamed to "Golden Dome" by the Pentagon, this initiative invokes Israel's famed Iron Dome system as inspiration for a nationwide protective umbrella against missile and aerial attacks (The Iron Dome for America, 2025).

Below, we review emerging literature on three key aspects of Trump's 2025 missile defense gambit:

- technological feasibility and development challenges
- historical context and comparisons to earlier missile defense efforts, especially Ronald Reagan's Strategic Defense Initiative (SDI)

Technological Feasibility and Development Challenges

Trump's Iron Dome for America envisions an integrated, multi-layered missile defense shield covering the entirety of the U.S. homeland. The plan casts a wide net in technological scope, calling for cutting-edge capabilities that remain at various stages of development and likely carry significant technological hurdles (Roque, 2025) (Cimbala & Korb, 2025). While missile defense technology has advanced since the Reagan-era SDI, formidable challenges remain. Implementing a nationwide or space-based missile shield requires a colossal and daunting effort to fully develop and it may require strategic political trades from the administration to effectively implement (O'Hanlon, 2025).

Space-Based Sensors for Hypersonic Threats. A top priority is to accelerate deployment of a new Hypersonic and Ballistic Tracking Space Sensor (HBTSS) operational layer in orbit. Space-based infrared sensors are seen as vital for detecting and tracking ultra-fast, maneuverable hypersonic missiles that can evade ground radar coverage. The Missile Defense Agency (MDA) has built HBTSS prototypes and has been flying these demonstrator satellites on-orbit. The goal of MDA's HBTSS is to demonstrate critical hypersonic detection and tracking capabilities and provide lessons learned to the Space Development Agency (SDA) to inform future acquisition decisions. Integrating these satellites into a cohesive network will be complex. Industry experts warn that linking the Space Force's sensor constellations with SDA and MDA systems, along with intelligence assets, to get one common operational tracking picture that can visualize and distribute low-latency fire control quality data to a weapon system is a daunting software and command-and-control challenge (Erwin, GOP senators back Trump's space-based 'Iron Dome' plan with $19.5B bill, 2025). In short, the U.S. has developed initial stages of the required sensor technology but making them seamlessly interoperable against hypersonic threats is a non-trivial hurdle. Additionally, these space-based sensing capabilities need to be operational prior to fielding critical hypersonic defeat weapons systems to fully enable the tracking and engagement of advanced threats and delivery of fire control quality data to weapons systems.

Space-Based Interceptors (Boost-Phase Defense). The most daunting piece of Trump's vision that carries a high degree of risk to implement in the short and mid-term is space-based interceptors. These space-based weapons would shoot down missiles in their boost phase, a phase of powered flight that occurs for a duration of only several minutes. This essentially revives a concept from the 1980s Reagan-era "Star Wars" program, which planned to leverage autonomous orbital interceptors called "Brilliant Pebbles." However, this program never fully materialized due to cost and technical barriers (Porter, 2025). At the time, the required sensors, propulsion, and microprocessor technology were not sufficiently sophisticated enough to produce autonomous kill vehicles, thus making the vision unattainable.

Countering the missile burnout phase requires kill vehicles with advanced onboard processing to support artificial intelligence and autonomous capabilities that were well beyond the capabilities of the time. Implementing a space-based interceptor capability now would likely be interpreted by peer and near-peer nations as a significant escalation in space-based capabilities. Proponents argue that modern advancements (cheaper launches, better sensors, miniaturization) might overcome past obstacles. Analysts Tom Karako and Clayton Swope of

CSIS contend that the technological and cost barriers that doomed SDI's space weapons may no longer hold; they urge outlining requirements or attributes and harnessing today's industry innovations to see what is feasible (Erwin, Space Force to play 'central role' in Iron Dome U.S. missile defense initiative, 2025).

However, many experts remain skeptical of the viability of current technology for Golden Dome. Former Pentagon research and development chief, Dr. Michael Griffin, himself a long-time advocate of advanced missile defense, recently admitted in a recent MDAA-led virtual roundtable that it is not worth spending money on a space-based interceptor constellation targeting the boost phase and that engaging Inter-Continental Ballistic Missiles (ICBMs), in a timely manner, using interceptors from space is almost entirely limited by physics (Boost Phase Missile Defense From Space, 2025). The sheer scale of space-based interceptors required to cover all possible threat launch trajectories is sobering; one independent assessment calculated roughly 16,000 orbiting interceptors would be needed to reliably stop even 10 North Korean ICBMs in boost phase, an astronomical number of satellites for a relatively small salvo, when compared to what China or Russia could field. Furthermore, critics argue that adversaries could easily deploy decoys or simply build more missiles to overwhelm any orbital defense layer (Trump's Misguided "Golden Dome" Gambit, 2025) (O'Hanlon, 2025). The offense-defense cost exchange still heavily favors offense; shooting down missiles from space might remain a technically dazzling but strategically dubious pursuit if cheap countermeasures can foil it. Dr. Fred Kennedy, former Space Development Agency Director, wrote an opinion piece in Aerospace America stating that space-based interceptors are technically and economically viable today due to satellite miniaturization scale of affordability of commercial launches, relative to the SDI effort in the 80's (Kennedy, 2025). Advances over 40 years in miniaturized electronics, mass-production, and low-cost access to space (e.g., Starlink/OneWeb) now make small, cheap satellites with interceptors feasible where before only massive, costly systems existed.

Directed-Energy Weapons. The Presidential executive order also demands "non-kinetic" defenses to augment the system, broadly interpreted as directed-energy weapons (high-power lasers or microwaves) to destroy missiles or warheads. The U.S. military has made progress in directed energy for smaller and shorter-ranged threats; the Army is testing truck-mounted lasers and microwave systems to down drones and rockets, and Israel's Rafael is developing an "Iron Beam" laser to complement Iron Dome (Roque, 2025). When it comes to using lasers against high-speed ballistic missiles or hypersonic glide vehicles, the technology is still in its infancy. The Pentagon's own assessments indicate that "laser technology for strategic missile defense remains far from deployment." A 2024 study by the American Physical Society concluded that laser interceptors for ICBMs won't likely be feasible until at least 2035 under current research trajectories. Even optimistic advocates label directed-energy defenses a "long-term" prospect that will not contribute meaningfully in the near term (Trump's Misguided "Golden Dome" Gambit, 2025).

In the meantime, some laser systems can bolster point-defense; for example, the Air Force tested airborne lasers that can shoot down cruise missiles in controlled conditions (Porter, 2025). Yet scaling these into a reliable shield against nuclear missiles requires breakthroughs in beam power, beam propagation through the atmosphere, and targeting mechanisms. The U.S. has developed and deployed several defensive laser weapons systems such as the 60-100kW Navy High Energy Laser with Integrated Optical-dazzler and Surveillance (HELIOS), Air Force 10-15kW High Energy Laser Weapon System (HELWS), and Army 50kW Directed Energy Maneuver-SHORAD (DE M-SHORAD). There is also an Isreal/U.S. "Iron Beam" system currently in co-development that aims to deliver a ~100kW laser for rocket and missile defense. The Missile Defense Agency is currently exploring the development of a megawatt-class laser weapon system for ICBM defense. Though the technology to support missile engagements is evolving, sufficient sustained financial investments are required to support Golden Dome needs and meet stated timelines.

Systems Integration and Battle Management. Orchestrating the previously mentioned components into a functioning missile defense shield presents a major developmental and systems engineering challenge. The envisioned system spans multiple layers: boost, mid-course, and terminal phase interceptors, plus a "custody layer" of persistent sensors and novel capabilities like left-of-launch defeat (preemptive cyber or strikes) (Roque, 2025). This missile defense system demands a unified battle management command, control, and communications (BMC3) architecture that fuses data from diverse sources (satellites, radars, launch detection systems) and coordinates interceptors in real time.

During the Cold War, efforts to build such an integrated BMC3 for nationwide defense repeatedly fell short; even today, creating a "common operating picture with sufficient fidelity to actually act and take out a target" across various agencies' assets is, as one industry executive put it, a "monster systems engineering problem" . The Pentagon plans to host industry forums and "Industry Day" events to assess the readiness of all the disparate technologies needed for Golden Dome. However, making them work together as a seamless whole will test not only technological limits but also bureaucratic coordination across the Space Force, MDA, Army, Air Force, and the intelligence community. As a SpaceNews analysis observed, Trump's order essentially demands a "whole-of-government solution from sensing through missile defeat," which will pose a complex integration challenge for both hardware and organizations (Erwin, GOP senators back Trump's space-based 'Iron Dome' plan with $19.5B bill, 2025).

In conclusion, feasibility remains in question. Even supporters admit the "Iron Dome for America" is ambitious and will need incremental steps. In the near-term, the focus may be on improving existing defenses (e.g. upgrading Ground-Based Interceptors and deploying better sensors) while researching and developing the more exotic elements for implementation in later phases.

The Pentagon must deliver an architecture plan detailing what can be done and when within 60 days of the order. As one defense expert summarized, Trump is correct that today's technology is "much better than before"; sensors are more powerful, interceptors have improved, and limited missile defense has proven successes. In the end, the question is not just developing each technology segment, but whether the U.S. can realistically deploy a reliable nationwide shield against determined major-power attacks. Many analysts caution that a 100% leak-proof dome remains a physics and engineering nightmare; any system can be saturated or fooled, meaning technical progress must be weighed against diminishing returns and strategic risks (Cimbala & Korb, 2025) (Trump's Misguided "Golden Dome" Gambit, 2025).

Policy Implications of Development and Deployment of Golden Dome

The Golden Dome executive order directs a comprehensive missile defense system, aiming to reinforce U.S. deterrence capabilities against adversaries with advanced missile technologies. By committing to this initiative, the U.S. emphasizes the advancement of space-based interceptors and sensor layers, integrating cutting-edge technologies into national defense strategies. This shift may strain relations with nations like Russia and China, who could perceive the missile defense shield as a threat to the strategic balance, potentially leading to an arms race.

Gen. Stephen Whiting, the head of U.S. Space Command, recently called for the deployment of weapons in space, stating, “it's time that we can clearly say that we need space fires and we need weapon systems. We need orbital interceptors. And what do we call these? We call these weapons, and we need them to deter a space conflict and to be successful if we end up in such a fight” (Decker, 2025). Implementing such an expansive defense system requires substantial financial investments, raising debates over budget allocations and economic priorities. The executive order underscores the importance of strengthening missile defense collaborations with allies, potentially leading to joint development programs and shared defense infrastructures. President Trump's executive order aims to establish a formidable missile defense system, reflecting a strategic move to safeguard national security amidst evolving global threats. However, it also introduces complex policy challenges related to international diplomacy, economic resources, and technological feasibility.

Treaty Considerations

The Golden Dome executive order raises several concerns regarding existing international treaties and agreements. While the U.S. has withdrawn from some treaties, the new missile defense initiative risks escalating tensions with Russia and China, potentially destabilizing global strategic stability. The move could also hinder future arms control agreements and lead to further militarization of space. Diplomatic negotiations will be necessary to mitigate concerns and prevent an arms race. Below we assess whether implementing Golden Dome could violate any of these obligations:

Outer Space Treaty (1967)

The Outer Space Treaty (OST) serves as a cornerstone of space law, prohibiting the placement of nuclear weapons or other weapons of mass destruction (WMD) in orbit and banning military bases or fortifications on celestial bodies. Importantly, it does not ban conventional weapons in Earth's orbit (Harper, 2019). The proposed U.S. missile shield plans to deploy "proliferated space-based interceptors" and a new sensor layer in orbit (The Iron Dome for America, 2025). Because these interceptors carry conventional kinetic kill vehicles, they do not fall under the OST's WMD prohibition. Therefore, no legal treaty barriers exist for conventional interceptor satellites in orbit (Harper, 2019). U.S. officials emphasize that any space-based defense will respect OST principles by avoiding nuclear armaments in space (Hitchens, How Trump's 'Iron Dome for America' upends four decades of nuclear doctrine, 2025).

However, while not explicitly illegal, such actions erode the traditional norm of keeping space "weapons-free." Deploying space-based interceptors would "break the taboo of weaponizing space" and could undermine ongoing United Nations discussions on responsible space behavior (Harper, 2019). International analysts warn that this move may prompt other nations to "exploit this domain" by developing their own space weapons, fueling an arms race in orbit (Harper, 2019). Both Russia and China strongly oppose the weaponization of space. In a 2022 joint statement, Presidents Putin and Xi "declared their opposition" to U.S. global missile defense plans and "attempts by some States to turn outer space into an arena of armed confrontation." They vowed to "make all necessary efforts to prevent the weaponization of space and an arms race in outer space" (Malekos-Smith, 2022). While the U.S. does not violate the letter of the Outer Space Treaty, a homeland "Iron Dome" with space-based components would clash with international efforts (like the proposed PAROS treaty) aimed at keeping space peaceful. It risks causing diplomatic fallout for seeming to militarize space, even if done in the name of defense (Malekos-Smith, 2022).

Anti-Ballistic Missile (ABM) Treaty (1972) (U.S. Withdrew in 2002)

This treaty initially limited the deployment of missile defense systems to maintain strategic stability between the U.S. and USSR. The U.S. withdrew during President George W. Bush's era. While the U.S. is no longer bound by the treaty, adversaries may view the new missile defense initiative as a destabilizing move that could reignite Cold War-era arms races. The ABM Treaty's collapse remains central to today's situation. Russia vehemently opposed the U.S. withdrawal in 2002 and still views it as a major blow to arms control. Putin cited the U.S. ABM Treaty withdrawal as justification when unveiling new Russian strategic weapons in 2018 designed to evade missile defense (Cimbala & Korb, 2025). Now, Trump's "Iron Dome" rhetoric confirms Moscow's worst fears. Russian commentators say, "Trump's plans may push the world into a new era of Star Wars," referring to weaponizing space and igniting offense-defense competition (Press review: Trump's plans may spark a Star Wars era as Russian delegation visits Syria, 2025).

By discarding the ABM Treaty, the U.S. regained legal freedom to pursue this initiative, but it also removed any legal reassurance to Russia and China that their deterrent would not be negated. Moscow and Beijing have called to negotiate a new pact to prohibit or limit strategic missile defenses, but Washington has shown no interest. Thus, the U.S. has not violated this treaty; yet implementing a vast missile shield fulfills the very scenario that the ABM Treaty aimed to avoid, with serious consequences for global stability.

New START Treaty (2010) (Currently Planned to Expire in 2026)

The New START Treaty between the U.S. and Russia limits strategic offensive nuclear forces. It does not directly restrict missile defense systems – in fact, U.S. officials insist that current and planned missile defenses are "not constrained by New START" (Liang, New START at a Glance, 2024). The treaty's preamble merely acknowledges the "interrelationship between strategic offensive arms and strategic defensive arms," but this statement is non-binding. However, New START's Article V imposes one specific constraint; it prohibits converting ICBM or Submarine-Launched Ballistic Missiles into missile defense interceptor launchers (and vice versa). This rule aims to prevent either side from circumventing warhead limits by repurposing launchers. The U.S. has no plans to convert any nuclear missile silos for defense use (Liang, New START at a Glance, 2024). The missile shield envisioned by our President would rely on new interceptors, including space-based ones and existing THAAD/SM-3 interceptors, and does not violate New START's terms. The treaty text does not forbid America from building a multi-layered defensive shield on its own soil.

The strategic impact of a U.S.-spanning missile defense system directly relates to New START's future. Russia has long viewed robust U.S. missile defenses as undermining the balance of mutually assured destruction. Moscow agreed to New START in 2010 with the understanding that U.S. defenses would remain limited. If the U.S. now pursues an "Iron Dome" capable of blunting a Russian nuclear strike, Russia may consider this a breach of trust or spirit. In fact, Russian officials have explicitly warned that Trump's new initiative "puts an end to the prospects of strategic offensive arms reduction" beyond New START. Grigory Mashkov, a senior Russian Foreign Ministry official, stated that such a move would doom further arms control and threaten "strategic stability" (Hitchens, How Trump's 'Iron Dome for America' upends four decades of nuclear doctrine, 2025).

Russia could choose to withdraw from New START, or let it expire in 2026, in response, since the treaty's preamble linkage and Russia's unilateral statements assert that a breakout in missile defense could justify withdrawal (Liang, New START at a Glance, 2024). While the U.S.

missile defense plan does not trigger an immediate legal violation of New START, it jeopardizes the treaty's continuation. The Kremlin has indicated it would likely refuse to extend or replace New START under these conditions, claiming it cannot negotiate new nuclear cuts while the U.S. seeks to neutralize Russia’s deterrent (Hitchens, How Trump’s ‘Iron Dome for America’ upends four decades of nuclear doctrine, 2025).

Missile Technology Control Regime (MTCR) (1987)

The MTCR is a voluntary multi-lateral export control arrangement, not a binding treaty, that seeks limited proliferation of missiles capable of delivering weapons of mass destruction. It restricts the transfer of long-range missiles and related technology, particularly Category I systems (>300 km range with >500 kg payload). The Iron Dome for America effort is primarily a domestic development effort, faces limited direct applicability from the MTCR. Deploying interceptors on U.S. soil or in space does not violate MTCR guidelines, as these guidelines govern exports, not domestic deployments.

However, MTCR considerations could arise if the U.S. collaborates with or transfers technology to allies as part of this missile defense build-up. For example, the U.S. might share advanced interceptor technology with partners, stemming from the Golden Dome executive order’s focus on increased missile defense cooperation with allies; any such transfers would be evaluated under MTCR rules (Fact Sheet: President Donald J. Trump Directs the Building of the Iron Dome Missile Defense Shield for America, 2025). Notably, many missile defense interceptors, like Israel’s Iron Dome Tamir missiles or U.S. SM-3 interceptors, have ranges below intercontinental thresholds and carry small kinetic kill vehicles instead of heavy warheads, potentially placing them outside the strictest MTCR Category I definitions. If technology sharing remains confined to trusted allies, most of whom are MTCR members, and systems cannot be easily converted to offensive use, the MTCR should not be an obstacle to Golden Dome. The MTCR does not prohibit the U.S. from developing or even exporting missile defense systems, but it does advise caution against uncontrolled spread of any high-performance interceptor technology that could double as an offensive missile.

Summary: Treaty Statuses Relating to Golden Dome

The U.S. can proceed with a homeland missile defense shield without breaching its treaty obligations: the Outer Space Treaty remains un-violated as long as no WMD are stationed in orbit (Harper, 2019). Although SBIs are military technology capable of attacking and destroying other satellites, missiles, or re-entry vehicles, international law does not consider them weapons of mass destruction because they primarily serve a defensive purpose and lack the capability to cause widespread damage or casualties. Currently, no specific international law prohibits states from deploying conventional weapons in space, including interceptor missiles (Elleman & Toyoma, 2018).

New START imposes no direct limits on defenses, aside from launcher conversion rules, which the U.S. intends to honor, and the MTCR does not halt domestic defensive deployments. The ABM Treaty is no longer in force; however, the spirit and future of international arms agreements will likely be affected. Many view the move as contrary to the cooperative restraint those treaties promoted. Legal compliance does not equate to international approval, and it will be interesting to observe the reactions of U.S. allies, adversaries, and global institutions to the development and deployment of a U.S. Golden Dome next-generation missile defense system. Overall, the “Iron Dome for America” executive order is an ambitious push to create a comprehensive missile defense shield over the U.S. homeland. While it marks a significant policy shift and strategic aspiration, several perceived limitations possibly threaten feasibility, effectiveness, and long-term sustainability.

Technological Feasibility Gaps. Many requisite technologies are still undeveloped or unproven at scale. Boost-phase intercept efforts have largely been unsuccessful because of technological, budgetary, treaty, and goal-oriented obstacles. Boost-phase missile defense is very sensitive to the geographic characteristics of an adversary nation. Space-based systems provide a solution to those geographic barriers, allowing effectors to intercept within the required timeframe before burnout but come at a significant cost to provide constant access to areas of interest. Space-based platforms are also vulnerable to anti-satellite attacks and will require complex command and fire control systems to manage the large constellations and provide low-latency. Directed energy weapons will require significant advancements in power density, beam control, and cooling systems to allow for the practical and operational application in a Golden Dome architecture. Fully integrated sensor networks, capable of persistent and real-time tracking across multiple missile threat vectors (ballistic, cruise, hypersonic, FOB/MOB) are not yet fully interoperable **(Williams & Dahlgren, 2022) (Cimbala & Korb, 2025)**.

Cost versus Benefit Trades. The Golden Dome initiative will likely require hundreds of billions of dollars with unknown strategic returns. Massive investments in space-based constellations, interceptors (ground, air and space-based), sensor networks, command and control, and other software development efforts will be required to enable an integrated and layered Golden Dome. Adversaries may choose to develop and deploy lower-cost solutions to overwhelm or deplete inventories or higher-cost interceptors. Reagan’s SDI proved that even significant financial investments may not yield an effective architecture.

Organizational and Bureaucratic Hurdles. Implementing Golden Dome requires unprecedented coordination among various defense agencies and combatant commands, including the Missile Defense Agency, Space Force, USNORTHCOM, NORAD, SPACECOM, USINDOPACOM, and others. Officials have likened the required level of collaboration to that of the Manhattan Project. However, existing bureaucratic structures and inter-agency rivalries pose significant challenges to such integration. Without clear leadership and streamlined processes, the initiative risks delays and inefficiencies **(Albon, 2025)**.

Legal and political Challenges. The executive order has already faced legal scrutiny, with courts examining its implications and the administration's authority to implement such sweeping defense measures. Furthermore, the initiative's success depends on sustained political support and funding, which may fluctuate with changing administrations and congressional priorities.

Comparative Analysis: Trump's 2025 "Iron Dome for America" Order and Biden's 2022 Missile Defense Review (MDR)

President Donald Trump's executive order "The Iron Dome for America," issued on January 27, 2025, directs the Pentagon to create a U.S.-based multi-layered missile defense shield. This initiative echoes Reagan's Strategic Defense Initiative and aims to expand homeland missile defenses beyond previous limits. The executive order shifts focus from a rogue nation approach to a missile defense policy that now emphasizes the development of a next-generation missile defense system focused on peer and near-peer threats (The Iron Dome for America, 2025). In contrast, President Joe Biden's 2022 Missile Defense Review (MDR), released alongside the National Defense Strategy, outlines missile defense policy within an integrated deterrence framework. It largely continues the long-standing focus on rogue-state threats while stressing alliance cooperation and strategic stability (The 2022 Missile Defense Review: Still Seeking Alignment, 2022) (U.S. Department of Defense, 2022). The two documents exhibit several key policy vector changes:

Threat Prioritization:

The 2025 executive order prioritizes all missile threats, removing the rogue state versus great power distinction in homeland defense. It declares that the U.S. will "deter and defend against any foreign aerial attack on the homeland," including next-generation ballistic, hypersonic, and cruise missiles "from peer, near-peer, and rogue adversaries." This shift marks a departure from past policy focused only on "rogue-nation" missile threats (like North Korea or Iran). The order notes that since the 2002 ABM Treaty withdrawal, U.S. policy had been "only to stay ahead of rogue-nation threats," implying that peer competitors (Russia, China) were previously not considered. The Biden-era 2022 MDR treated Russia and China's strategic arsenals as outside the scope of U.S. missile defenses.

Strategic Doctrine: Deterrence by Denial vs. Punishment:

The 2025 executive order emphasizes deterrence by denial, aiming to prevent enemy attacks from succeeding, coupled with maintaining a strong retaliatory deterrent or a credible second-strike capability. The executive order explicitly adopts "peace through strength" and states U.S. policy to "deploy and maintain a next-generation missile defense shield" to protect the American people and critical infrastructure. Trump's directive seeks to deny any adversary confidence in a successful strike on the U.S., pledging to "defend against any foreign aerial attack" on the homeland. It also guarantees the U.S. will "secure its second-strike capability," recognizing the continued role of nuclear retaliation, deterrence by punishment. The 2022 MDR emphasized an integrated deterrence approach, with a comparatively greater reliance on deterrence by punishment for large nuclear threats and deterrence by denial mainly for limited or regional attacks, not focusing on homeland defense, in contrast with Trump's Iron Dome executive order.

The MDR describes U.S. missile defenses and nuclear forces as "complementary and mutually reinforcing" in deterring attacks. For a rogue state like North Korea, the strategy is "defeat-dominant," i.e., "stay ahead" of DPRK missiles with defenses, "complemented by the credible threat of direct cost imposition." Against Russia and China, the document explicitly states that the U.S. "will continue to rely on strategic deterrence… to deter large intercontinental-range nuclear missile threats" (The 2022 Missile Defense Review: Still Seeking Alignment, 2022), essentially maintaining that the threat of U.S. nuclear retaliation remains the primary check on Russian/Chinese nuclear strikes, while U.S. missile defenses are not sized to counter massive attacks.

Technological Focus and Posture

Trump’s 2025 Executive Order calls for an aggressive pursuit of new missile defense technologies and layers, including space-based and non-kinetic systems, to achieve a next-generation, multi-layer shield. The executive order mandates a comprehensive architecture that covers boost-phase intercept, advanced tracking, and space-based interceptors on orbit. Notably, it orders development and deployment of proliferated space-based interceptors capable of boost-phase intercept, reviving a concept from Reagan’s “Star Wars” program that had long been shelved for cost and technical reasons (Easley, 2025). Trump prioritizes non-kinetic defenses by directing development of capabilities to defeat missile attacks prior to launch (left-of-launch cyber/strike options) and non-kinetic capabilities to augment kinetic defeat of missiles. The 2022 MDR took a more incremental and programmatic approach to leveraging advanced technology and not embracing dramatic shifts in approaches to missile defenses that leverage non-conventional means (i.e., space-based interceptors, non-kinetic kill approaches). Biden's MDR did not endorse deploying space-based interceptors or other sweeping new layers in the near term. The focus was on achievable improvements, e.g. refining sensor networks (land, sea, and space) for better tracking and discrimination of threats, improving over-the-horizon radars for cruise missile detection, and strengthening regional/theater defense systems.

Policy Tone and Intent

President Donald Trump's "Iron Dome" Executive Order exudes an ambitious, urgent, and bold tone, framing the initiative as a historic leap forward. The executive order invokes President Reagan's efforts and explicitly critiques the past approach as insufficient, stating it was "canceled before its goal could be realized" and too limited to rogue states (The Iron Dome for America, 2025). Trump's public statements around this policy were grandiose; he promised supporters "a dome like has never been seen before, a state-of-the-art missile defense shield" over America. The official text reflects this intent, speaking of "peace through strength" and a transformative next-generation defense, conveying a major national endeavor on par with the Strategic Defense Initiative (SDI).

The order's tone is transformational rather than incremental, aiming to dramatically change the U.S. homeland defense posture. For example, the GOP 2024 platform embraced Trump's call in emphatic terms: "PREVENT WORLD WAR THREE... AND BUILD A GREAT IRON DOME… OVER OUR ENTIRE COUNTRY – ALL MADE IN AMERICA," positioning the shield as a visionary goal (Flaherty, 2024). Trump's missile defense policy casts as a game-changing flagship initiative; it carries a hopeful, hyperbolic tone (e.g., aiming for "the greatest dome of them all") and signals an intent to leap ahead with American technology to decisively secure the homeland. This approach marks a "dramatic departure" from prior GOP defense thinking and presents as a signature, "America first" security project, akin to the border wall, but applied to missile threats (Flaherty, 2024).

President Joe Biden's 2022 Missile Defense Review (MDR) maintained a measured, policy-focused tone, aligned with broader strategic continuity. The MDR employed the technocratic language of strategy documents, emphasizing integration, balance, and realism. It did not announce revolutionary changes but underscores missile defense as one component of deterrence. For instance, it noted that missile defenses contribute to "integrated deterrence" by undermining an adversary's confidence in a successful attack (Department of Defense Releases its 2022 Strategic Reviews – National Defense Strategy, Nuclear Posture Review, and Missile Defense Review, 2022). This phrasing reflected an intent to refine and improve, not to radically overhaul.

The document described ambitions in relatively incremental terms, such as improving mobility, interoperability, and affordability of defenses over time. The overall tone was pragmatic and stabilizing, aiming to reassure that U.S. missile defense efforts will be "tailored to specific competitors and challenges" and coordinated with allies, rather than a unilateral sprint for invulnerability (Department of Defense Releases its 2022 Strategic Reviews – National Defense Strategy, Nuclear Posture Review, and Missile Defense Review, 2022).

The 2022 MDR reads as a strategy alignment exercise, conducted "in an integrated way, aligned with the National Security Strategy," aiming to match resources to goals. Overall, Biden's missile defense policy appears evolutionary. The rhetoric is far less dramatic than Trump's; it projects a tone of continuity and caution (e.g., reaffirming commitments to deterrence and arms control norms) rather than a rallying cry for a new shield. Ambitions are framed as important but measured improvements (like fielding Next Generation Interceptors, improving regional defenses), and the document often reads as incremental in intent, deliberately contrasting the transformational language of Trump's approach.

Alliances and Global Cooperation

President Donald Trump's 2025 "Iron Dome" order recognizes the importance of allies in missile defense and aims to increase cooperation, primarily focusing on U.S. capabilities initially. Section 4 of the executive order declares that the U.S. "continues to cooperate on missile defense with its allies and partners" to defend allied populations and U.S. forces abroad. It then mandates a subsequent "Allied and Theater Missile Defense Review" to identify ways the U.S. and its allies can bolster collective defenses after initiating the new homeland architecture. Key objectives include increasing bilateral and multilateral cooperation on missile defense technology, capabilities, and operations; enhancing theater missile defenses for forward-deployed U.S. forces and allied territories; and expediting the provision of U.S. missile defense capabilities to allies and partners (The Iron Dome for America, 2025). This approach suggests that Trump's policy envisions joint development and potentially more armaments sharing, such as making U.S. systems (like THAAD, Aegis, Iron Dome batteries) more accessible to allies and co-developing technology (the U.S. has a history of cooperative programs like the Arrow with Israel or SM-3 Block IIA with Japan).

Trump's emphasis on "All made in America" for the homeland shield does not exclude cooperation; in fact, the U.S. might incorporate allied innovations (such as Israel’s Iron Dome technology) (Flaherty, 2024). Overall, while the executive order primarily focuses on domestic efforts, it clearly anticipates a robust allied component: after the U.S. constructs its "dome," it plans to work closely with allies to integrate systems, share sensors, and extend protection. The tone reflects American leadership, with the U.S. establishing a new defense and then assisting allies to enhance their defenses in tandem.

President Joe Biden's 2022 Missile Defense Review (MDR) placed a strong emphasis on alliances and partnerships as central to the missile defense strategy, integrating U.S. efforts with those of allies across regions. A dedicated section of the MDR, "Strengthening International Cooperation with Allies and Partners," highlighted America's alliances as "one of its greatest assets" in missile defense. The MDR prioritized enhancing collective Integrated Air and Missile Defense (IAMD) with allies in North America, Indo-Pacific, Europe, and the Middle East. It underscored how cooperation "strengthens common protection, enhances extended deterrence, and provides assurances" to allies, reinforcing alliance cohesion against regional missile threats (Department of Defense Releases its 2022 Strategic Reviews – National Defense Strategy, Nuclear Posture Review, and Missile Defense Review, 2022).

In practical terms, Biden's MDR detailed various regional strategies: improving NORAD early warning for North America with Canada; collaborating closely with Japan, South Korea, Australia on interconnected missile defense in the Indo-Pacific, including encouraging those partners to invest in ground and space-based sensors and to co-develop new technologies, like hypersonic defenses; leveraging NATO’s integrated air and missile defense and the European Phased Adaptive Approach in Europe; and sustaining cooperation with Israel and Gulf states in the Middle East, while fostering nascent regional defense partnerships against Iran’s missiles.

Overall, Biden’s MDR’s tone was inclusive and collaborative. Unlike Trump's America-centric language, Biden's MDR explicitly frames missile defense as a collective effort and calls for information sharing, joint training, and even co-production of systems with allies. It reinforced U.S. security commitments by assuring allies that U.S. defenses (homeland and regional) also protect them, and conversely, that allied contributions are vital to U.S. security. In summary, Biden's policy placed alliance integration at the forefront, pursuing a global network of missile defense cooperation, whereas Trump's executive order, while advocating continued cooperation on missile defense with allies, centers more on unilateral U.S. capabilities, to be followed by allied enhancements.

Arms Control and Strategic Stability Implications

President Donald Trump's 2025 "Iron Dome" order raises significant concerns for arms control and strategic stability by aiming for capabilities that could undermine the deterrents of other nuclear powers. A U.S. pursuit of a broad homeland shield "capable of defending against peer" nuclear missiles essentially signals an attempt to negate Russia’s or China’s nuclear retaliatory capability (The Iron Dome for America, 2025). Historically, U.S.-Russian arms control relied on mutual vulnerability, as exemplified by the 1972 ABM Treaty, which banned nationwide missile defenses to preserve stable deterrence (Pifer, 2022). Trump’s policy, by discarding any pretense of self-restraint in homeland defense, could be seen as overturning that paradigm, much like the ABM Treaty withdrawal did, but to a greater extent. This shift likely pressures adversaries to expand or diversify their offensive arsenals. Analysts warn that if missile defenses remain unconstrained and seem likely to grow in effectiveness, the other side will assume worst-case improvements and respond by building more warheads or novel penetration aids (Pifer, 2022). Furthermore, "if missile defenses remain unconstrained and grow in number, the other side may conclude that it must expand its strategic offensive forces," potentially leading to offense-defense arms races reminiscent of the 1960s.

Russia has developed exotic systems, such as hypersonic glide vehicles and nuclear-powered cruise missiles, explicitly to "penetrate missile defenses," and China, with a smaller arsenal, has shown alarm by testing a fractional orbital bombardment system, a nuclear glider that approaches from an unconventional azimuth, seemingly to evade U.S. defenses. Trump's ambitious shield could accelerate these trends. For example, to overwhelm a U.S. "Iron Dome," an adversary might deploy decoy-rich missile salvos or more submarine-launched missiles. The cost-exchange ratio favors offense – as one U.S. general noted, "when our interceptor costs more than the weapon attacking us, that's a bad place to be." Critics argue that Trump's plan may ultimately decrease U.S. security by spurring adversaries to build more nuclear weapons. It also complicates arms control prospects because Russia may be unwilling to reduce warheads below New START limits or agree to future cuts if it fears U.S. defenses could nullify a smaller arsenal. In short, the Trump 2025 approach prioritizes U.S. defensive capability, even at the risk of destabilizing the offense-defense balance. This approach bets that technological "peace through strength" can replace treaty-based stability, a stance some hawks applaud but arms control experts view as provocative (Pifer, 2022).

President Joe Biden's 2022 Missile Defense Review (MDR) was more aware of stability concerns and largely maintained traditional limits on missile defense ambitions to avoid derailing strategic arms control. By affirming that U.S. homeland defenses are not aimed at Russia's or China's nuclear arsenals, the MDR implicitly supported the status quo of mutual deterrence. The document did not renounce missile defense, it still sought improvements against rogue states and advanced regional threats, but it avoided suggesting the creation of a shield against major powers. This stance aligned with the longstanding U.S. policy that defending against a massive nuclear attack poses "significant technical, financial, and geopolitical challenges" (Liang, Current U.S. Missile Defense Programs at a Glance, 2025).

The geopolitical aspect referred to how such defenses can erode stability; if Russia and China believe that U.S. defenses are limited, they have less incentive to enlarge their arsenals. Indeed, all recent presidents prior to Trump assured Moscow and Beijing that U.S. missile defenses were "not aimed at undermining their strategic deterrents." The Biden MDR continued this delicate balance. Notably, the 2022 MDR did not overtly expand the scope of homeland defense, thereby tacitly adhering to the understanding that U.S. missile defenses remain "restrained to countering rogue states and accidental launches" (Soofer & Costlow, 2023). This approach likely helped mitigate an arms race. Russia’s large ICBM force can confidently penetrate U.S. defenses, and China, while modernizing rapidly, knows the U.S. is not currently fielding interceptors to negate a sizable second-strike.

Strategic stability is being tested by external factors, such as Russia’s war in Ukraine and Chinese nuclear expansion, and the MDR was perhaps less explicit about arms control than some expected, analysts noted the "absence of the usual reference to arms control limitations" in the text (The 2022 Missile Defense Review: Still Seeking Alignment, 2022). Nonetheless, the Biden administration's actions, like extending New START in 2021 and not pursuing more destabilizing defense concepts, align with a desire to avoid offense-defense arms races. In summary, Biden’s missile defense policy attempted to balance capability with stability. It sought credible protection against limited threats from rogue states without signaling a quest for absolute security against Russia/China that could unravel strategic arms agreements. This approach reflected the classic arms control argument that beyond a certain point, more missile defense can reduce security by prompting adversaries to "overwhelm the shield" (Pifer, 2022). Biden’s team seems to accept this logic, opting to strengthen missile defenses in targeted ways but not aiming for an impenetrable homeland shield, thereby preserving the possibility of future arms control and a stable deterrence equilibrium.

Comparative Analysis: Trump’s 2025 Iron Dome for America and Defense of Guam

Defense of Guam Background

The Defense of Guam missile defense initiative, launched in the early 2020s, aims to protect the U.S. territory of Guam from a range of advanced missile threats. U.S. Indo-Pacific Command’s (INDOPACOM) warnings about the growing capabilities of Chinese, North Korean, and other regional missiles spurred the Department of Defense to prioritize Guam’s air and missile defense as a top requirement. The INDOPACOM Commander identified the "Defense of Guam" as the number-one unfunded priority in 2024, highlighting its critical importance (Doyle, 2024) (Schriver, 2025). The initiative envisions a 360-degree, layered defense to protect Guam’s strategic bases, such as Andersen AFB and Naval Base Guam, against ballistic missiles, cruise missiles, hypersonic glide vehicles, and other aerial threats. This section analyzes the initiative's progress from 2021 to the present, focusing on key deficiencies and challenges in leadership, systems integration, politics, technology, and site-specific factors. It concludes with an overall assessment of whether the Guam defense effort is on track to succeed.

Leadership and Agency Responsibility:

From the beginning, the Defense of Guam project involved multiple defense organizations, raising questions about leadership and responsibility. Initially, the Missile Defense Agency (MDA) led the design of Guam’s missile defense architecture in coordination with the Army and Navy. However, as the effort intensified, it became apparent that a single service needed to oversee integration and operations. In June 2023, Deputy Secretary of Defense Kathleen Hicks signed a memo officially designating the U.S. Army as the lead service for the defense of Guam. Specifically, the Army's Sustainment Command received the task of coordinating this complex, cross-domain effort. Army leadership stated that having one executive agent with oversight would "ensure that integration occurs with the right oversight," while MDA continues to develop the necessary technologies (Trevithick, 2022). This decision came after a period of inter-service deliberation.

Guam's defense involves traditional Army missions, such as terminal air defense with systems like THAAD and Patriot, Navy capabilities with Aegis missile defense technology, and MDA's specialized role in missile defense development. The INDOPACOM Commander and Pentagon leaders realized that without clear roles, the program risked becoming fragmented. By assigning the Army the task of integrating the various components, the department sought to bring "order to a complicated acquisition effort" that spans sensors, interceptors, and command systems. MDA officials supported this structure, noting that the Army-led framework allowed MDA to concentrate on delivering technical components while the Army integrates them into an operational capability (Roaten, 2023).

Systems Engineering and Integration Challenges

Designing a "system of systems" to defend Guam presents major systems engineering and integration challenges. Unlike a single-architecture solution, Guam's defenses combine multiple missile defense systems, each with its own radar, interceptors, and fire control that must operate together. Integrating these independent fire control systems into a cohesive network is critical, as one expert pointed out (Ferran, 2024). The Guam Defense System intends to merge Army systems for lower-tier and cruise missile defense with Navy/MDA systems for higher-tier ballistic and hypersonic defense into one seamless network, a complex technical task (Ferran, 2024) (Williams L., 2022). Key components include the Army's Terminal High Altitude Area

Defense (THAAD) battery (deployed on Guam since 2013); Patriot batteries for medium-/low-altitude threats; planned Indirect Fire Protection Capability (IFPC) launchers for cruise missiles and drones; and a new land-based Aegis Guam System developed by MDA that can launch Standard Missile-3 (SM-3) and SM-6 interceptors. These systems will be supported by a distributed sensor network: the new AN/TPY-6 radar, an MDA-developed sensor tailored for Guam's needs; Army LTAMDS - Lower Tier Air and Missile Defense Sensors, an upgraded Patriot radar; existing AN/TPY-2 radar units; and other sensors to ensure overlapping coverage.

To command this multi-layered defense, the Army is deploying the Integrated Battle Command System (IBCS) as the central command and control (C2) hub. IBCS is designed to process data from all sensors and coordinate among the different "shooters," creating a single integrated air picture (Roaten, 2023). The MDA's Command and Control, Battle Management, and Communications (C2BMC) system also interfaces to provide links to strategic warning systems. The challenge lies in the fact that many of these systems were not originally designed to work together. For instance, the Navy's Aegis system operated independently at sea, and the Army's air defense systems had their own isolated control. Now in Guam, they must exchange engagement data and hand off targets in real time.

Recent tests have started to show this integration: in a December 2024 flight test (codenamed FEM-02), the Aegis Guam System with an AN/TPY-6 radar successfully detected and intercepted a medium-range ballistic missile while operating with other defense assets (Ferran, 2024). This test marked a significant step toward demonstrating the system's integrated capability but was limited to a single ballistic target and not operationally representative. The system ultimately aims to handle complex, simultaneous attacks, such as salvos of different missile types arriving together. Achieving reliable integration for such scenarios is challenging, requiring solutions to technical issues like common data standards, fire-control software compatibility, sensor fusion, and interceptor deconfliction.

Despite these challenges, progress is evident. The Army's Rapid Capabilities and Critical Technologies Office (RCCTO) has been testing an "advanced battle management and fire control" approach for Guam, effectively establishing a prototype integrated defense battalion (Olseon, 2024). In 2023, the Army activated a temporary "composite" air defense battalion structure on Guam to test the joint operation of THAAD, Patriot, and other units. MDA and Army leaders stress that cross-service coordination is now standard practice, with teams on Guam working "very hard" together (Williams L., 2022). While significant integration hurdles persist, the DoD has established the organizational framework and initial technical connections (such as IBCS and joint fire control tests) to eventually unite these disparate systems into a unified shield over Guam.

Inter-Departmental Political Challenges

One political issue experienced in this effort involved the initial divergent visions between the services and the Missile Defense Agency (MDA), which related to budget control. Initially, U.S. Indo-Pacific Command and some members of Congress advocated for the swift deployment of an Aegis Ashore system to Guam, similar to the Aegis Ashore sites in Europe (Trevithick, 2022). In 2021, then-INDOPACOM Commander Adm. Phil Davidson explicitly requested an Aegis Ashore battery for Guam in his unfunded priorities list, citing the advancement of Chinese missile capabilities and the possibility of a conflict by 2027 (Sadler, 2022). The MDA began to explore this option, but the Army, which would likely operate any land-based Aegis system, expressed concerns about committing a Navy-developed system to one island and questioned whether it would counter the full spectrum of threats, as Aegis Ashore was originally designed primarily for ballistic missiles from one direction.

By 2022, the Pentagon shifted toward a more distributed architecture for Guam's defense rather than a single Aegis Ashore deckhouse (Trevithick, 2022). This strategic change, while tactically sound, led to a more complex acquisition process without an off-the-shelf solution, prompting Congress to raise questions about execution risk. Ultimately, the 2023 memo from Deputy Secretary of Defense Kathleen Hicks, which designated the Army as the lead service, helped resolve inter-service disputes by clarifying roles (Roaten, 2023). The Office of the Secretary of Defense endorsed the Army's leadership in integration to streamline the program and prevent bureaucratic infighting.

Technological Challenges

Defending Guam against the full spectrum of conventional and advanced missile threats poses significant technological challenges. Guam could be targeted by intermediate-range ballistic missiles (IRBMs) like China’s DF-26 “Guam Killer,” cruise missiles launched from aircraft or ships that fly at low altitudes, and potentially hypersonic glide vehicles that maneuver unpredictably at high speeds. Creating a single defensive system to counter all these threats was unprecedented. The Defense of Guam architecture necessitated a truly layered defense system, employing multiple interceptor and sensor types to engage different threats at various flight phases (Doyle, 2024).

On the interceptor side, the system plans to integrate both endo-atmospheric and exo-atmospheric defenses. MDA’s environmental impact statement indicates that the mix will include SM-3 Block IIA missiles for exo-atmospheric interception of medium- and intermediate-range ballistic missiles in midcourse; SM-6 missiles, which can engage cruise missiles, aircraft, and some ballistic or hypersonic threats in later phases; the Army's THAAD interceptors for high-altitude endo-atmospheric interception of ballistic missiles in their terminal phase; and Patriot PAC-3 MSE missiles for lower-altitude terminal defense against ballistic and air-breathing threats (Doyle, 2024). This combination is state-of-the-art but also complex to integrate.

A technological gap exists regarding hypersonic glide vehicles – no current U.S. interceptor is specifically designed to defeat a maneuvering hypersonic glide weapon in midcourse. The MDA is developing the Glide Phase Interceptor (GPI) for this purpose, but GPI is still in the prototyping stage and unlikely to be deployable by 2027. This was recently confirmed by MDA Director, Lt. Gen. Heath Collins, in testimony provided to House Armed Services Strategic Forces subcommittee on 30 April. The MDA is facing a roughly three-year delay in delivering an interceptor capable of defeating a hypersonic weapon in the glide phase. The funding the agency has received for the program "will actually push that delivery to 2035," Collins said (Judson, Reduced funding slows MDA's hypersonic interceptor development, 2025). Consequently, Guam's defense will rely on a layered backup approach, engaging hypersonics in the terminal phase with SM-6 or potentially THAAD, while performing early tracking to cue interceptors as soon as possible. This strategy places heavy reliance on existing sensors and effective battle management, command, and control.

Sensor coverage is a formidable technical challenge due to Guam's geography. Achieving 360° radar coverage against low-flying cruise missiles requires multiple sensor nodes around the island. The MDA has deployed the first AN/TPY-6 radar to Guam, a new sensor derived from Long-Range Discrimination Radar technology. In the December 2024 test, the AN/TPY-6 successfully tracked a target missile and guided an SM-3 interception, demonstrating its fundamental capability. This radar provides high-power, long-range coverage and is oriented to handle threats from Guam's western approaches (Judson, 2024). Unfortunately, the AN/TPY-6 radar work on Guam was halted in January 2025, as directed by then U.S. Deputy Secretary of Defense Kathleen Hicks (Trevithick, Uncertainty Over AN/TPY-6 Guam Missile Defense Radar Emerges, 2025). The Army's LTAMDS radar, which offers 360° coverage in the lower-tier, is also planned for Guam to detect cruise missiles or drones (Roaten, 2023). Additionally, mobile Sentinel radars and other sensors may be integrated via IBCS to detect low-altitude threats from any direction. Space-based sensors will supplement the detection capabilities by identifying launches and tracking missiles in mid-course. The Space Force's new satellite constellations, part of the Hypersonic and Ballistic Tracking Space Sensor layer, are expected to contribute to Guam's defense by providing detection and tracking of advanced threats. Ensuring all these sensors feed data to a unified fire control system without overload or delay is a significant technical endeavor.

Another technological hurdle is developing new infrastructure to support these systems in Guam's environment. For instance, the MDA and Lockheed Martin have developed a novel tilting launcher for the Mk 41 Vertical Launch System for use on Guam. Unlike fixed vertical silos in Aegis Ashore installations, the Guam launcher can tilt to widen the firing arc and potentially extend the range toward threats from specific azimuths. This innovation required engineering, testing, and validation; recent test images showed the land-based Mk 41 launcher structure and a successful missile firing. The command-and-control software that links Navy Aegis components with IBCS is another element requiring custom development and testing. Each interceptor and radar also need updated algorithms to handle the island attack scenario. All these technical components must be operational by the 2026–2027 timeframe for initial capability (Trevithick, 2022).

Finally, capacity and sustainment are technical considerations. The system must withstand saturation attacks, meaning it requires a sufficient number of launchers and interceptors and the ability to reload quickly. The plan for 16 distributed sites is designed to address this by dispersing launchers, but the total number of interceptors Guam can field is finite, limited by launcher cells and reload logistics (Doyle, 2024). If China were to launch a significantly larger number of missiles than Iran fired at Israel in 2021, as one analyst suggested, it could overwhelm Guam's defenses (Ferran, 2024). Technologically, exploring directed-energy weapons or electronic warfare for Guam's defense could be beneficial in the future (the executive order for Iron Dome for America also calls for non-kinetic defenses). Currently, however, Guam's defense relies on kinetic interceptors and is constrained by their physical limitations. In summary, the technological challenges, from integrating advanced radars and interceptors to developing new launcher systems and command and control software, to ensuring sufficient defensive capacity, are significant. The December 2024 test demonstrated many of the correct components (new radar, new launcher, joint engagement) functioning in a simple and very limited scenario. The next few years will determine if this can be scaled up to a fully "persistent, layered, integrated" defense network that fulfills its intended purpose (Ferran, 2024) (Ziezulewicz & Trevithick, 2024).

Successes and Shortfalls

Evaluating the Defense of Guam initiative up to the present reveals a mix of important some progress and notable shortfalls. Indo-Pacific Command defined the requirements for a 360° layered defense mandate, chose a distributed Enhanced Integrated Air and Missile Defense system rather than a single-site solution (Trevithick, 2022), and key components are already in limited testing (e.g., the Aegis Guam System and AN/TPY-6 radar intercept test in 2024).

Organizationally, the Pentagon identified and addressed the initial leadership ambiguity by empowering the Army to lead, which by late 2023 injected clearer accountability and integrative focus (Roaten, 2023). Funding has been sustained through multiple budget cycles, indicating continued political commitment to the mission. All these are positive indicators that the Defense of Guam initiative is being taken seriously and is making some tangible headway.

Despite these positive aspects, several areas require improvement, and many issues or concerns still need to be addressed. One major concern is timing; the program's full capability is slated for around 2027–2028, which some experts warn may be too late if a conflict erupts sooner (Sadler, 2022). So far, DoD has not deployed significant interim enhancements (beyond the standing THAAD battery and some rotational Patriot deployments), meaning Guam in 2025 is only modestly better defended than it was in 2020. If a crisis were to occur tomorrow, Guam would still have only limited, point-defense level protection. In that sense, the pace of effort could be viewed as a failure to urgently field near-term defenses, even if it succeeds in delivering the long-term solution. The Pentagon has essentially accepted a risk in the short term to focus on the optimal long-term architecture (Sadler, 2022). Whether that trade-off is wise will only be known with time.

Another area of concern is integration testing and reliability. Thus far, only relatively basic tests have been conducted. One ballistic intercept test from Guam that involved a single target in an event titled FEM-02 by the Missile Defense Agency (MDA) (Ferran, 2024). The truly stressing scenarios: mass raids, mixed ballistic and cruise attacks, and electronic countermeasures by the adversary, have not yet been demonstrated and won't be until later in the decade. There is a risk that unexpected technical bugs or interoperability issues will emerge during these advanced tests, potentially requiring redesigns or causing delays. The Government

Accountability Office (GAO) noted in a recent report that MDA has sometimes struggled to meet annual testing goals and timelines for new systems (Missile Defense: Annual Goals Unmet for Deliveries and Testing, 2023) (Department of Defense Fiscal Year (FY) 2025 Budget Estimates, 2024). If similar issues occur with Guam's defense elements, such as IBCS software integration faltering or a new interceptor failing in testing, it could delay the deployment beyond 2028. This postponement would miss the threat window the commanders are worried about. In short, schedule risk and technical risk remain high.

Resource sufficiency is another area of concern. The final defensive architecture envisions 16 dispersed sites in Guam with a combination of launchers and sensors. Maintaining and manning the nodes will require significant personnel and logistics. The Army will likely need to station additional Air Defense units in Guam (or deploy them on long rotations), which has not been done at this scale before. Training and sustaining those units in a remote location is challenging. If the Army faces overall end-strength or budget pressures, keeping Guam's defense fully crewed and supplied might prove difficult. There's also the matter of stockpile: missile defense interceptors are expensive, and war reserve inventories are finite. In a protracted conflict, Guam's defense could potentially run low on interceptors if resupply cannot keep pace with expenditures. These are planning factors that DoD will have to iron out, such as pre-positioning extra interceptors on Guam, which in turn requires storage infrastructure. None of these are show-stoppers, but they underscore that the effort is far from complete—success depends not just on building the systems but on sustaining them under pressure.

One may conclude that the Defense of Guam effort is neither a full success nor a failure, but a work in progress with mixed reviews. Advocates point to the urgency of the threat and the progress made in architecture and testing, arguing that the DoD is finally treating Guam's defense with the seriousness it deserves. Skeptics, including some in the strategic community, worry that even this improved defense could be overwhelmed by China's missile arsenal, or that it might be ready too late to matter (Sadler, 2022) (Ferran, 2024). The true measure of success will be if the system can be delivered on time (by 2027) and perform as intended against realistic threats.

So far, milestones like the 2024 intercept test and the completion of environmental reviews are encouraging (Doyle, 2024) (Ferran, 2024). But until the full capability is fielded and proven, the Defense of Guam remains an unproven promise. In the interim, it represents a partial success in mobilizing attention and resources, yet a potential failure if the pacing threat outstrips the defense's arrival. The next two years (2025–2027) will be critical in determining the outcome. For now, observers would be prudent to consider Guam's enhanced defense neither fully secure nor a lost cause, but cautiously on its way, with much work still to be done.

Defense of Guam Against "Iron Dome for America"

Although the two efforts differ greatly in terms of scope and concept, lessons learned of the on-going effort should be considered when planning and executing the Golden Dome effort. Both efforts are massive systems engineering problems, combining multiple systems to work together to defend a defined area against various threats.

Defense of Guam intends to field a missile defense systems that defends a single roughly 200 square mile island. It is theater defense, focused on a regional contingency (an Indo-Pacific conflict scenario). In contrast, Golden Dome is envisioned to be a nationwide, layered missile defense shield, covering the continental United States. This is an enormously larger area, on the order of millions of square miles, and involves defending major cities, critical infrastructure, and population centers across the country. The metaphor of an "Iron Dome" in the U.S. context implies protecting all 50 states from advanced missile attack, a scope akin to the Cold War-era SDI if fully realized. Because of these scope differences, the scale of effort differ greatly.

The Guam defense will have on the order of dozens of interceptors deployed at any time and a handful of radars – enough to protect Guam's airspace. Iron Dome for America would require hundreds or even thousands of interceptors, a wide network of sensors across North America and in space, and infrastructure spanning the continent. For example, to replicate even Israel's dense Iron Dome coverage across U.S. cities would require many batteries stationed around the country. More ambitiously, the Trump administration's concept includes satellite architectures for global coverage. In short, Guam's defense is a point defense in the Pacific, whereas Iron Dome for America is a global/national defense of the homeland. The scope difference also means Guam's system can be tailored to one threat axis (threats approaching Guam from the western Pacific), whereas a U.S. homeland shield must look in all directions. This makes the latter inherently more complex.

The feasibility of the two initiatives contrasts sharply. The Defense of Guam largely leverages existing or near-term technologies. While integration is challenging, each component of Guam's system exists or is in late-stage testing. The Iron Dome for America, on the other hand, is far more aspirational and requires technologies that are not yet developed or fielded. The executive order mandates, for instance, "proliferated space-based interceptors capable of boost-phase intercept". Currently, the United States has no space-based missile interceptors, this resurrects a concept from Reagan-era proposals that has never been realized due to technical and cost hurdles. Developing and deploying such a space interceptor constellation would likely take well over a decade and many billions of dollars, pushing beyond 2030. The order also calls for boost-phase defenses and left-of-launch capabilities (Roque, 2025). These are cutting-edge or speculative capabilities involving directed energy, cyber, or advanced sensors. While research is ongoing, these are not deployable systems as of 2025.

Even the more conventional parts of Iron Dome for America face readiness issues. The Executive Order mentions an “underlayer and terminal-phase intercept” for city protection. The U.S. does have terminal defenses like Patriot and the THAAD battery in California, but covering every major city would be an enormous expansion of those systems. Additionally, these systems are intended to engage intermediate or short-range missiles and are not capable of destroying ICBM warheads in terminal phase. The homeland currently relies primarily on the Ground-Based Midcourse Defense (GMD) system for long-range ballistic missiles, which has fewer than 50 interceptors focused on North Korean ICBMs. Iron Dome for America implies a *massive increase* in defensive coverage, something the Pentagon has not planned or budgeted for.

By contrast, Guam’s system is already budgeted in the five-year defense plan and has a initial operational capability target by 2027 (Roaten, 2023) (Williams L. , 2022). The implementation of the Golden Dome for America would be a brand-new major defense acquisition program that could span decades. Analysts have quickly pointed out serious feasibility questions about Iron Dome for America. A Bulletin of the Atomic Scientists commentary noted that the ambitious nationwide defense plans deserve scrutiny “about whether they are feasible, from the standpoint of available and foreseeable technology and cost” (Cimbala & Korb, 2025). In other words, many of the pieces of Iron Dome for America, like space sensors and interceptors, either exist only on paper or are in infancy.

Politically, the Defense of Guam has largely bipartisan support, rooted in the shared perception of the China threat in the Pacific. Both the Trump and Biden administrations supported Guam air defense upgrades, and Congress funded it via the Pacific Deterrence

Initiative with relatively little controversy (Williams L. , 2022) (Sadler, 2022). In contrast, the Iron Dome for America initiative emerged in a hyper-partisan context. It was an Executive Order by President Trump at the start of his second term, announced with great fanfare about building "the greatest dome of them all" (Roque, 2025). Because of this provenance, it has been met with skepticism from political opponents and some defense analysts. There is concern that such a sweeping program could be a money sink or a political stunt. Within Congress, Republicans like Sen. Wicker have praised the vision and echoed the need for urgency in improving homeland defense. Wicker noted it "is a must" and praised the President's urgency, even while acknowledging "that's going to be expensive" (Roque, 2025). Democrats, on the other hand, have historically been more cautious about expansive missile defense, especially if it involves space weapons or could upset strategic nuclear stability. It's likely that an Iron Dome for America program would face intense debate in Congress, questions about cost-effectiveness, arms race implications, and technical viability.

Unlike Guam's defense, which had a clear and present justification, a nationwide shield raises the specter of the old SDI debate. Some lawmakers might oppose it on strategic grounds or prefer funds to go to other deterrence means. Furthermore, the Arms Control community and allies could object. By attempting to shield the U.S. homeland against Russia or China's nuclear missiles, the U.S. could be seen as undermining the concept of Mutually Assured Destruction that underpins deterrence (Sankaran, 2023). In contrast, the 2022 Missile Defense Review explicitly stated the U.S. would rely on nuclear deterrence, not missile defense, against Russia/China. Iron Dome for America seems to challenge that norm, which would be a politically sensitive shift. While "defense of the homeland" is a politically appealing phrase, the details of this initiative are contentious. We can expect partisan divides and possibly legal/appropriations hurdles for Iron Dome for America, whereas Defense of Guam had more unanimous backing as a pressing military requirement.

Compared to the Defense of Guam effort, the Iron Dome for America has a much broader and more ambitious strategic rationale, essentially seeking to nullify or greatly mitigate the threat of missile attacks on the U.S. homeland from any adversary, whether that's a rogue state or a peer competitor. The executive order explicitly references defending against "ballistic, hypersonic, advanced cruise missiles, and other next-generation aerial attacks from peer, near-peer, and rogue adversaries" (Roque, 2025). This includes Russian ICBMs, Chinese advanced missiles, North Korean missiles, possibly even terrorist or proxy-launched cruise missiles. It is a comprehensive view of missile defense that blurs the line between regional and strategic defense. The strategic rationale seems to be, as these threats proliferate, especially hypersonics and advanced cruise missiles that could evade current defenses, the U.S. needs to invest in new defenses to protect the homeland. Proponents likely argue this will bolster deterrence by denial – if adversaries cannot threaten U.S. cities or infrastructure, they gain less leverage over the U.S. in a crisis.

Comparative Analysis: Trump's 2025 "Iron Dome for America" and Reagan's SDI

Trump's "Iron Dome for America" initiative inevitably draws comparisons to President Ronald Reagan's SDI of 1983, the original attempt to build a comprehensive shield against nuclear missiles. Both efforts share an ambitious goal of nullifying the threat of nuclear attack, but they differ in technological maturity, geopolitical context, and the lessons learned in the decades between.

Figure 1: Israel's Iron Dome system intercepts incoming rockets (streaks in sky over Haifa, 2024). Trump's plan aims to scale this concept up 400-fold to shield the entire United States – a vastly larger territory – against far more powerful missiles. (Roque, 2025)

Technological Ambition: Golden Dome Against SDI

Reagan's SDI, nicknamed "Star Wars", was visionary for its time, proposing space-based lasers, particle beams, and interceptor satellites to destroy incoming Soviet warheads mid-flight. In the 1980s, many of these technologies were purely theoretical or in infancy. SDI's largest ideas never moved beyond laboratory experiments. By contrast, Trump's 2025 plan arrives after decades of incremental progress in missile defense tech. Today's ambitions, while still lofty, stand on a more solid base of demonstrated systems. For example, the U.S. has consistently conducted successful hit-to-kill intercepts of ballistic missiles outside the atmosphere, which was once doubted. Sensors are far more advanced and computation that was impossible in Reagan's era is now routine. Trump explicitly claimed that "we now have the technology to do what Reagan intended but was unable to achieve." There is some truth to this, modern feats like Israel's multilayered defense show that integrated missile defense can work on a limited scale, and wartime intercept successes in conflicts such as the 2022–2024 Ukraine war (shooting down cruise and ballistic missiles) offer "partial evidence to support Trump's goal" (Roque, 2025).

SDI was criticized because the tech of the day couldn't realistically protect the U.S. from a massive Soviet ICBM salvo. Trump's system would face that same fundamental challenge if aimed at peers or near-peers like Russia and/or China. Today's defensive repertoire does include things Reagan could only dream of. For example, hit-to-kill kinetic interceptors are now proven. The computing power and sensors available now are vastly superior, making integration of a layered system at least conceivable. There is active work on directed-energy weapons, whereas in Reagan's time weaponizing lasers was science fiction. But despite improved technology, the core difficulty remains. Modern adversaries deploy countermeasures like decoys, maneuverable reentry vehicles, and hypersonic glide vehicles specifically to penetrate or evade missile defenses (Trump's Misguided "Golden Dome" Gambit, 2025) (Cimbala & Korb, 2025).

As the Bulletin of Atomic Scientists notes, historically "the capabilities of ballistic missile offenses exceeded those of defenses," meaning even the best defensive tech could be overwhelmed by a determined offense at a fraction of the cost. That was true in the 1980s and, absent some revolutionary new technology, is likely true now. Golden Dome is technologically bolder in scope than anything attempted since SDI, but whether today's innovations truly overcome the limits that hindered Reagan's program is hotly debated. Supporters say the U.S. should try, given advancements, whereas skeptics see it as "once fanciful" ideas as still unproven.

Strategic Rationale and Goals

Reagan pitched SDI in almost idealistic terms. He spoke of rendering nuclear weapons "impotent and obsolete," motivated by a vision to end the era of Mutual Assured Destruction (MAD). Strategically, SDI was meant to counter the Soviet threat and give the U.S. a way to deter nuclear war by defense rather than offense. Trump's rationale is couched in similarly grand terms of "peace through strength" and protecting the American people (The Iron Dome for America, 2025). Since 2002, U.S. policy limited homeland missile defense to "rogue" threats like North Korea – intentionally not threatening Russia or China's arsenals. Trump's 2025 executive order explicitly breaks from that posture, declaring the U.S. will "defend…against any foreign aerial attack," even large nuclear powers, and will "progressively defend against a countervalue attack by nuclear adversaries" (Trump's Misguided "Golden Dome" Gambit, 2025). This marks a return to the expansive goal of SDI, defending against the full spectrum of nuclear threats, not just a small accidental or third-party launch. One strategic goal Trump emphasizes is securing America's second-strike capability. Paradoxically, traditional nuclear deterrence relies on retaliatory second-strike forces being survivable without defenses (e.g. hidden submarines). Trump's argument is that a missile shield will ensure the U.S. can absorb an attack and still retaliate, thus deterring enemy strikes in the first place (Antonov, 2025). Reagan, on the other hand, at times spoke of the possibility that effective defense could enable nuclear disarmament, a notion that never materialized.

In 2025, the goal is not to eliminate offensive forces but to add a layer of protection on top of deterrence. In that sense, Trump's strategy is arguably more about *fortifying deterrence* than about superseding offensive deterrence. Still, the political message is similar, both SDI and the Iron Dome for America were touted as game-changers that would make Americans safer from nuclear devastation. In both cases, critics countered that this pursuit might actually make security more precarious by upsetting the delicate balance that prevented nuclear war.

Outcome and Sustainability

Historically, grandiose missile defense plans have a record of unfulfilled promises. Reagan's SDI, while it generated valuable research (like hit-to-kill technology), never produced an actual shield. It was eventually scaled down into more limited programs. The George H.W. Bush administration's "Global Protection Against Limited Strikes" (GPALS) and *Brilliant*

Pebbles also never came to fruition, as focus shifted to regional defenses in the 1990s (Cimbala & Korb, 2025). Trump's initiative is in some ways very similar to the SDI effort, and it faces similar hurdles: technical skepticism; astronomical costs with some experts estimating the overall cost in the hundreds of billions of dollars; and uncertain political longevity (Stone & Taylor, 2025). If Trump's homeland defense initiatives and priorities persist for multiple terms, the program could advance significantly, perhaps achieving a robust sensor layer and adding new interceptors. However, a future administration with different priorities might scale it back, much as the Obama administration cancelled some Bush-era missile defense expansions.

Optimists, including some at influential think tanks like the Heritage Foundation, argue that now is the time to pursue an "American Iron Dome" aggressively, given rising missile threats from China, Russia, North Korea and even Iran (Hathorn, 2025). They see it as a necessary investment to avoid being caught vulnerable to new weapons like hypersonics. Pessimists, including arms control advocates, label it a "misguided…gambit" that could waste resources and undermine strategic stability. They counsel strengthening traditional deterrence and arms control rather than chasing an ultimate shield. Between these poles, some experts like Michael O'Hanlon of Brookings suggest a middle path to improve missile defenses, especially against rogue-state missiles and to protect U.S. forces and allies in theaters of conflict. O'Hanlon advises against banking on an impenetrable national shield, which might prompt Russia/China to vastly expand arsenals for marginal gains in U.S. security. Additionally, O'Hanlon points out the stark reality that scaling Israel's Iron Dome to U.S. size is impractical. "Tens of thousands of defensive batteries" would be needed for full coverage, and the U.S. faces nuclear threats Israel doesn't. In essence, an "American Iron Dome" cannot be an ironclad dome in the near term; at best, it might become a stronger "iron mesh" that could reduce damage from a small attack but not erase the threat of large-scale nuclear war (O'Hanlon, 2025) (Trump's Misguided "Golden Dome" Gambit, 2025).

Trump's "Iron Dome for America" hearkens back to Reagan's Star Wars in its grand vision of technological salvation from missile threats. Both initiatives sprung from a desire to change the calculus of nuclear deterrence through defense. And in both cases, they encountered the cold realities of physics, engineering, cost, and adversaries' responses. Today's effort benefits from decades of progress and real-world missile defense experiences that Reagan lacked, we have seen Patriot and Iron Dome intercept missiles in battle and hit-to-kill interceptors can work. Yet the fundamental trade-offs and risks remain as salient as when SDI was debated (Cimbala & Korb, 2025). As one arms control analyst put it, the *"fantasy of a missile shield"* runs up against a core rule: the enemy always gets a vote (Trump's Misguided "Golden Dome" Gambit, 2025). History suggests that any attempt at an impenetrable shield spurs the enemy to build a bigger sword. Whether Trump's Golden Dome can escape that fate will depend on both technical breakthroughs and careful diplomacy to manage the reactions of other powers. The coming years will reveal if this ambitious plan yields a genuine enhancement of U.S. security or simply reprises the cycle of aspiration and reality seen in past missile defense efforts.

Leveraging Lessons Learned from Defense of Guam and SDI to Inform the Trump "Golden Dome" Missile Defense Initiative

Golden Dome should be guided by hard-earned lessons in program governance, technology pacing, architecture design, developmental approach, integration approach, and strategic signaling. A clear roadmap, phased deployment, strong systems engineering focused leadership and interagency unity will be essential to long-term credibility and effort effectiveness to deliver a capability that reflects the initial vision.

Category	Guam Lesson	SDI Lesson	Golden Dome Recommendation
Governance and Leadership	Centralizing oversight under the U.S. Army improved integration and accountability	Suffered from cross-agency turf wars and strategic drift post-Reagan	Establish a Joint Executive Program Office with a proven leader with Navy, Army, MDA, Space Force, and OSD
Systems Engineering and Integration	Struggled to integrate disparate systems (THAAD, Aegis, Patriot)	Technologies weren't matured or designed for interoperability	Prioritize scalable, open architectures, common data formats, and spiral development; mesh versus chain approach
Political and Funding Stability	Enjoyed bipartisan support due to regional threat urgency	Lost momentum due to shifting priorities and budget uncertainty	Pursue phased capability delivery and align with bipartisan strategic narratives
Technological Realism	Focused on fielding proven systems first, while prototyping advanced ones	Emphasized exotic tech (lasers, particle beams) not ready for deployment	Build around current deployable assets (SM-3/6, THAAD, Patriot, Aegis), upgrade incrementally and develop plans to fund, mature and deploy advance technologies
Strategic and Diplomatic Considerations	Supported conventional deterrence in INDOPACOM	Raised global arms race concerns; disrupted arms control	Emphasize defensive posture, ensure transparency, and engage allies diplomatically; emphasize ally co-development/operations

Table 1: Summary of Lessons Learned from Similar Previous Efforts

Recommendations and Conclusion

To ensure the Golden Dome initiative is executed with clarity, efficiency, and enduring strategic value, it is essential to begin with establishing a robust governance structure that avoids the leadership ambiguity experienced in the early years of the Defense of Guam effort. The creation of a unified joint Golden Dome program management team comprising critical players such as the MDA, SDA, Army, Navy, Space Force, NORAD/NORTHCOM, SPACECOM and STRATCOM would provide a central authority, with direct access to decision makers in the administration, responsible for program execution, budgetary synchronization, and cross-agency systems integration. This task force should be led by a strong systems engineering focused individual who will be the lead program executive for the effort. Notable examples of effective individuals who led monumental military development efforts are Bernard Schriever leading the ICBM development effort and Hyman Rickover leading the nuclear submarine development effort. LTG Leslie Groves led the monumental Manhattan Project as the overall project leader of all the project's phases, including scientific, technical and process development, construction, production, security and military intelligence of enemy activities, and general planning for use of the bomb. His leadership led the country to the successful development and testing of the first atomic bombs, which ultimately led to the end of World War II.

This leadership model should be formalized early through a presidential directive or legislation, ensuring accountability and programmatic continuity across administrations. Lt. Gen. Collins, Director of the MDA, was recently quoted as saying, "we certainly cannot do Golden Dome the way we've been doing business the last five years or so, it's not fast enough, it's not agile enough, way too risk averse. And we've got to get after all of those as we go forward." He also believes that a single agency needs to be at the helm, saying "I do believe one execution agency needs to be put in charge. I think the committee structure that we tend to approach joint efforts with is very, very difficult and doesn't quite work. Frankly, I think we need the focus to stay." Having a sole agency in charge avoids the conventional committee structure that is generally very difficult and does not work (Heckmann, 2025). The MDA Director also said, “they need the access to senior decision-makers very quickly and not tiers of hell that you have to go through when you’re going through the Pentagon to try to get a decision made”.

In terms of technological pacing, the Golden Dome program must embrace an incremental development strategy, favoring near-term deployment of mature technologies over premature reliance on futuristic or unproven concepts. Unlike SDI, which collapsed under the weight of its own technical overreach, Golden Dome should first prioritize the deployment of existing missile defense systems, such as THAAD, SM-3, SM-6, and Patriot, around high-value targets. National command centers, power grids, and coastal cities should be a primary focus, as well as defending space launch centers like Cape Canaveral Space Force Station and Vandenberg Space Force Base. The opening round of a near-peer conflict will start, and space and vital launch infrastructure must be protected from missile strikes to rapidly reconstitute warfighting and intelligence satellites.

Simultaneously, the Department of Defense should invest in space-based sensors, such as the Proliferated Warfighter Space Architecture (PWSA) to deliver missile warning, tracking and defense capabilities such as the Hypersonic and Ballistic Tracking Space Sensor (HBTSS) system, which was directly called out in the President’s Executive Order, to provide fire control quality hypersonic target data to weapon systems. It is critical for the Golden Dome to leverage a space-based, air, and land-based sensor network to provide birth to death detection, identification, tracking, custody, and fire control quality data of homeland missile threats. More ambitious elements like space-based interceptors and directed-energy weapons should remain medium to long-term research priorities to align with out-year deployment epochs, not critical path dependencies for initial operational capability. This balanced approach will allow the system to evolve as technology matures while still providing credible deterrent value in the near term.

This approach is in alignment with recent remarks Lt. Gen. Collins made regarding pacing of introduction of advanced technology into Golden Dome, where over the next five years he expects to see “demonstrating and burning down a lot of risk and increasing tech maturity on a lot of these new concepts,” such as space-based interceptors, directed energy and non-kinetic systems (Heckmann, 2025).

To protect the program from political volatility and funding instability, it is critical to anchor Golden Dome within a multi-year, bipartisan legislative framework. This includes incorporating it into the Future Years Defense Program (FYDP) with clearly defined capability milestones to demonstrate early returns on investment. By framing the initiative as a resilience-building system, capable of blunting missile threats, the program can maintain broader political and public support. Avoiding claims of invulnerability or dominance is essential to prevent the credibility issues that plagued SDI. Additionally, economic sustainability can be bolstered by emphasizing dual-use applications, such as using homeland defense sensors and interceptors to protect against conventional threats like cruise missiles, drones, or terrorist attacks.

Given the far-reaching implications of a homeland missile defense shield, the United States must engage proactively with international stakeholders, including treaty partners, allies, adversaries, and arms control institutions. The Golden Dome should be consistently characterized as a defensive system, one that does not seek to undermine the strategic nuclear balance or provide a first-strike advantage. Policymakers should anticipate pushback from Russia and China and be prepared to present confidence-building measures to mitigate arms race dynamics, including data transparency, site visits, or public declarations of system limitations. This will be crucial to preserving the United States' credibility in forums like the UN, as well as under the principles of the Outer Space Treaty and past norms shaped by the ABM Treaty, even if no longer legally binding. Additionally, partners can be encouraged to cost share on systems that provide global capabilities, such as space-based interceptors and PWSA.

The Department of Defense should leverage lessons learned from the Defense of Guam effort as a prototype for the Golden Dome effort. Guam's integrated, 360-degree, multi-layered defense architecture provides valuable operational and technical lessons learned, particularly in the orchestration of disparate systems, the fusion of data from multiple radars, and the management of complex command and control networks like IBCS and C2BMC. Gen. Michael Guetlein, Vice Chief of Space Operations, said during the McAleese and Associates Defense Programs Conference in March, that many pieces of the Golden Dome puzzle already exist. “They’re just not connected today,” which is where the magic of the current initiative lies, he said: the ability to connect them that did not exist in the Reagan era. This is an organizational challenge, not a technology challenge (Heckmann, 2025).

Testing Golden Dome concepts at key infrastructure sites or U.S. territories, modeled on the Guam architecture, would offer proof-of-concept validation and reduce the risk of rolling out an untested national-scale defense. This would posture the Golden Dome effort to avoid spending billions and not having a viable and cohesive end-product reflective of the initial vision, such as what happened with Reagan’s SDI. The challenges of radar siting, interceptor magazine capacity, and saturation response encountered in Guam should directly inform homeland defense designs, making the Golden Dome not just visionary, but technically grounded.

The Golden Dome initiative should be built not merely as a defense system, but as a strategically balanced, technologically phased, diplomatically aware, and operationally proven architecture. Drawing deeply from the hard-won insights of Guam’s defensive modernization and the cautionary lessons of SDI, the Trump administration, and successors, can steer this effort away from the pitfalls of over-reach and move toward a credible, layered Golden Dome that enhances deterrence while maintaining stability and increases the likelihood of success.

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