# Supplementary Materials: Competing Theater Strategies of Additive Complexity in the Iran War

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# 1 The Evolution of JADO Theater Strategies

In the Gulf War of 1991, the United States deployed a new doctrine for warfighting in large-scale combat operations (LSCO) known as parallel effects-based operations[1]. Figure 1 (TOP) depicts the prior conceptualization of warfare, which was a series of destruction-based tasks. A specific kind of target, such as air defenses, would be targeted until completely destroyed. Then the next target list – command and control would be targeted until destroyed [1, p. 21].

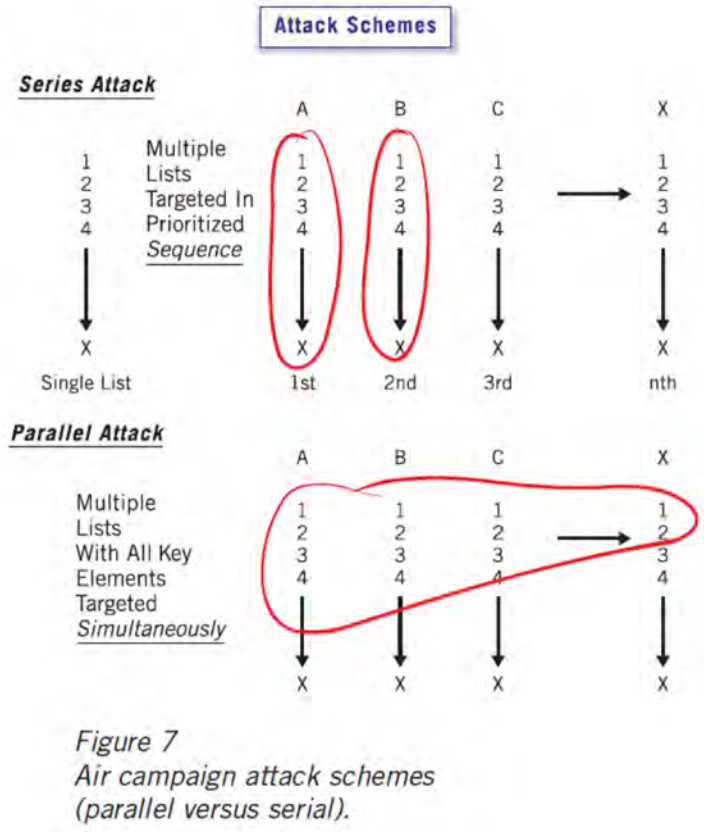



Figure 1: Contrasting pre-Gulf War Series Attack Schemes (TOP) with Parallel Effects Based Operations (EBO) (Bottom) Source: Deptula 2001

In the Gulf War, superior US airpower and precision munitions enabled parallel effects-based attack schemes as shown in Figure 1 (BOTTOM). Instead of attacking target lists sequentially, they would be attacked in parallel. And instead of requiring the complete destruction of a target list, an 'effects-based' outcome was sufficient. If a bomb failed to fully destroy a command center, but required the evacuation of command personnel, the 'effect' was achieved[1, p. 14]. This doctrine of parallel EBO was used to great success in the Kosovo Intervention of 1999 as well as the shock and awe phase of the invasion of Iraq in 2003. Parallel EBO also recognized a flaw in the approach of these campaigns – the massing of US forces outside the battlespace in a regional theater of operations, realizing future adversaries may "capitalize on the massing of forces and associated build-up time required by US…for conducting major theater war (MTW) to deny US access" even predicting that anti-access theater strategies became more effective as

“delivery systems such as accurate ballistic missiles…proliferate among potentially hostile states[1, p. 25].”

And strategic adversaries such as Iran were taking note. Understanding the clear dominance of parallel EBO and realizing they couldn’t compete at parity in an air war, Iran began developing “largely defensive and flexible military doctrine known as a mosaic defense (defa e mozaik)[2]”. Over time, this would evolve into a concept of mosaic warfare. Iran sought to decentralize its military capabilities in case of decapitation of command and control (C2) while promoting local commanders to take advantage of multi-domain (air, sea, land) and their proxy forces even while “responding to an attack through retaliatory actions that inflict pain on the adversary” through combinations of rocket, missile, and drone barrages; cyber-attacks; and terrorism to dissuade them from aggression or to deescalate quickly[3, pp. 19–21].

By 2017[4], thought pieces recognized that future adversaries would not fight as Iraq and Yugoslavia had, beginning to advance US doctrine from parallel EBO to joint all-domain operations (JADO). The first JADO exercises were held by the Department of Defense in 2019 and 2020[5, p. 2]. JADO is described as a multi-domain and multi-layer doctrine (MDML). JADO envisions all the domains of battlespace air, sea, land, space, and cyber[6] integrated across three layers. First, a sensing layer of intelligence, surveillance, reconnaissance, and analysis (ISR) “to understand the enemy”, subsumed into a command-and-control layer that directs an “effects layer, which includes kinetic, non-kinetic, and information operations.[7]”

The multi-layer approach is a current framework of a concept developed in the 1960’s of observation-orientation-decision-action loops (OODA Loop)[8],[9]. Pioneered in dogfighting, OODA loops might originally be measured in seconds between two individual pilots' reflexes and the performance characteristics of their planes. But as technology has advanced and JADO capabilities proliferated, OODA loops now consist of vast arrays of ground, air, maritime, and space-based sensors that can direct strikes and counterstrikes from any of these domains. OODA loops can also be broken into offensive loops, such as air combat between planes, and defensive loops, such as the ability of a Patriot missile battery to detect and intercept an incoming ballistic missile. As the concept has grown, the acronym has become more complex. It is now colloquially referred to as Find, Fix, Track, Target, Engage, and Assess (F2T2EA). Still, these are just variations on OODA loops.

And the OODA loops were spreading over larger areas with more dispersed forces. Increasing proliferation of barrage capabilities targeting massed and massing concentrations of US forces gave form to the threat Deputal had warned would undermine parallel EBO. Iranian mosaic warfare was always conceived as a dispersed operation. But both the US Air Force and Navy adopted similar doctrines to address the risk. Both Agile Combat Employment (ACE)[10] for the US Air Force and Distributed Maritime Operations (DMO) for the Navy[11] are doctrines calling for dispersal of forces away from clustered targets the enemy could strike, emphasizing network coordination and maneuver to bring together capabilities across a theater. Rather than massing air power at large air bases, Blue forces would be split between naval carrier strike groups, many regional air installations, and, in some cases, the ability to fly B-52 bombers from hemispheric locations and B-2 bombers from the other side of the globe.

Theater operations were growing larger and more complex. Whereas OODA loop interactions of past conventional conflicts such as the Gulf War (1991), Kosovo Intervention (1999), and Iraqi Invasion (2003) had dozens or hundreds of aircraft trading missile fire or conducting missions in a theater the size of a country, now the battlespace is crowded with thousands of entities interacting dynamically and simultaneously over a battlespace the size of a region. Parsimoniously depicted in concept Figure 2 below [5, p. 1].

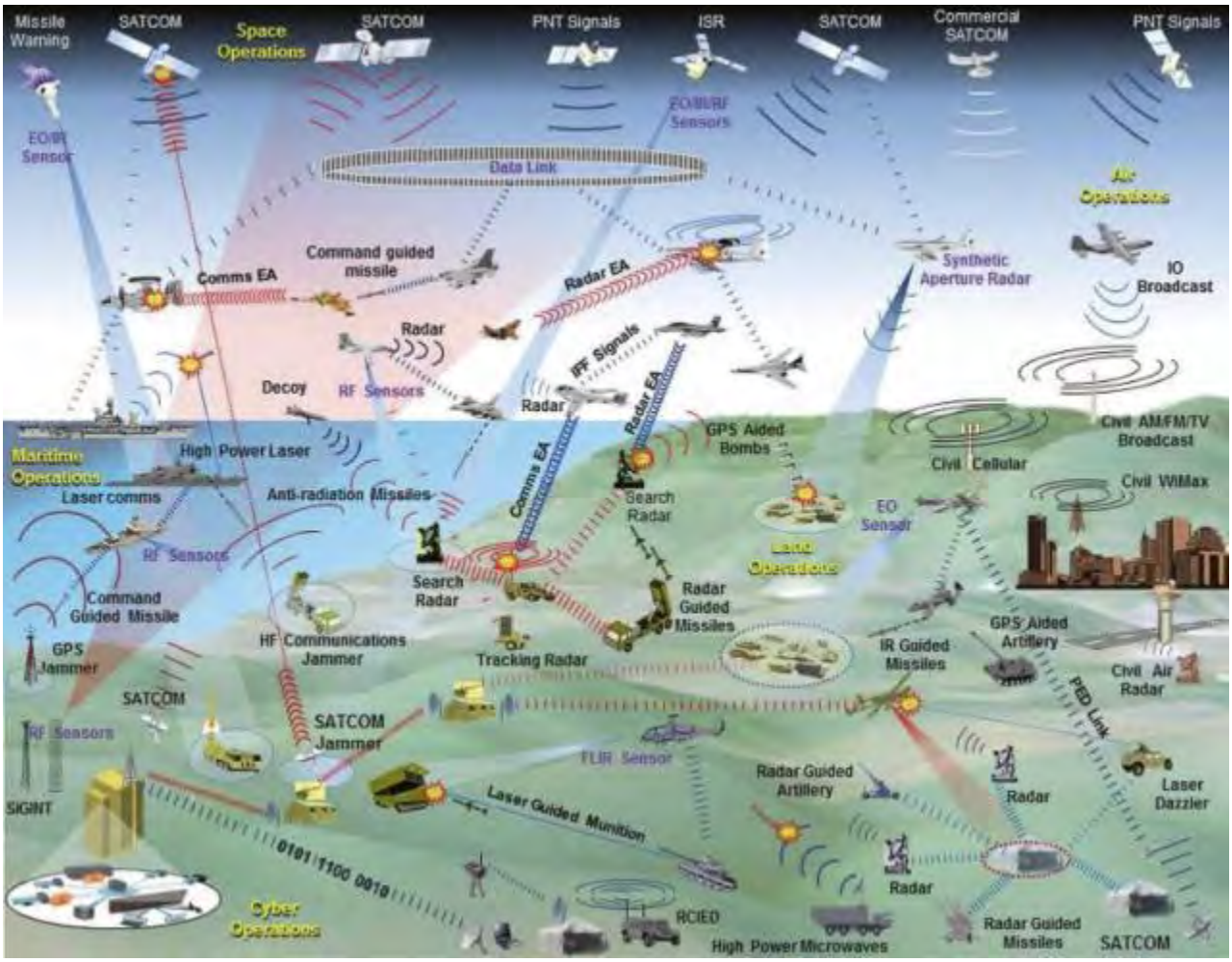


Figure 2: Depiction of Joint All-Domain Operations (JADO) Concept

The image in Figure 2 is busy and static at the same time. But focusing on the details, what emerges is an overlapping series of offensive and defensive OODA loops, frozen at a moment in time like a frame in a film. This is what lends understanding of JADO through system dynamics. CLDs explicitly model the feedback loops and their dynamic behavior over time with a good understanding of the interaction of positive and negative feedback loops. While a system dynamics computer simulation built from the CLD, leveraging calculus, can 'advance the frame' of the static image as integrations of these interacting feedback over time. A computer

simulation can also use the standard of so-called DIME-PMESII, which stands for the diplomatic, information, military, and economic inputs creating political, military, economic, social, information, and infrastructure outputs[12]. Offensive and defensive OODA loops represent the military inputs and outputs. Still, they can then be connected to other factors in DIME-PMESII to model regional-scale operations at the scale necessary for JADO.

The competing theater strategies of mosaic warfare and ACE/DMO are both variations of additive complexity within the JADO context. An approach to warfare built on an understanding of conflict as complex systems:

> "additive complexity involves a series of actions targeting an actor, each of which requires a certain amount of organizational complexity (e.g., resources, managerial decision making, personnel) to respond to…a threshold effect is reached when the gradual incremental accumulations create a condition where the next additive complexity cannot be handled as well as the previous. This creates a loss of capability which then creates a feedback effect, further reducing available complexity to handle the next incremental addition by a larger gap. This feedback effect can compound rapidly and, in theory, leads to a cascade of failures across the actor targeted. While outright collapse might not be a result, as non-critical functions are abandoned to focus on critical functions – additive complexity can seriously impair responses[13]."

These two theater strategies are competing in the current war. The Blue JADO theater strategy leverages network superiority to coordinate hundreds of offensive OODA loop operations to simultaneously achieve air superiority over the Red force, decapitate the Iranian regime, and begin attacking military units; governmental targets; and infrastructure to collapse the regime under additive complexity. The Red mosaic warfare theater strategy seeks to absorb Blue offensive actions with dispersed and disaggregated autonomous units operating without C2 and conducting retaliatory strikes to overwhelm Blue network capabilities to sense, prioritize, and direct responses, while exhausting countermeasures and achieving enough direct strikes against assets and implied threats against the Strait of Hormuz. Paraphrased, Blue's theater strategy is to employ additive complexity to collapse Red, while Red's theater strategy is to diffuse Blue by defending so many targets that it cannot sustain the attack on Iran while defending regional assets, leading to regional and global pressure to negotiate a ceasefire and end the conflict.

# *2 The Road to War June 24, 2025 – February 28th, 2026*

The forty-year history of conflict between the United States and Iran is well documented elsewhere. But to understand how the two competing theater strategies of additive complexity came into recent conflict, we can arbitrarily pick the conclusion of the 12-Day War on June 24th, 2026. Israel had spent much of the conflict eliminating Iranian air defense capabilities. At the same time, Iran used limited retaliatory fires, largely symbolic while trying to absorb attacks. By the 24th, Israel had achieved air superiority over Iran, and in partnership with the United States effectively destroyed nuclear enrichment programs, and demonstrated credible threats by conducting limited strikes against internal security institutions versus actually trying to topple the regime, leading to a cease fire[31].

## 2.1 24 JUN 2025 through 11 JAN 2026 - Iranian Uprisings

The aftermath of the 12-Day War led to a breakdown in nuclear weapon disarmament and implementation of 'snapback provisions' of the Joint Comprehensive Plan of Action (JCPOA) on October 18th, 2025. This returned sanctions to extremely strict levels and immediately impacted Iran's economy, leading to rising prices and the unavailability of many goods. As a consequence of the deteriorating economic conditions under JCPOA snapback[32], domestic protests began in late December of 2025. Originally targeted at the expense and difficulty of sustaining daily living conditions, they rapidly took on an anti-government posture. By January had escalated into the most serious threat the Iranian regime had faced in decades, with an estimated 7-10 million Iranians protesting. This activated the dictator's dilemma, and Supreme Leader Khamenei ordered a crackdown which took place 8-9 JAN with death tolls conservatively estimated at between 3,000-5,000. Some estimates go as high as 30,000[33].

During the crackdown, President Trump threatened military intervention against Iran, even publicly announcing "help is on the way" on the Monday the 11th of January 2026. However, a map annotated by the author, depicted in Figure 3, indicates that no US Navy carrier groups are operating in the region, instead deployed to the South China Sea and into the Caribbean[34].

Figure 3: Missed Window

The US military projects both offensive and defensive OODA loops in expeditions through its US Naval carrier groups. These carrier groups have the striking power of mid-sized countries. Nuclear-powered carriers, with their several dozen accompanying aircraft, are the most well-known. Each carrier group is also escorted by a dozen or more vessels with many destroyers and

cruisers specializing in both ballistic missile fires (offensive OODA loops) and anti-missile interception (defensive OODA loops)[35]

## 2.2 12 JAN – 16 FEB 2026 Positioning US Forces for Intervention

As annotated by the author on the map, any seriously contemplated action against Iran to overthrow the regime in support of uprisings would need both dynamic providers of offensive and defensive OODA loops in position. The offensive OODA loop region consists largely of the territory of Iran itself. It requires a carrier group in either the Persian Gulf or Gulf of Oman. Such a position would also allow that carrier group to provide partial defensive OODA loop coverage to the region, which encompasses the Gulf Cooperation Council (GCC) states of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates, as well as shipping in the Gulf and the Strait of Hormuz. But a carrier group positioned in the eastern Mediterranean or Red Sea is necessary to provide remaining defensive OODA loop coverage to US allies in Israel and Jordan, and to attempt to secure the Strait of Bab-el-Mandeb.

But carrier groups take longer to deploy than a flight of B-2s. It wasn't until the 26th of January 2026 that the USS Abraham Lincoln carrier strike group (CSG) arrived in position to provide offensive OODA loops and partial defensive OODA loop coverage as shown in Figure 4 (A). Still missing was dynamic provision of offensive and defensive OODA loops capable of covering Israel and Jordan.

Figure 4 depicts three snapshots of US forces moving into position using annotated USNI maps showing the US Carrier Strike Groups Abraham Lincoln and Ford and other assets converge on the Middle East, providing both offensive and defensive OODA loops in the region [36], [37], [38].

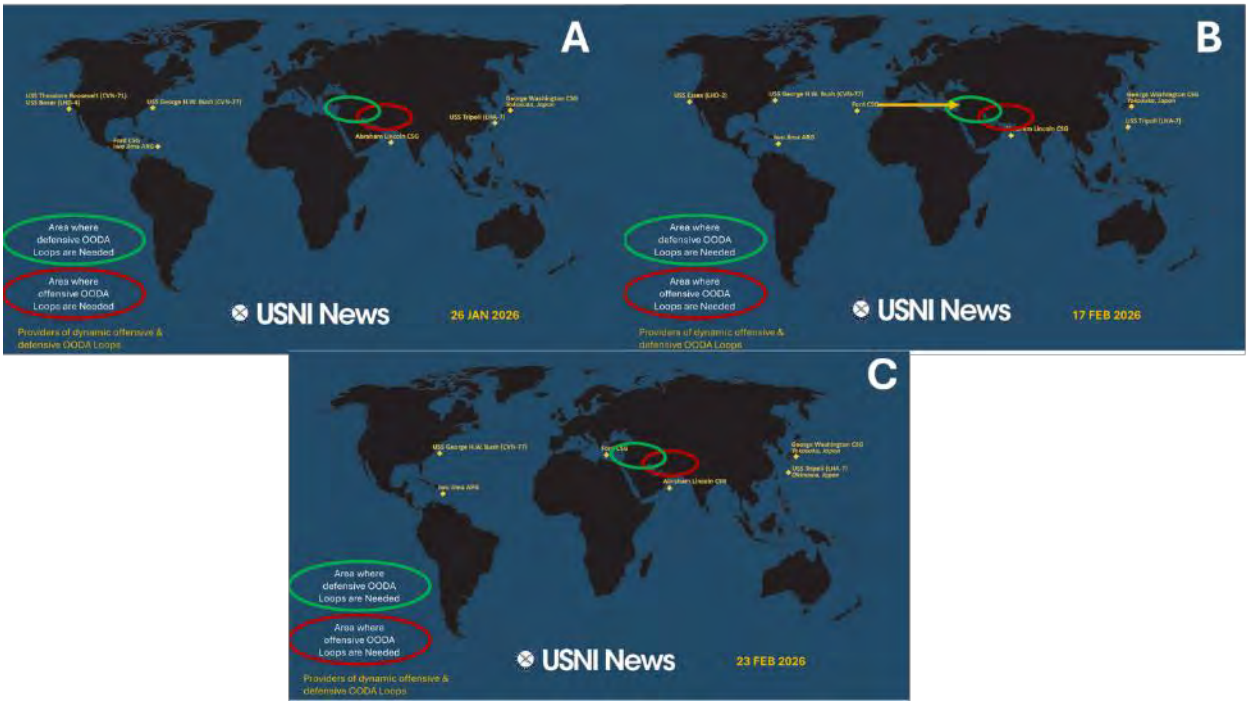


Figure 4: Progression of US CSG Abraham Lincoln and Ford into position (A) 26 JAN; (B) 17 FEB; (C) 23 FEB.

Although the failure to provide any meaningful intervention or support at the time of the crackdown ended any hope of protests or uprisings continuing, the deaths did set in place a timing mechanism known as "arba'in" or "chehellom". This is a Shia mourning ritual where the bereaved visit the graves 40 days after the death of a martyr. During the Iranian revolution, the Supreme Ayatollah Khomeini used chehellom as a timing mechanism to bypass censorship and media blackouts. Even if radio, television, and newspapers were limited – as long as protestors had a calendar they knew to come out again on the 40th day, and this created renewal mechanisms for protests that ultimately helped topple the Shah of Iran. As most were killed on 8-9 JAN, the Chehellom period would end on 17-18 FEB. And renewed protests in February might create renewed instability for the regime and opportunity for President Trump[39].

## 2.3 17-20 FEB Iranian Protests Return after Chehellom Mourning Period

On 16th January, the author noted that the chehellolm window for the massacres involved in the uprising crackdown would occur sometime between the 17th and 20th of February[39]. And the timing proved correct with fresh protests breaking out in parallel with the mourning rituals[40].

At this time, President Trump had ordered the US Navy CSG Ford to the Mediterranean, depicted in the annotated map in Figure 4 17 FEB 2026 [37]. The CSG Ford is widely considered the strongest strike group in the US Navy, with an advanced nuclear power aircraft carrier accompanied by

### 2.4 23 FEB 2026 – USCG Ford Arrives in Mediterranean

By February 23rd, the USCG Ford had entered the Mediterranean and was proceeding directly east to the combat theater. The USCG Ford arrived in position west of Israel in the eastern Mediterranean as depicted in Figure 4, and the war began a few days later on 28 FEB.

# *3 Preserved Models & Forecasts*

These posts preserve major points of the development of this analysis, beginning with the outbreak of hostilities on 28 FEB; the first presentation of model, phases, and forecasts on 1 MAR, updating to include the new revised objectives on 4 MAR, the sharing of the dynamic hypotheses built on the 1 MAR forecasts on 5 MAR. The screenshots only capture relevant details and time-date stamps (many posts were 2,000 words or longer). Other posts explaining technical aspects of the conflict (e.g. the 'ordnance problem') are not included as they did not relate to the model or forecasts. All posts are preserved online and publicly available both on Facebook (initial posting) and the author's Blog (archived).

### 3.1 February 28th, 2026 – 1:58am EST Initial Analysis & Historical Context

The first analysis was posted at 1:58am EST on February 28th on the author's personal Facebook page. As the war had just begun and information was limited, the analysis concerned historical context leading to the conflict (captured above). In the early minutes, two scenarios were also presented based on whether this was a limited strike by the US and Israel, and whether Iran would, in return, limit its retaliation to a performative rite of agitation or begin a full-scale retaliation. Very quickly it was confirmed that Iran was retaliating at scale, and the post was updated to reflect this. The post also summarizes past research and existing models on the difficulties of regime change. The post is preserved on the author's blog, which includes a link to the original Facebook post[41], as shown in Figure 5.

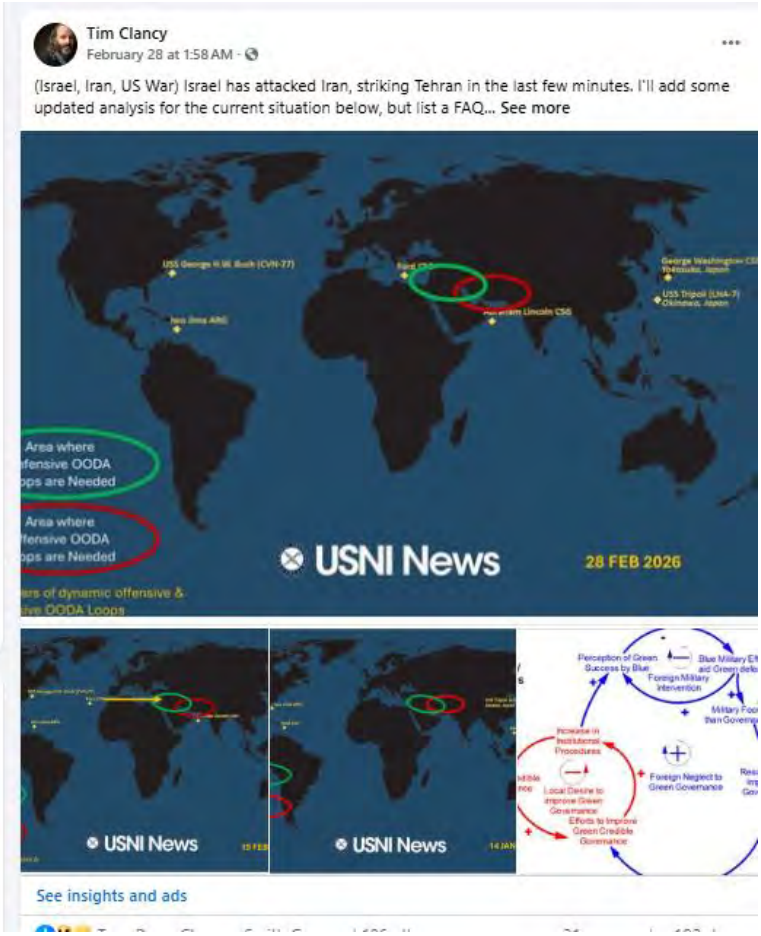



Figure 5: Initial Analysis & Historical Context with no New Model, Phases, or Forecasts as of 2/28/2026 1:58am EST

## 3.2 March 1st, 2026 – 6:49pm First Model, Phases & Forecasts

The second analysis was posted at 6:49pm EST on March 1st, 2028, on the author's personal Facebook page. This post included the JADO v. mosaic warfare paradigm model and the five forecasts and their probability. Although the text of the five objectives was revised for clarity and to reflect the updated strategic objectives from the March 2nd press releases, they remained substantively the same with the same probability. The post is preserved both on the author's blog, which preserves a link to the original Facebook post[42], and is displayed in Figure 6, Figure 7, and Figure 8 below.

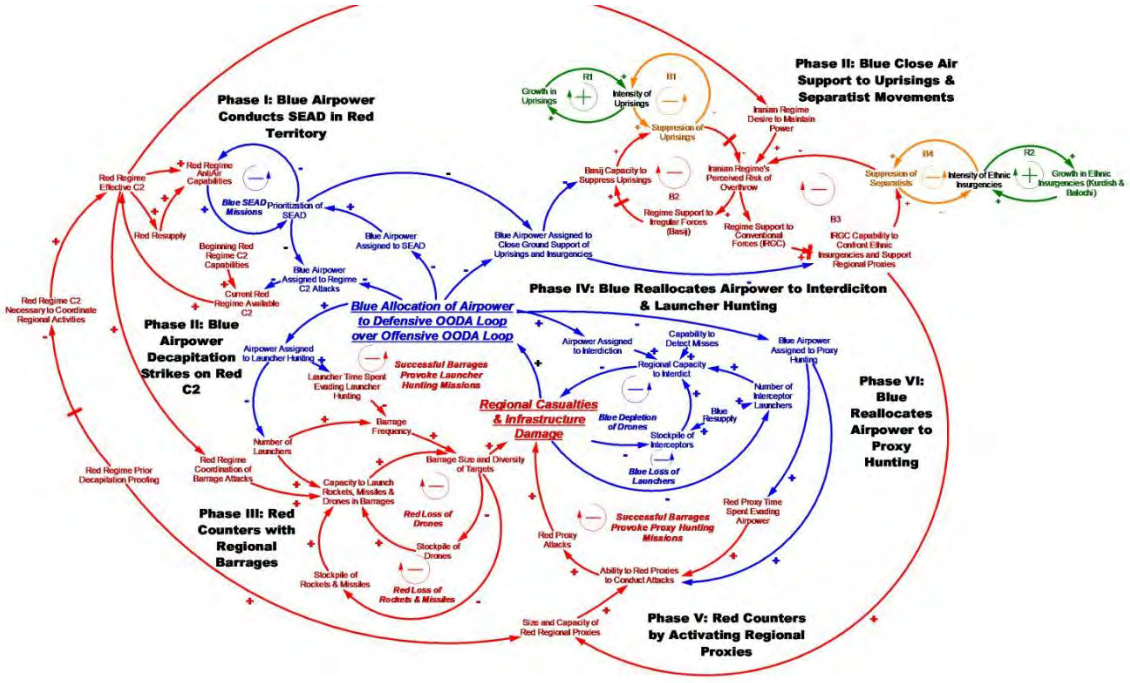



Figure 6: Initial CLD Phases I-VI as of 3/1/2026 at 6:49pm EST

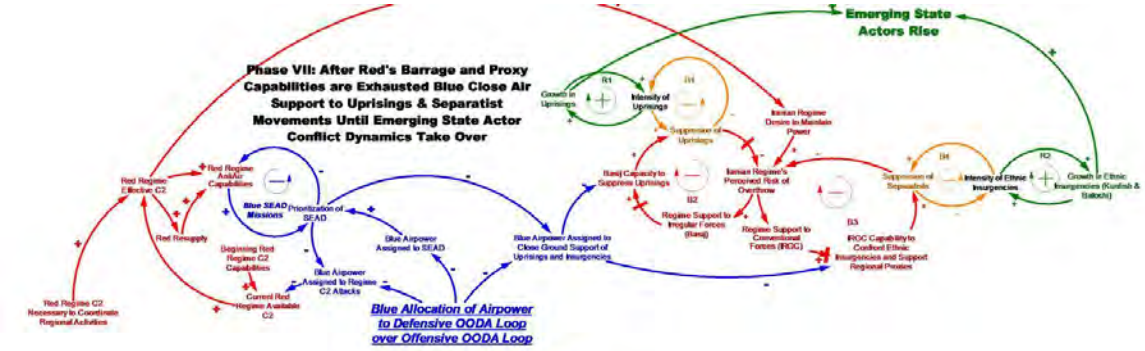



Figure 7: Initial CLD Phase VII as of 3/1/2026 at 6:49pm EST

1) A complete collapse of the regime under Phase VII attacks or even earlier decapitation strikes or calls for 'surrender' of the IRGC. This would be only a partial win condition for the US as the creation of a large power vacuum, with no clear armed (or unarmed) successor groups capable of filling it. I find this very unlikely for reasons discussed above. Iran is a government of institutions, rather than individuals, and probably has more staying power and experience operating in disaggregated fashion, and has prepared for this, than Trump anticipates.

2) Iran counter-punches exceed regional and US/Israeli domestic appetite for another forever war and pressure on the Blue Forces (US and Israel) to disengage with the Iranian regime intact. This is a clear win condition for the Iranian regime. I don't think its probable because neither President Trump nor Prime Minister Netanyahu strike me as willingly taking the L when they can use their militaries in defiance of regional, and even global, condemnation if such arises.

3) The US and Israel coalition exhausts Iranian counter-punches and succeed in sparking popular uprisings and ethnic insurgencies. These result in emerging-state actor dynamics that topple, or at least tangle, the Iranian regime significantly reducing its power and projection capability for years to come. What plays out looks like the Syrian Civil War, lasting for years or more of conflict before a final resolution. If Iran cannot maintain it's counter-punch and the US and Israel are determined to keep striking until uprisings or insurgencies occur, this is a probable if grim, scenario.

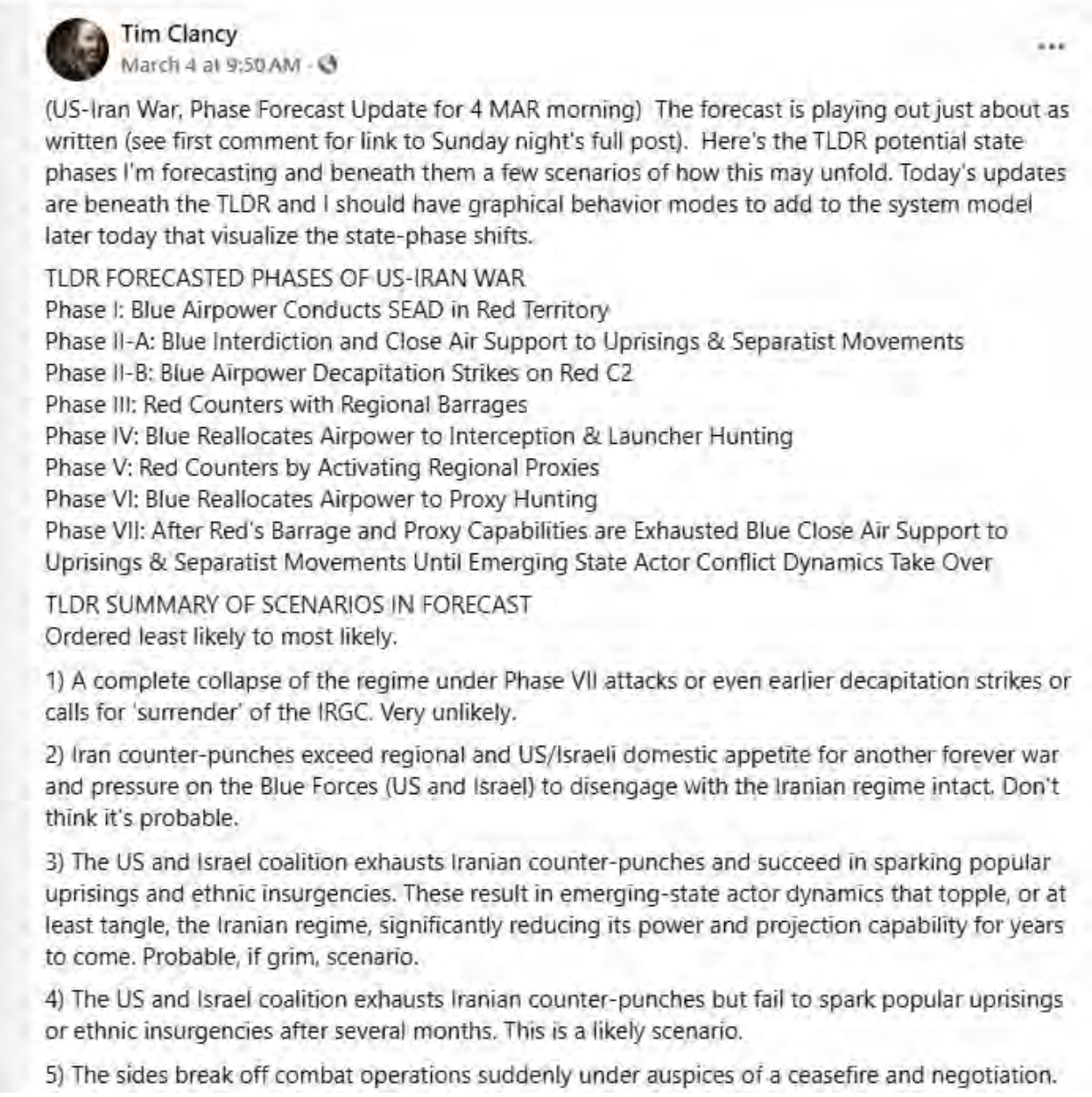
4) The US and Israel coalition exhausts Iranian counter-punches but fail to spark popular uprisings or ethnic insurgencies after several months. This is the most likely scenario. Iran has regularly killed off thousands of organizers and leaders who would be needed to launch a protest, the most recent just several months ago. Without offering ground support, or even arms shipment, Trump's call for "YOLO!" is going to be hard to generate sustained enthusiasm for. Both sides take a partial win condition. For the US and Israel, they will have set Iran back years. For Iran, the regime survives. Israel gets a head of sovereign state notch on their 'killed abroad' list. Trump gets to claim he 'beat' Iran, even if conditions don't change for the regime and it looks more like Venezuela than anything else.

5) The sides break off combat operations suddenly under auspices of a ceasefire and negotiation. This is the most likely scenario, but only after the end of this week. Iran cannot let the death of the Grand Ayatollah go unpunished and neither President Trump nor Netanyahu can look 'soft' for having risked so much. However, this is exactly how the 12-Day War ended. Face-saving combat on both sides waning rapidly to a ceasefire and a period of negotiations. I'm not the only one capable of doing analyses like these and there's very few win conditions available to either side without a long heavy drawn-out slog...so it may just be better to invent new win conditions and negotiate for those.

Figure 8: Initial Paradigm Model & 5 Forecasts as of 3/1/2026 6:49pm EST

## 3.3 March 4th, 2026 – 9:50am Summarized Forecasts & Inclusion of Revised US Objectives

The third analysis was posted at 9:50am EST on March 4th, 2026, on the author's personal Facebook page. In this post, the longer forecasts of March 1st were summarized for clarity. The wording of Scenario 3 changed to reflect statements by the Secretary of Defense, Secretary of State, and President on more limited objectives of reducing barrage capability rather than regime change in press briefings from March 2nd. The post is preserved both on the author's blog, which preserves a link to the original Facebook post[43], and is displayed in Figure 9 below.



Tim Clancy
March 4 at 9:50 AM

(US-Iran War, Phase Forecast Update for 4 MAR morning) The forecast is playing out just about as written (see first comment for link to Sunday night's full post). Here's the TLDR potential state phases I'm forecasting and beneath them a few scenarios of how this may unfold. Today's updates are beneath the TLDR and I should have graphical behavior modes to add to the system model later today that visualize the state-phase shifts.

TLDR FORECASTED PHASES OF US-IRAN WAR
Phase I: Blue Airpower Conducts SEAD in Red Territory
Phase II-A: Blue Interdiction and Close Air Support to Uprisings & Separatist Movements
Phase II-B: Blue Airpower Decapitation Strikes on Red C2
Phase III: Red Counters with Regional Barrages
Phase IV: Blue Reallocates Airpower to Interception & Launcher Hunting
Phase V: Red Counters by Activating Regional Proxies
Phase VI: Blue Reallocates Airpower to Proxy Hunting
Phase VII: After Red's Barrage and Proxy Capabilities are Exhausted Blue Close Air Support to Uprisings & Separatist Movements Until Emerging State Actor Conflict Dynamics Take Over

TLDR SUMMARY OF SCENARIOS IN FORECAST
Ordered least likely to most likely.

1) A complete collapse of the regime under Phase VII attacks or even earlier decapitation strikes or calls for 'surrender' of the IRGC. Very unlikely.

2) Iran counter-punches exceed regional and US/Israeli domestic appetite for another forever war and pressure on the Blue Forces (US and Israel) to disengage with the Iranian regime intact. Don't think it's probable.

3) The US and Israel coalition exhausts Iranian counter-punches and succeed in sparking popular uprisings and ethnic insurgencies. These result in emerging-state actor dynamics that topple, or at least tangle, the Iranian regime, significantly reducing its power and projection capability for years to come. Probable, if grim, scenario.

4) The US and Israel coalition exhausts Iranian counter-punches but fail to spark popular uprisings or ethnic insurgencies after several months. This is a likely scenario.

5) The sides break off combat operations suddenly under auspices of a ceasefire and negotiation.

Figure 9: Updated Text of 5 Forecasts 3/4/2026 9:50am EST

## 3.4 March 5th, 2026 – 5:02pm EST Dynamic Hypotheses on 1 MAR Forecasts

The dynamic hypotheses were shared at 5:02pm on March 5th, 2026, on the author's personal Facebook page. These depicted the eight reference modes for four of the five scenarios originally posted on March 1st and their updates. (A dynamic hypothesis for Scenario #4 was never shared as the author had previously published this under earlier research and pointed to that [44], [45].) The post is preserved both on the author's blog, which preserves a link to the original Facebook post [46], and displayed in Figure 10 and Figure 11 below.

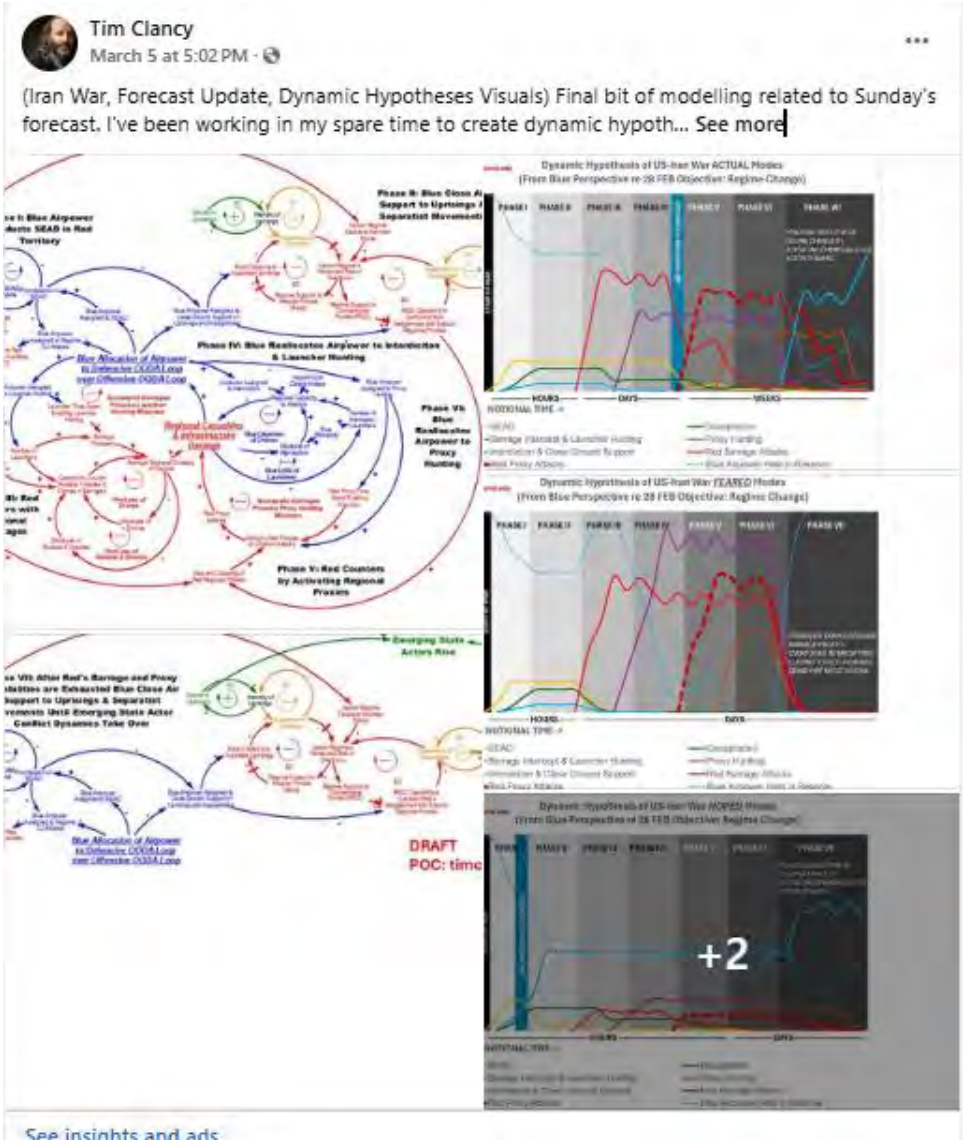
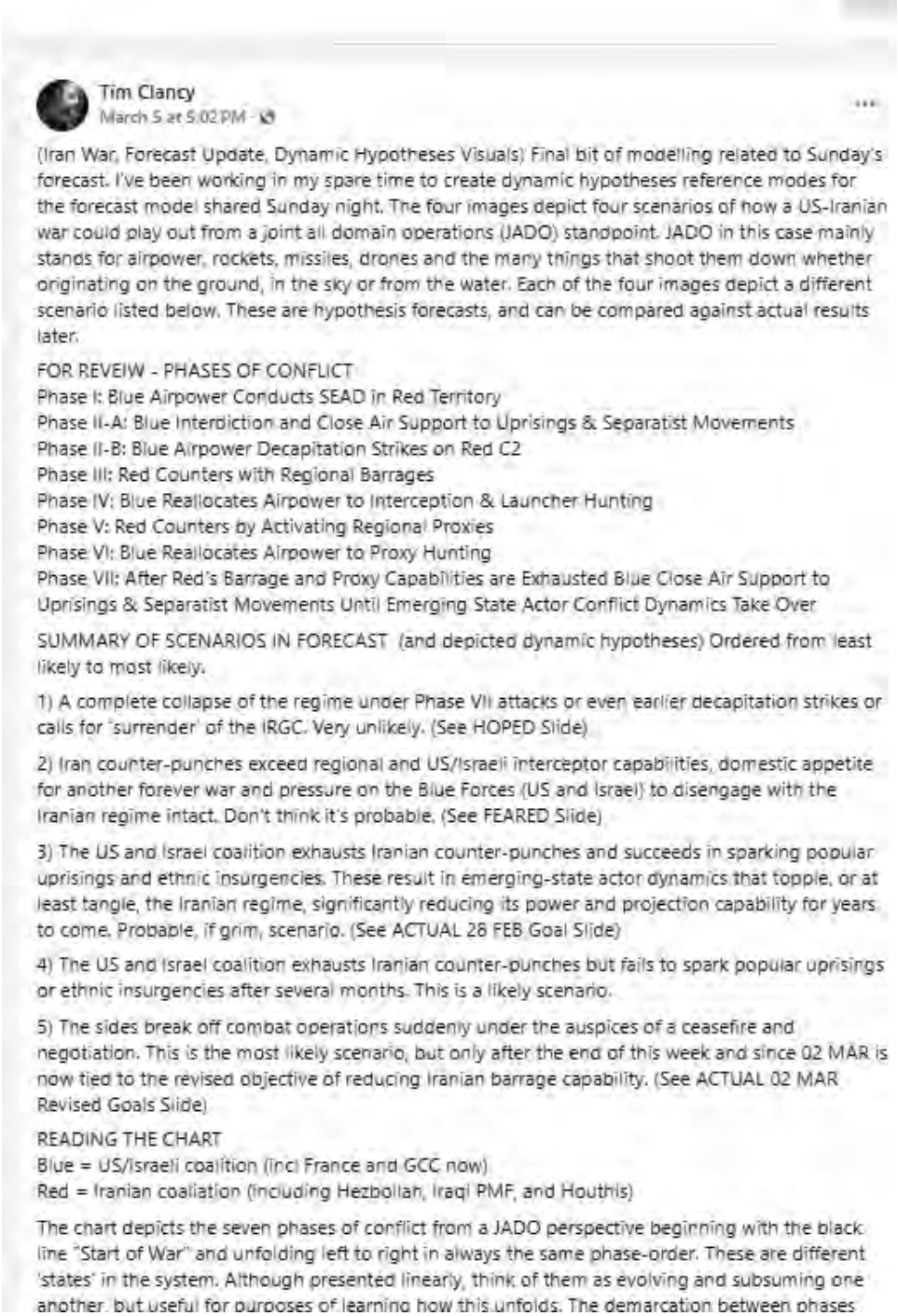



Figure 10: Dynamic Hypotheses of 1 MAR Forecasts



Tim Clancy
March 5 at 5:02 PM

(Iran War, Forecast Update, Dynamic Hypotheses Visuals) Final bit of modelling related to Sunday's forecast. I've been working in my spare time to create dynamic hypotheses reference modes for the forecast model shared Sunday night. The four images depict four scenarios of how a US-Iranian war could play out from a joint all domain operations (JADO) standpoint. JADO in this case mainly stands for airpower, rockets, missiles, drones and the many things that shoot them down whether originating on the ground, in the sky or from the water. Each of the four images depict a different scenario listed below. These are hypothesis forecasts, and can be compared against actual results later.

FOR REVEIW - PHASES OF CONFLICT
Phase I: Blue Airpower Conducts SEAD in Red Territory
Phase II-A: Blue Interdiction and Close Air Support to Uprisings & Separatist Movements
Phase II-B: Blue Airpower Decapitation Strikes on Red C2
Phase III: Red Counters with Regional Barrages
Phase IV: Blue Reallocates Airpower to Interception & Launcher Hunting
Phase V: Red Counters by Activating Regional Proxies
Phase VI: Blue Reallocates Airpower to Proxy Hunting
Phase VII: After Red's Barrage and Proxy Capabilities are Exhausted Blue Close Air Support to Uprisings & Separatist Movements Until Emerging State Actor Conflict Dynamics Take Over

SUMMARY OF SCENARIOS IN FORECAST (and depicted dynamic hypotheses) Ordered from least likely to most likely.

1) A complete collapse of the regime under Phase VII attacks or even earlier decapitation strikes or calls for 'surrender' of the IRGC. Very unlikely. (See HOPED Slide)

2) Iran counter-punches exceed regional and US/Israeli interceptor capabilities, domestic appetite for another forever war and pressure on the Blue Forces (US and Israel) to disengage with the Iranian regime intact. Don't think it's probable. (See FEARED Slide)

3) The US and Israel coalition exhausts Iranian counter-punches and succeeds in sparking popular uprisings and ethnic insurgencies. These result in emerging-state actor dynamics that topple, or at least tangle, the Iranian regime, significantly reducing its power and projection capability for years to come. Probable, if grim, scenario. (See ACTUAL 28 FEB Goal Slide)

4) The US and Israel coalition exhausts Iranian counter-punches but fails to spark popular uprisings or ethnic insurgencies after several months. This is a likely scenario.

5) The sides break off combat operations suddenly under the auspices of a ceasefire and negotiation. This is the most likely scenario, but only after the end of this week and since 02 MAR is now tied to the revised objective of reducing Iranian barrage capability. (See ACTUAL 02 MAR Revised Goals Slide)

READING THE CHART
Blue = US/Israeli coalition (incl France and GCC now)
Red = Iranian coaliation (including Hezbollah, Iraqi PMF, and Houthis)

The chart depicts the seven phases of conflict from a JADO perspective beginning with the black line "Start of War" and unfolding left to right in always the same phase-order. These are different 'states' in the system. Although presented linearly, think of them as evolving and subsuming one another, but useful for purposes of learning how this unfolds. The demarcation between phases

Figure 11: Post on 3/5/2026 restating five forecasts and sharing dynamic hypotheses of 4 of 5 scenarios

## 3.5 March 12th, 2026 – 3:44pm EST Ceasefire Forecast

The first ceasefire forecast was shared at 3:44pm EST on March 12th, 2026, on the author's personal Facebook page. This post estimated that the earliest ceasefire would be on April 9th, with intermittent fires gradually decreasing until the 12th of April. The actual ceasefire was on April 7th, with fires gradually decreasing until April 9th. The post is preserved both on the author's blog[47], which preserves a link to the original Facebook post, and displayed in Figure 12.

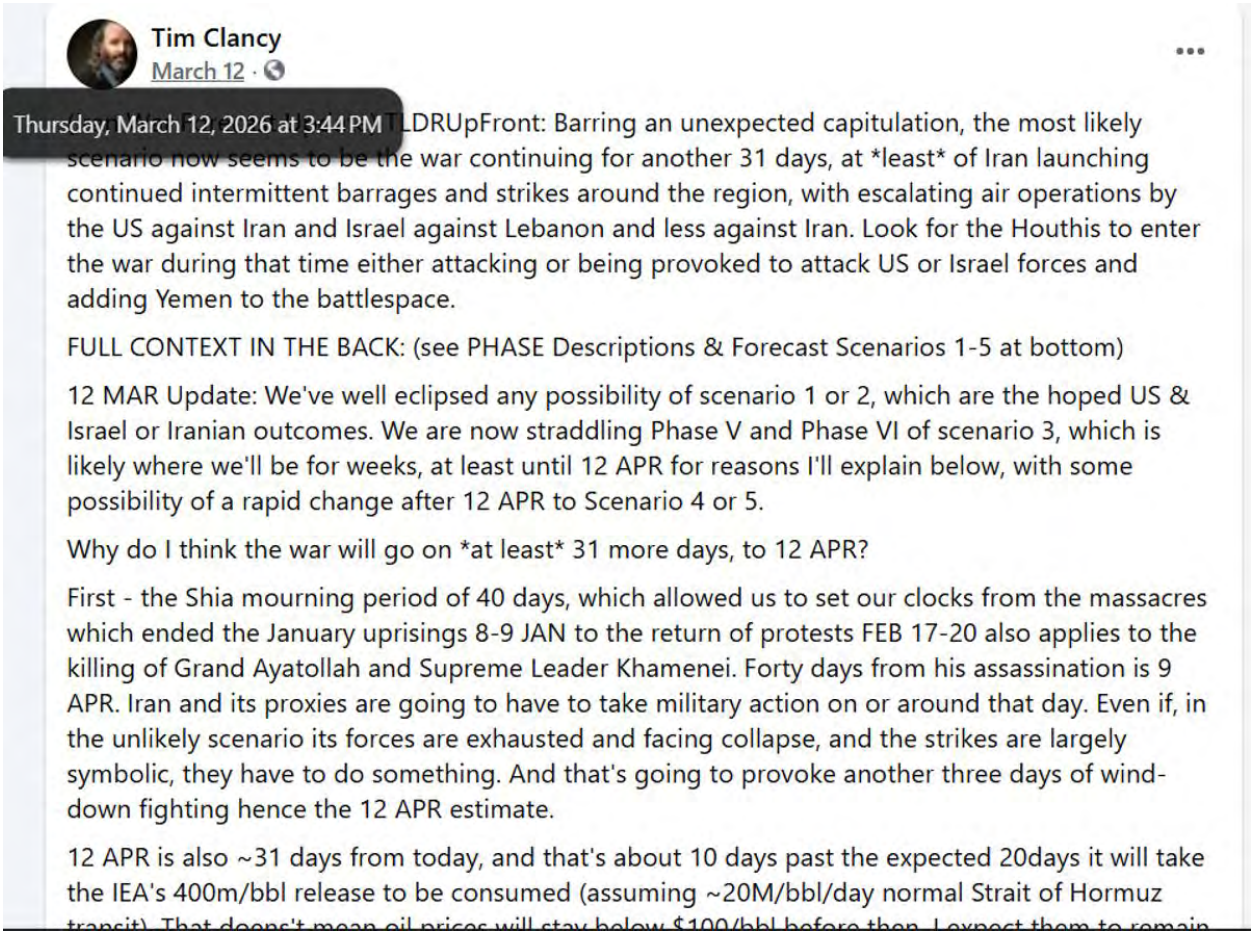



Figure 12: Original ceasefire forecast of no earlier than April 9th, 2026

## 3.6 Scenario 4– Actual by Blue Failing to Activate Resistance Rated Likely

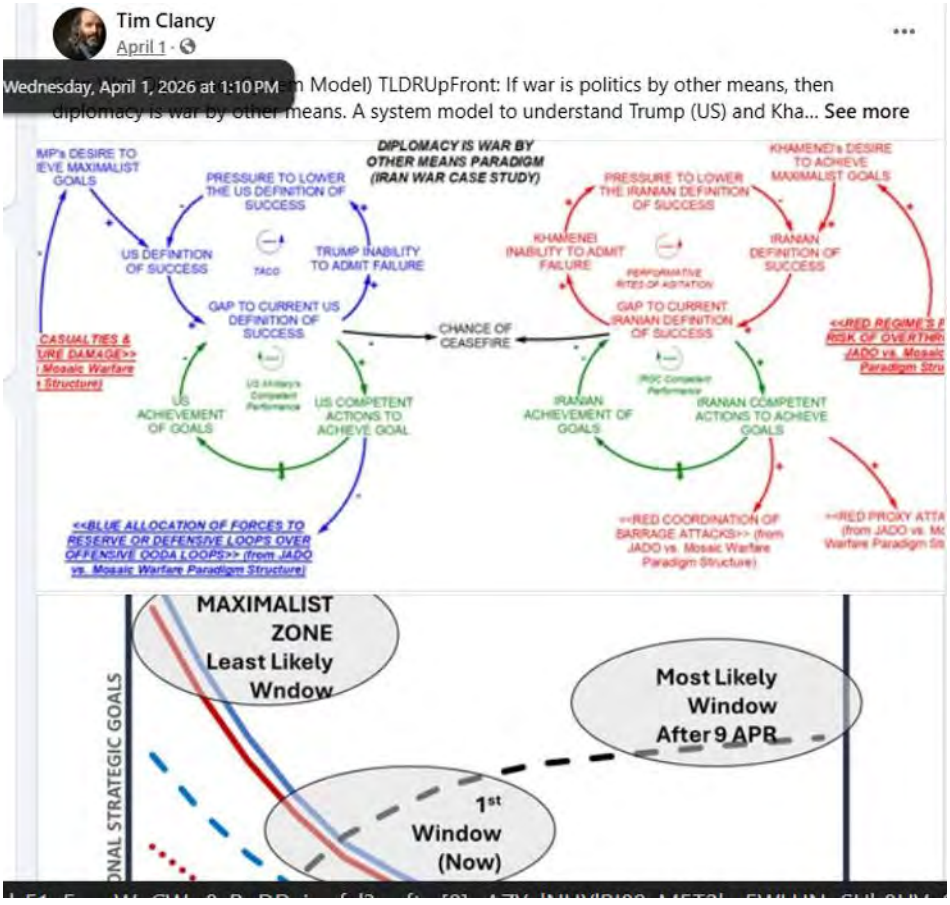
Scenario 4 depicts an alternative "Actual" scenario derived from Scenario 3, with the main difference articulated as: "The US and Israel coalition exhausts Iranian counter-punches but fails to spark popular uprisings or ethnic insurgencies after several months. This is a likely scenario."

Scenario 4 is substantively similar to scenario 3 in the dynamic hypothesis, except that at the conclusion of sustained Phase VII interdiction and close air attacks, neither popular uprisings

nor insurgencies have gained the level of emerging-state actors. Attacks winnow away or break off in a negotiated ceasefire, and the Red regime remains intact.

### 3.7 April 1, 2026 – 1:10pm EST Diplomacy is War by Other Means Paradigm Model.

The first version of the diplomacy is war by other means paradigm model was shared at 1:10pm EST on April 1st, 2026, on the author's personal Facebook page. This post provided additional structure to the JADO v. Mosaic Warfare paradigm by depicting, at a high-level, ceasefire and peace negotiations between US and Iranian leaders, and how the dynamics of that could activate, increase, or decrease military activity between the two countries. The post is preserved both on the author's blog [48], which preserves a link to the original Facebook post, and displayed in Figure 12.




# 4 Initial Five Scenarios

and refined through 05 MAR, when the notional, when I first posted dynamic hypotheses. I use the summarized scenario of 05 MAR for space considerations, as these were shorter

and included reference to hoped, feared, and actual outcomes (see supplementary materials for the preserved online public posts). The dynamic hypotheses have minor alterations from the normal form to convey specific scenario details that may require explanation.

First, the hoped, feared, and actual scenarios are from the Blue perspective after the breakpoint of a war beginning. These scenarios of hoped, feared, actual, and revised are presented one to a chart for better clarity and illustration of the dynamics that lead to that scenario forecast. Each chart depicts the seven phases or system-state transitions as vertical shaded bands, advancing from Phase I on the left to Phase VII on the right. The Y-axis is a notional linear depiction of force levels performing offensive or defensive OODA loop operations in support of Blue or Red theater strategy. The X-axis is notional time, non-linear, and broken into segments from left to right: hours, days, and weeks.

Additionally, the locations of these segmentations vary by forecast. Finally, there are two breakpoints marked in the vertical columns. The first is the start of the war and is always located to the left. The second is when Blue gains air superiority. The location of the hours/days/week's segments of time on the x-axis and the location of the Blue air superiority breakpoint change between scenarios. This captures the divergent time horizons encompassed by the forecasts. For the reference modes, all operations not otherwise marked are Blue, while Red lines are labeled as such. Blue Forces reference modes are cumulative and bounded by remaining Blue Forces Held in Reserve. As Blue conducts more JADO offensive and defensive OODA loop operations simultaneously, the Blue Forces Held in Reserve depletes, in some cases reaching zero, signaling the risk of collapse under Red's mosaic warfare theater strategy. Red Forces are not bounded in the same way as Red Barrage Attacks and Red Proxy Attacks draw from different Iranian and proxy inventories and launchers, respectively.

## 4.1 Scenario 1– Hoped by Blue Force Rated Very Unlikely

Scenario 1 depicts the "Hoped" scenario from Blue Force's perspective, as articulated by President Trump in his first remarks[49]. (This would be the Feared scenario for Red). The Scenario 1 forecast in its 05 MAR form is: "1) A complete collapse of the regime under Phase VII attacks or even earlier decapitation strikes or calls for 'surrender' of the IRGC. Very unlikely. (See HOPED Slide)"

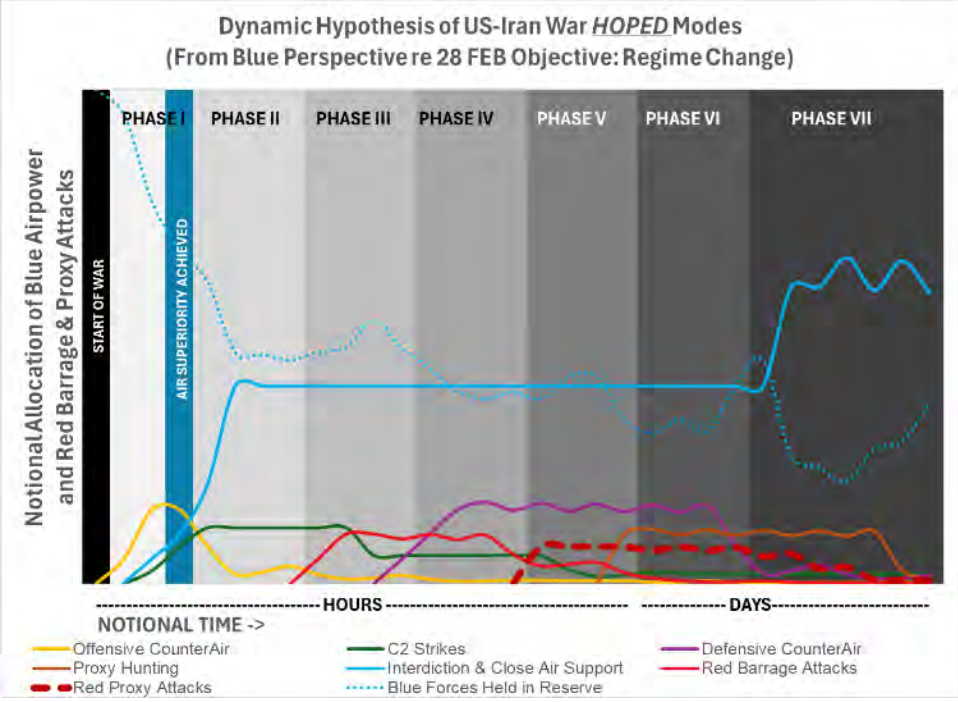


Figure 13: Scenario 1 - Hoped Forecast Rated Very Unlikely

Note that in Figure 13, the notional timeline consists only of hours and days. This is indicative of the hoped-for outcome of the JADO theater strategy: delivering a rapid and decisive end to the conflict. Air superiority is gained quickly in the opening hours as MDML C2 strikes kill key Red regime and military leadership nearly simultaneously. This collapses the regime under additive complexity, and to the extent regional barrages and activated proxy attacks occur, their output is minimal and easily contained by low levels of Blue Defensive CounterAir. Because of this, Blue can maintain both a high op-tempo of offensive OODA loop operations in interdiction and close air support, as well as reserves. These offensive actions target irregular and conventional military units that might prevent popular uprisings or confront ethnic insurgencies. As a result, Blue is well on its way to enabling the rise of emerging state actors capable of challenging, or taking the place of, the Red Regime[44].

The hoped-for scenario by Blue obviously didn't happen. But it's worth noting that this is roughly the hoped-for scenario of several recent opening moves by much stronger nations against weaker foes, including Russia's invasion of Ukraine. Simultaneous efforts to gain early air superiority occurred alongside C2 strikes, followed by rapid regime collapse.

## 4.2 Scenario 2– Feared by Blue Force Rated Very Unlikely

Scenario 2, shown in Figure 14, depicts the "Feared" scenario from the perspective of Blue Force as articulated by President Trump in his first remarks[49]. (This would be the Hoped scenario for Red). The Scenario 2 forecast in its 05 MAR form is: "2) Iran counter-punches exceed

regional and US/Israeli interceptor capabilities, domestic appetite for another forever war, and pressure on the Blue Forces (US and Israel) to disengage with the Iranian regime intact. Don't think it's probable. (See FEARED Slide)

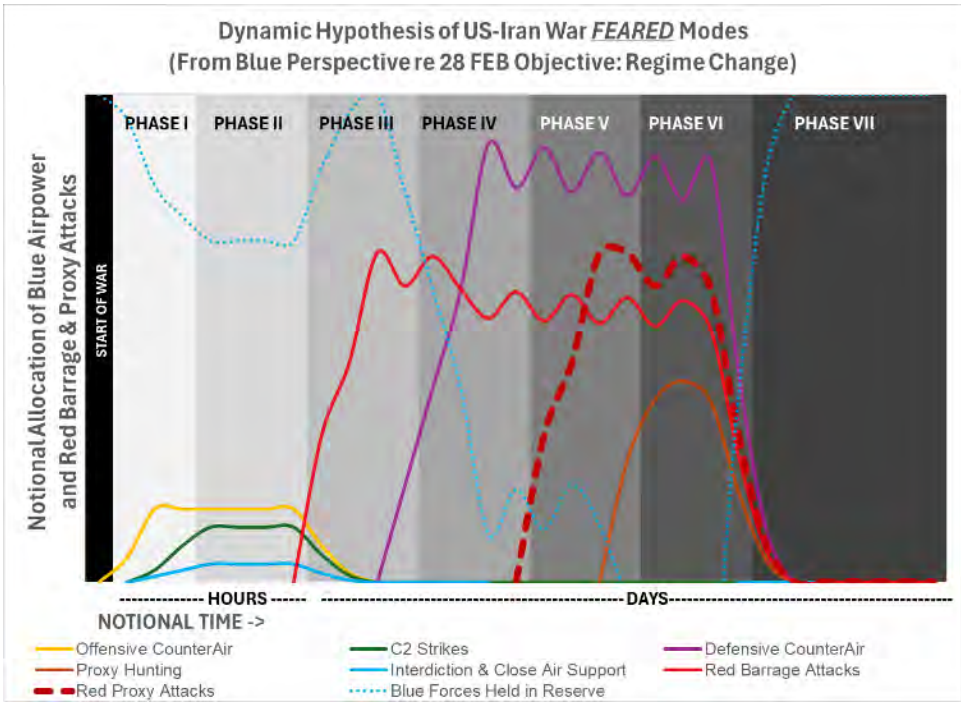


Figure 14: Scenario 2 - Feared Forecast Rated Very Unlikely

As in Figure 13, the notional timeline in Figure 14 consists only of hours and days. This is indicative of the feared outcome of a successful mosaic warfare theater strategy that counters and overwhelms JADO, leading to defeat via additive complexity. In this scenario, Blue air superiority over Red is never gained. Within hours, the doctrine of retaliatory barrages was put into effect, and regional proxies began attacks that day or by the second day. Both drew Blue forces away from offensive OODA actions into defensive positions, quickly exhausting them and then overwhelming Blue force reserves. Unable to maintain the op-tempo of mosaic warfare's additive complexity or the imposed costs on the region and the globe, Blue quickly moves towards a ceasefire, and all operations fall off within days, before Phase VII.

The Feared scenario by Blue obviously didn't happen either. The JADO theater strategy proved capable of containing most, if not all, mosaic warfare theater strategies as shown below. But the forecast remains useful to understand how China may adapt a theater strategy in relation to its efforts to seize Taiwan. Iran is not a near-peer of the United States. China has access to technology and production capabilities to create more stockpiles of rockets, missiles, and UAVs than Iran. China does not have the regional proxies in place that Iran has and may seek to gain them – an early indication of a strategic shift to a mosaic warfare doctrine.

## 4.3 Scenario 3– Actual by Blue Force activating Resistance Rated Probable, if Grim

Scenario 3 depicts the "Actual" scenario from Blue Force's perspective, based on the objectives articulated by President Trump in his first remarks[49]. These were supplanted on 02 MAR by revised objectives, depicted in Scenario 4. However, US strategic objectives regarding Iran shift frequently, and there are indications that this scenario remains the intended outcome. The Scenario 3 forecast in its 05 MAR form is: "3) The US and Israel coalition exhausts Iranian counter-punches and succeeds in sparking popular uprisings and ethnic insurgencies. These result in emerging-state actor dynamics that topple, or at least tangle, the Iranian regime, significantly reducing its power and projection capability for years to come. Probable, if grim, scenario. (See ACTUAL 28 FEB Goal Slide)."

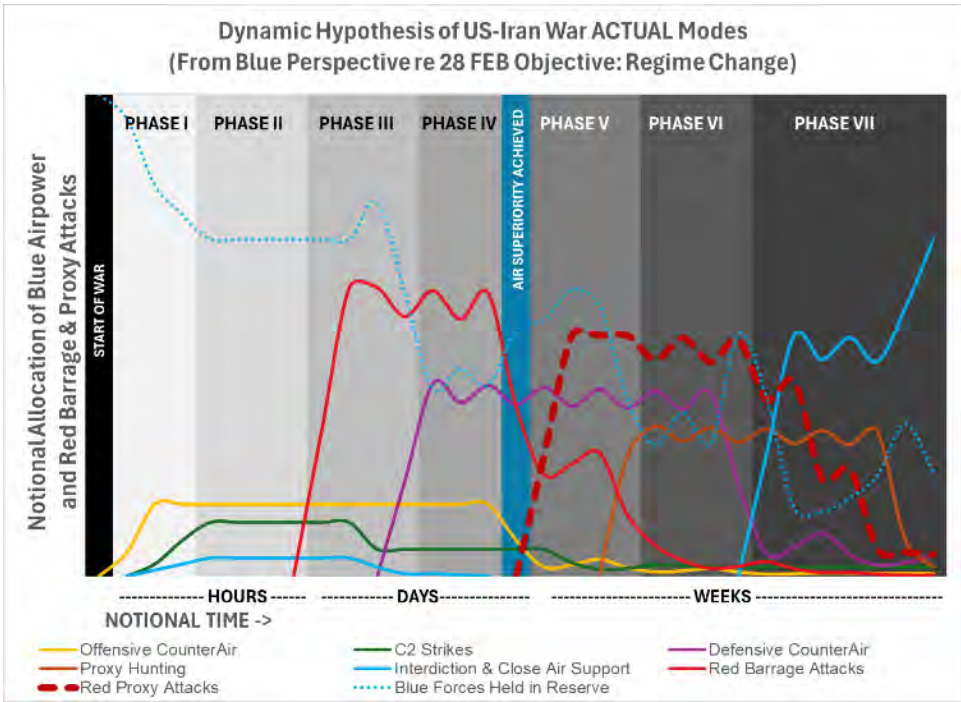



Figure 15: Scenario 3 - Actual by Blue Force Rated Probable, if Grim

In Figure 15, the notional timeline has shifted from hours and days to hours, days, and weeks. Initial Offensive CounterAir operations and C2 strikes under the JADO theater strategy do take significant Red anti-air capabilities offline and remove key leadership. But due to prior planning and preparation for such C2 strikes, the mosaic warfare theater strategy is ready, and retaliation barrages begin almost immediately, moving to Phase III within hours. This requires significant defensive OODA loop operations by Blue in Defensive CounterAir and Launcher Hunting, thereby reducing available Blue reserves. Almost immediately, regional proxies are activated, attacking from the flanks and further moving the system towards Phase VI within a few days. Although JADO theater strategy Defensive CounterAir operations, launcher hunting, and proxy hunting are successful in mitigating these barrages and attacks from inflicting

overwhelming damage to civilians and infrastructure as in Scenario 2, it still draws Blue forces away from offensive OODA loop operations over Iran and into defensive OODA loop operations. Blue can rapidly reduce, if not eliminate, regional barrages, but proxies are more difficult to handle. The Blue JADO theater strategy can only contain the Red mosaic warfare theater strategy after weeks of combat, at which point it shifts to Phase VII. At this point, continued interdiction and close air support enable emerging-state actors to eventually rise, confronting the Red regime and moving Iran into what effectively amounts to a protracted civil war, similar to either Libya or Syria as a long-term source of continued instability in the region. The Red regime remains a competitor in this conflict. Still, it has significantly reduced its ability to project mosaic warfare and threaten regional actors, instead focusing on internal conflicts.

## 4.4 Scenario 5– Revised Actual by Blue Force Rated Most Likely

Scenario 5, depicted in Figure 16, shows a new "Actual" scenario from the perspective of Blue Force based on the revised objectives stated 02 MAR. These revised objectives, articulated by Secretaries Hegseth and Rubio initially and then confirmed by President Trump[50], reflect more limited strategic outcomes of the war as shown by a summary in its 05 MAR form: "5) The sides break off combat operations suddenly under the auspices of a ceasefire and negotiation. This is the most likely scenario, but only after the end of this week, and since 02 MAR is now tied to the revised objective of reducing Iranian barrage capability. (See ACTUAL 02 MAR Revised Goals Slide)

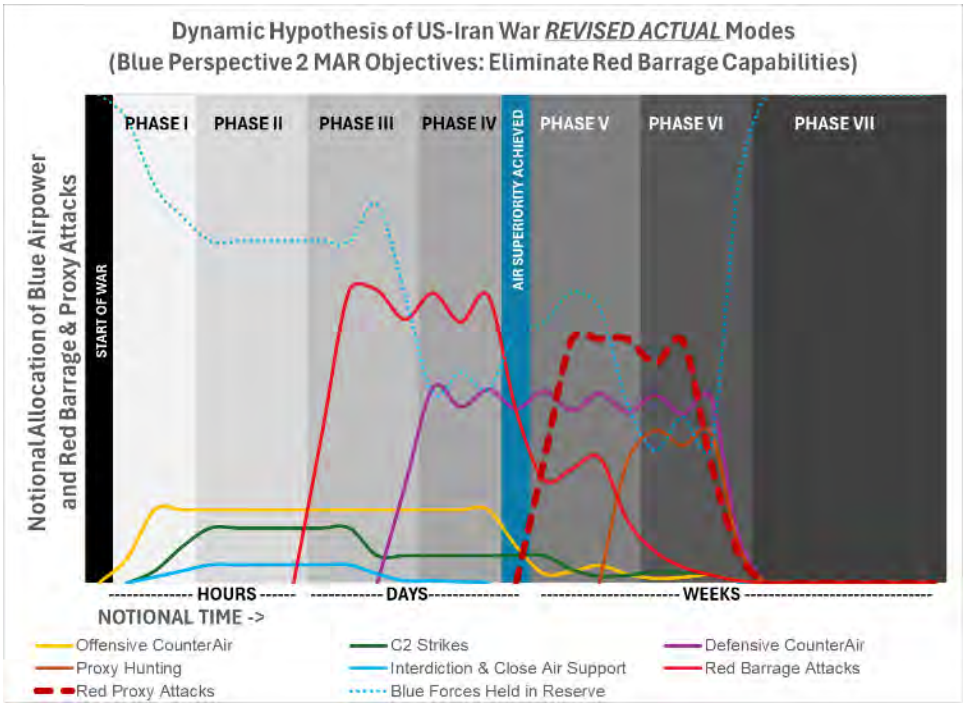


Figure 16: Scenario 5 - Revised Actual by Blue Force Rated Most Likely

Scenario 4 is substantively similar to scenarios 3 and 4 in the dynamic hypothesis, except that the goal is no longer regime change, but the elimination of barrage capability. The JADO theater strategy conducts little to no offensive OODA loop operations outside of Offensive CounterAir and C2 strike, interdiction, and close air support, previously targeting units capable of suppressing uprisings or insurgencies, which are reallocated. Instead, the focus is on defensive OODA loop operations – defensive CounterAir operations, launcher hunting, and proxy hunting. Throughout this period, the Red mosaic warfare strategy continues to impose costs, reinforcing the need to end the war no longer than necessary to save face. Once barrages are sufficiently reduced and enough time has passed for both sides to save face, ceasefire negotiations begin, leading to the rapid end of the conflict after a few weeks without progressing into Phase VII.

# 5 Additional Insights into System Paradigm Model

## 5.1 Slicing Details & Hasty Modeling Limitations

The geographic slice modeled focused on the theater where MDML LSCO operations were being conducted, including Azerbaijan, Bahrain, Cyprus, Iran, Iraq, Israel, Kuwait, Lebanon, Oman, Qatar, Türkiye, Saudi Arabia, the United Arab Emirates, the United Kingdom, and the US. Excluded from the geographic slice are countries experiencing economic hardship related to the closure of the Strait of Hormuz (e.g., India), targeted by terrorism (e.g., Germany), or involved in diplomatic efforts to resolve the conflict outside theater participants (e.g., Pakistan). Militaries across this geographic slide are simplified to Blue and Red forces in the model. Modeling is from the perspective of the Blue force, which, in US doctrine, consists of the US and its allies' military forces, versus the Red force, including the opposing forces of Iran and its proxies.

The time slice modeled begins with H-Hour, the start of operations, and proceeds in hours, days, and weeks from that position. Time slices vary by forecast. Changing phase states may be forecast to occur in hours or days in one scenario, but in weeks in another.

Forecasting used modified dynamic hypotheses of the standard method [28] with eight abstracted reference modes in each scenario [14] representing relative growth and decline of the Blue or Red offensive and defensive OODA loop operations, split into major activities as they relate to their theater strategy.

Hasty methods have numerous limitations and cautions. In contested and degraded environments, no data collection was conducted during model and forecast development beyond what was publicly reported and available to all within the first 36 hours. This leads to data scarcity and high ambiguity in understanding. There was no group model building or stakeholder review. The dynamics, design choices, and terminology are solely those of the author, and any errors are owned by the author as well. Hasty should not be mistaken for unprepared, as the author drew upon over 20 years of analysis and work on national security problems, including efforts in the region and with the competitors in question, as well as relevant prior experience with these methods for modeling conflict. This allowed the bulk of hasty modeling to focus on translating established mental models into correct system models rather than learning them for the first time, a definite limitation and a caution against overuse of hasty modeling by those who do not have deep prior mental models of the domain in question.

## 5.2 Phase II System Insights

To enable uprisings or insurgencies (green) to flip to exponential growth Blue must conduct interdiction conduct interdiction targeting Red force surface military capabilities [15, p. 11] and close air support targeting Red Forces in close proximity to friendly forces conducting uprisings or insurgencies [15, p. 35] which represent the amber loops or reduce the regime's ability to coordinate actions, which are the red loops. Phase II-B activities can only be conducted at scale and with concentration when all other threats have been addressed in Phase VII below. Past US LSCO air operations (e.g. Gulf War, Kosovo intervention and Iraq Invasion, see supplementary) quickly established air superiority and conducted systemic and unlimited offensive Phase II OODA loop operations: C2 attacks against Red force leadership and interdiction and close air support against Red military forces

## 5.3 Phase III System Insights

Red's additive complexity approach in mosaic warfare is to activate the key positive polarity link between Regional Casualties & Infrastructure Damage and Blue Allocation of Forces to Reserve or Defensive OODA Loop Operations. As costs in civilian casualties or damaged infrastructure increase, Blue can allocate fewer of its forces to offensive OODA loop operations. Even the threat of such barrages may force Blue to hold significant reserves ready. This draws Blue's offensive capabilities out of Phase II and disperses them across a much larger regional area of potential barrage targets.

## 5.4 Modified Dynamic Hypothesis Approach

In the standard method of system dynamics, multiple scenarios of hoped, feared, and actual are presented on a single dynamic hypothesis [16], each as one behavior mode. Timelines are notional without specification of units of time. In this hasty approach, the x-axis timeline is notionally denominated in quasi-logarithmic hours, days, and weeks across the phases, and the alignment of those two phases varies between scenarios. Each chart contains only one scenario, and each scenario consists of eight component behavior mode forecasts charted to more richly forecast potential behaviors across the progression of JADO v. mosaic warfare phases described above, as shown for Scenario 5 Figure 16 below.

## 5.5 Diplomacy is War by Other Means Paradigm

In the system paradigm in **Error! Reference source not found.**, both Trump and Khamenei are depicted in symmetrical drifting goals structures (left for the US and right for Iran) linked by a ceasefire window. The top half of each structure is the leadership, and the bottom half is the military forces they control, connected to the other paradigm model through links marked <<<…>>> The larger endogenous system encompasses war, which is politics by other means, and diplomacy, which is war by other means.

# 6 Data Collection for JADO vs. Mosaic Warfare MDML Platforms & Munitions Consumption

The four categories of munitions and platforms that are defined in Table 1 & Table 2 are exquisite, alternative, low-cost alternative, and vintage. The difference between munitions and platforms can be demonstrated by considering two types of unmanned aerial vehicles (UAVs) that both share the ability to maneuver and loiter during their flights. A UAV loitering munition carries an explosive and propellant. It is destroyed in the strike on the target, much like an artillery shell, rocket, missile, or other munition[15, p. 148]. In contrast, a UAV drone platform is intended to be recovered and reused. If it conducts a strike, it does so by launching a munition at the target[17].

Table 1: Definition of Munition/Platform Categories

| Category of Munition or Platform in Analysis (ranked in order of sophistication) | Definition |
|---|---|
| Exquisite | Sophisticated high-end munitions that are state of the art. Highly capable and extremely expensive to build, often requiring rare-earth minerals. They are the most likely munition to succeed at its intended design and are very difficult to counter. |
| Alternative | A suitable conventional standby for exquisite munitions. They are not cheap, often costing several hundred thousand up to $1M per munition. They are mostly effective in the role they are designed for but over time have accumulated more counters than the exquisite munitions. |
| Low-Cost Alternative | A new category of munitions designed specifically to take advantage of cost asymmetry. These serve a variety of roles but are usually under $50,000 per munition. |
| Vintage (Iran Only) | Munitions or platforms that are older (e.g., 30+ years old). Though capable at their time of manufacture, they are significantly outclassed by modern, even alternative or low-cost alternative, munitions or platforms. |

Table 2: Definition of Types of Munitions & Platforms

| Types of Munition or Platform in Analysis | Definition |
|---|---|
| Aircraft: Multi-Role | An aircraft that operates across multiple domains of air, sea, and land and/or can perform multiple missions |
| Aircraft: Single Role | An aircraft specialized in operating in a specific domain or type of mission (e.g., air superiority, ground interdiction, and close air support, etc.) |
| Aircraft: Special Operations | An aircraft designed to support special operations, typically having stealth and more sophisticated avionics. |

| | |
|---|---|
| Aircraft: Support | An aircraft that supports overall operations |
| Anti-Ballistic Missiles | A ballistic missile designed to acquire, track, and intercept an incoming ballistic missile |
| Ballistic Missiles | A powerful, long-range missile that achieves hypersonic speeds and rapidly travels in an arc through the lower or upper atmosphere from launch to impact |
| Cannon | A proximity defensive weapon used to shoot down loitering munitions, rockets, and some cruise missiles within a few km of the protected asset |
| Cruise Missiles | A missile that flies slower than ballistic missiles and can navigate en route to its target, harder to detect from afar but easier to intercept |
| Glide Bombs | A gravity bomb fitted with fins to enable it to "glide" or travel some distance from release to impact. |
| Gravity Bombs | A traditional bomb that is dropped from an aircraft, can be guided in a limited sense but generally |
| Missiles | |
| Radar & Early Warning Systems | A general class of systems designed to detect anything in the air and in sufficient time to direct interception |
| Rockets | Shorter range |
| UAV (Loitering Munitions) | An unmanned aerial vehicle that is designed to fly to a target and hit it, destroying the UAV. Some loitering munitions can be recovered if they miss, but the design intent. |
| UAV: Drone | A UAV that is designed to be recovered after its mission. It can launch weapons, but it is not intended to be destroyed in the attack. |

The crosswalk charts below reflect open source and publicly available information (OSINT & PAI). Where ranges were given, cost or starting munitions

Data collection also focuses on consumption rates, munitions expenditures, and damage or destruction of platforms as indicators of military activity. As the hasty method forecasts were notionally depicted in a timeline of hours, days, and weeks, sourcing was sought to match that effort [33], [18], [19], [20]. These were compared with daily reported rates of Iran and its axis partners targeting GCC states and Israel [21], [22],[23],[24], [25], [26],[27] and other reported findings [28], [17]. Iran's replenishment and recovery were determined by reporting on the unburying of collapsed underground arsenals [29], [30]. The deliberate data collection results in 75 charts: Blue (for JADO) and Red (for Mosaic Warfare), both charted specifically, as well as comparative behavior. Despite best efforts, these analyses should be taken as notional and illustrative at best. Relying on OSINT & PAI, so close in time to the conflict, and on the nature and complexity of JADO and mosaic warfare in terms of the variety, types, and uses of munitions and platforms, and the possibility of information operations downplaying or exaggerating claims, means all analysis is directional at best.

Munitions marked "Plentiful" are not generally tracked in specific usage, such as the shells of a CRWS close-range automated cannon. They are instead tracked by hundreds of thousands through Congressional appropriations and so marked "Plentiful", and their munitions were not included in the data analysis.

| *BLUE MUNITIONS & PLATFORMS USED AGAINST RED BY CATEGORY (PHASE I & II EXQUISITE)* | | | | | Optimal | Available | Less than Ideal | PHASE I BLUE OFFENSIVE COUNTERAIR | | PHASE II- BLUE DECAP, INTERDICT & CAS | PHASE IV DEFENSIVE COUNTERAIR AGAINST RED BARRAGES | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Country** | **Category** | **Type** | **Munition or Platform** | **Launch Domain** | **Target Domain** | **Range** | **Per Munition/Asset Cost Estimate** | **Ground, Sea, or Both** | **Air Targets** | **Ground, Sea, or Both** | **Rocket** | **Drones & Loitering Munitions** | **Cruise Missile** | **Ballistic Missile** |
| Israel | Exquisite | Ballistic Missile | Blue Sparrow | Air | Ground | 2000km | $ 2,000,000 | X | | X | | | | |
| US | Exquisite | Missile | BGM-109 Tomahawk | Air, Ground, Sea | Ground | 1666km | $ 2,500,000 | X | | X | | | | |
| US | Exquisite | Missile | LRASM AGM-158 | Sea | Sea | 926km | $ 3,240,000 | X | | X | | | | |
| US | Exquisite | Ballistic Missile | PrSM | Ground | Ground | 500km | $ 2,500,000 | X | | X | | | | |
| US | Exquisite | Missile | JASSM (Replaces ATACMS) | Ground | Ground | 370km | $ 700,000 | X | | X | | | | |
| Israel | Exquisite | Ballistic Missile | Popeye Turbo/Crystal Maze II | Air | Ground | 250km | $ 2,000,000 | X | | X | | | | |
| Israel | Exquisite | Loitering Munition | Delilah Cruise Missile | Air | Ground | 250km | $ 1,750,000 | X | | X | | | | |
| US | Exquisite | Missile | AGM-88 HARM / AARGMER | Air | Ground | 148km | $ 870,000 | X | | X | | | | |
| US | Exquisite | Gravity Bomb | GBU-57 Massive Ordnance Penetrator | Air | Ground | Gravity | $ 390,000 | | | X | | | | |
| US | Exquisite | Drone | MQ-4C Triton | Air | Air, Ground, Sea ISR | 11909km | $ 180,000,000 | X | X | X | | | | |
| Israel | Exquisite | Drone | IAI Eitan | Air | Ground ISR | 7400km | $ 40,000,000 | X | X | X | | | | |
| US | Exquisite | Drone | MQ-9 Reaper | Air | Ground ISR | 1850km | $ 34,000,000 | X | X | X | | | | |
| Israel | Exquisite | Drone | IAI Heron | Air | Ground ISR | 1000km | $ 9,500,000 | X | X | X | | | | |
| Israel | Exquisite | Drone | Elbit Hermes 900 | Air | Ground ISR | 1000km | $ 15,000,000 | X | X | X | | | | |

Figure 17: Blue Exquisite Munitions & Platforms  Phase I – Offensive Counter Air Operations

| BLUE MUNITIONS & PLATFORMS USED AGAINST RED BY CATEGORY (PHASE I & II EXQUISITE) | | | | | START | LOW ESTIMATE | | | | Low Estimate Cummulaive | | | | Realistic Estimate Behavior over Time | | | | Realistic Estimate Cummulaive | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Country | Category | Type | Munition or Platform | Launch Domain | Est. Start Inventory | First 36 Hours | First 4 Days | Days 4-16 | Days 16-39 | First 36 Hours | By 4th Day | By Day 16 | By Day 39 | First 36 Hours | First 4 Days | Days 4-16 | Days 16-39 | First 36 Hours | By 4th Day | By Day 16 | By Day 39 |
| Israel | Exquisite | Ballistic Missile | Blue Sparrow | Air | 100 | 30 | 13 | 13 | - | 30 | 43 | 56 | 56 | 30 | 13 | 13 | 13 | 30 | 43 | 56 | 69 |
| US | Exquisite | Missile | BGM-109 Tomahawk | Air, Ground, Sea | 3,100 | 120 | 255 | 160 | 565 | 120 | 375 | 535 | 1,100 | 120 | 255 | 160 | 565 | 120 | 375 | 535 | 1,100 |
| US | Exquisite | Missile | LRASM AGM-158 | Sea | 200 | 30 | 12 | 13 | - | 30 | 42 | 55 | 55 | 30 | 12 | 13 | 13 | 30 | 42 | 55 | 68 |
| US | Exquisite | Ballistic Missile | PrSM | Ground | 90 | 13 | 42 | - | - | 13 | 55 | 55 | 55 | 13 | 42 | - | - | 13 | 55 | 55 | 55 |
| US | Exquisite | Missile | JASSM (Replaces ATACMS) | Ground | 4,400 | 70 | 65 | 777 | 188 | 70 | 135 | 912 | 1,100 | 70 | 65 | 777 | 188 | 70 | 135 | 912 | 1,100 |
| Israel | Exquisite | Ballistic Missile | Popeye Turbo/Crystal Maze II | Air | 300 | 35 | 30 | 55 | - | 35 | 65 | 120 | 120 | 35 | 30 | 55 | 55 | 35 | 65 | 120 | 175 |
| Israel | Exquisite | Loitering Munition | Delilah Cruise Missile | Air | 500 | 50 | 40 | 70 | - | 50 | 90 | 160 | 160 | 50 | 40 | 70 | 70 | 50 | 90 | 160 | 230 |
| US | Exquisite | Missile | AGM-88 HARM / AARGMER | Air | 4,000 | 90 | 70 | 42 | - | 90 | 160 | 202 | 202 | 90 | 70 | 42 | 42 | 90 | 160 | 202 | 244 |
| US | Exquisite | Gravity Bomb | GBU-57 Massive Ordnance Penetrator | Air | 25 | 8 | - | - | - | 8 | 8 | 8 | 8 | 8 | - | - | - | 8 | 8 | 8 | 8 |
| US | Exquisite | Drone | MQ-4C Triton | Air | 20 | - | - | - | 2 | - | - | - | 2 | - | - | - | 2 | - | - | - | 2 |
| Israel | Exquisite | Drone | IAI Eitan | Air | 12 | - | 1 | 2 | - | - | 1 | 3 | 3 | - | 1 | 2 | - | - | 1 | 3 | 3 |
| US | Exquisite | Drone | MQ-9 Reaper | Air | 190 | 1 | - | 9 | 14 | 1 | 1 | 10 | 24 | 1 | - | 9 | 14 | 1 | 1 | 10 | 24 |
| Israel | Exquisite | Drone | IAI Heron | Air | 250 | - | 1 | 3 | 1 | - | 1 | 4 | 5 | - | 1 | 3 | 1 | - | 1 | 4 | 5 |
| Israel | Exquisite | Drone | Elbit Hermes 900 | Air | 900 | 2 | 3 | 2 | 4 | 2 | 5 | 7 | 11 | 2 | 3 | 2 | 4 | 2 | 5 | 7 | 11 |

Figure 18: Blue Exquisite Munitions & Platforms Phase I Offensive Counter Air Operations Consumption Data

Notes on Figure 18:

- Blue Sparrow estimated 36hr and 96hr rates from reporting that 30 Blue Sparrows were launched at Ayatollah Compound and dividing the difference between that and the ending 56 for the 96hour rate.
- LRASM AGM-158 estimated 36-hour usage from the claimed Iranian navy strikes by CENTCOM, and 96-hour is the midpoint between 36-hr and the 16-day estimate.
- PrSM derived from subtracting PrSM end usage (CISI) from PrSM+ATACMS first 96 hours use (FPRI) and assuming all PrSM used in first 96 hrs. For the first 36 hours, the used ratio of 96-hour usage (e.g., 25% of reported PrSM/ATACMS were PrSM). This then reached the estimated final usage (CISI) of 55, and all remaining PrSM + ATACMS were allocated to ATACMS.
- GBU-57 Massive Ordnance Penetrator original reporting of 10 in first 36 hours but only reported 8 in 96 hours so dropped to 8.

| BLUE MUNITIONS & PLATFORMS USED AGAINST RED BY CATEGORY (PHASE IV EXQUISITE) | | | | | Optimal | Available | Less than Ideal | PHASE I BLUE OFFENSIVE COUNTERAIR | | PHASE II- BLUE DECAP, INTERDICT & CAS | PHASE IV DEFENSIVE COUNTERAIR AGAINST RED BARRAGES | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Country | Category | Type | Munition or Platform | Launch Domain | Target Domain | Range | Per Munition/Asset Cost Estimate | Ground, Sea, or Both | Air Targets | Ground, Sea, or Both | Rocket | Drones & Loitering Munitions | Cruise Missile | Ballistic Missile |
| US | Exquisite | Anti-Ballistic Missle | SM-3 | Sea | Air | 1,200km | $ 12,000,000 | | X | | | X | X | X |
| US | Exquisite | Anti-Ballistic Missle | SM-6 | Sea | Air | 500km | $ 4,900,000 | | | | | X | X | X |
| GCC | Exquisite | Anti-Ballistic Missle | Partner Operated THAAD | Ground | Air | 200km | $ 12,600,000 | | | | | X | X | X |
| US | Exquisite | Anti-Ballistic Missle | US THAAD | Ground | Air | 200km | $ 12,600,000 | | | | | X | X | X |
| Israel | Exquisite | Anti-Ballistic Missle | David's Sling | Ground | Air | 180km | $ 700,000 | | X | | X | X | X | X |
| US | Exquisite | Anti-Ballistic Missle | US Pac-3 Patriot | Ground | Air | 160km | $ 4,000,000 | | X | | X | X | X | X |
| GCC | Exquisite | Anti-Ballistic Missle | Saudi Pac-3 Patriot | Ground | Air | 160km | $ 4,000,000 | | X | | X | X | X | X |
| GCC | Exquisite | Anti-Ballistic Missle | Gulf Partner Pac-3 Patriot | Ground | Air | 160km | $ 4,000,000 | | X | | X | X | X | X |
| Israel | Exquisite | Anti-Ballistic Missle | Arrow 2/ Arrowe 3 | Ground | Air | 150km | $ 3,000,000 | | | | | X | X | X |
| France | Exquisite | Anti-Ballistic Missle | French Rafael MICA | Air | Air | 80km | $ 2,500,000 | | X | | | X | | |
| Qatar | Exquisite | Anti-Ballistic Missle | Aster | Ground | Air | 30km | $ 2,000,000 | | X | | X | X | X | X |
| Israel | Exquisite | Missile | Python/Derby Derivative (SEAD) | Air | Air | 20km | $ 750,000 | | X | | | X | X | X |

Figure 19: Blue Exquisite Munitions & Platforms Phase IV - Counter Barrage

| BLUE MUNITIONS & PLATFORMS USED AGAINST RED BY CATEGORY (PHASE IV EXQUISITE) | | | | | START | LOW ESTIMATE | | | | Low Estimate Cummulaive | | | | Realistic Estimate Behavior over Time | | | | Realistic Estimate Cummulaive | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Country | Category | Type | Munition or Platform | Launch Domain | Est. Start Inventory | First 36 Hours | First 4 Days | Days 4-16 | Days 16-39 | First 36 Hours | By 4th Day | By Day 16 | By Day 39 | First 36 Hours | First 4 Days | Days 4-16 | Days 16-39 | First 36 Hours | By 4th Day | By Day 16 | By Day 39 |
| US | Exquisite | Anti-Ballistic Missle | SM-3 | Sea | 410 | 72 | 52 | 48 | 18 | 72 | 124 | 172 | 190 | 72 | 52 | 48 | 18 | 72 | 124 | 172 | 190 |
| US | Exquisite | Anti-Ballistic Missle | SM-6 | Sea | 1,160 | 108 | 78 | 73 | 21 | 108 | 186 | 259 | 280 | 108 | 78 | 73 | 21 | 108 | 186 | 259 | 280 |
| GCC | Exquisite | Anti-Ballistic Missle | Partner Operated THAAD | Ground | 200 | 30 | 35 | 55 | - | 30 | 65 | 120 | 120 | 30 | 35 | 55 | 55 | 30 | 65 | 120 | 175 |
| US | Exquisite | Anti-Ballistic Missle | US THAAD | Ground | 360 | 40 | 40 | 118 | 42 | 40 | 80 | 198 | 240 | 40 | 40 | 118 | 42 | 40 | 80 | 198 | 240 |
| Israel | Exquisite | Anti-Ballistic Missle | David's Sling | Ground | 250 | 35 | 30 | 70 | - | 35 | 65 | 135 | 135 | 35 | 30 | 70 | 70 | 35 | 65 | 135 | 205 |
| US | Exquisite | Anti-Ballistic Missle | US Pac-3 Patriot | Ground | 2,330 | 90 | 235 | 77 | 843 | 90 | 325 | 402 | 1,245 | 90 | 235 | 77 | 843 | 90 | 325 | 402 | 1,245 |
| GCC | Exquisite | Anti-Ballistic Missle | Saudi Pac-3 Patriot | Ground | 2,000 | - | 60 | 57 | - | | 60 | 117 | 117 | - | 60 | 57 | 57 | | 60 | 117 | 174 |
| GCC | Exquisite | Anti-Ballistic Missle | Gulf Partner Pac-3 Patriot | Ground | 4,000 | 250 | 368 | 667 | - | 250 | 618 | 1,285 | 1,285 | 250 | 368 | 667 | 667 | 250 | 618 | 1,285 | 1,952 |
| Israel | Exquisite | Anti-Ballistic Missle | Arrow 2/ Arrowe 3 | Ground | 150 | 40 | 40 | 42 | - | 40 | 80 | 122 | 122 | 40 | 40 | 42 | 42 | 40 | 80 | 122 | 164 |
| France | Exquisite | Anti-Ballistic Missle | French Rafael MICA | Air | 320 | - | - | 87 | - | | | 87 | 87 | - | - | 87 | 87 | | | 87 | 174 |
| Qatar | Exquisite | Anti-Ballistic Missle | Aster | Ground | 300 | - | 11 | 42 | - | - | 11 | 53 | 53 | - | 11 | 42 | 42 | - | 11 | 53 | 95 |
| Israel | Exquisite | Missile | Python/Derby Derivative (SEAD) | Air | 2,000 | 90 | 85 | 146 | - | 90 | 175 | 321 | 321 | 90 | 85 | 146 | 146 | 90 | 175 | 321 | 467 |

Figure 20: Blue Exquisite Munitions & Platforms Phase IV - Counter Barrage Consumption Data

Notes on Figure 20:

- SM-3 first 36 & 96hr usage derived from ratio of use at end of conflict (CISI) and applied to SM-2/3/6 combined usage (FPRI). This results in 40% of SM-3/6 being allocated to SM-3.

- SM-6 first 36 & 96hr usage derived from ratio of use at end of conflict (CISI) and applied to SM-2/3/6 combined usage (FPRI).
- Python/Derby Derivative (SEAD) combines reported offensive and defensive use.

| *BLUE MUNITIONS & PLATFORMS USED AGAINST RED BY CATEGORY (ALL PHASES EXQUISITE AIRCRAFT & RADAR)* | | | | | Optimal | Available | Less than Ideal | PHASE I BLUE OFFENSIVE COUNTERAIR | | PHASE II- BLUE DECAP, INTERDICT & CAS | PHASE IV DEFENSIVE COUNTERAIR AGAINST RED BARRAGES | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Country** | **Category** | **Type** | **Munition or Platform** | **Launch Domain** | **Target Domain** | **Range** | **Per Munition/Asset Cost Estimate** | **Ground, Sea, or Both** | **Air Targets** | **Ground, Sea, or Both** | **Rocket** | **Drones & Loitering Munitions** | **Cruise Missile** | **Ballistic Missile** |
| US | Exquisite | ISR Aircraft | E-3 | Air | Air, Ground, Sea ISR | 9300km | $ 270,000,000 | X | X | X | X | X | X | X |
| US | Exquisite | Special Operations Aircraft | MC-130J | Air | Ground Special Operations | 4828km | $ 114,000,000 | X | X | X | | | | |
| US | Exquisite | Support Aircraft | KC-135 | Air | Air | 2419km | $ 79,000,000 | X | X | X | X | X | X | X |
| US | Exquisite | Multirole Aircraft | F-35A | Air | Air, Ground, Sea | 2200km | $ 120,000,000 | | X | X | | X | X | |
| US | Exquisite | Multirole Aircraft | F-15E | Air | Air, Ground, Sea | 1609km | $ 94,000,000 | | X | X | | X | X | |
| US | Exquisite | Single Role Aircraft | A-10 II | Air | Air, Ground, Sea | 1287km | $ 20,400,000 | X | | X | | X | | |
| US | Exquisite | Special Operations Aircraft | HH-60W | Air | Ground Special Operations | 1110km | $ 30,000,000 | X | X | X | | | | |
| US | Exquisite | Radar/Early Warning | AN/FPS-132 | Air | Air ISR | 4828km | $1,100,000,000 | | | | X | X | X | X |
| US | Exquisite | Radar/Early Warning | AN/TPY-2 | Air | Air ISR | 3000km | $ 650,000,000 | | | | X | X | X | X |
| US | Exquisite | Radar/Early Warning | AN/TPS-59 | Air | Air ISR | 740km | $ 60,000,000 | | | | X | X | X | X |

Figure 21: Blue Exquisite Platforms All Phases

| *BLUE MUNITIONS & PLATFORMS USED AGAINST RED BY CATEGORY (ALL PHASES EXQUISITE AIRCRAFT & RADAR)* | | | | | START | LOW ESTIMATE | | | | Low Estimate Cummulaive | | | | Realistic Estimate Behavior over Time | | | | Realistic Estimate Cummulaive | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Country** | **Category** | **Type** | **Munition or Platform** | **Launch Domain** | ***Est. Start Inventory*** | ***First 36 Hours*** | ***First 4 Days*** | ***Days 4-16*** | ***Days 16-39*** | ***First 36 Hours*** | ***By 4th Day*** | ***By Day 16*** | ***By Day 39*** | ***First 36 Hours*** | ***First 4 Days*** | ***Days 4-16*** | ***Days 16-39*** | ***First 36 Hours*** | ***By 4th Day*** | ***By Day 16*** | ***By Day 39*** |
| US | Exquisite | ISR Aircraft | E-3 | Air | 16 | - | - | - | 2 | - | - | - | 2 | - | - | - | 2 | - | - | - | 2 |
| US | Exquisite | Special Operations Aircraft | MC-130J | Air | 64 | - | - | - | 2 | - | - | - | 2 | - | - | - | 2 | - | - | - | 2 |
| US | Exquisite | Support Aircraft | KC-135 | Air | 396 | - | - | 3 | - | - | - | 3 | 3 | - | - | 3 | - | - | - | 3 | 3 |
| US | Exquisite | Multirole Aircraft | F-35A | Air | 1,325 | - | - | - | 1 | - | - | - | 1 | - | - | - | 1 | - | - | - | 1 |
| US | Exquisite | Multirole Aircraft | F-15E | Air | 435 | - | 3 | - | 1 | - | 3 | 3 | 4 | - | 3 | - | 1 | - | 3 | 3 | 4 |
| US | Exquisite | Single Role Aircraft | A-10 II | Air | 162 | - | - | - | 1 | - | - | - | 1 | - | - | - | 1 | - | - | - | 1 |
| US | Exquisite | Special Operations Aircraft | HH-60W | Air | 47 | - | - | - | 1 | - | - | - | 1 | - | - | - | 1 | - | - | - | 1 |
| US | Exquisite | Radar/Early Warning | AN/FPS-132 | Air | 5 | 1 | - | - | - | 1 | 1 | 1 | 1 | 1 | - | - | - | 1 | 1 | 1 | 1 |
| US | Exquisite | Radar/Early Warning | AN/TPY-2 | Air | | 4 | - | - | - | 4 | 4 | 4 | 4 | 4 | - | - | - | 4 | 4 | 4 | 4 |
| US | Exquisite | Radar/Early Warning | AN/TPS-59 | Air | | 1 | - | - | - | 1 | 1 | 1 | 1 | 1 | - | - | - | 1 | 1 | 1 | 1 |

Figure 22: Blue Exquisite Platforms All Phases Consumption Data

Notes on Figure 22:

- ATACMS derived from subtracting PrSM end usage (CISI) from PrSM+ATACMS first 96 hours use (FPRI).

| *BLUE MUNITIONS & PLATFORMS USED AGAINST RED BY CATEGORY (PHASE II ALTERNATIVE)* | | | | | Optimal | Available | Less than Ideal | PHASE I BLUE OFFENSIVE COUNTERAIR | | PHASE II- BLUE DECAP, INTERDICT & CAS | PHASE IV DEFENSIVE COUNTERAIR AGAINST RED BARRAGES | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Country** | **Category** | **Type** | **Munition or Platform** | **Launch Domain** | **Target Domain** | **Range** | **Per Munition/Asset Cost Estimate** | **Ground, Sea, or Both** | **Air Targets** | **Ground, Sea, or Both** | **Rocket** | **Drones & Loitering Munitions** | **Cruise Missile** | **Ballistic Missile** |
| US | Alternative | Ballistic Missile | ATACMS | Ground | Ground | 300km | $ 1,700,000 | X | | X | | | | |
| Israel | Alternative | Missile | Rampage Supersonic | Air | Ground | 200km | $ 300,000 | X | | X | | | | |
| US | Alternative | Glide Bomb | AGM-154JSOW | Air | Ground | 130km | $ 720,000 | X | | X | | | | |
| Israel | Alternative | Glide Bomb | Spice-2000/1000 Guided Bombs | Air | Ground | 125km | $ 225,000 | | | X | | | | |
| US | Alternative | Glide Bomb | GBU-39 Small Diameter Bomb | Air | Ground | 111km | $ 40,000 | | | X | | | | |
| US | Alternative | Rocket | GMLRS/GMLRS-ER | Ground | Ground | 92km | $ 434,000 | X | | X | | | | |
| US | Alternative | Glide Bomb | GBU-31/32/38 JDAM Modification | Air | Ground, Sea | 80km | $ 66,000 | | | X | | | | |
| Israel | Alternative | Glide Bomb | Israeli JDAM | Air | Ground, Sea | 80km | $ 66,000 | | | X | | | | |
| US | Alternative | Missile | AGM-114 Hellfire / JAGM | Air | Air, Ground, Sea | 11km | $ 117,000 | | | X | | X | | |

Figure 23: Blue Alternative Munitions Phase II: Decapitation, Interdiction, and Close Air Support

| *BLUE MUNITIONS & PLATFORMS USED AGAINST RED BY CATEGORY (PHASE II ALTERNATIVE)* | | | | | START | LOW ESTIMATE | | | | Low Estimate Cummulaive | | | | Realistic Estimate Behavior over Time | | | | Realistic Estimate Cummulaive | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Country** | **Category** | **Type** | **Munition or Platform** | **Launch Domain** | ***Est. Start Inventory*** | ***First 36 Hours*** | ***First 4 Days*** | ***Days 4-16*** | ***Days 16-39*** | ***First 36 Hours*** | ***By 4th Day*** | ***By Day 16*** | ***By Day 39*** | ***First 36 Hours*** | ***First 4 Days*** | ***Days 4-16*** | ***Days 16-39*** | ***First 36 Hours*** | ***By 4th Day*** | ***By Day 16*** | ***By Day 39*** |
| US | Alternative | Ballistic Missile | ATACMS | Ground | 610 | 37 | 133 | 95 | - | 37 | 170 | 265 | 265 | 37 | 133 | 95 | 95 | 37 | 170 | 265 | 360 |
| Israel | Alternative | Missile | Rampage Supersonic | Air | 500 | 70 | 60 | 114 | - | 70 | 130 | 244 | 244 | 70 | 60 | 114 | 114 | 70 | 130 | 244 | 358 |
| US | Alternative | Glide Bomb | AGM-154JSOW | Air | 5,000 | 50 | 40 | 93 | - | 50 | 90 | 183 | 183 | 50 | 40 | 93 | 93 | 50 | 90 | 183 | 276 |
| Israel | Alternative | Glide Bomb | Spice-2000/1000 Guided Bombs | Air | 4,000 | 280 | 180 | 440 | - | 280 | 460 | 900 | 900 | 280 | 180 | 440 | 440 | 280 | 460 | 900 | 1,340 |
| US | Alternative | Glide Bomb | GBU-39 Small Diameter Bomb | Air | 30,000 | 90 | 70 | 160 | - | 90 | 160 | 320 | 320 | 90 | 70 | 160 | 160 | 90 | 160 | 320 | 480 |
| US | Alternative | Rocket | GMLRS/GMLRS-ER | Ground | 60,000 | 50 | 160 | 155 | - | 50 | 210 | 365 | 365 | 50 | 160 | 155 | 155 | 50 | 210 | 365 | 520 |
| US | Alternative | Glide Bomb | GBU-31/32/38 JDAM Modification | Air | 115,000 | 210 | 322 | 548 | - | 210 | 532 | 1,080 | 1,080 | 210 | 322 | 548 | 548 | 210 | 532 | 1,080 | 1,628 |
| Israel | Alternative | Glide Bomb | Israeli JDAM | Air | 8,000 | 140 | 90 | 321 | - | 140 | 230 | 551 | 551 | 140 | 90 | 321 | 321 | 140 | 230 | 551 | 872 |
| US | Alternative | Missile | AGM-114 Hellfire / JAGM | Air | 25,000 | 60 | 45 | 273 | - | 60 | 105 | 378 | 378 | 60 | 45 | 273 | 273 | 60 | 105 | 378 | 651 |

Figure 24: Blue Alternative Munitions Phase II: Decapitation, Interdiction, and Close Air Support Consumption Data

| *BLUE MUNITIONS & PLATFORMS USED AGAINST RED BY CATEGORY (PHASE IV ALTERNATIVE)* | | | | | Optimal | Available | Less than Ideal | PHASE I BLUE OFFENSIVE COUNTERAIR | | PHASE II- BLUE DECAP, INTERDICT & CAS | PHASE IV DEFENSIVE COUNTERAIR AGAINST RED BARRAGES | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Country** | **Category** | **Type** | **Munition or Platform** | **Launch Domain** | **Target Domain** | **Range** | **Per Munition/Asset Cost Estimate** | **Ground, Sea, or Both** | **Air Targets** | **Ground, Sea, or Both** | **Rocket** | **Drones & Loitering Munitions** | **Cruise Missile** | **Ballistic Missile** |
| US | Alternative | Missile | AIM-120 AAMRAM | Air | Air | 160km | $ 1,000,000 | | X | | | X | X | |
| UK | Alternative | Missile | RAF AIM120/AIM-9 | Air | Air | 160km | $ 1,000,000 | | X | | | X | X | |
| Jordan | Alternative | Missile | Jordan AIM-120/ AIM-9 | Air | Air | 160km | $ 1,000,000 | | X | | | X | X | |
| GCC | Alternative | Missile | Qatar/Bahrain/ UAE AIM-120/AIM-9 | Air | Air | 160km | $ 1,000,000 | | X | | | X | X | |
| GCC | Alternative | Missile | Kuwait AIM-120/AIM-9 | Air | Air | 160km | $ 1,000,000 | | X | | | X | X | |
| GCC | Alternative | Missile | Saudi SHORAD (Crotale) | Ground | Air | 15km | $ 120,000 | | X | | | X | X | |
| Israel | Alternative | Rocket | Israeli Iron Dome Tamir | Ground | Air | 70km | $ 60,000 | | | | X | X | X | |

Figure 25: Blue Alternative Munitions - Phase IV Counter Barrage

| *BLUE MUNITIONS & PLATFORMS USED AGAINST RED BY CATEGORY (PHASE IV ALTERNATIVE)* | | | | | START | LOW ESTIMATE | | | | Low Estimate Cummulaive | | | | Realistic Estimate Behavior over Time | | | | Realistic Estimate Cummulaive | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Country** | **Category** | **Type** | **Munition or Platform** | **Launch Domain** | ***Est. Start Inventory*** | ***First 36 Hours*** | ***First 4 Days*** | ***Days 4-16*** | ***Days 16-39*** | ***First 36 Hours*** | ***By 4th Day*** | ***By Day 16*** | ***By Day 39*** | ***First 36 Hours*** | ***First 4 Days*** | ***Days 4-16*** | ***Days 16-39*** | ***First 36 Hours*** | ***By 4th Day*** | ***By Day 16*** | ***By Day 39*** |
| US | Alternative | Missile | AIM-120 AAMRAM | Air | 14,000 | 20 | 23 | 161 | - | 20 | 43 | 204 | 204 | 20 | 23 | 161 | 161 | 20 | 43 | 204 | 365 |
| UK | Alternative | Missile | RAF AIM120/AIM-9 | Air | 5,000 | - | 6 | 26 | - | | 6 | 32 | 32 | - | 6 | 26 | 26 | | 6 | 32 | 58 |
| Jordan | Alternative | Missile | Jordan AIM-120/ AIM-9 | Air | 800 | 12 | - | 65 | - | 12 | 12 | 77 | 77 | 12 | - | 65 | 65 | 12 | 12 | 77 | 142 |
| GCC | Alternative | Missile | Qatar/Bahrain/ UAE AIM-120/AIM-9 | Air | 1,500 | 8 | - | 49 | - | 8 | 8 | 57 | 57 | 8 | - | 49 | 49 | 8 | 8 | 57 | 106 |
| GCC | Alternative | Missile | Kuwait AIM-120/AIM-9 | Air | 500 | 3 | - | 60 | - | 3 | 3 | 63 | 63 | 3 | - | 60 | 60 | 3 | 3 | 63 | 123 |
| GCC | Alternative | Missile | Saudi SHORAD (Crotale) | Ground | 1,000 | - | 25 | 70 | - | | 25 | 95 | 95 | - | 25 | 70 | 70 | | 25 | 95 | 165 |
| Israel | Alternative | Rocket | Israeli Iron Dome Tamir | Ground | 3,000 | 70 | 65 | 428 | - | 70 | 135 | 563 | 563 | 70 | 65 | 428 | 428 | 70 | 135 | 563 | 991 |

Figure 26: Blue Alternative Munitions - Phase IV Counter Barrage Consumption Data

| *BLUE MUNITIONS & PLATFORMS USED AGAINST RED BY CATEGORY (ALL PHASES LOW COST ALTERNATIVE)* | | | | | Optimal | Available | Less than Ideal | PHASE I BLUE OFFENSIVE COUNTERAIR | | PHASE II- BLUE DECAP, INTERDICT & CAS | PHASE IV DEFENSIVE COUNTERAIR AGAINST RED BARRAGES | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Country** | **Category** | **Type** | **Munition or Platform** | **Launch Domain** | **Target Domain** | **Range** | **Per Munition/Asset Cost Estimate** | **Ground, Sea, or Both** | **Air Targets** | **Ground, Sea, or Both** | **Rocket** | **Drones & Loitering Munitions** | **Cruise Missile** | **Ballistic Missile** |
| US | Low Cost Alternative | Loitering Munition | LUCAS/Scorpion | Ground | Ground | 800km | $ 35,000 | X | | X | | | | |
| US | Low Cost Alternative | Loitering Munition | Merops | Ground | Air | 20km | $ 15,000 | | | | | X | | |
| US | Low Cost Alternative | Loitering Munition | Road Runner | Ground, Sea | Air | 15km | $ 500,000 | | | | | X | | |
| US | Low Cost Alternative | Loitering Munition | Coyote | Ground, Sea | Air | 15km | $ 125,000 | | | | | X | | |
| US & Allies | Low Cost Alternative | Rocket | APKWS Hydra 70 Mod | Air | Air, Ground, Sea | 11km | $ 22,000 | | | X | | X | | |
| US | Low Cost Alternative | Cannon | 20mm Phalanx CWIS / Centurion C-RAM | Ground, Sea | Air | 2km | $ 35 | | | | X | X | X | |
| KSA | Low Cost Alternative | Cannon | 35mm Other | Ground | Air | 2km | $ 62 | | | | X | X | X | |
| GCC | Low Cost Alternative | Cannon | 30mm Oerlikon HEI/APCR | Ground | Air | 2km | $ 70 | | | | X | X | X | |

Figure 27: Blue Low-Cost Alternatives All Phases

| *BLUE MUNITIONS & PLATFORMS USED AGAINST RED BY CATEGORY (ALL PHASES LOW COST ALTERNATIVE)* | | | | | START | LOW ESTIMATE | | | | Low Estimate Cummulaive | | | | Realistic Estimate Behavior over Time | | | | Realistic Estimate Cummulaive | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Country** | **Category** | **Type** | **Munition or Platform** | **Launch Domain** | ***Est. Start Inventory*** | ***First 36 Hours*** | ***First 4 Days*** | ***Days 4-16*** | ***Days 16-39*** | ***First 36 Hours*** | ***By 4th Day*** | ***By Day 16*** | ***By Day 39*** | ***First 36 Hours*** | ***First 4 Days*** | ***Days 4-16*** | ***Days 16-39*** | ***First 36 Hours*** | ***By 4th Day*** | ***By Day 16*** | ***By Day 39*** |
| US | Low Cost Alternative | Loitering Munition | LUCAS/Scorpion | Ground | 5,000 | 120 | 80 | 320 | - | 120 | 200 | 520 | 520 | 120 | 80 | 320 | 320 | 120 | 200 | 520 | 840 |
| US | Low Cost Alternative | Loitering Munition | Merops | Ground | 13,000 | - | - | - | - | | | | - | - | - | - | - | | | | - |
| US | Low Cost Alternative | Loitering Munition | Road Runner | Ground, Sea | 500 | - | - | - | - | | | | - | - | - | - | - | | | | - |
| US | Low Cost Alternative | Loitering Munition | Coyote | Ground, Sea | 100,000+ | - | - | - | - | | | | - | - | - | - | - | | | | - |
| US & Allies | Low Cost Alternative | Rocket | APKWS Hydra 70 Mod | Air | 100,000+ | - | - | - | - | | | | - | - | - | - | - | | | | - |
| US | Low Cost Alternative | Cannon | 20mm Phalanx CWIS / Centurion C-RAM | Ground, Sea | Hundreds of thousands | - | - | - | | | | | | - | - | - | | | | | |
| KSA | Low Cost Alternative | Cannon | 35mm Other | Ground | Hundreds of thousands | - | - | - | | | | | | - | - | - | | | | | |
| GCC | Low Cost Alternative | Cannon | 30mm Oerlikon HEI/APCR | Ground | Hundreds of thousands | - | - | - | | | | | | - | - | - | | | | | |

Figure 28: Blue Low-Cost Alternatives All Phases Consumption Data

| *AGGREGATE RED MUNITIONS & PLATFORMS USED AGAINST BLUE BY CATEGORY (ALL PHASES ALTERNATIVE)* | | | | | Optimal | Hide | Hide | Hide | Available | Less than Ideal | PHASE I RED DEFENSIVE COUNTERAIR | | PHASE III RED COUNTERS W/ REGIONAL BARRAGES | PHASE IV RED DEFENSIVE COUNTERAIR AGAINST BLUE STRIKES | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Country** | **Category** | **Type** | **Munition or Platform** | **Launch Domain** | **Target Domain** | **Sort Air (Hide)** | **Sort Ground (Hide)** | **Sort Sea (Hide)** | **Range Estimate** | **Per Munition/ Asset Cost Estimate** | **Ground, Sea, or Both** | **Air Targets** | **Ground, Sea, or Both** | **Rocket** | **Drones & Loitering Munitions** | **Cruise Missile** | **Ballistic Missile** |
| Iran | Alternative | Ballistic Missile | Ballistic Missile Family (Shahab-3 as representative) | Ground | Ground | 0 | 1 | 0 | 2000km | $2,000,000 | X | | X | | | | |
| Iran | Alternative | Cruise Missile | Cruise Missile Family (Soumar as representative) | Ground | Ground | 0 | 1 | 0 | 1350km | $3,000,000 | X | | X | | | | |
| Iran | Alternative | Multirole Aircraft | F-14 Tomcat | Air | Air, Ground, Sea | 0 | 0 | 0 | 932km | $38,000,000 | X | X | X | | X | X | |
| Iran | Alternative | Multirole Aircraft | P-3 Orion | Air | Sea | 0 | 0 | 0 | 2491km | $36,000,000 | | | X | | | | |
| Iran | Alternative | Light Combat | Yak-130 | Air | Air, Ground | 0 | 0 | 0 | 2100km | $15,000,000 | | X | X | | X | X | |
| Iran | Alternative | Multirole Aircraft | Chengdu J-7 | Air | Air, Ground | 0 | 0 | 0 | 850km | $2,000,000 | X | X | X | | X | X | |
| Iran | Alternative | Single Role Aircraft | Su-25 | Air | Ground | 0 | 0 | 0 | 750km | $13,000,000 | X | | X | | | | |
| Iran | Alternative | Support Aircraft | An-74 Transport | Air | Ground | 0 | 0 | 0 | 4325km | $22,000,000 | X | X | X | X | X | X | X |

Figure 29: Red Alternative Munitions & Platforms All Phases

| *AGGREGATE RED MUNITIONS & PLATFORMS USED AGAINST BLUE BY CATEGORY (ALL PHASES ALTERNATIVE)* | | | | | START | Low Estimate Behavior over Time | | | | Low Estimate Cummulaive | | | | Realistic Estimates Behavior over Time | | | | Realistic Estimate Cummulaive | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Country | Category | Type | Munition or Platform | Launch Domain | Est. Start Inventory | First 36 Hours | First 4 Days | Days 4-16 | Days 16-39 | First 36 Hours | By 4th Day | By Day 16 | By Day 39 | First 36 Hours | First 4 Days | Days 4-16 | Days 16-39 | First 36 Hours | By 4th Day | By Day 16 | By Day 39 |
| Iran | Alternative | Ballistic Missile | Ballistic Missile Family (Shahab-3 as representative) | Ground | 3,000 | 327 | 44 | 355 | 612 | 327 | 371 | 399 | 967 | 327 | 44 | 355 | 612 | 327 | 371 | 726 | 1,338 |
| Iran | Alternative | Cruise Missile | Cruise Missile Family (Soumar as representative) | Ground | 4,000 | 378 | 28 | 25 | - | 378 | 406 | 53 | 25 | 378 | 28 | 25 | - | 378 | 406 | 431 | 431 |
| Iran | Alternative | Multirole Aircraft | F-14 Tomcat | Air | 25 | - | - | 3 | - | - | - | 3 | 3 | - | - | 3 | - | - | - | 3 | 3 |
| Iran | Alternative | Multirole Aircraft | P-3 Orion | Air | 3 | - | - | - | 1 | - | - | - | 1 | - | - | - | 1 | - | - | - | 1 |
| Iran | Alternative | Light Combat | Yak-130 | Air | 8 | - | - | 1 | - | - | - | 1 | 1 | - | - | 1 | - | - | - | 1 | 1 |
| Iran | Alternative | Multirole Aircraft | Chengdu J-7 | Air | 12 | - | - | 9 | 11 | - | - | 9 | 20 | - | - | 9 | 11 | - | - | 9 | 20 |
| Iran | Alternative | Single Role Aircraft | Su-25 | Air | 12 | - | - | 1 | - | - | - | 1 | 1 | - | - | 1 | - | - | - | 1 | 1 |
| Iran | Alternative | Support Aircraft | An-74 Transport | Air | 11 | - | - | 3 | - | - | - | 3 | 3 | - | - | 3 | - | - | - | 3 | 3 |

Figure 30: Red Alternative Munitions & Platforms All Phases Munitions Consumption

Notes on Figure 30:

- Ballistic Missile Family (Shahab-3 as representative) consumption estimate 2500-300 source: https://www.thetimes.com/world/middle-east/israel-iran/article/how-many-missiles-iran-war-ztwhk5twp
- Cruise Missile Family (Soumar as representative) took low end 7,000 estimate of ballistic & cruise missiles and subtracted 3,000 estimated ballistic from this source: https://global21.substack.com/p/how-many-missiles-does-iran-still?r=7kssds&utm_medium=ios&triedRedirect=true
- F-14 Tomcat Wide reporting that of the original 79 Tomcats purchased, Iran still had 20-30 operational and taking the midpoint. Sample: https://www.npr.org/2026/03/24/nx-s1-5752380/f14-tomcats-iran-us-israel-airstrikes-top-gun
- P-3 Orion consumption estimated from https://nationalinterest.org/blog/buzz/irans-military-flying-some-really-old-planes-and-they-were-built-america-101022
- Yak-130 consumption estimated from an estimate for the amount of Iranian arsenal unavailable (75% of which 50% was destroyed and 50% buried). This was adjusted to 50% for a conservative estimate, still split 50%/50% https://www.jpost.com/middle-east/iran-news/article-892171

| AGGREGATE RED MUNITIONS & PLATFORMS USED AGAINST BLUE BY CATEGORY (ALL PHASES LOW COST ALTERNATIVE & VINTAGE) | | | | | Optimal | | | | | Available | Less than Ideal | PHASE I RED DEFENSIVE COUNTERAIR | | PHASE III RED COUNTERS W/ REGIONAL BARRAGES | PHASE IV RED DEFENSIVE COUNTERAIR AGAINST BLUE STRIKES | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Country | Category | Type | Munition or Platform | Launch Domain | Target Domain | Sort Air (Hide) | Sort Ground (Hide) | Sort Sea (Hide) | Range Estimate | Per Munition/ Asset Cost Estimate | | Ground, Sea, or Both | Air Targets | Ground, Sea, or Both | Rocket | Drones & Loitering Munitions | Cruise Missile | Ballistic Missile |
| Iran | Low Cost Alternative | Loitering Munition | Shahed Family (136 model representative) | Ground | Ground | 0 | 1 | 0 | 2500 | $30,000 | | X | | X | | | | |
| Iran | Low Cost Alternative | Loitering Munition | SAM/MANPAD Family (358 / SA-67 as representative) | Ground | Air | 1 | 0 | 0 | 125km | $55,000 | | | X | | | X | X | |
| Iran | Vintage | Multirole Aircraft | Su-22 | Air | Air, Ground, Sea | 0 | 0 | 0 | 1150km | $7,000,000 | | X | X | X | | X | X | |
| Iran | Vintage | Multirole Aircraft | F-4 | Air | Air, Ground, Sea | 0 | 0 | 0 | 680km | $2,700,000 | | X | X | X | | X | X | |
| Iran | Vintage | Single Role Aircraft | Su-24 | Air | Ground | 0 | 0 | 0 | 615km | | | X | | X | | | | |
| Iran | Vintage | Multirole Aircraft | F-5 | Air | Air, Ground, Sea | 0 | 0 | 0 | 220km | $900,000 | | X | X | X | | X | X | |
| Iran | Vintage | Support Aircraft | 707 Refueling Tankers | Air | Air | 0 | 0 | 0 | 5200km | $16,000,000 | | X | X | X | X | X | X | X |
| Iran | Vintage | Support Aircraft | Il-76 | Air | Ground | 0 | 0 | 0 | 5000km | $15,000,000 | | X | X | X | X | X | X | X |
| Iran | Vintage | Support Aircraft | C-130 | Air | Ground | 0 | 0 | 0 | 1270km | $37,400,000 | | X | X | X | X | X | X | X |

Figure 31: Red Low-Cost Alternative & Vintage Munitions & Platforms all Phases

| AGGREGATE RED MUNITIONS & PLATFORMS USED AGAINST BLUE BY CATEGORY (ALL PHASES LOW COST ALTERNATIVE & VINTAGE) | | | | | START | Low Estimate Behavior over Time | | | | Low Estimate Cummulaive | | | | Realistic Estimates Behavior over Time | | | | Realistic Estimate Cummulaive | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Country | Category | Type | Munition or Platform | Launch Domain | Est. Start Inventory | First 36 Hours | First 4 Days | Days 4-16 | Days 16-39 | First 36 Hours | By 4th Day | By Day 16 | By Day 39 | First 36 Hours | First 4 Days | Days 4-16 | Days 16-39 | First 36 Hours | By 4th Day | By Day 16 | By Day 39 |
| Iran | Low Cost Alternative | Loitering Munition | Shahed Family (136 model representative) | Ground | 40,000 | 575 | 283 | 1,309 | 2,037 | 575 | 858 | 1,592 | 3,346 | 575 | 283 | 1,309 | 2,037 | 575 | 858 | 2,167 | 4,204 |
| Iran | Low Cost Alternative | Loitering Munition | SAM/MANPAD Family (358 / SA-67 as representative) | Ground | 5,000 | 50 | 65 | - | - | 50 | 115 | 65 | - | 50 | 65 | 65 | 65 | 50 | 115 | 180 | 245 |
| Iran | Vintage | Multirole Aircraft | Su-22 | Air | 13 | 2 | - | - | - | 2 | 2 | - | - | 2 | - | - | - | 2 | 2 | 2 | 2 |
| Iran | Vintage | Multirole Aircraft | F-4 | Air | 60 | 1 | - | - | - | 1 | 1 | - | - | 1 | - | - | - | 1 | 1 | 1 | 1 |
| Iran | Vintage | Single Role Aircraft | Su-24 | Air | 30 | 2 | - | 1 | - | 2 | 2 | 1 | 1 | 2 | - | 1 | - | 2 | 2 | 3 | 3 |
| Iran | Vintage | Multirole Aircraft | F-5 | Air | 9 | 1 | - | 1 | - | 1 | 1 | 1 | 1 | 1 | - | 1 | - | 1 | 1 | 2 | 2 |
| Iran | Vintage | Support Aircraft | 707 Refueling Tankers | Air | 3 | - | - | 2 | - | - | - | 2 | 2 | - | - | 2 | - | - | - | 2 | 2 |
| Iran | Vintage | Support Aircraft | Il-76 | Air | 12 | 1 | 1 | 6 | - | 1 | 2 | 7 | 6 | 1 | 1 | 6 | - | 1 | 2 | 8 | 8 |
| Iran | Vintage | Support Aircraft | C-130 | Air | 27 | 2 | - | 2 | 5 | 2 | 2 | 2 | 7 | 2 | - | 2 | 5 | 2 | 2 | 4 | 9 |

Figure 32: Red Low-Cost Alternative & Vintage Munitions & Platforms all Phases Munitions Consumption

Notes on Figure 32:

- Shahed Family (136 model representative) took a widely passed-around estimate that is hard to source, repeated by this expert, and cut it in half: https://www.dw.com/en/iran-us-israel-war-missiles-drones-strait-of-hormuz/a-76503329
- SAM/MANPAD Family (358 / SA-67 as representative) Starting estimated from a wide variety of sources that placed Iran's surface-to-air missile inventory at several thousand to ten thousand

and took the midpoint. 358 launches estimated by continuing the 4-day total to the other two periods as representative of the low number of launches that took down US aircraft.
- Su-22 consumption estimated from https://www.key.aero/article/irans-revolutionary-guard-corps-sukhoi-su-22-fitter-fleet

# 7 Forecast Accuracy Analysis

## 7.1 Converting Qualitative Forecasts to Quantitative for Formal Analysis

In making the initial reference modes for the qualitative dynamic hypothesis, an arbitrary value of 1,000 was set to represent the total available Blue, Red, and Proxy forces. Values for reference modes were then determined by percentage of this total number, to ensure conceptual conservation of mass and represent appropriate tradeoff. Blue, for example, couldn't simultaneously run unlimited offensive and defensive OODA loop operations; there would be a tradeoff between them.

The 1,000-unit marker level resulted in a useful-enough level to quantify the corresponding reference modes by multiplying them back against the percentage. Even though it wasn't a fully thought-out use case, the 1,000 per unit was within an order of magnitude (above or below) of actual volumes. It could still model the key dynamics, which were more important than point-to-point levels.

Two lessons arose from this method to improve hasty modeling. The first is to put some more thought into that underlying 'ceiling' level (1,000 in these models). The other is to specify variation in time units along the x-axis and adjust the ceiling number accordingly. The reference modes of the dynamic hypothesis continued to have 1,000 as a ceiling, regardless of whether the time unit in question was hours, days, or weeks. This likely results in the forecast being lower than observed in the "week" time periods, because I never multiplied the weekly time unit cases by x7.

It's also important to recognize the limitations of qualitative reference mode modeling and not try to 'overfit' or calibrate the reference modes for exact point-to-point behavior in the hasty modeling effort. If desired, which it may not always be, that activity can be conducted in computer simulations. It's this "did you count enough" forecast that can be checked through naïve forecasting in Thiel's $U_2$. In the hasty modeling, what is most important is the trendline outcome, phasing, cyclicality, and rough approximation of amplitude fluctuations by occurrence and timing, even if not by level. These forecasts can be checked using the decomposition components of Thiel's $U_1$.

## 7.2 Converting Qualitative Forecasts to Quantitative for Formal Analysis

The simplest of the two, Thiel's $U_2$ forecasting accuracy is used to evaluate against a naïve forecast. A result of <1.0 indicates better than guessing each subsequent period would be the same as the last, and is

marked in green; a result of =1.0 indicates no better or worse than guessing, and >1.0 indicates worse than guessing and is marked in red.

One limitation of Thiel's naïve forecast evaluation (U2) is that it struggles with forecasts that are sensitive to time-phasing and oscillations, both of which occur in MDML LSCO. A second Thiel forecast evaluation measure ($U_1$) decomposes the MSE into three components to better evaluate forecasts in this environment. Prevalence in the first component $U^m$ indicates a systemic error of consistent bias in parameter values, which is both wrong and useful. A prevalence of error attributable to the second component $U^s$ indicates unequal variation that may come from one of three sources: differing trendlines (wrong), accurate phasing but inaccurate amplitude fluctuations (wrong but useful), and lack of correlation (wrong) [51, p. 876]. Both visual inspection and further statistical analysis can determine the source and how that reflects forecast accuracy. Prevalence in the final component of $U^c$ indicates unequal covariation due to phasing differences, which may reflect a correct pattern at shifted-time intervals and is considered wrong but useful. Finally, if $U_2$ consists almost entirely of $U^s$ +$U^c$ this indicates that although the forecasted and observed share general means and trend of behavior, point-by-point behavior may differ, which is also wrong but useful. For purposes of hasty modeling, forecasts where the majority of $U_1$ results from a majority (>0.50) of $U^s$ or $U^c$ are marked in amber and inspected in the following discussion for explainable causes of error. Forecasts where almost all of $U_1$ (>0.85) was $U^{c,\text{ and}}$ almost the entirety (>0.95) is $U^s$ +$U^c$ are marked in green as more useful than not for purposes of overall behavior mode even if time phases, amplitude fluctuation, or point-by-point behavior varies, and this will be discussed in the narrative as these differences are important for lessons learned.

A strong caution is registered that the hasty forecasts were notional and illustrative; deliberate data collection was limited to OSINT & PAI estimates, so the rules are made up, and the points don't matter beyond being useful even if wrong.

## 7.3 Forecast Accuracy Results

Table 3: Forecast Accuracy Measures MAE, MASE & Thiel's $U_2$ Scenarios 1-3 & 5

| Scenario (Probability) → | Scenario 1 Blue Hoped / Red Feared (Very Unlikely) | | | | Scenario 2 Blue Feared / Red Hoped (Very Unlikely) | | | |
|---|---|---|---|---|---|---|---|---|
| Phenomena Compared → | Blue Ground Strikes | Blue Air Strikes | Iranian Barrages | Hezbollah Barrages | Blue Ground Strikes | Blue Air Strikes | Iranian Barrages | Hezbollah Barrages |
| Observed | 10,306 | 7,962 | 5,886 | 1,268 | 10,306 | 7,962 | 5,886 | 1,268 |
| Forecast | 12,562 | 1,563 | 743 | 582 | 1,800 | 7,641 | 7,683 | 4,278 |
| MAE | 612 | 442 | 322 | 54 | 552 | 280 | 300 | 206 |
| MASE | 697,861 | 473,244 | 203,292 | 5,777 | 908,554 | 205,400 | 145,105 | 86,579 |
| Better than Naïve <1.0 (Thiel $U_2$) | **0.75** | **0.97** | **1.28** | **0.68** | **1.15** | **.035** | **1.40** | **1.92** |
| Scenario (Probability) → | Scenario 3 Blue Actual Objectives as of 28 FEB (Probable if Grim) | | | | Scenario 5 Blue Actual Revised Objectives as of 04 MAR (Most Likely) | | | |
| Phenomena Compared → | Blue Ground Strikes | Blue Air Strikes | Iranian Barrages | Hezbollah Barrages | Blue Ground Strikes | Blue Air Strikes | Iranian Barrages | Hezbollah Barrages |
| Observed | 10,306 | 7,962 | 5,886 | 1,268 | 10,306 | 7,962 | 5,886 | 1,268 |
| Forecast | 6,604 | 3,990 | 4,459 | 3,631 | 3,502 | 3,651 | 4,383 | 3,004 |
| MAE | 645 | 391 | 328 | 165 | 451 | 369 | 331 | 126 |
| MASE | 965,697 | 296,746 | 167,019 | 54,643 | 759,273 | 289,230 | 171,581 | 33,756 |
| Better than Naïve <1.0 (Thiel $U_2$) | **9.88** | **17.53** | **1.01** | **2.23** | **1.04** | **.73** | **1.00** | **1.22** |

In terms of naïve forecasting, Scenarios 1 and 2 tried to capture the coupled Hoped/Feared of each opponent's early decisive victory due to a system collapse under a campaign of additive complexity. Scenario 3 tried to assess a realistic forecast for achieving day one maximalist objectives of regime change. While Scenario 5 tried to capture a more realistic portrayal that ultimately reflected closer to day four revised-lower Blue objectives of eliminating barrage capabilities. Scenarios 1 and 5 were the closest to being better than guessing, while Scenario 3 was the worst. In terms of naïve forecasting in components, Scenario 1 (Blue Hoped) was more accurate than guessing in terms of forecasted Blue Ground and Air Strikes and the level of proxy barrages. It was worse than guessing in terms of Iranian barrages. Scenario 2 (Blue Feared) was only more accurate than guessing in terms of Blue Air Strikes. Taken together, these tell a common narrative: estimates that JADO would perform better than mosaic warfare (Hoped > Feared) were correct, with a limitation that the scale of Iranian barrages was vastly underestimated. And even this may indicate success from a mosaic warfare doctrine; JADO defensive CounterAir operations (Blue Air Strikes Scenario 2) were more successful in absorbing those higher

barrages. Scenarios 3 and 5 were attempts to be more realistic, less hoped/feared. Scenarios 3 and 5 were generally less accurate than guessing. However, the maximalist objectives of Scenario 3 were the worst of all "guesses" by several multiples, mainly because that scenario envisioned a continued campaign under Phase VII conditions (similar to Gulf War I and the Iraq Invasion) that didn't occur as the ceasefire ended MDML LSCO on April 7th. Scenario 5 was close to, or slightly better than, guessing in every component other than Hezbollah barrages. As the Scenario 5 forecast aggregated all proxies, and the Houthis did not meaningfully engage, nor was data on Iranian-backed PMF in Iraq available, this explains the significant gap between a forecast of all proxies and the observed behavior of Hezbollah only.

| Scenario (Probability) → | Scenario 1 Blue Hoped / Red Feared (Very Unlikely) | | | | Scenario 2 Blue Feared / Red Hoped (Very Unlikely) | | | |
|---|---|---|---|---|---|---|---|---|
| Phenomena Compared → | Blue Ground Strikes | Blue Air Strikes | Iranian Barrages | Hezbollah Barrages | Blue Ground Strikes | Blue Air Strikes | Iranian Barrages | Hezbollah Barrages |
| MSE due to Bias ($U^m$) | 0.03 | 0.34 | **0.51** | **0.32** | 0.31 | 0.00 | 0.09 | **0.41** |
| MSE due to Unequal Variation ($U^s$) | 0.05 | **0.59** | 0.39 | **0.42** | 0.18 | 0.00 | 0.07 | **0.50** |
| MSE due to Covariation ($U^c$) | **0.92** | 0.09 | 0.13 | **0.28** | **0.52** | **1.00** | **0.85** | **0.11** |
| $U^m + U^s + U^c$ | ***1.0*** | ***1.0*** | ***1.0*** | ***1.0*** | ***1.0*** | ***1.0*** | ***1.0*** | ***1.0*** |
| Scenario (Probability) → | Scenario 3 Blue Actual Objectives as of 28 FEB (Probable if Grim) | | | | Scenario 5 Blue Actual Revised Objectives as of 04 MAR (Most Likely) | | | |
| Phenomena Compared → | Blue Ground Strikes | Blue Air Strikes | Iranian Barrages | Hezbollah Barrages | Blue Ground Strikes | Blue Air Strikes | Iranian Barrages | Hezbollah Barrages |
| MSE due to Bias ($U^m$) | **0.26** | **0.22** | 0.05 | **0.34** | 0.22 | **0.24** | 0.05 | 0.35 |
| MSE due to Unequal Variation ($U^s$) | **0.27** | **0.40** | 0.02 | **0.47** | **0.25** | **0.46** | 0.02 | **0.55** |
| MSE due to Covariation ($U^c$) | **0.45** | **0.35** | **0.93** | **0.24** | **0.58** | **0.35** | **0.93** | 0.12 |
| $U^m + U^s + U^c$ | ***1.0*** | ***1.0*** | ***1.0*** | ***1.0*** | ***1.0*** | ***1.0*** | ***1.0*** | ***1.0*** |

In every scenario, Hezbollah barrages were consistently incorrectly forecasted primarily because in the original forecasts "Proxy Barrages" were forecast to include Hezbollah, Iranian-backed Iraqi PMF, and Houthis. In the observed data, although they did occur, there was no reliable OSINT & PAI for Iranian-backed PMF barrages. More importantly, Houthis never activated in a meaningful way to contribute to MDML LSCO before the ceasefire was signed on April 7th.

In Scenario 1
In terms of naïve forecasting, Scenario 1 (Blue Hoped) was more accurate than guessing in terms of forecasted Blue Ground and Air Strikes and the level of proxy barrages. It was worse than guessing in terms of Iranian barrages. Scenario 2 (Blue Feared) was only more accurate than guessing in terms of Blue Air Strikes. Taken together, these tell a similar narrative: estimates that JADO would perform better than mosaic warfare (Hoped > Feared) were accurate except in estimates of the scale of Iranian barrages, which were far higher than expected. However, JADO defensive CounterAir operations were more successful than the hoped-for mosaic warfare scenario anticipated. Scenario 3

Scenarios 3 & 5 are remarkably similar because the opening phases are forecast to be similar. At the same time, the adjusted High Us shows forecasts with similar phasing to observed data, but the fluctuation in amplitude differs.

# 8 *Analysis of Data Set*

## 8.1 Confidence Building Charts

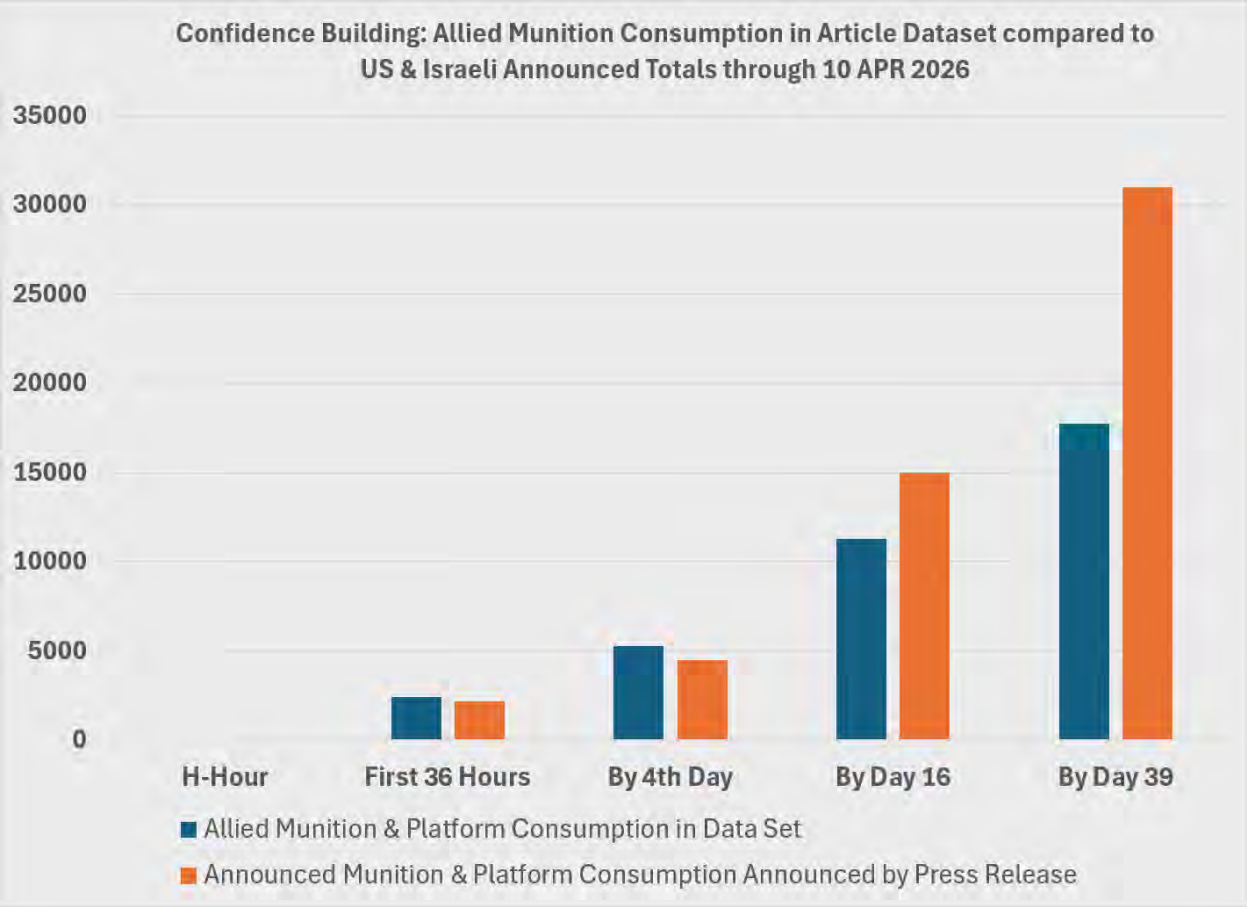



Figure 33: Confidence Building: Comparing Data Set Munition Consumption to Announced Levels

## 8.2 Key Lesson Charts

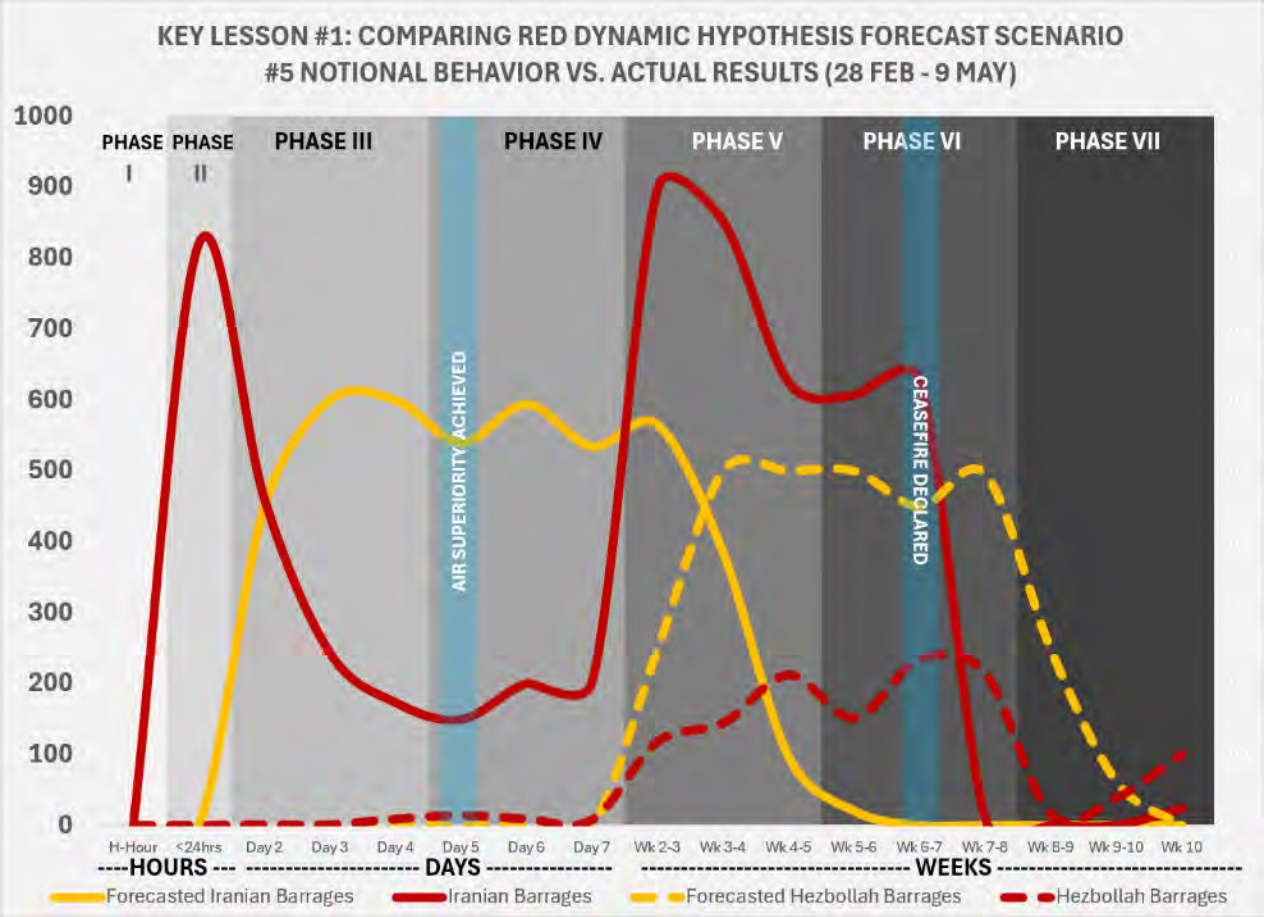


Figure 34: Key Lesson #1 Comparing Red Scenario 5 Forecasts vs Actual Results

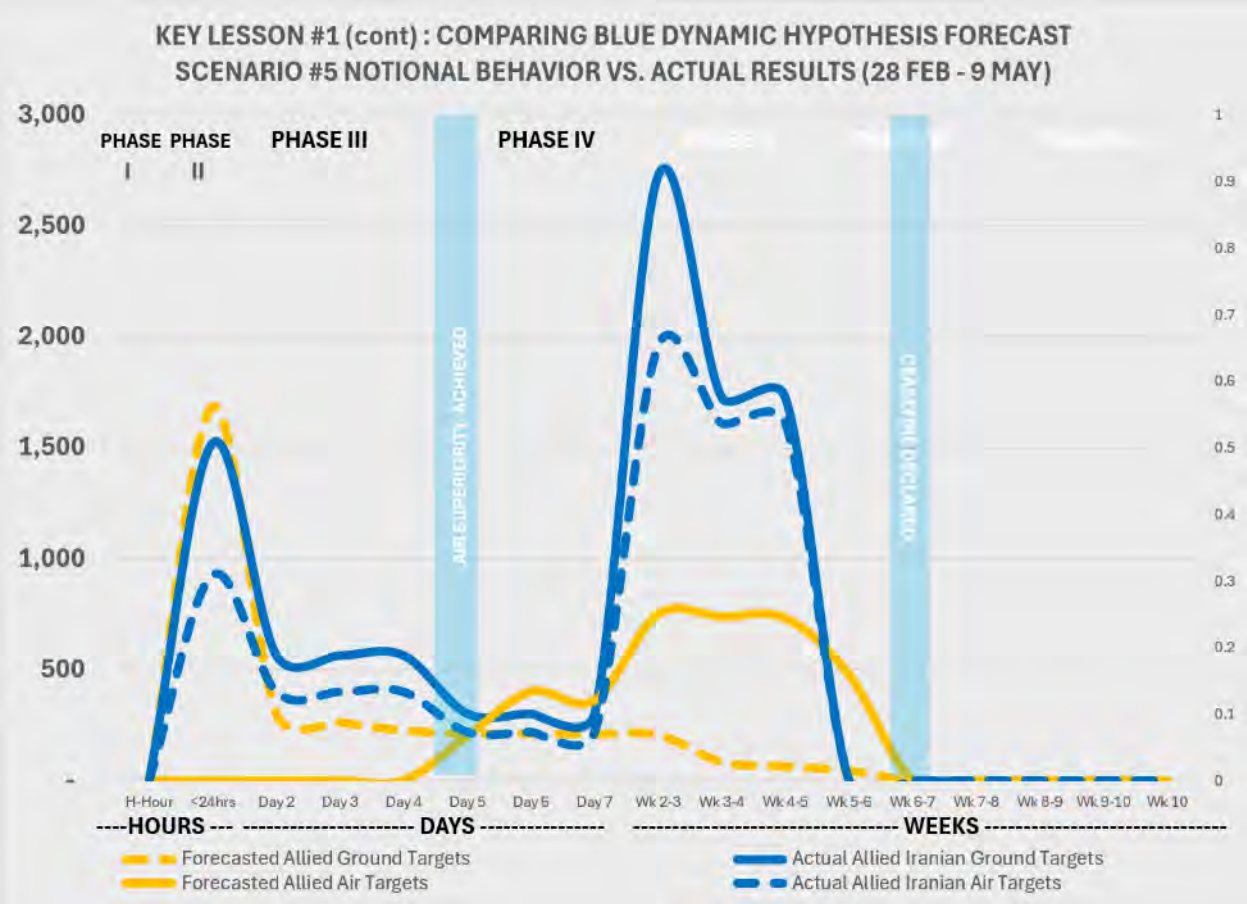


Figure 35: Key Lesson #2 Comparing Blue Scenario 5 Forecasts vs Actual Results

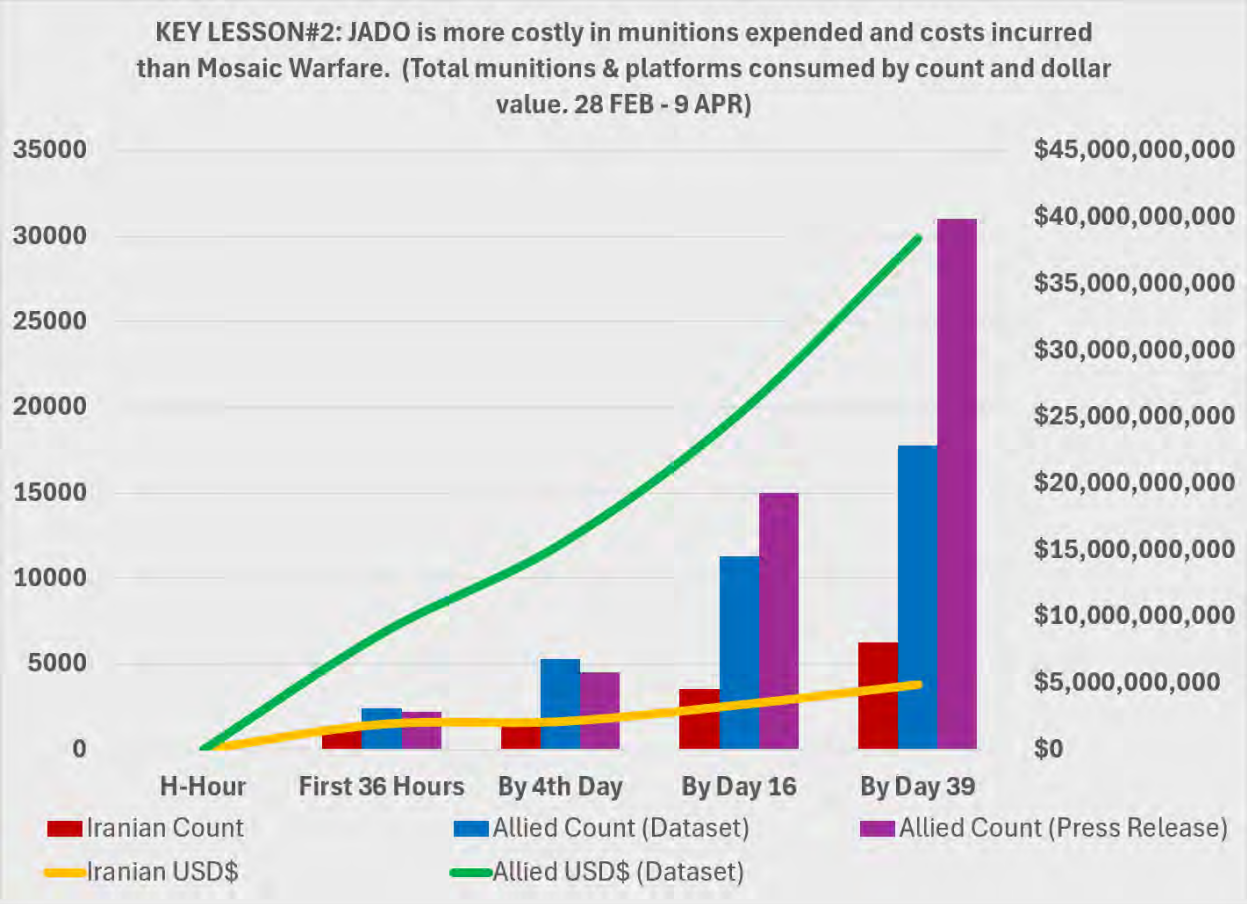



Figure 36: Key Lesson #2 JADO more costly and intense than Mosaic Warfare

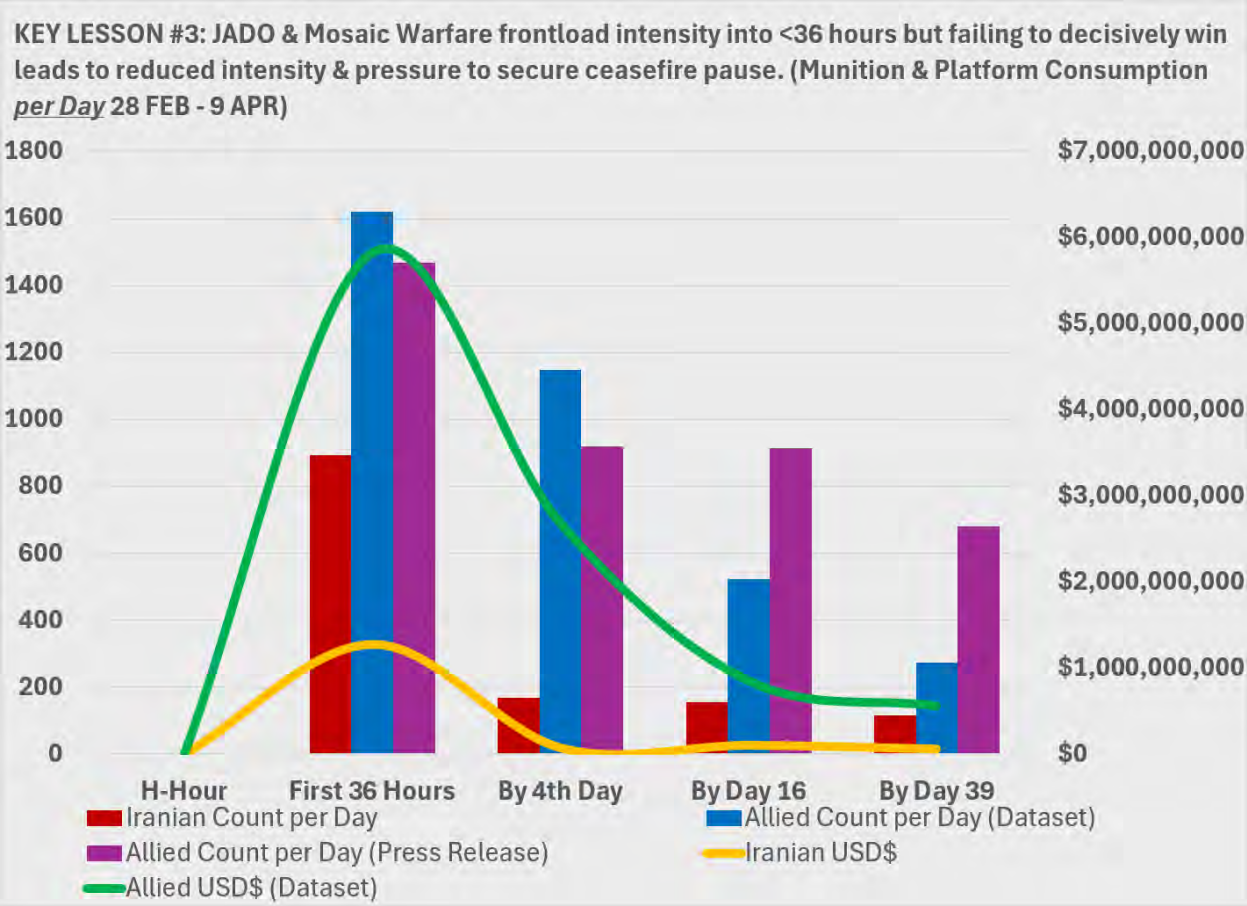



Figure 37: JADO & Mosaic Warfare frontload intensity into first 36hours but cannot sustain pace over time

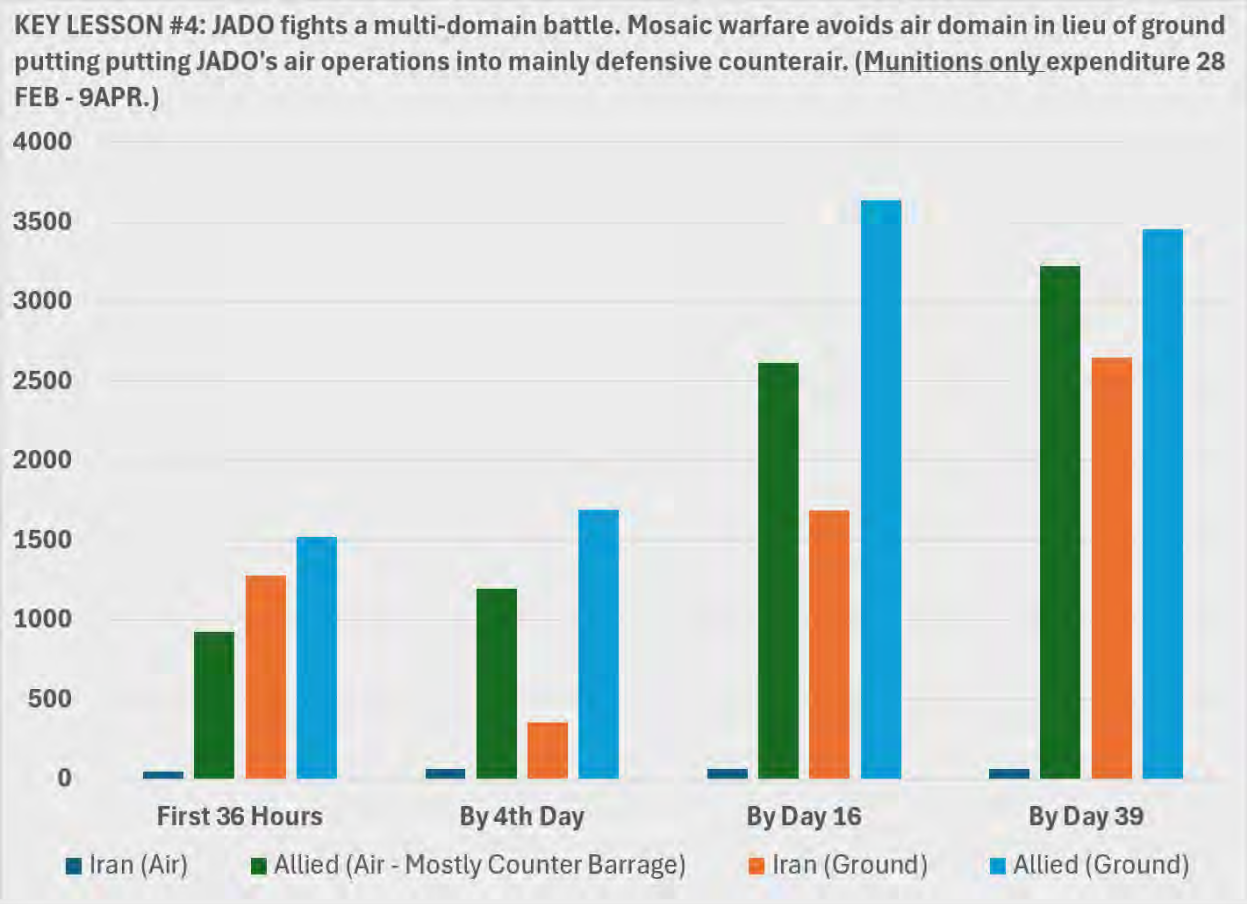



Figure 38: Key Lesson #4 JADO Targets Multiple-Dimensions Mosaic Warfare Focuses on Land & Sea Targets

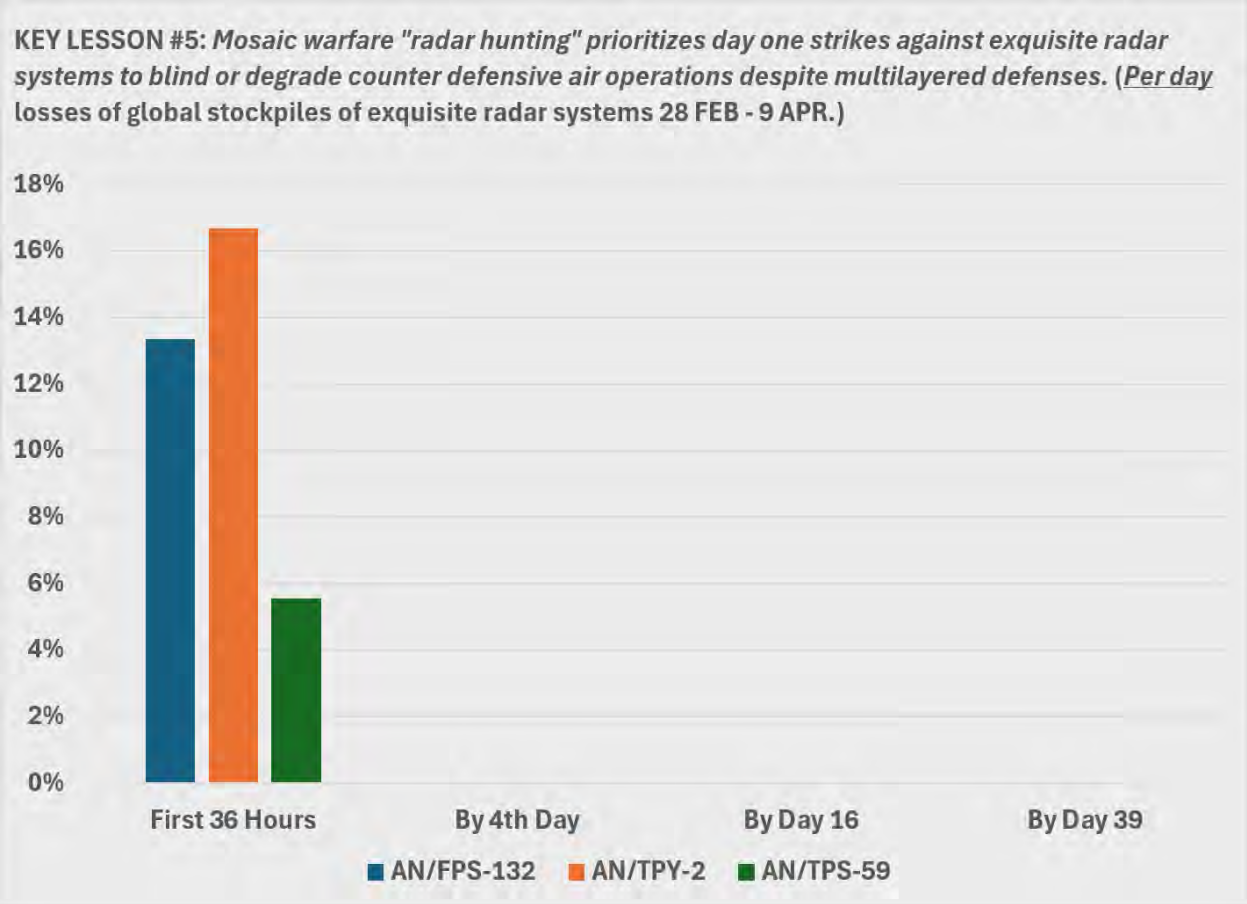



Figure 39: Mosaic warfare radar hunting

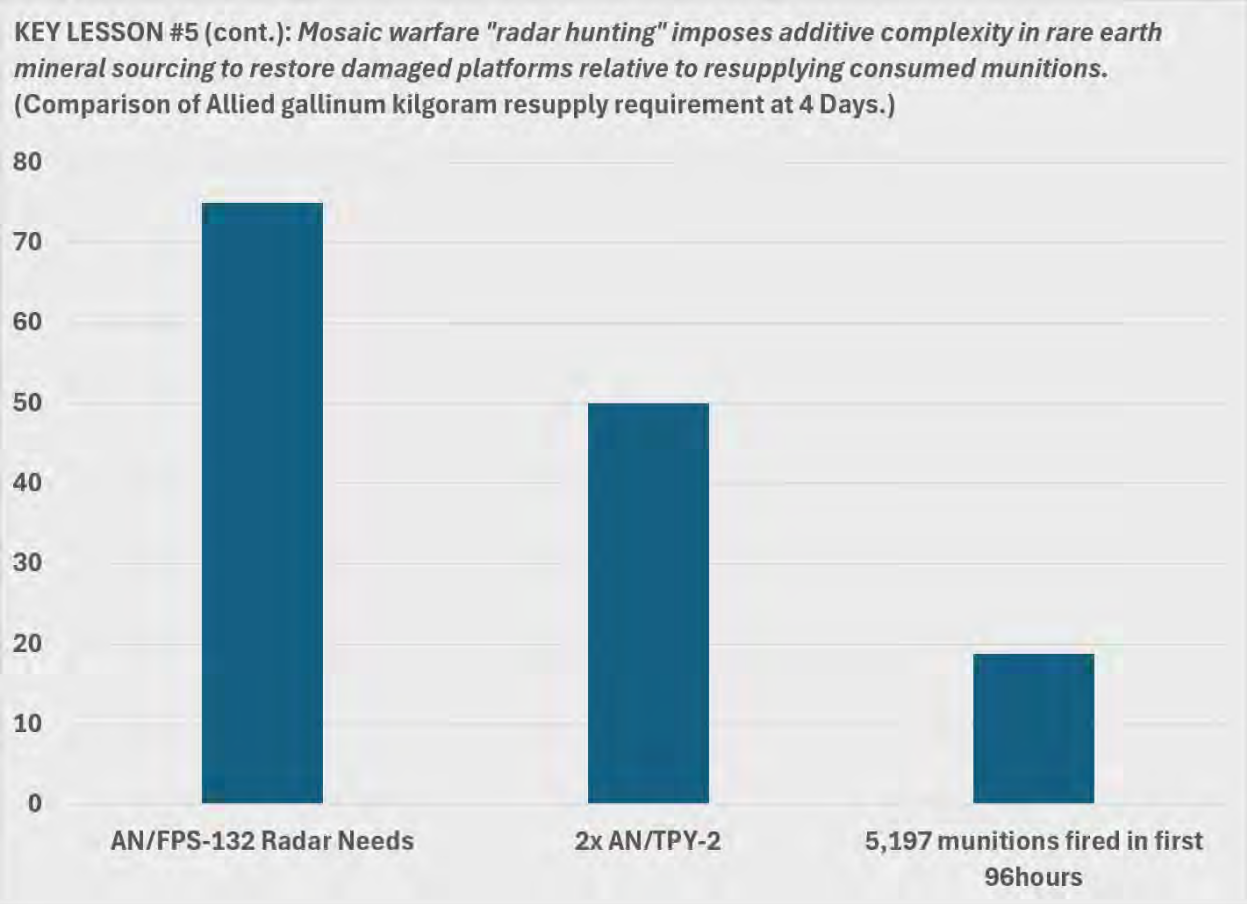


Figure 40: Additive complexity impacts of radar hunting

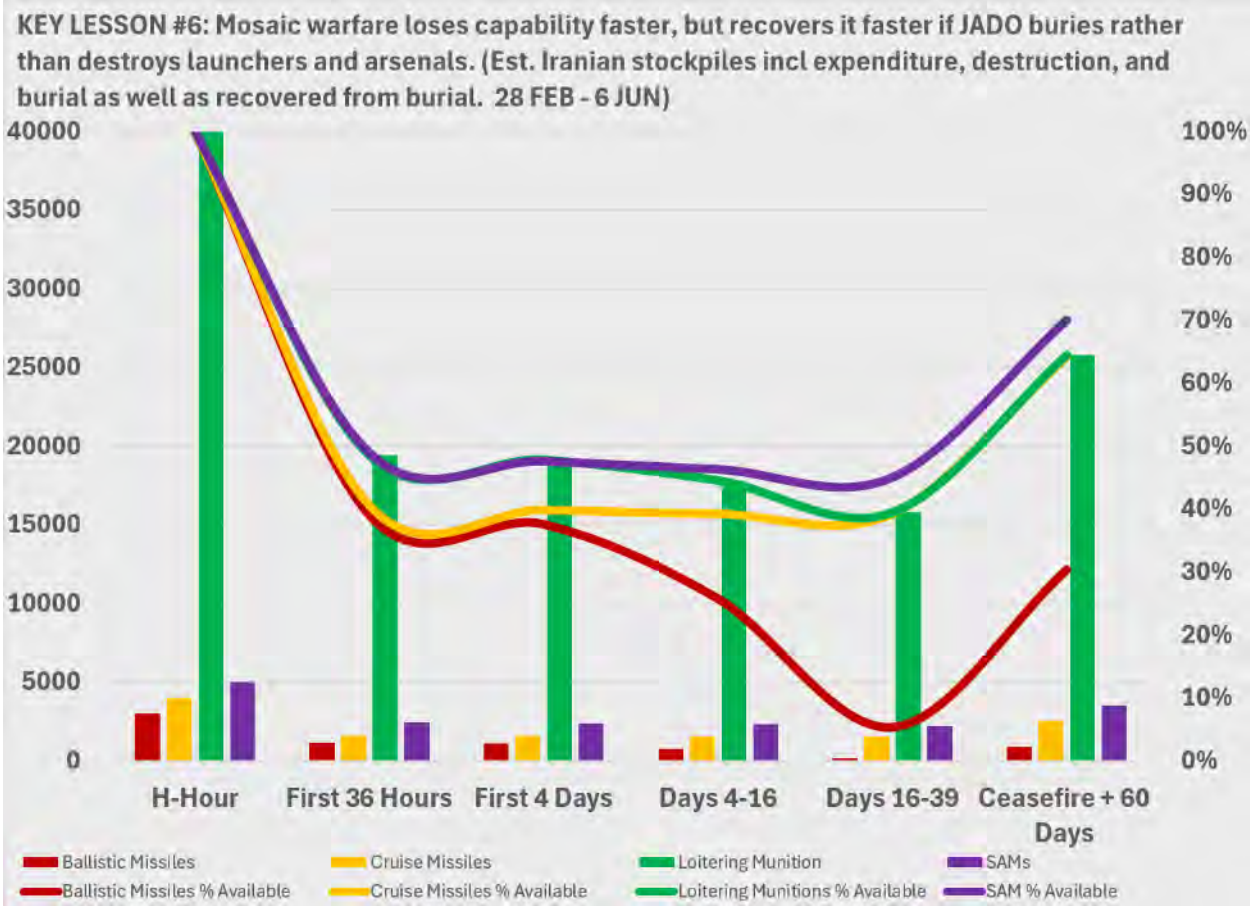


Figure 41: Key Lesson #6 Mosaic warfare loses capacity faster but can regain it faster if JADO focused on burying vs destroying targets

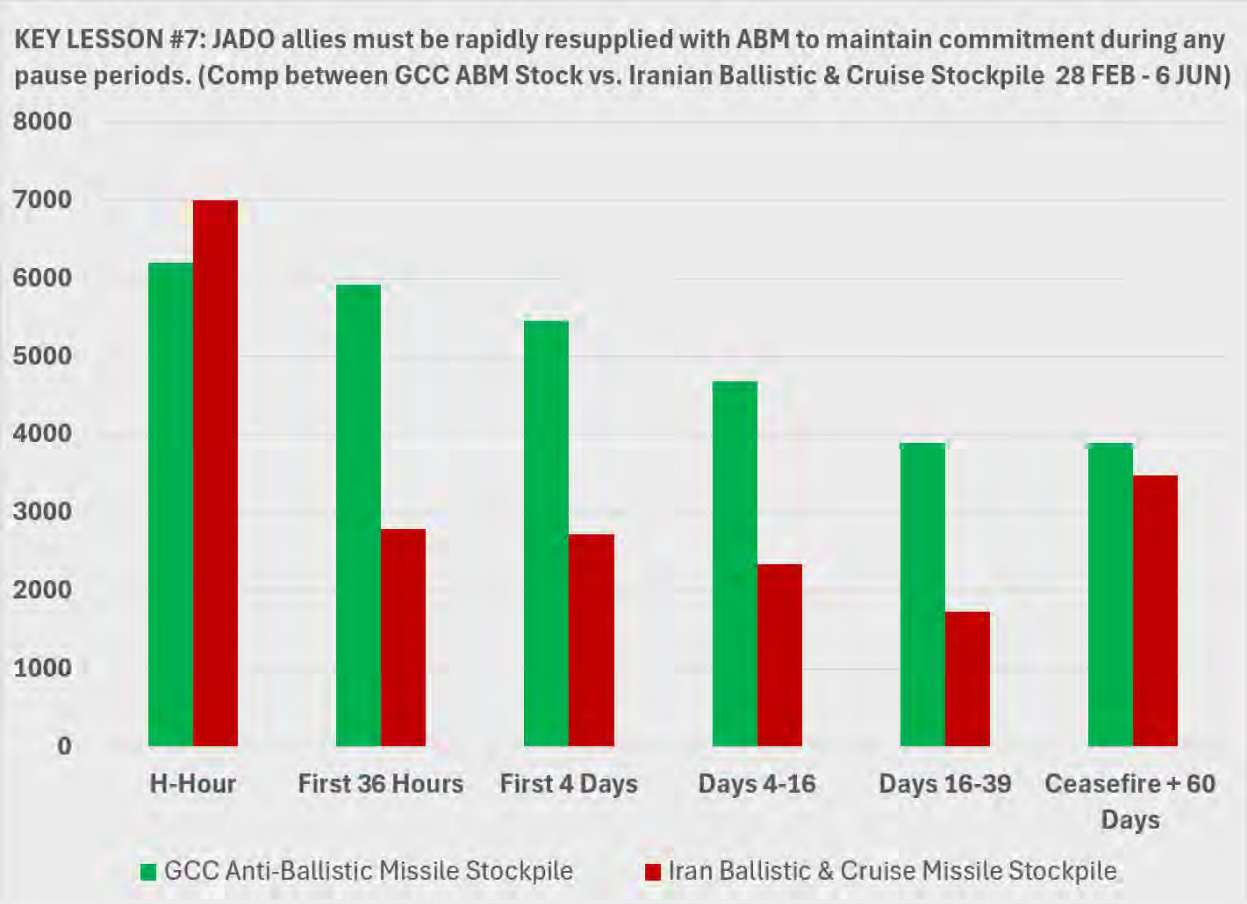


Figure 42: JADO allies require rapid resupply of ABM to maintain commitment

## 8.3 Allied Only Analysis

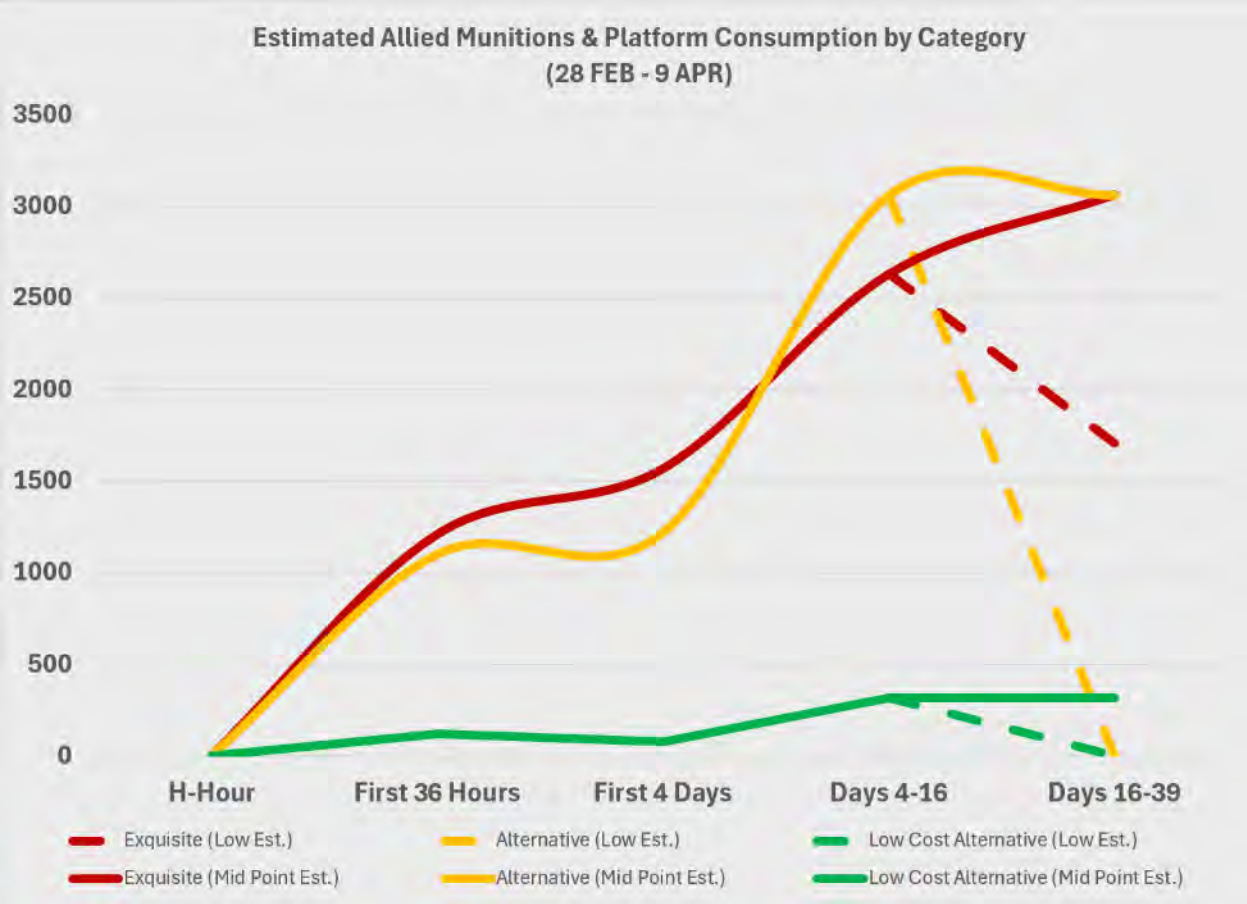



Figure 43: Estimated Allied Munitions & Platform Consumption by Category

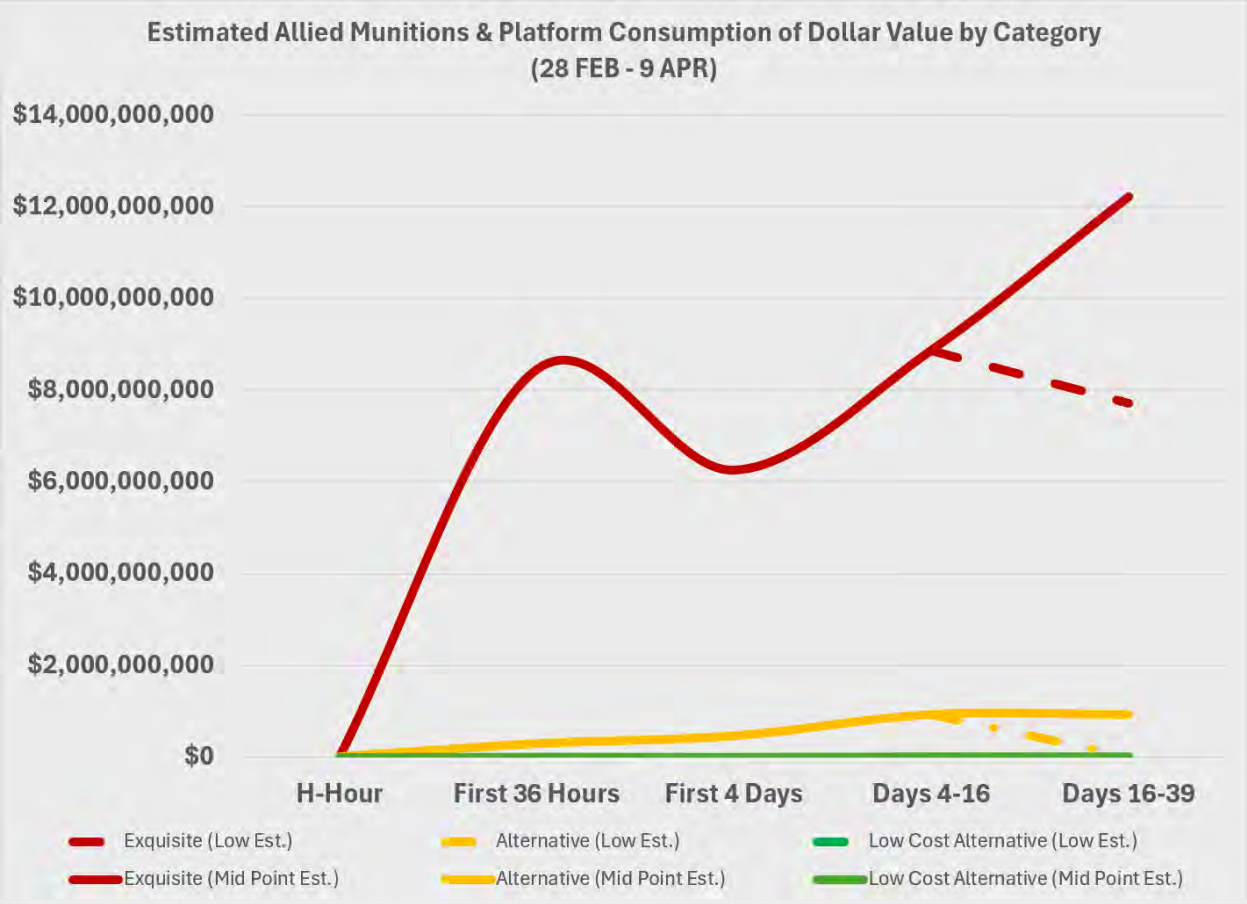



Figure 44: Estimated Allied Munitions & Platform Consumption of Dollar Value by Category

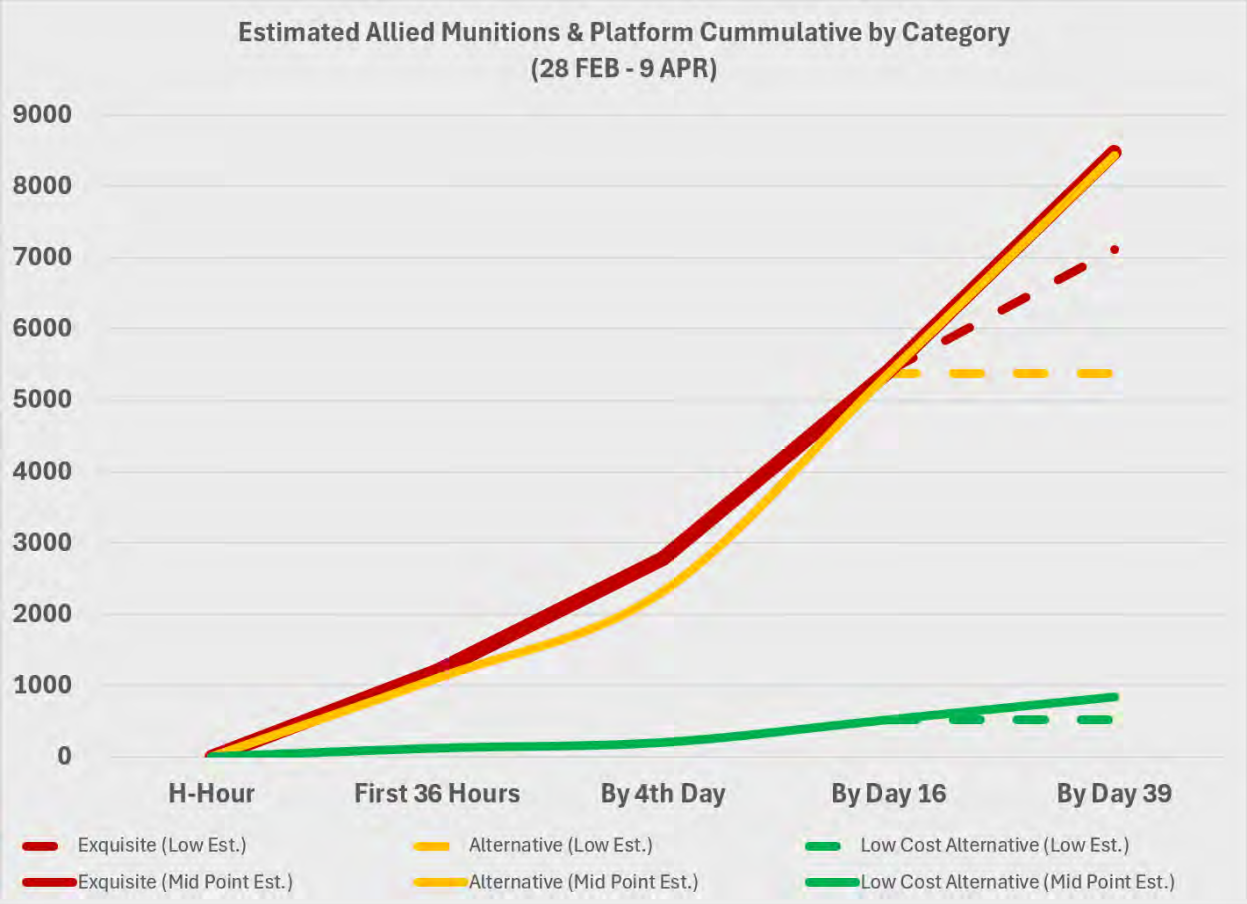



Figure 45: Estimated Allied Munitions & Platform Cumulative by Category

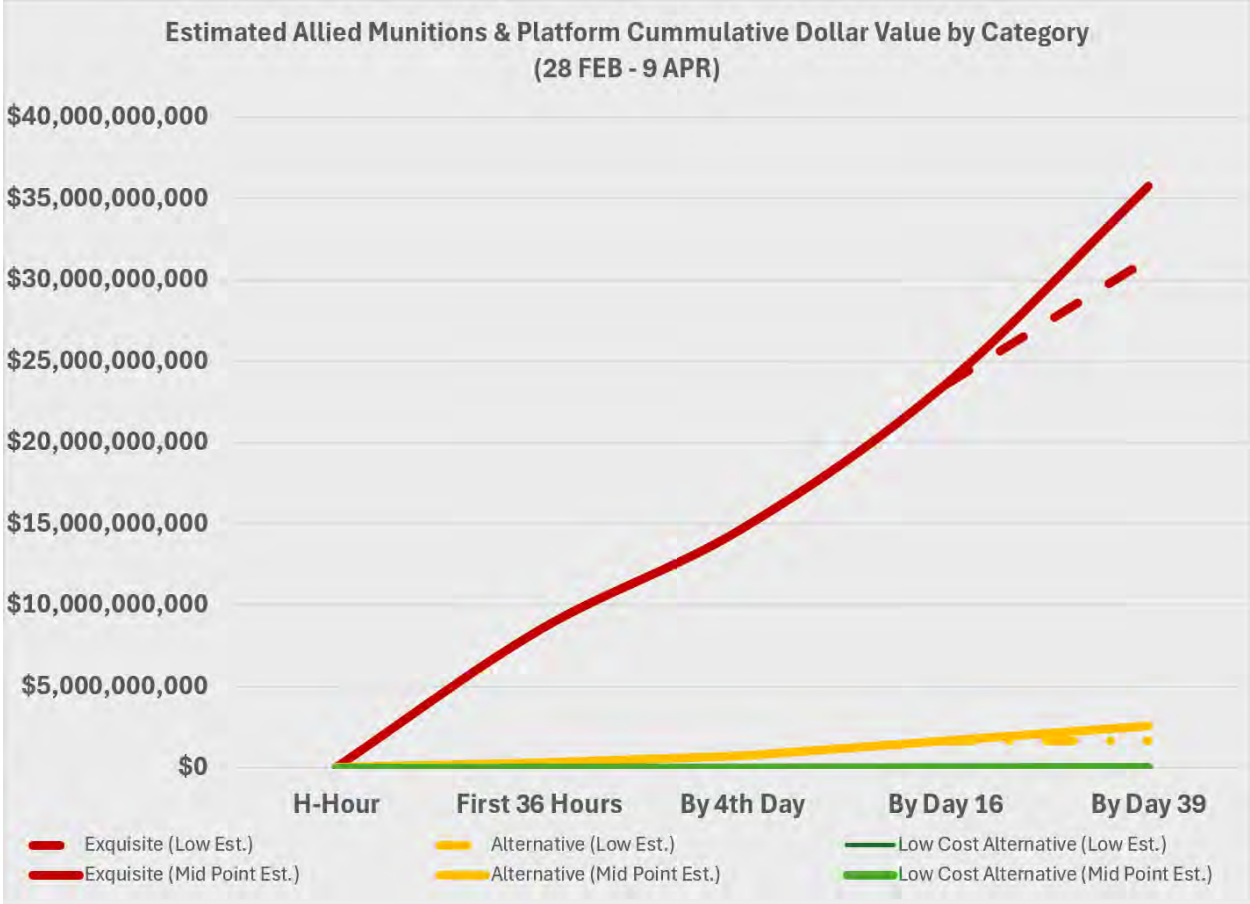


Figure 46: Estimated Allied Munitions & Platform Cumulative Dollar Value by Category

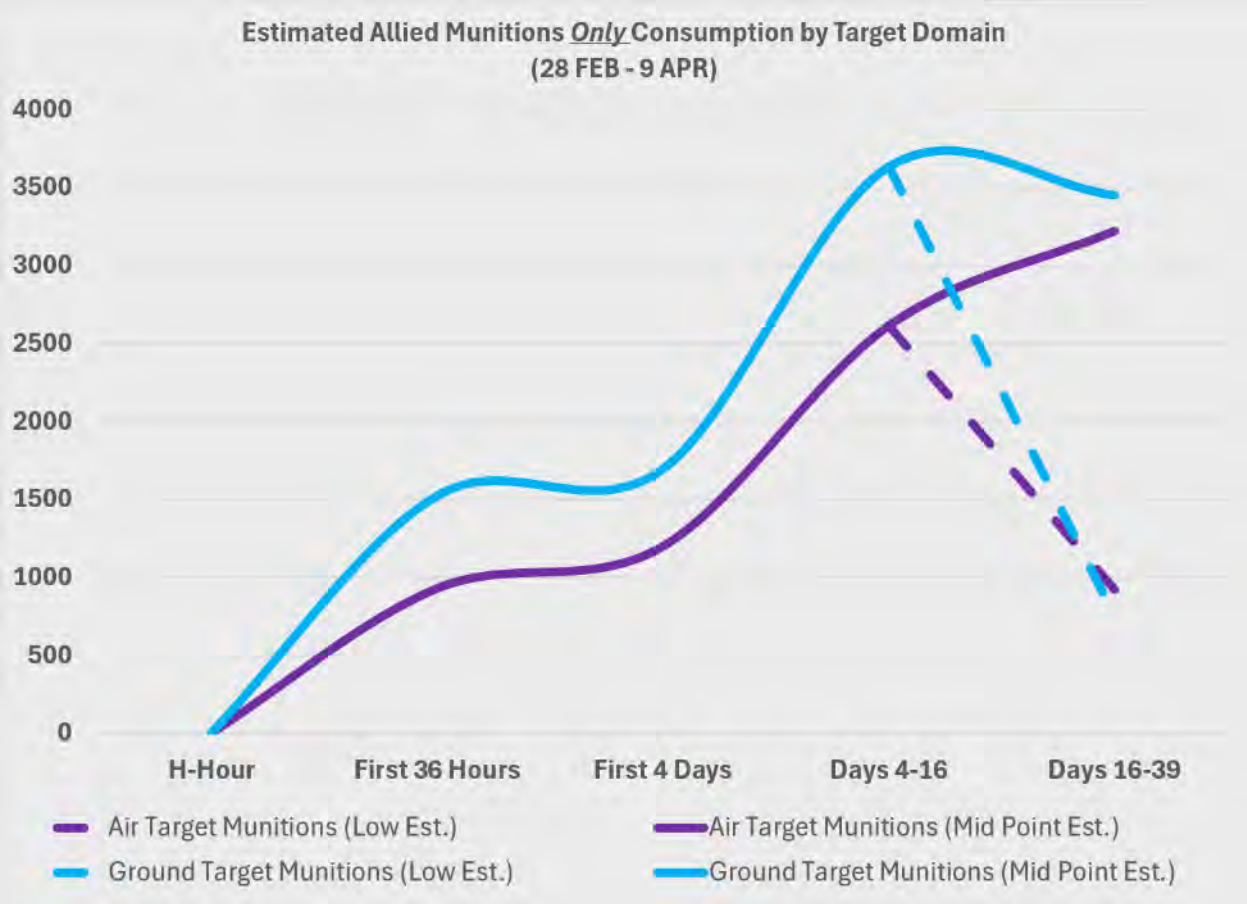


Figure 47: Estimated Allied Munitions Only Consumption by Target Domain

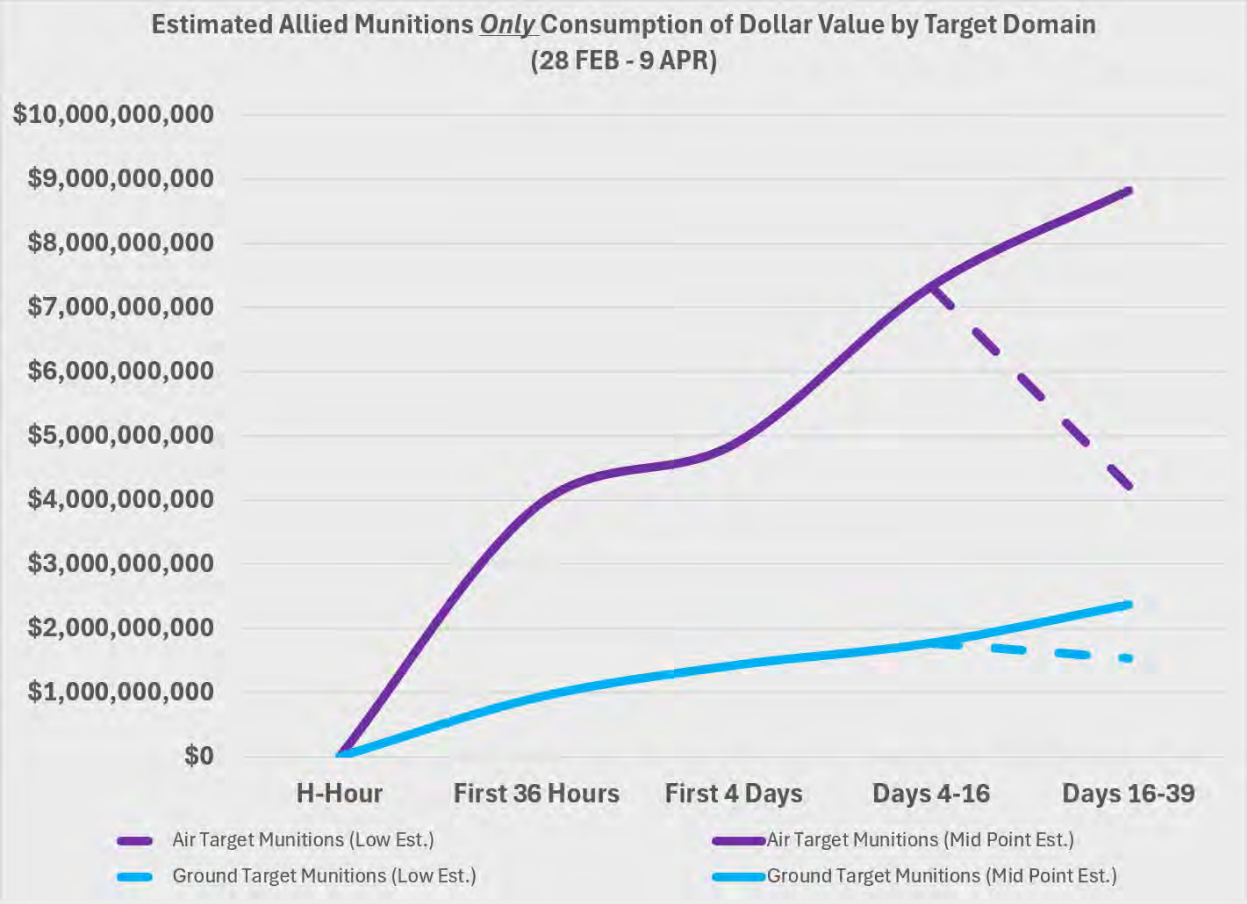


Figure 48: Estimated Allied Munitions Only Consumption of Dollar Value by Target Domain

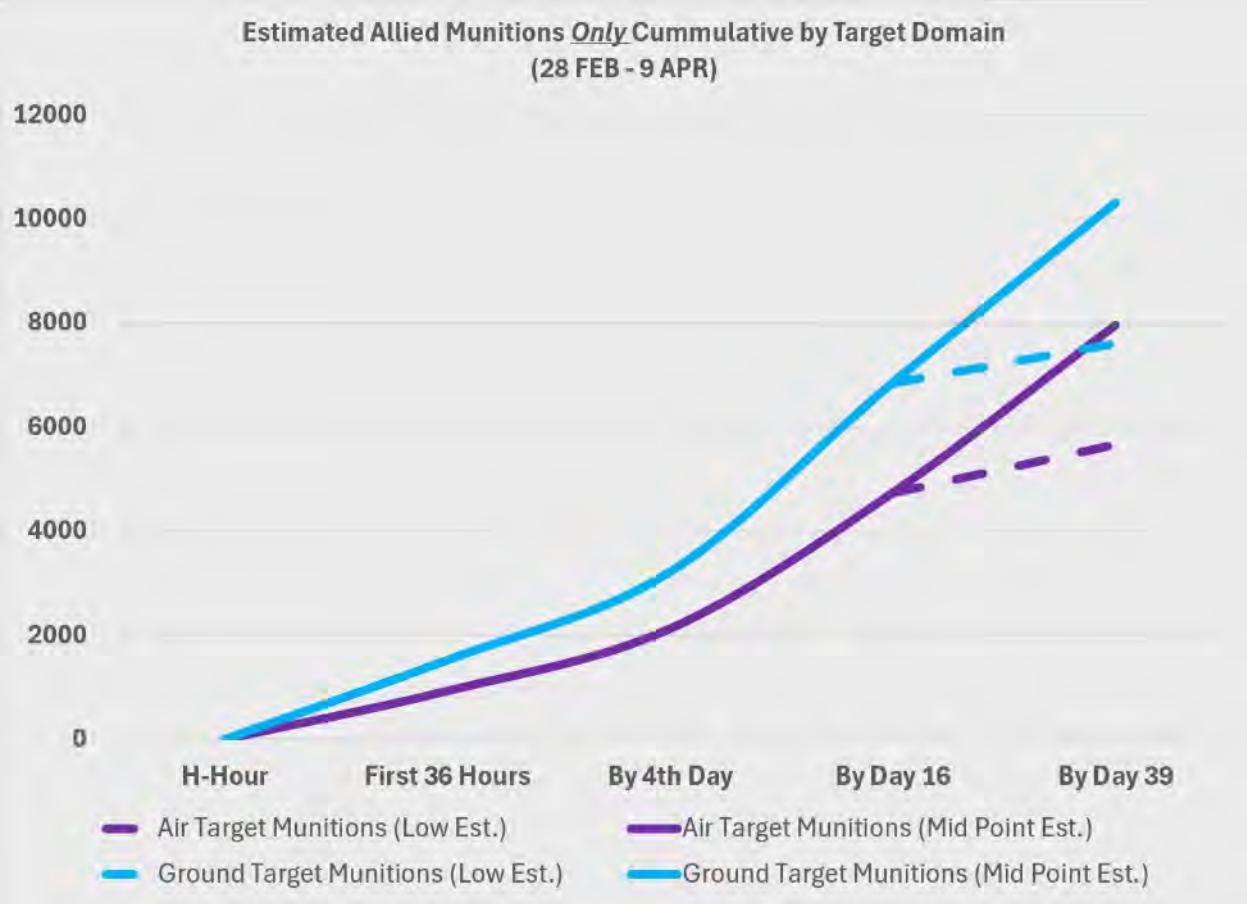


Figure 49: Estimated Allied Munitions Only Cumulative by Target Domain

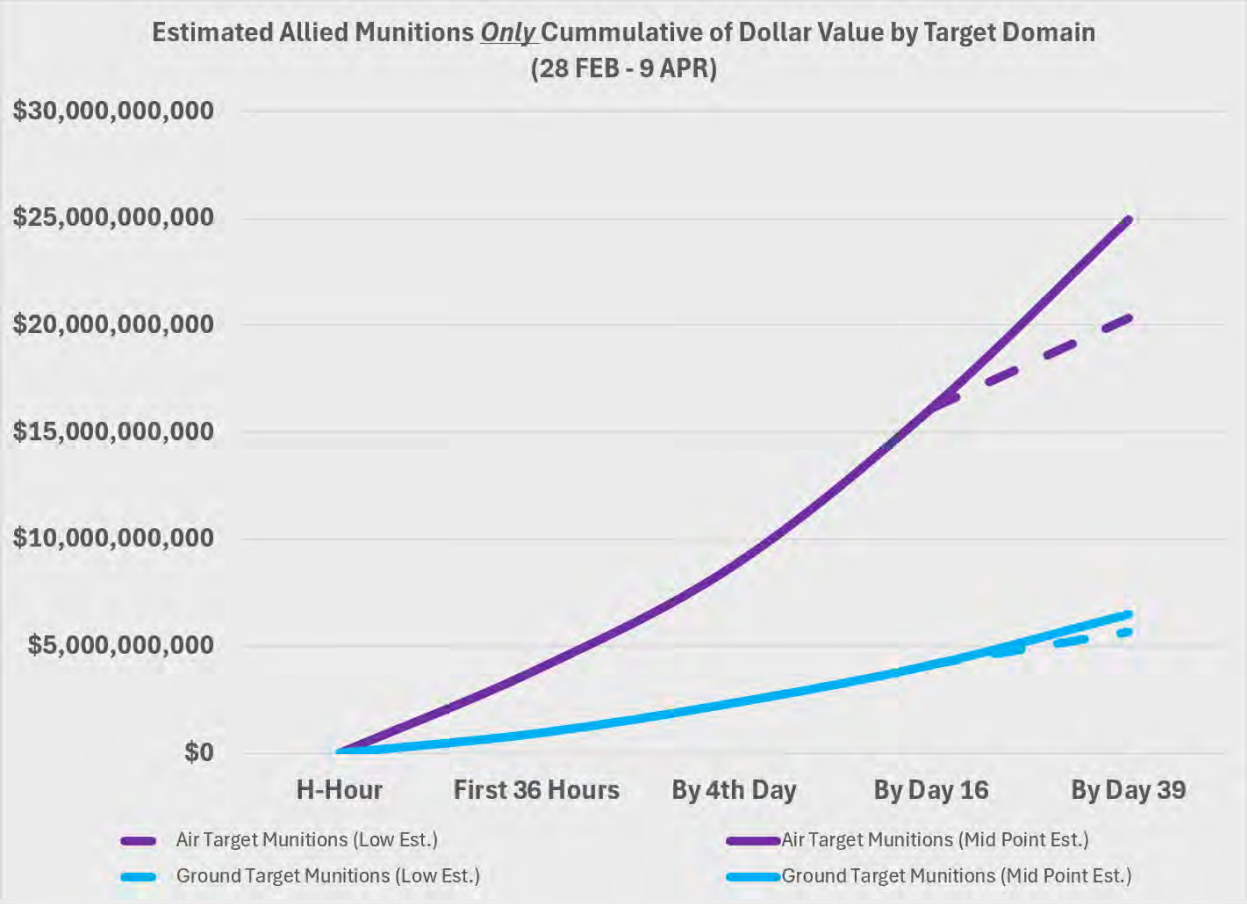


Figure 50: Estimated Allied Munitions Only Cumulative of Dollar Value by Target Domain

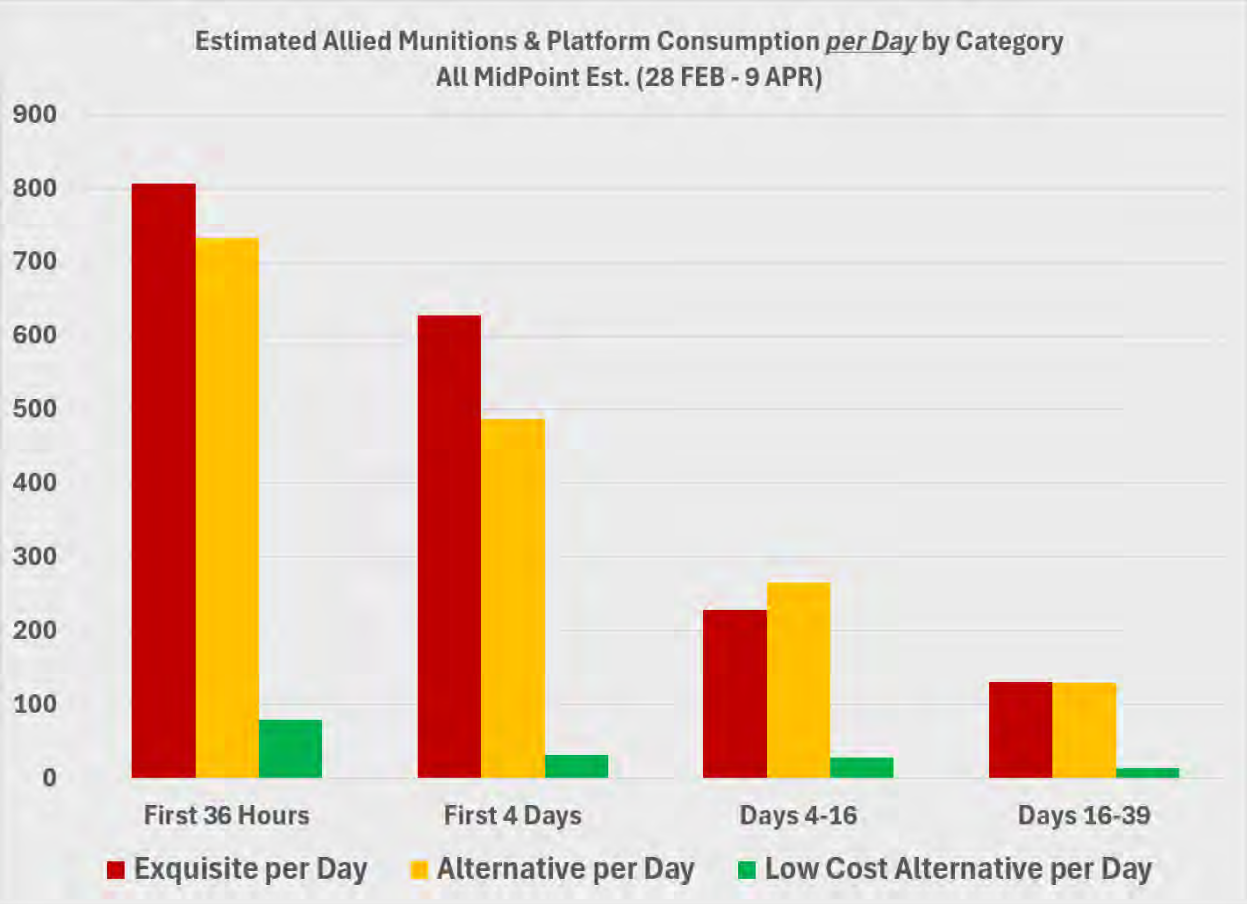



Figure 51: Estimated Allied Munitions & Platform Consumption per Day by Category

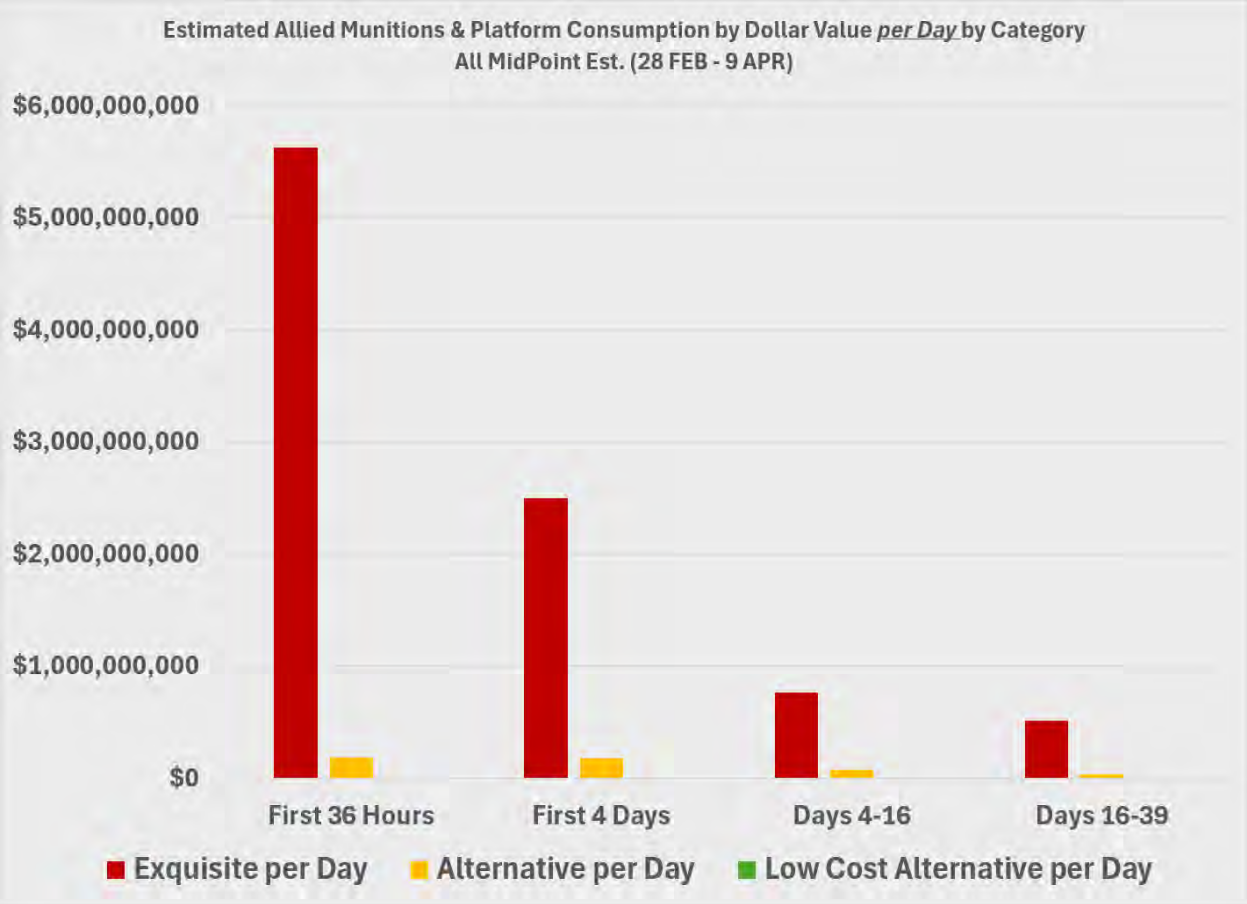


Figure 52: Estimated Allied Munitions & Platform Consumption by Dollar Value per Day by Category

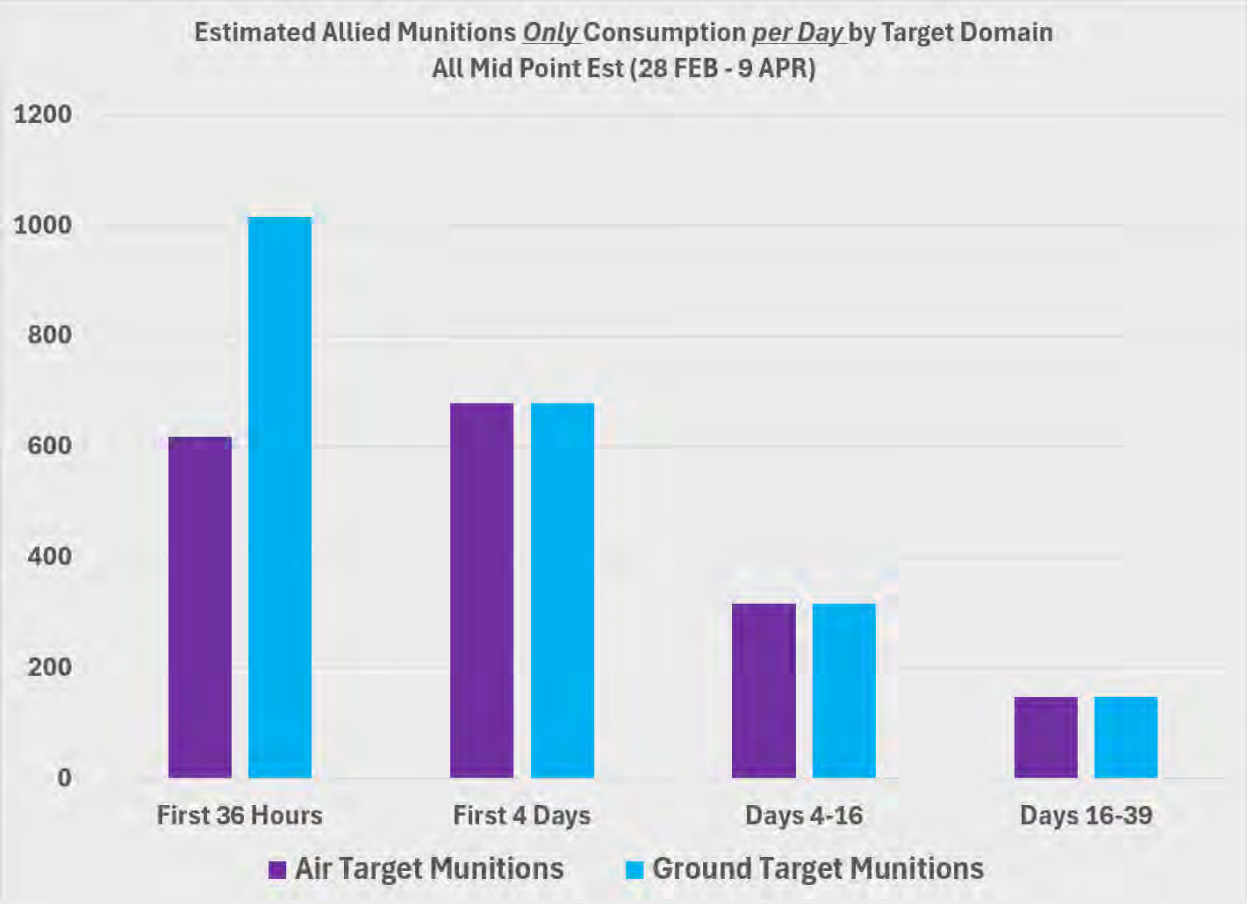


Figure 53: Estimated Allied Munitions Only Consumption per Day by Target Domain

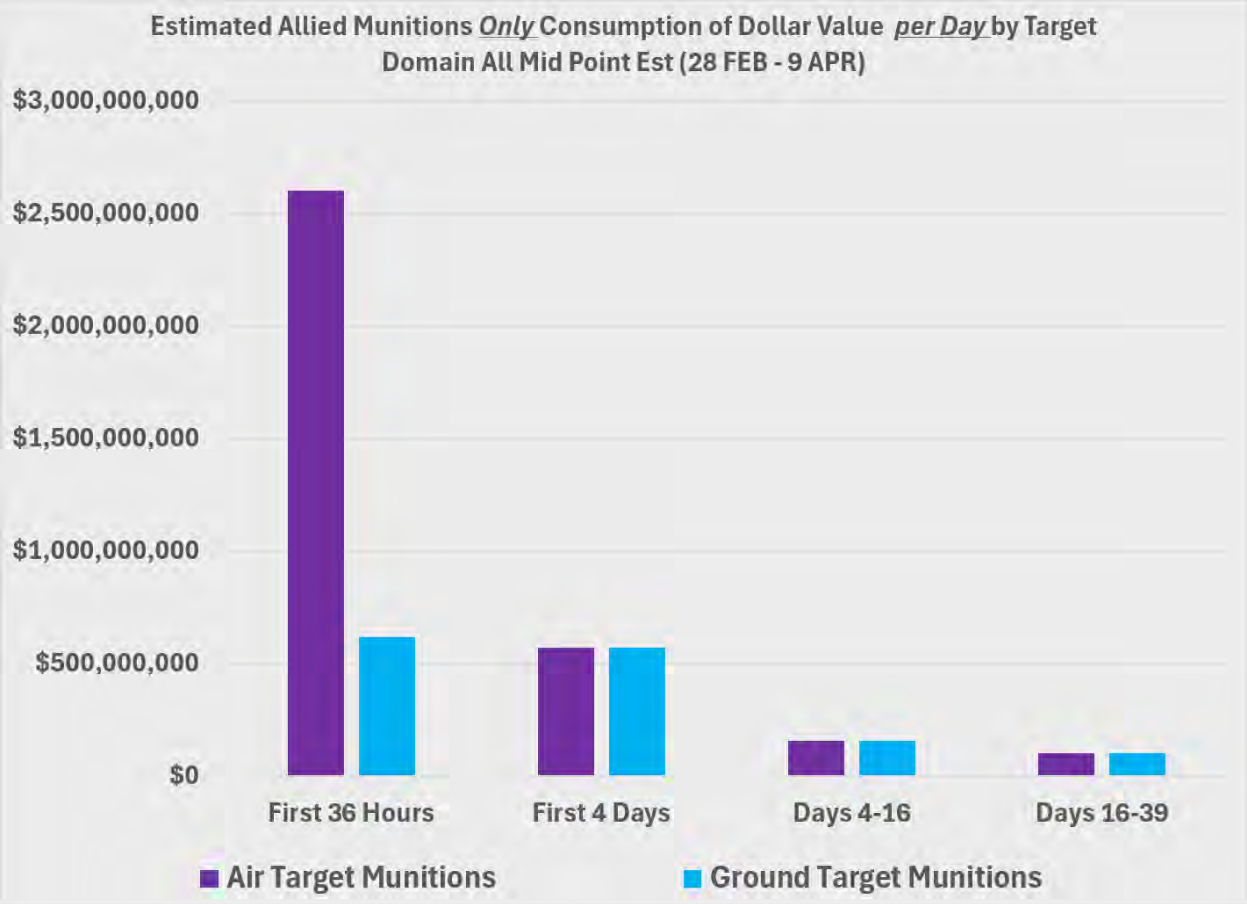


Figure 54: Estimated Allied Munitions Only Consumption of Dollar Value per Day by Target Domain All Mid-Point Est

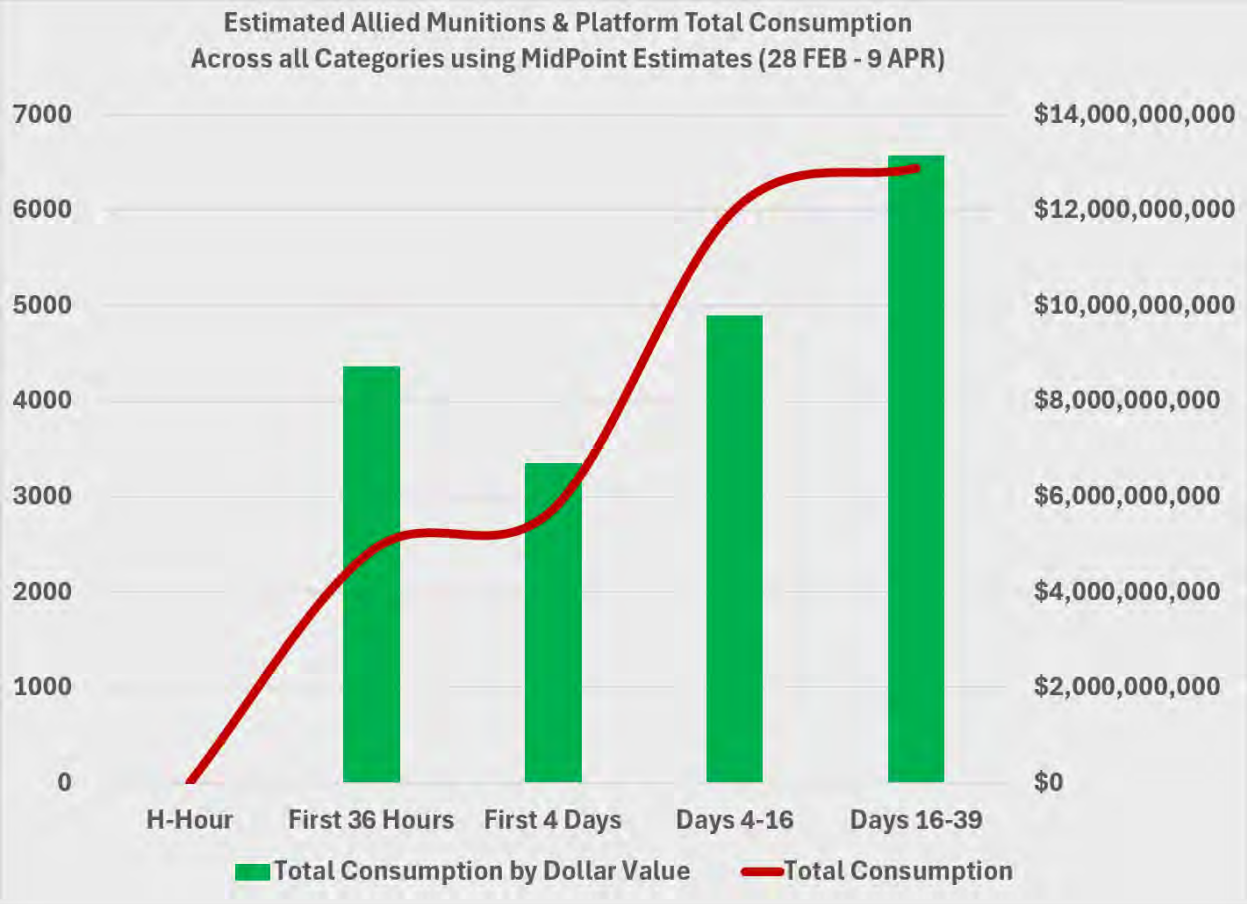


Figure 55: Estimated Allied Munition & Platform Total Consumption Across all Categories using Midpoint Estimates

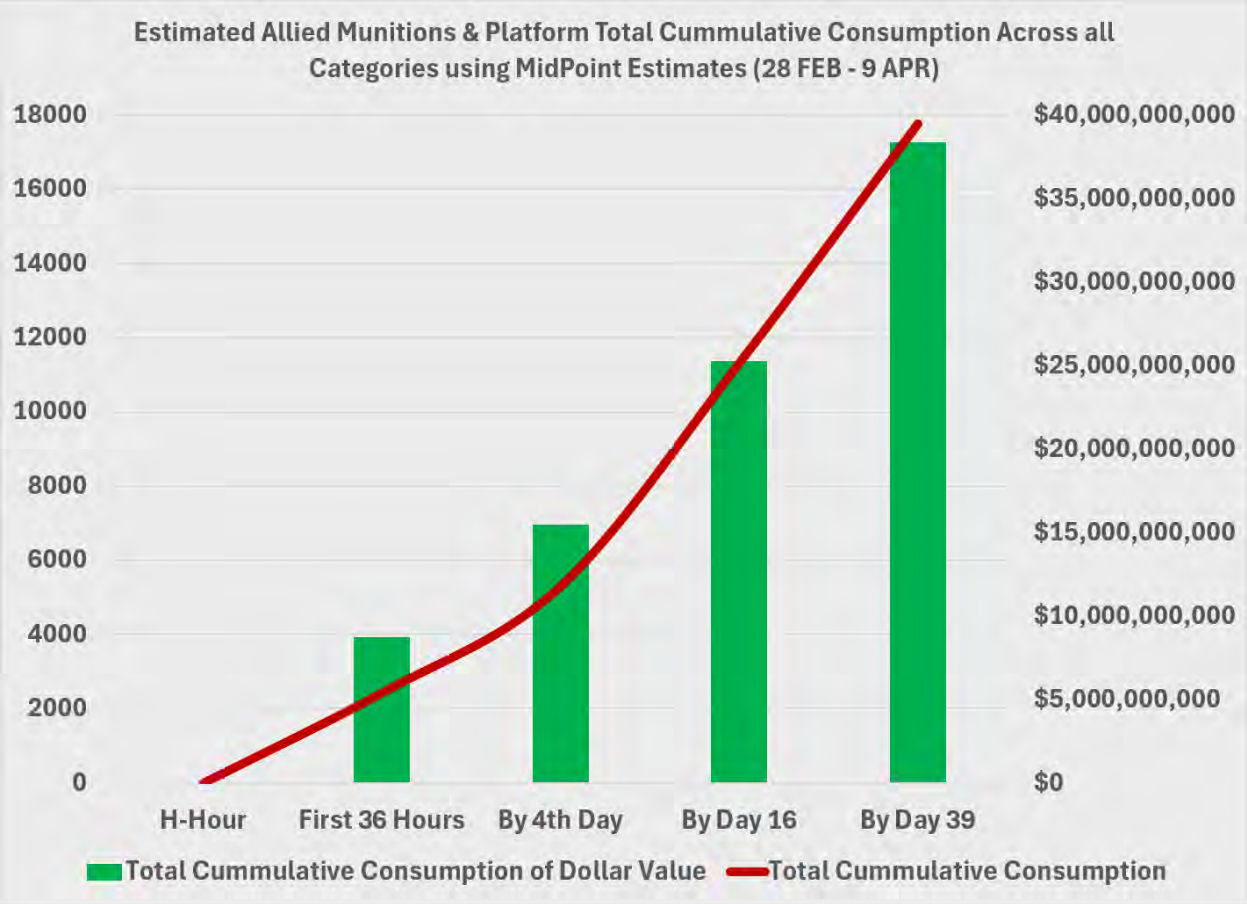


Figure 56: Estimated Allied Munitions & Platform Total Cumulative Consumption Across all Categories using Midpoint Estimates

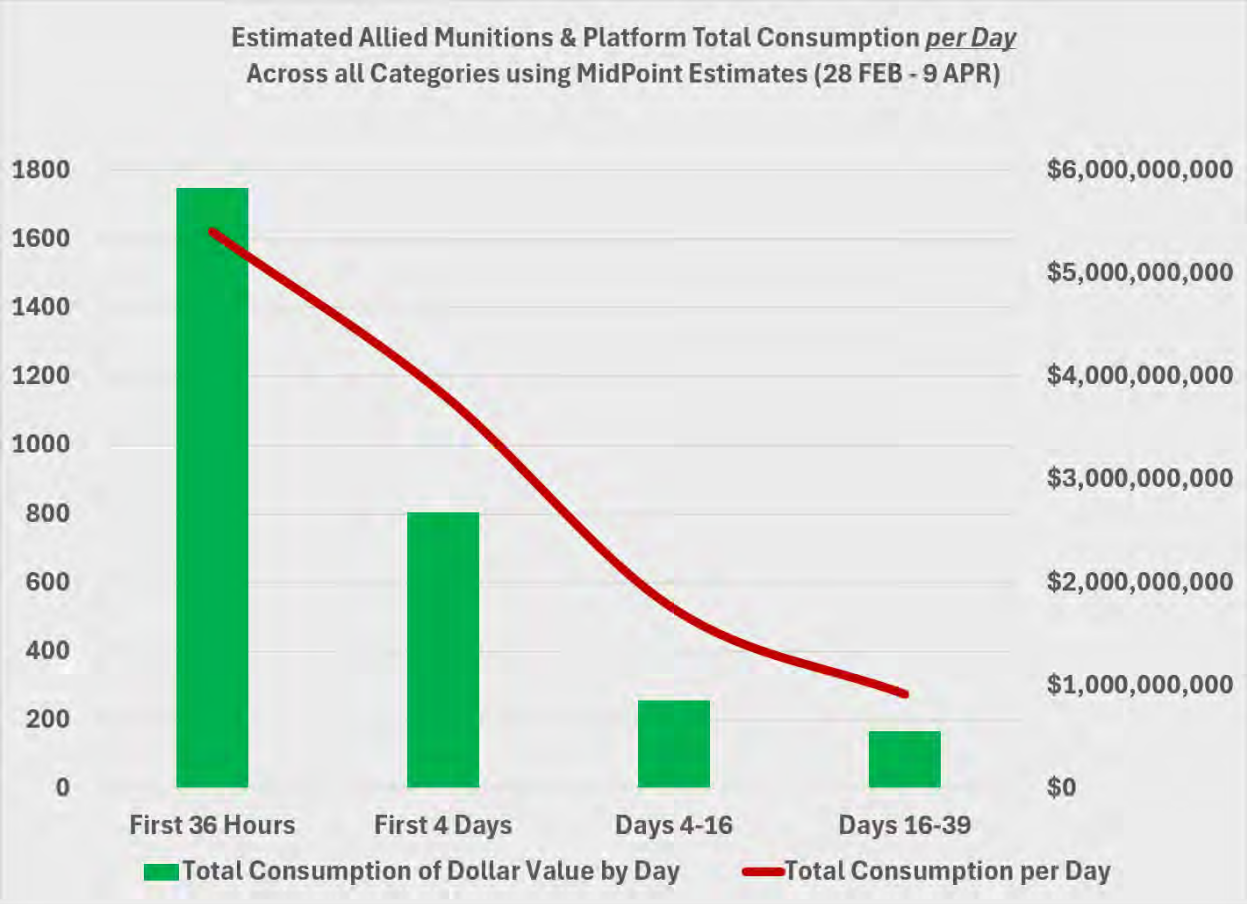


Figure 57: Estimated Allied Munitions & Platform Total Consumption per Day across all Categories using Midpoint Estimates

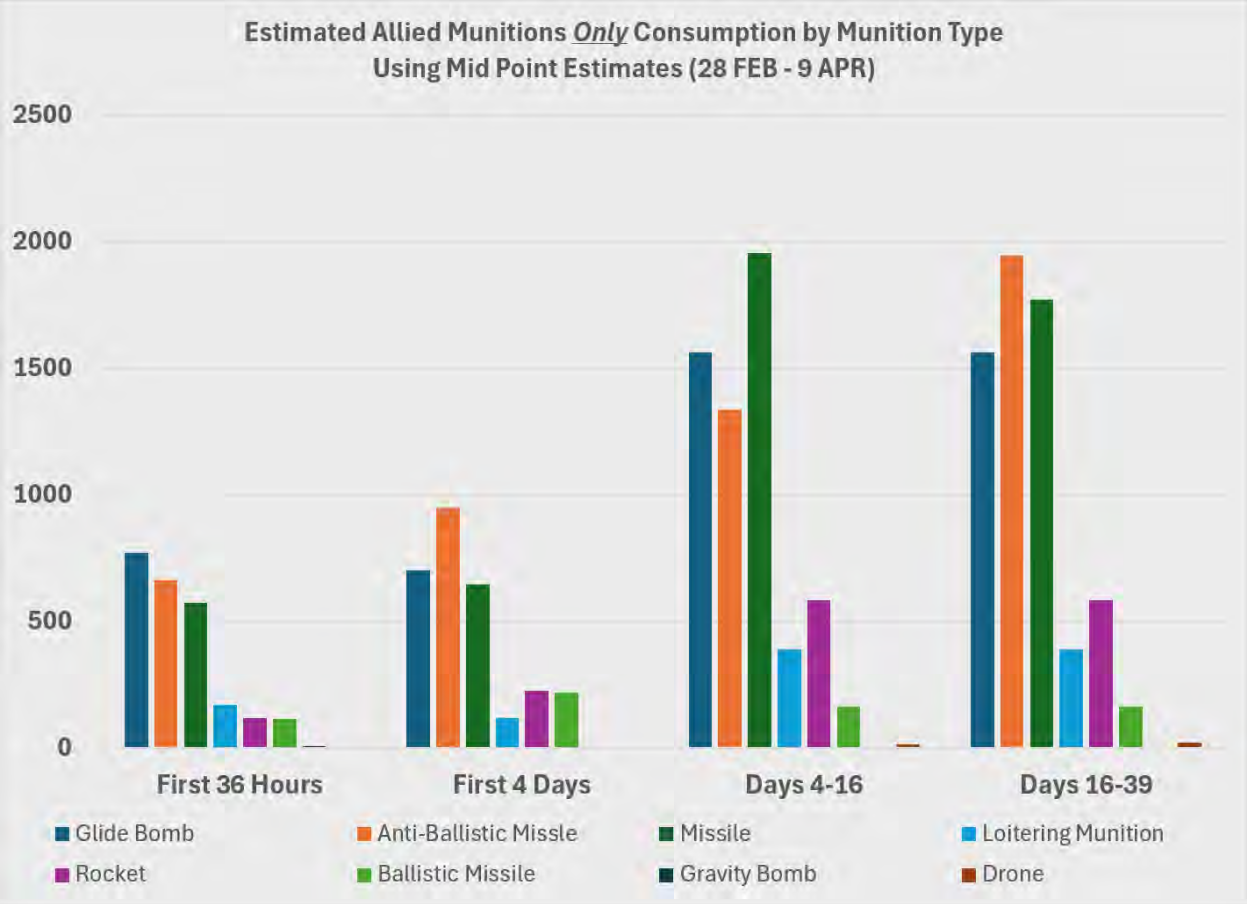


Figure 58: Estimated Allied Munitions Only Consumption by Munition Type Using Mid-Point Estimates

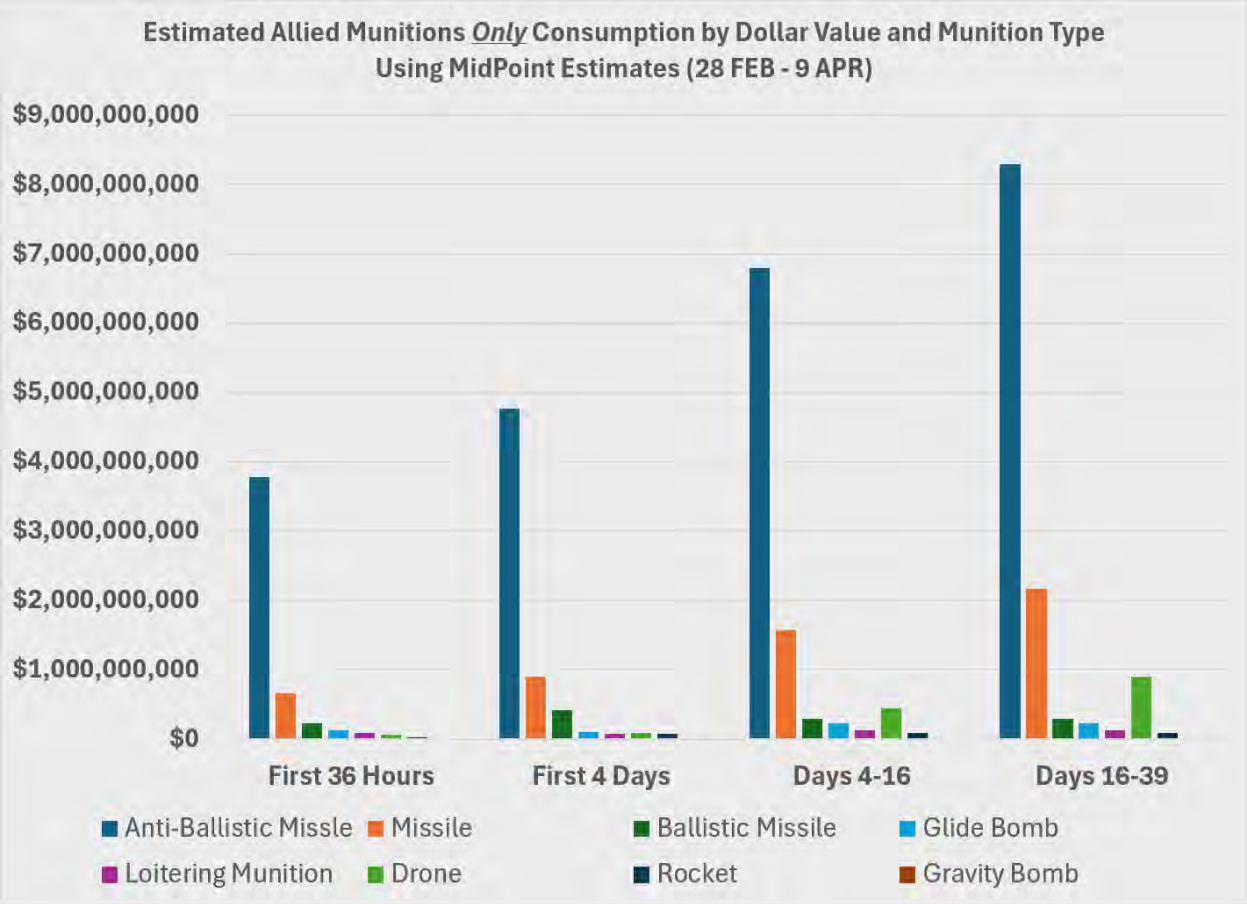


Figure 59: Estimated Allied Munitions Only Consumption by Dollar Value and Munition Type Using Midpoint Estimates

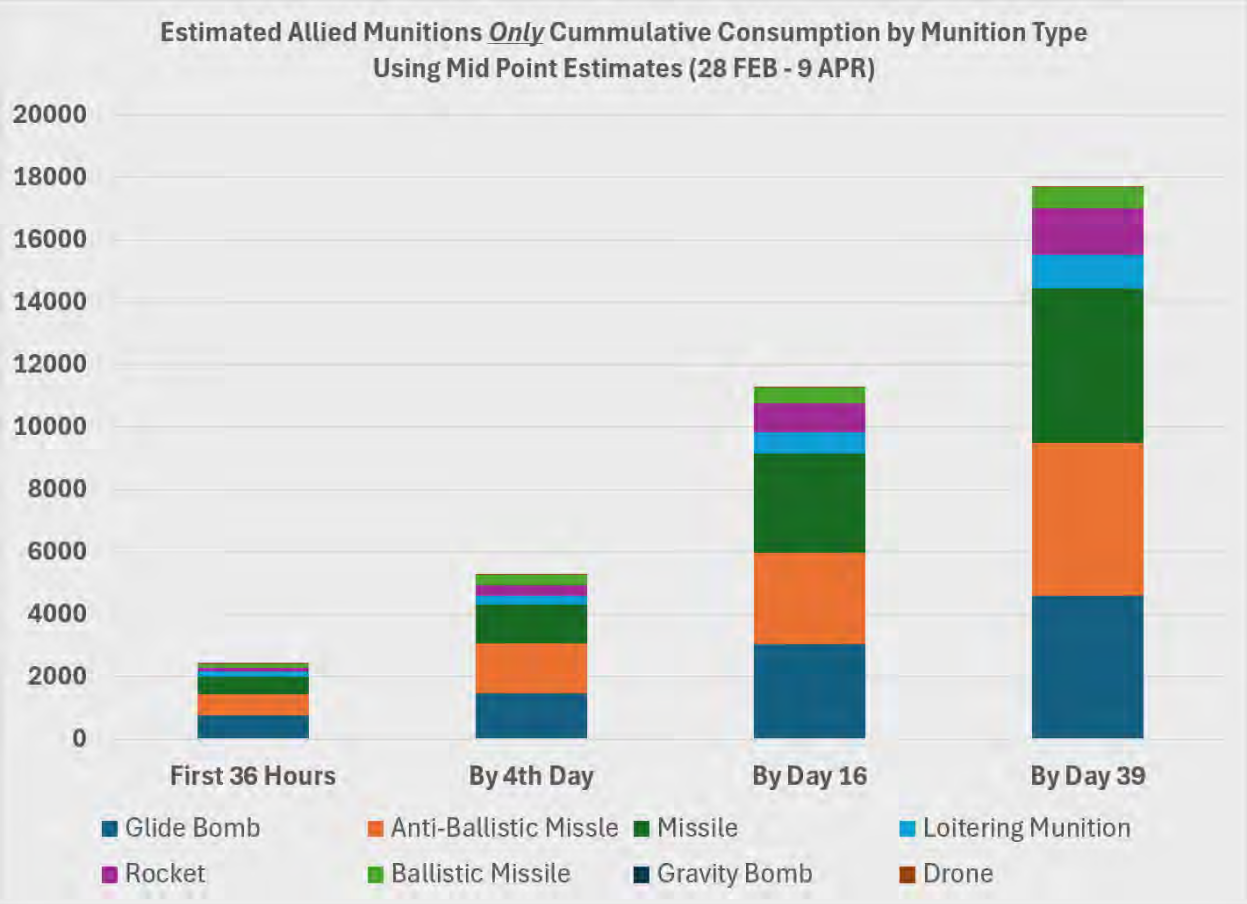


Figure 60: Estimated Allied Munitions Only Cumulative Consumption by Munition Type Using Midpoint Estimates

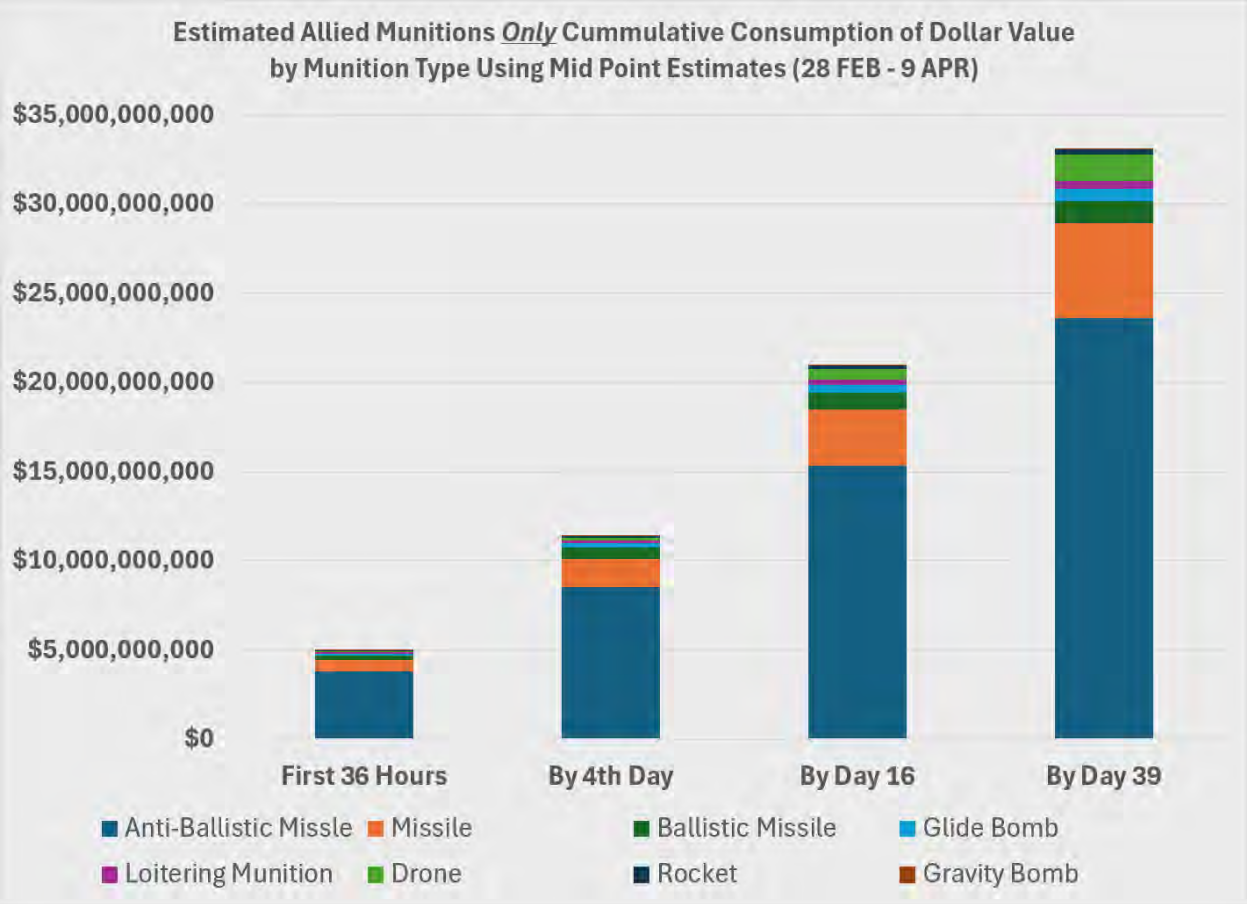


Figure 61: Estimated Allied Munitions Only Cumulative Consumption of Dollar Value by Munition Type Using Midpoint Estimates

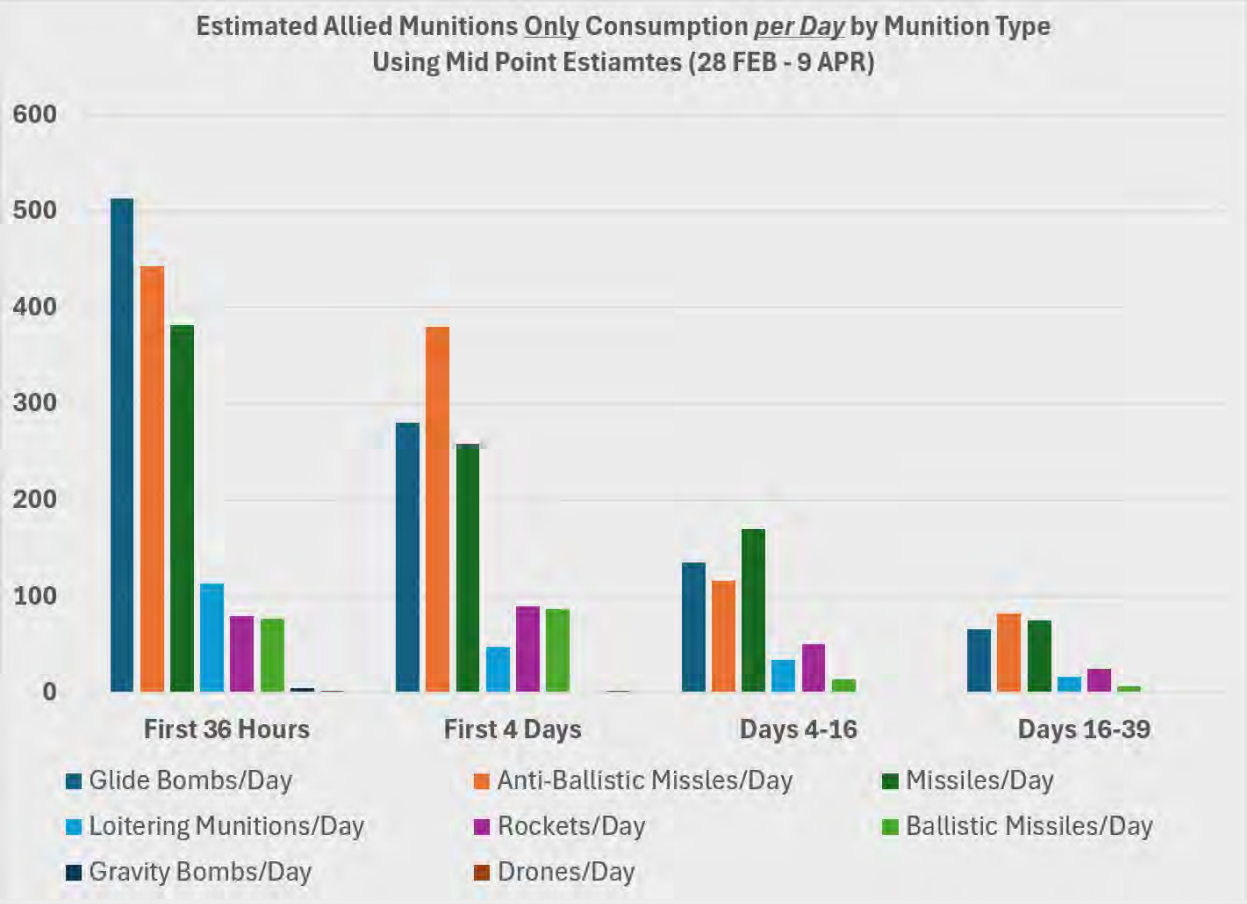


Figure 62: Estimated Allied Munitions Only Consumption per Day by Munition Type using Midpoint Estimates

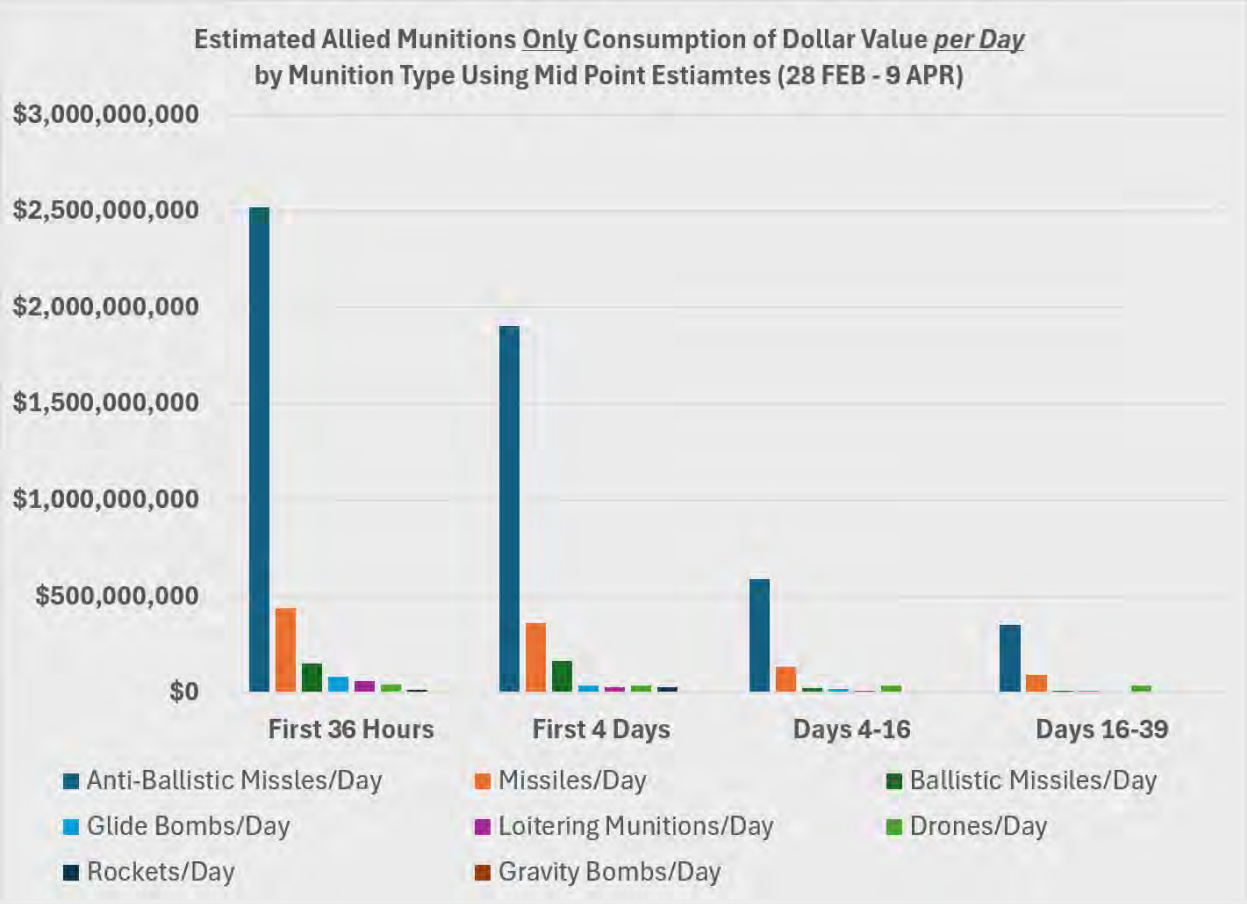


Figure 63: Estimated Allied Munitions Only Consumption of Dollar Value per Day by Munition Type using Midpoint Estimates

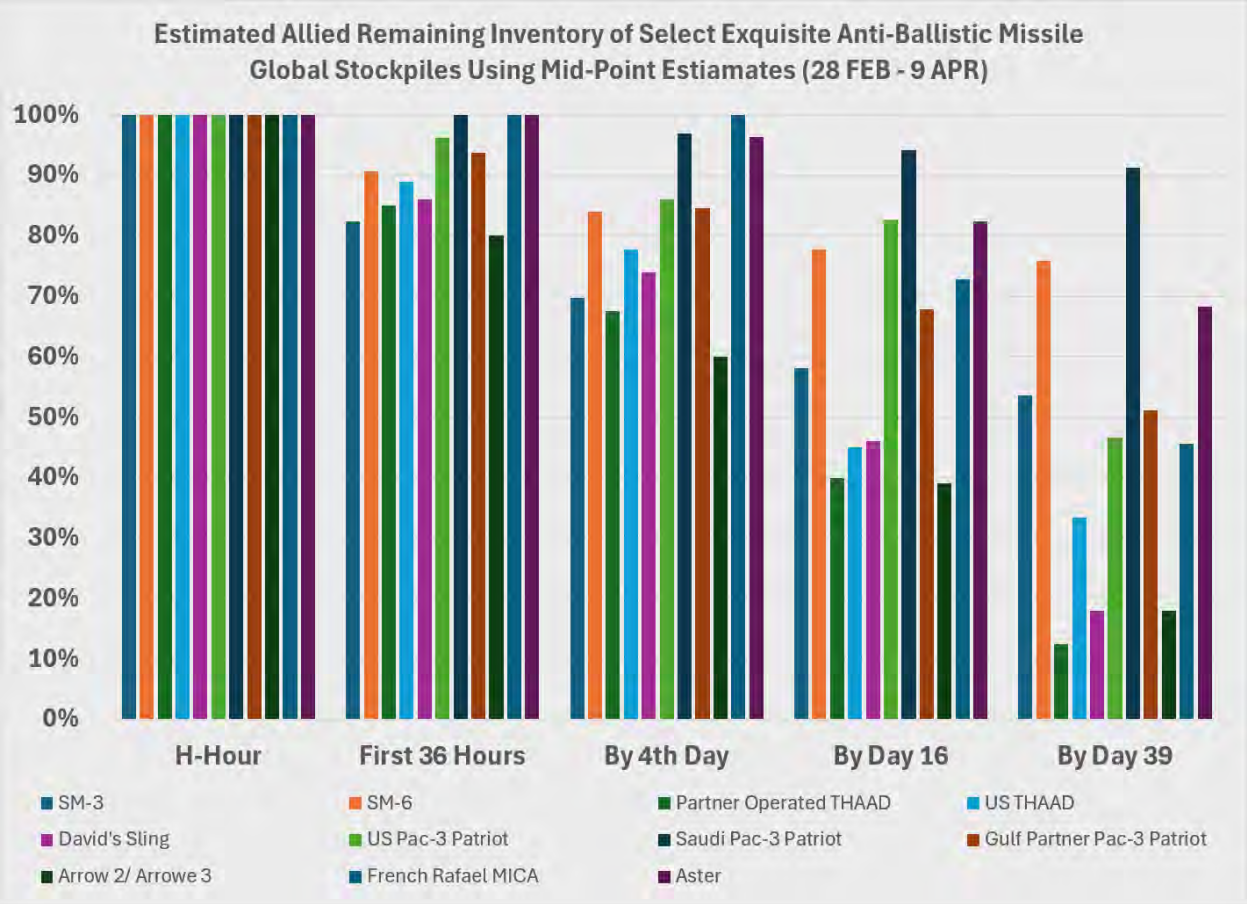


Figure 64: Estimated Allied Remaining Inventory of Select Exquisite Anti-Ballistic Missile Global Stockpiles using Midpoint Estimates

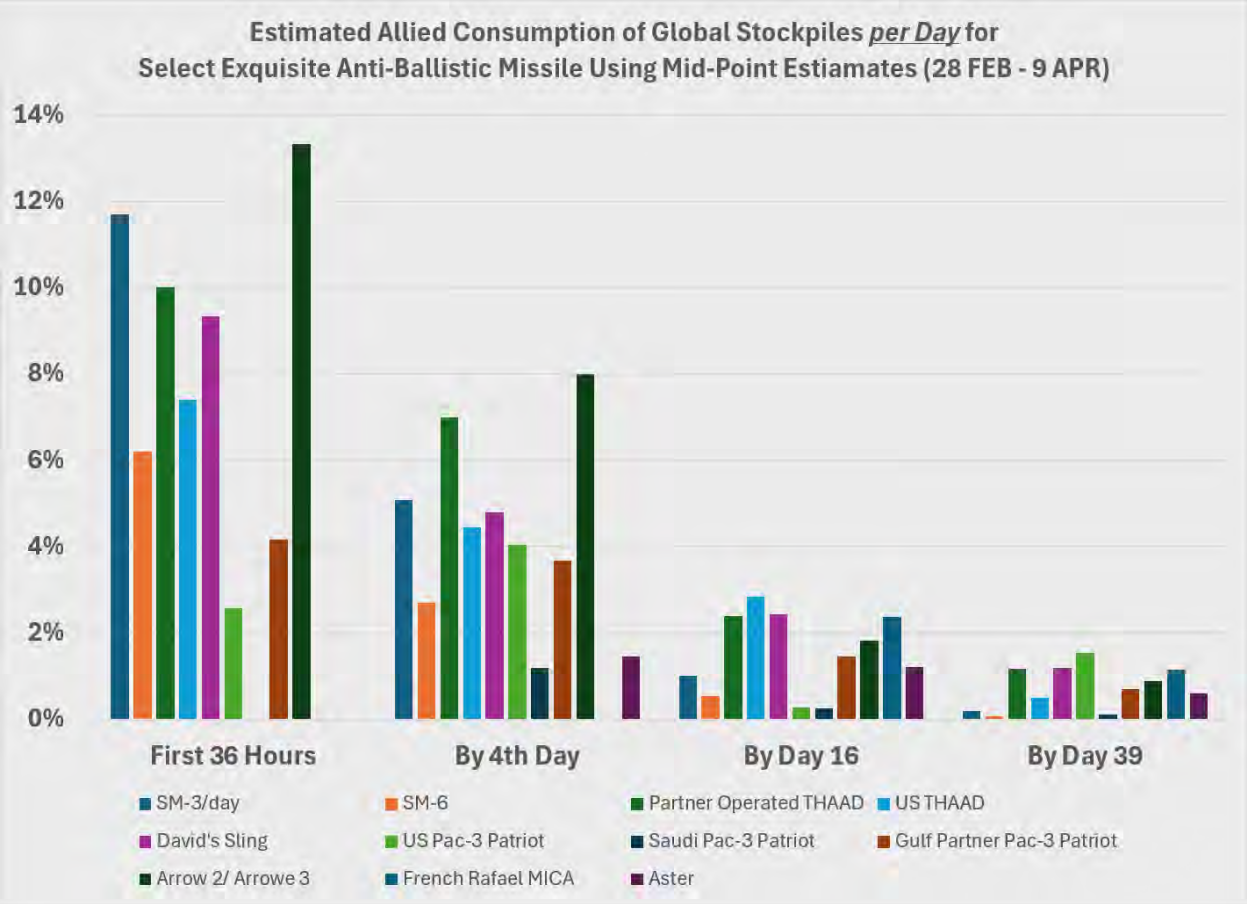


Figure 65: Estimated Allied Consumption of Global Stockpiles per Day for Select Exquisite Anti-Ballistic Missile Using Mid-Point Estimates

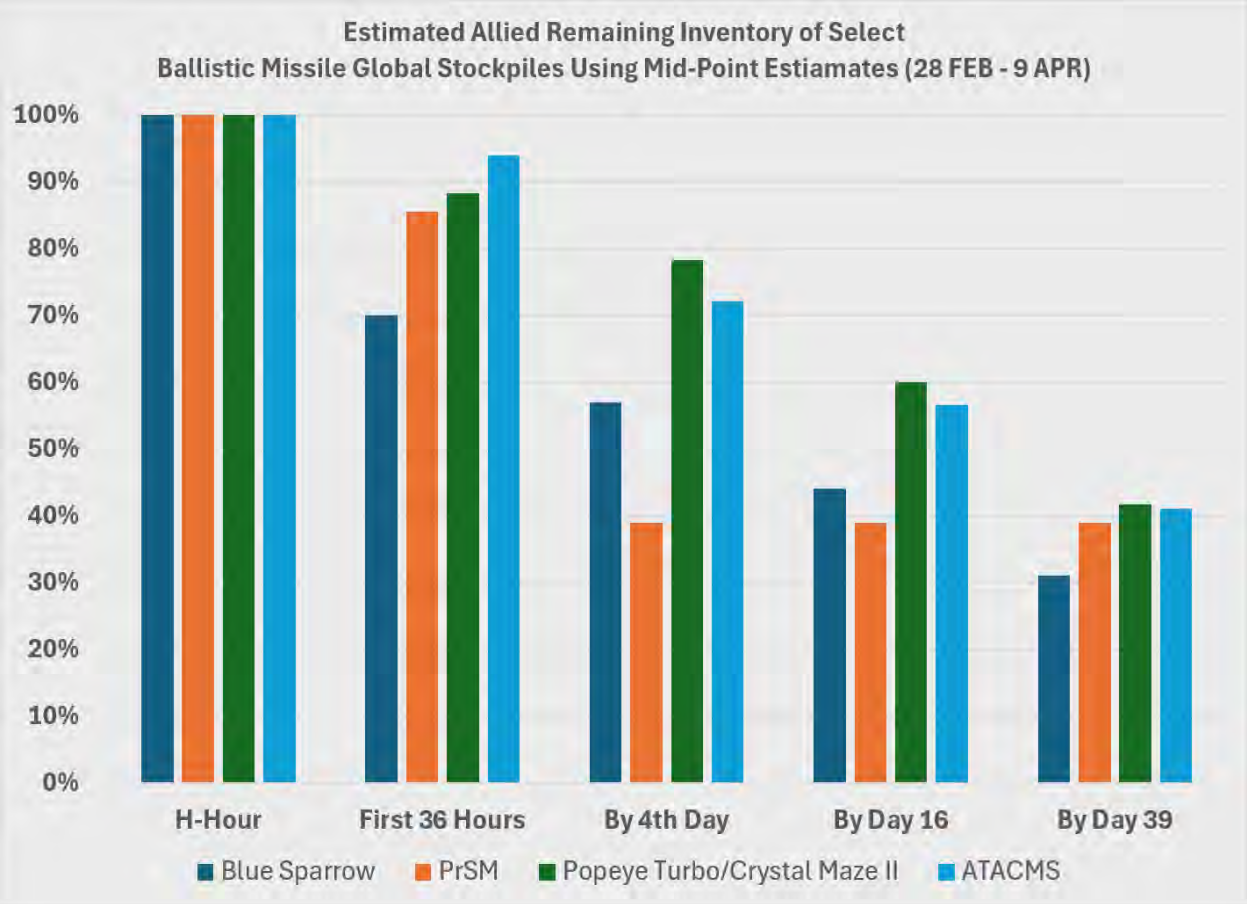


Figure 66: Estimated Allied Remaining Inventory of Select Ballistic Missile Global Stockpiles Using Mid-Point Estimates

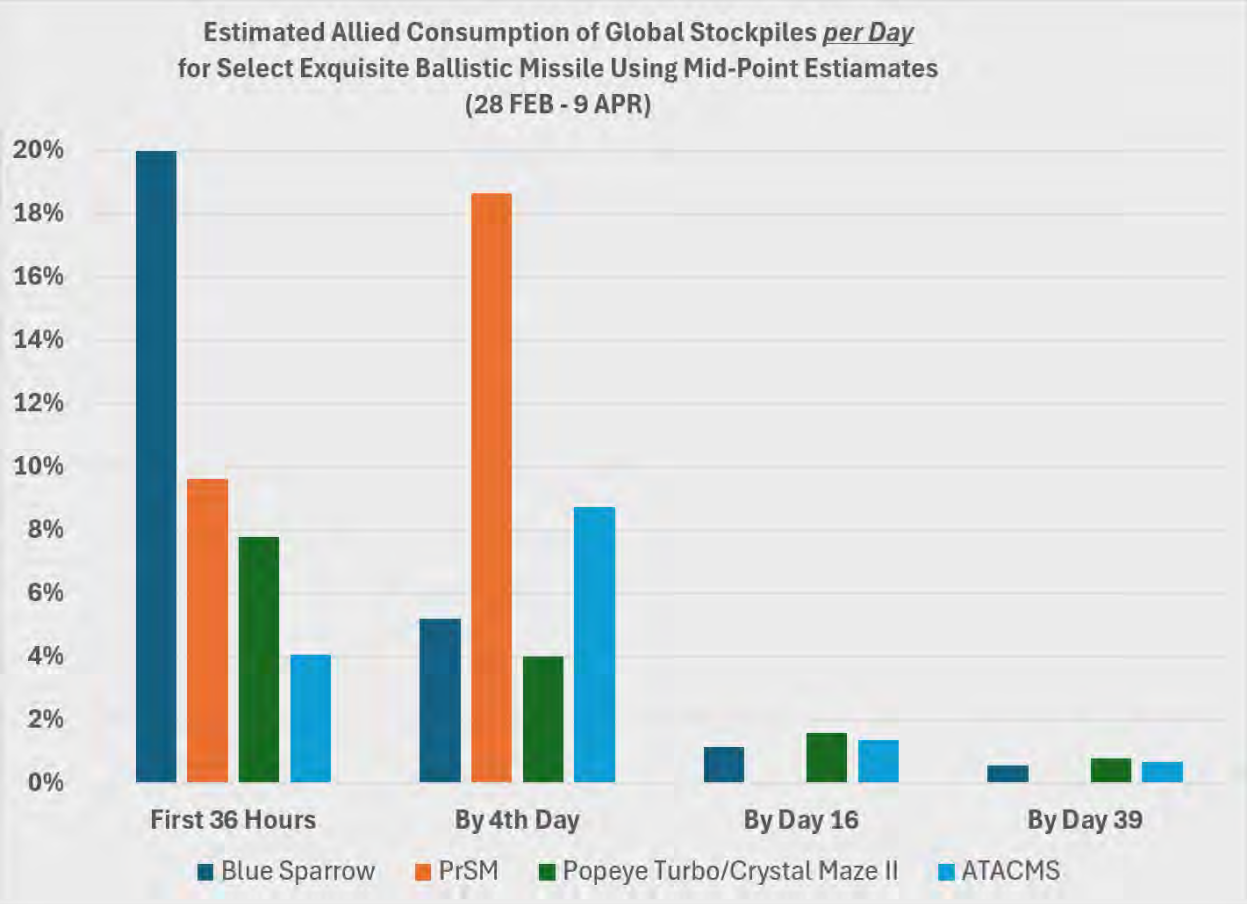


Figure 67: Estimated Allied Consumption of Global Stockpiles per Day for Select Exquisite Ballistic Missile using Mid-Point Estimates

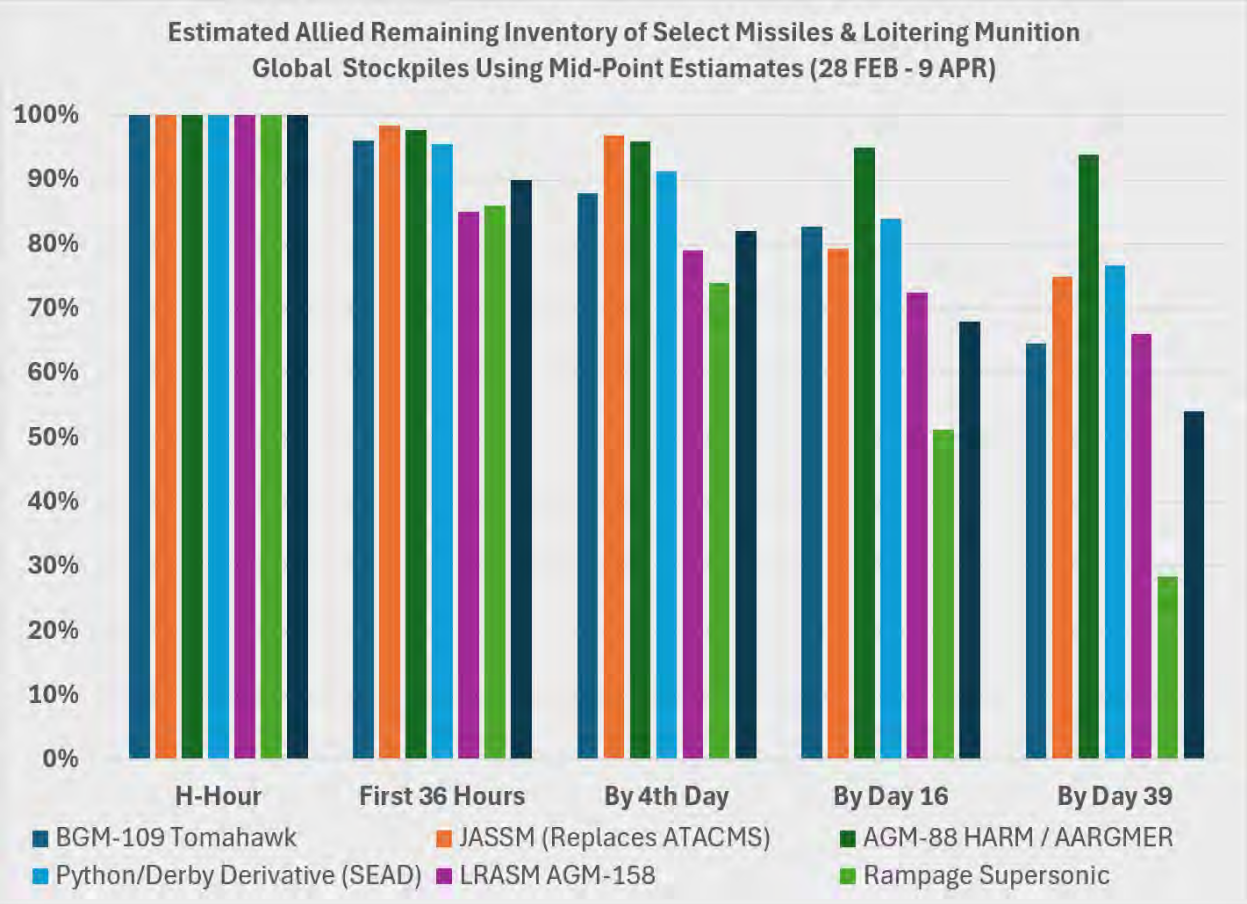


Figure 68: Estimated Allied Remaining Inventory of Select Missiles & Loitering Munition Global Stockpiles Using Midpoint Estimates

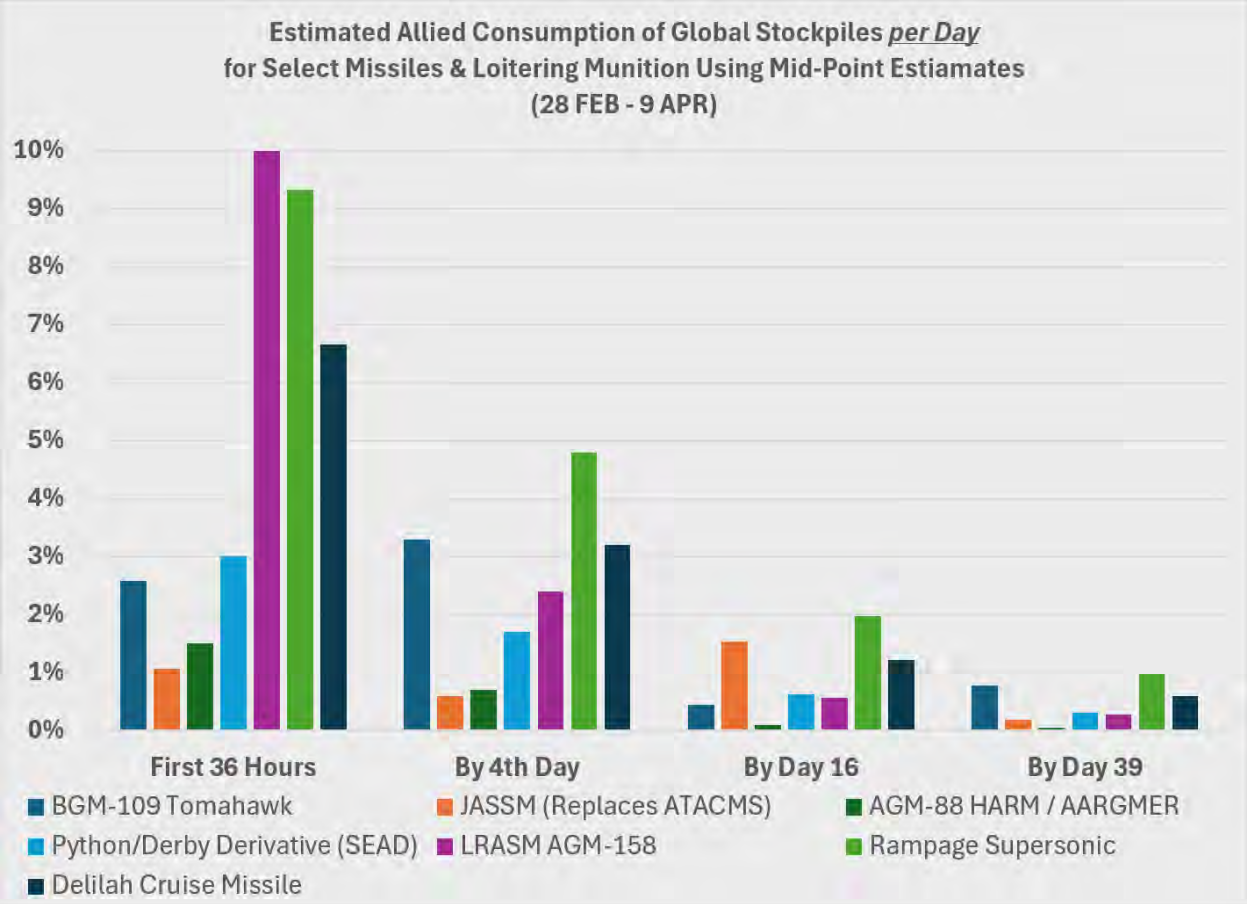


Figure 69: Estimate Allied Consumption of Global Stockpiles per Day for Select Missiles & Loitering Munitions Using Mid-Point Estimates

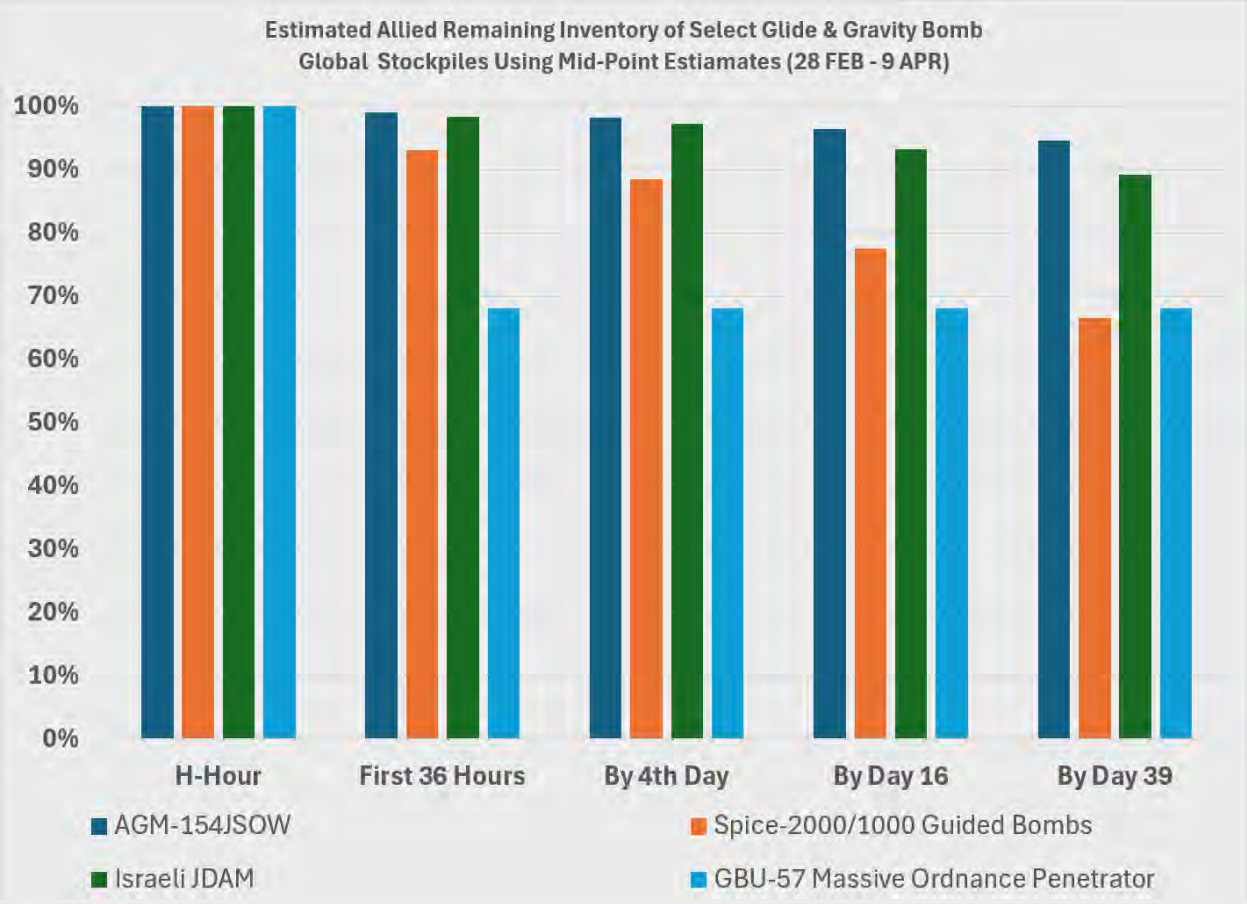


Figure 70: Estimated Allied Remaining Inventory of Select Glide & Gravity Bomb Global Stockpiles Using Midpoint Estimates

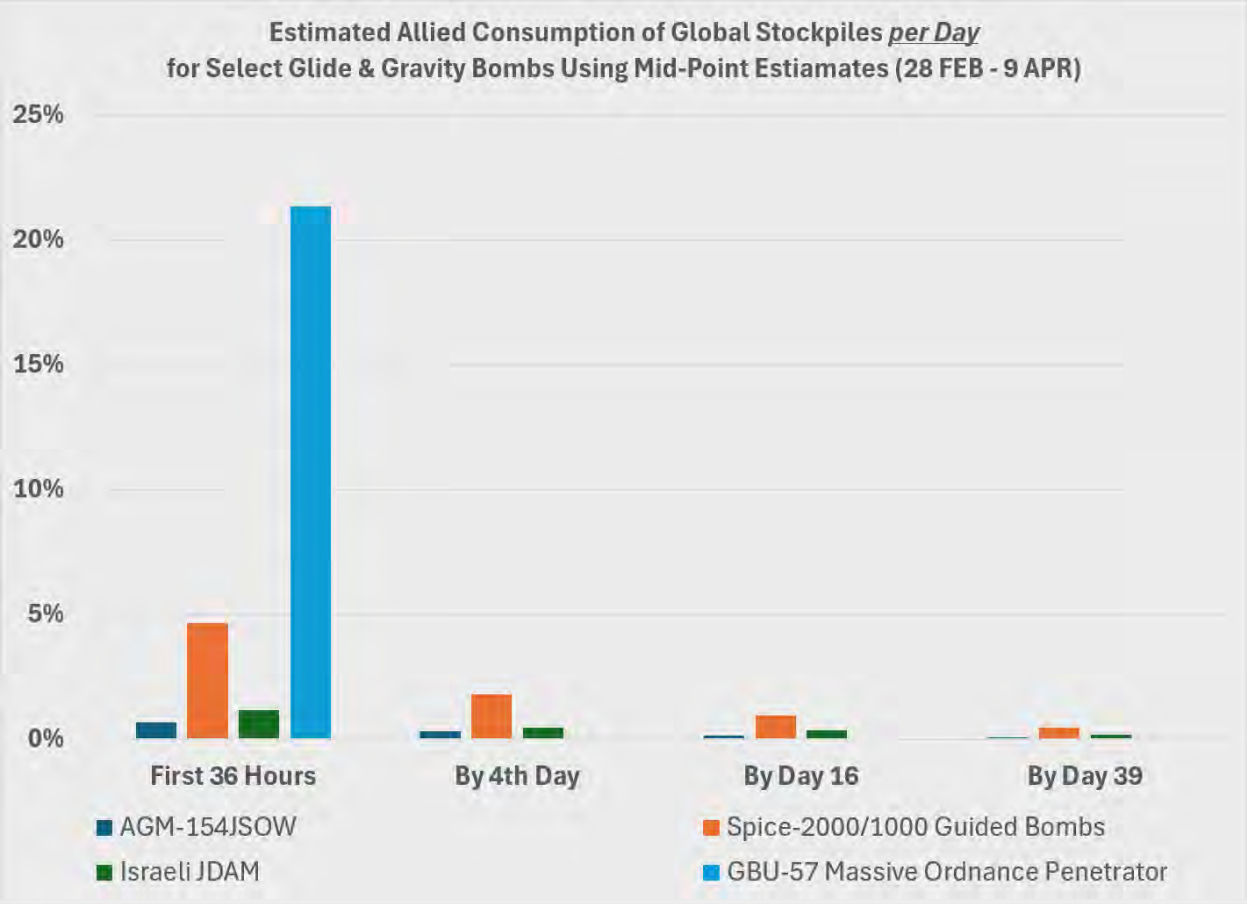


Figure 71: Estimated Allied Consumption of Global Stockpiles per Day for Select Glide & Gravity Bombs using Mid-Point Estimates

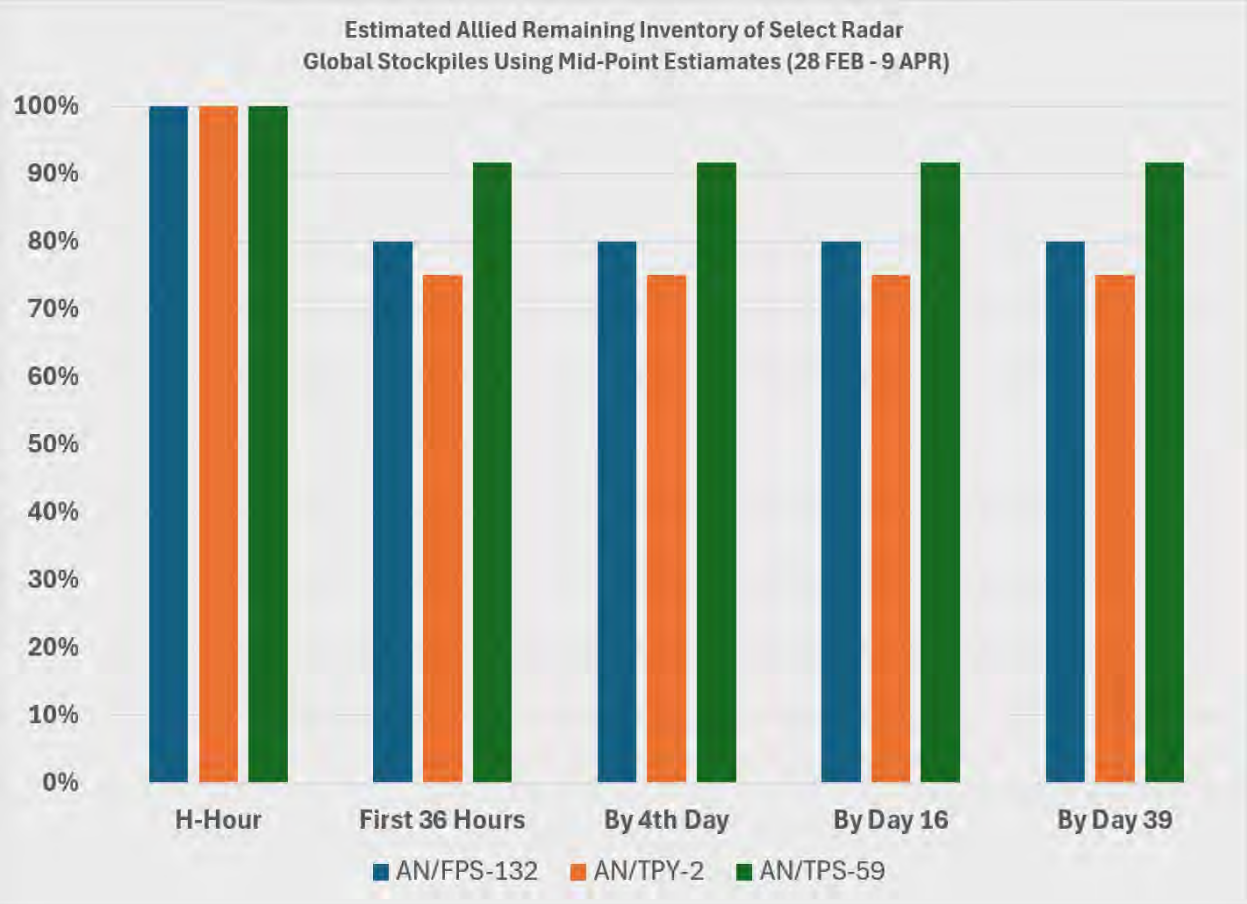


Figure 72: Estimated Allied Remaining Inventory of Select Radar Global Stockpiles Using Mid-Point Estimates

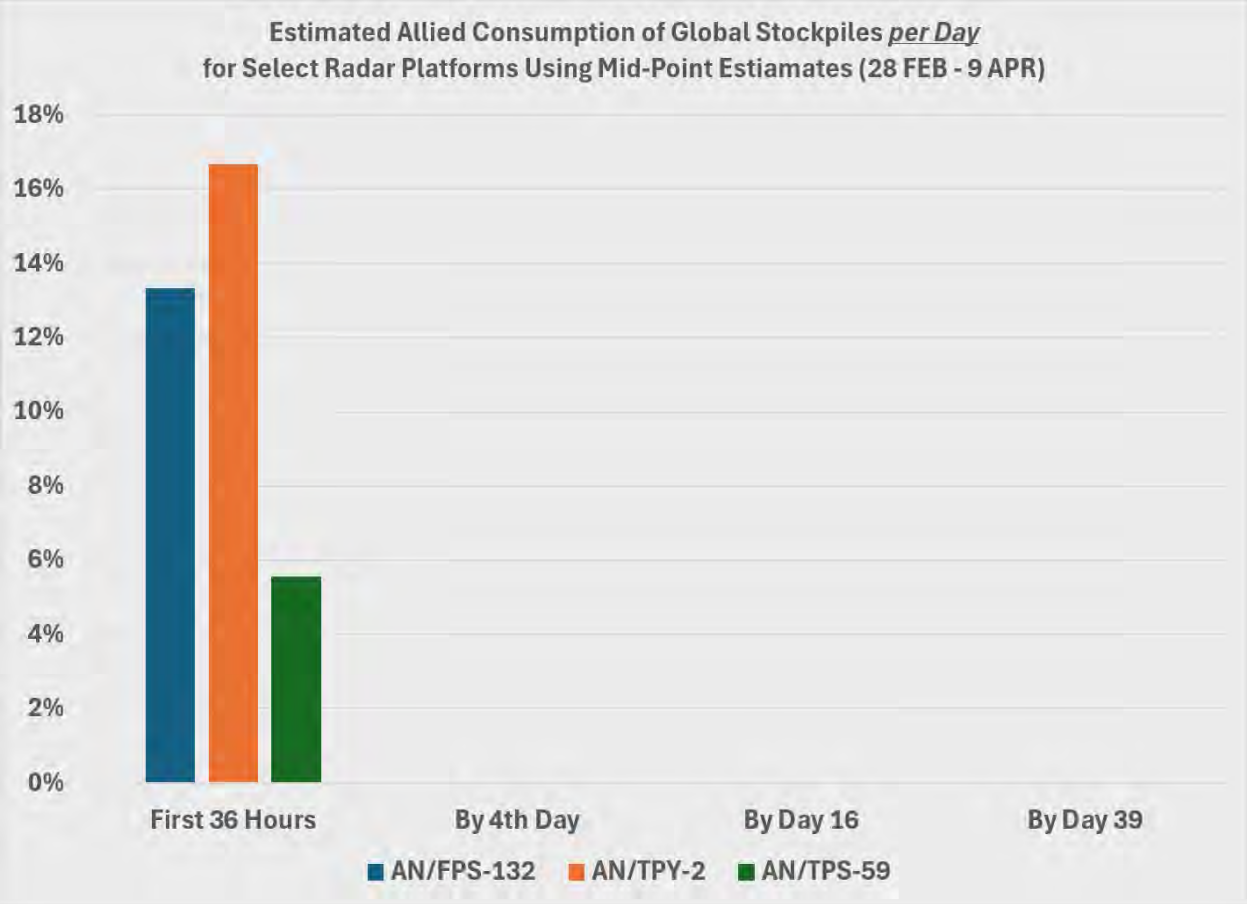


Figure 73: Estimated Allied Consumption of Global Stockpiles per Day for Select Radar Platforms using Mid-Point Estimates

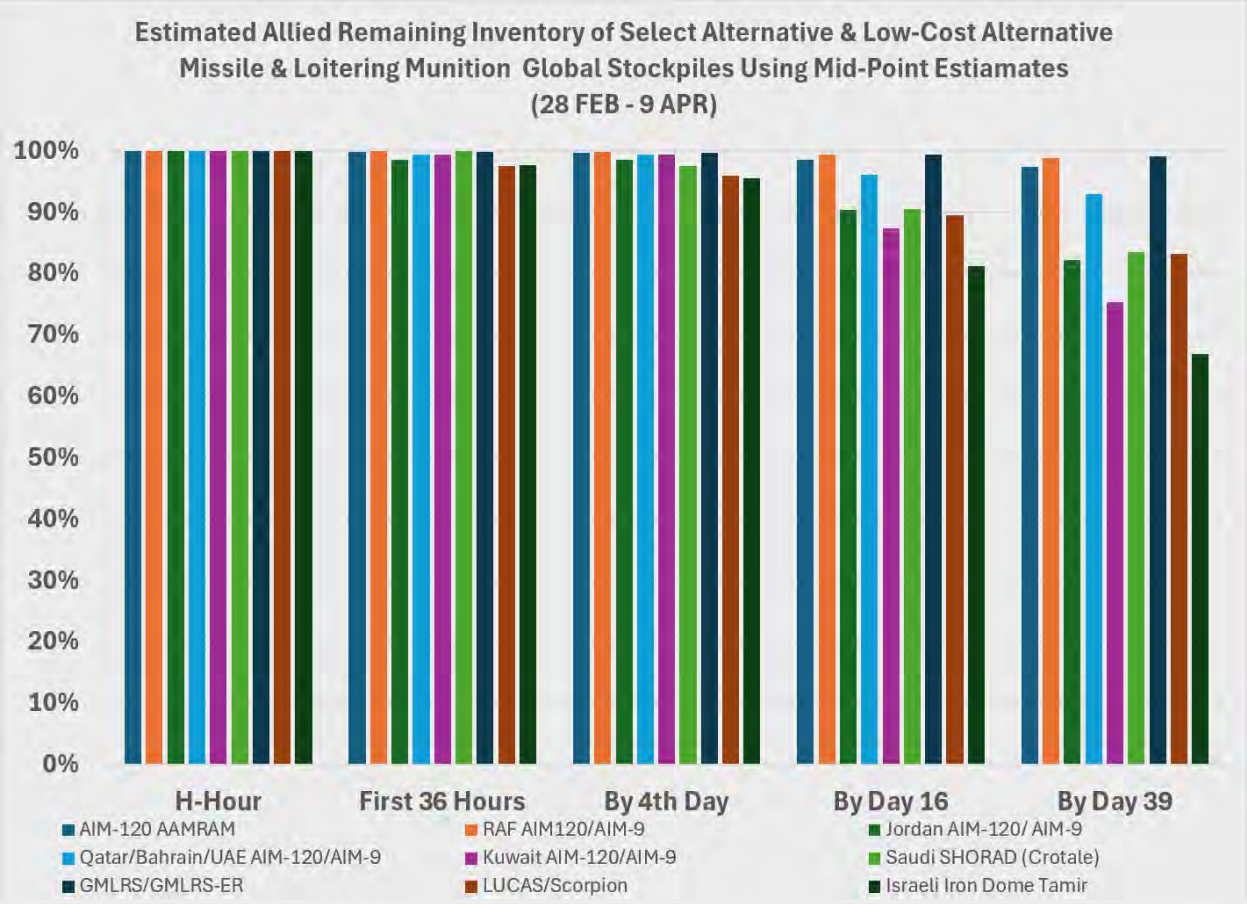


Figure 74: Estimated Allied Remaining Inventory of Select Alternative & Low-Cost Alternative Missiles & Loitering Munition Global Stockpiles using Midpoint Estimates

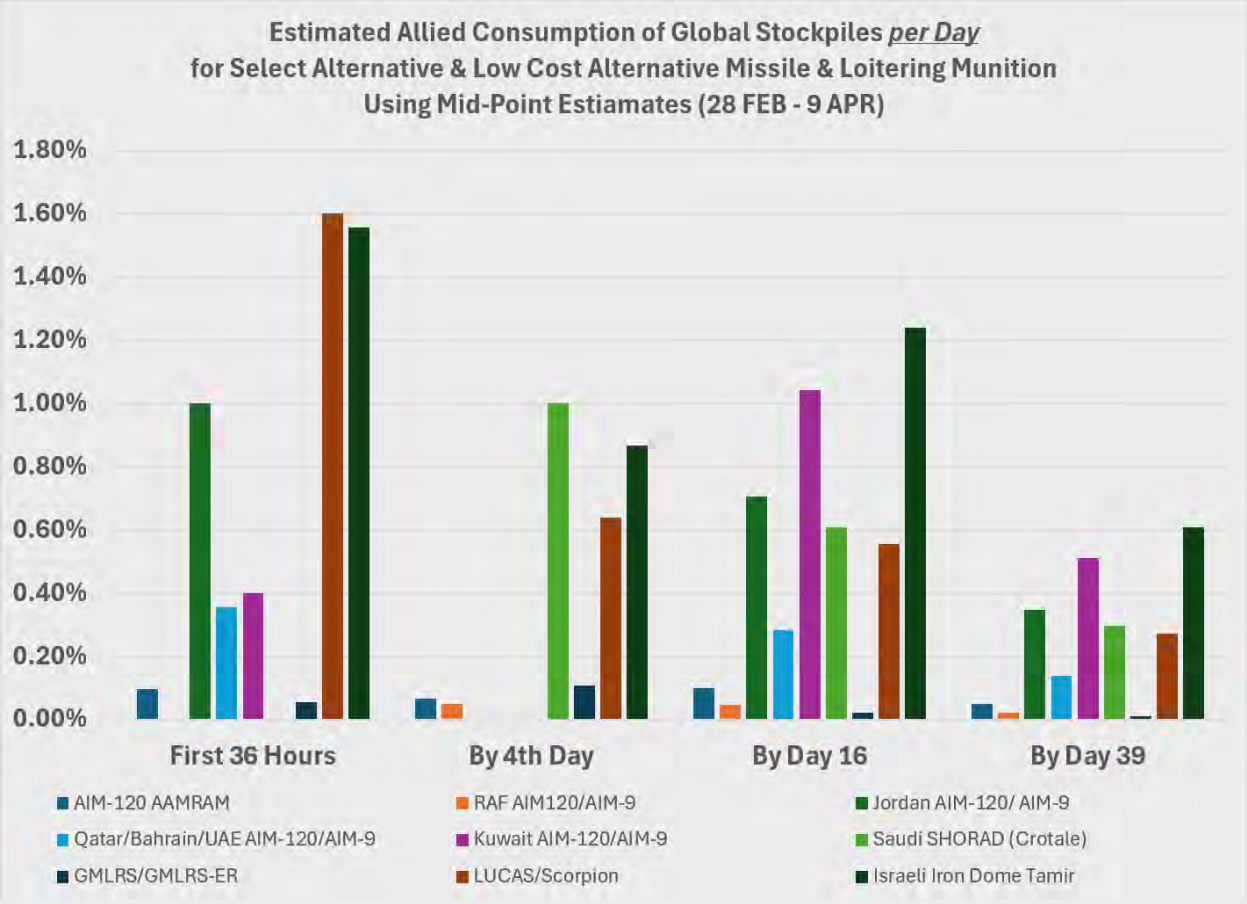


Figure 75: Estimated Allied Consumption of Global Stockpiles per Day for Select Alternative & Low-Cost Alternative Missile & Loitering Munition using Mid-Point Estimates

## 8.4 Iranian Only Analysis

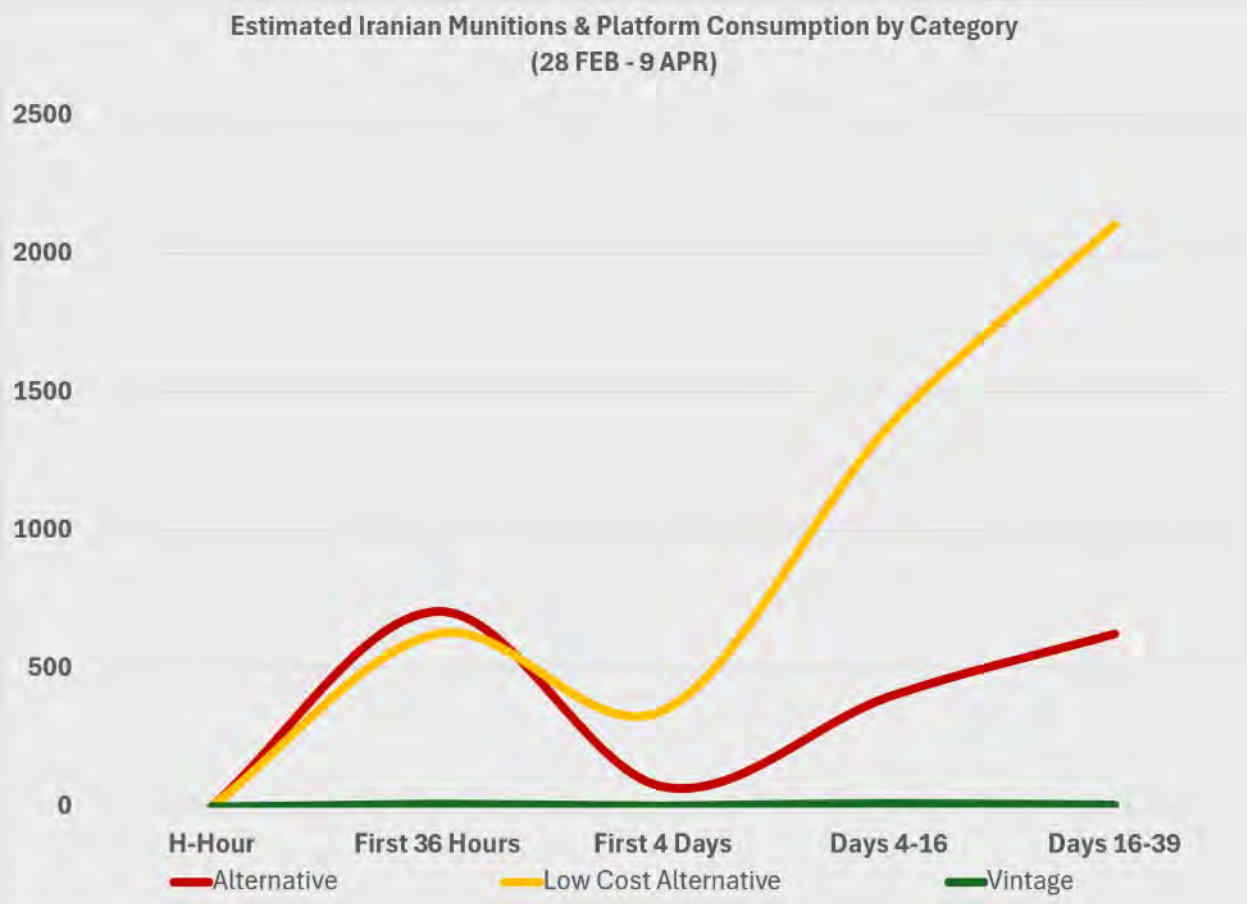


Figure 76: Estimated Iranian Munitions & Platform Consumption by Category

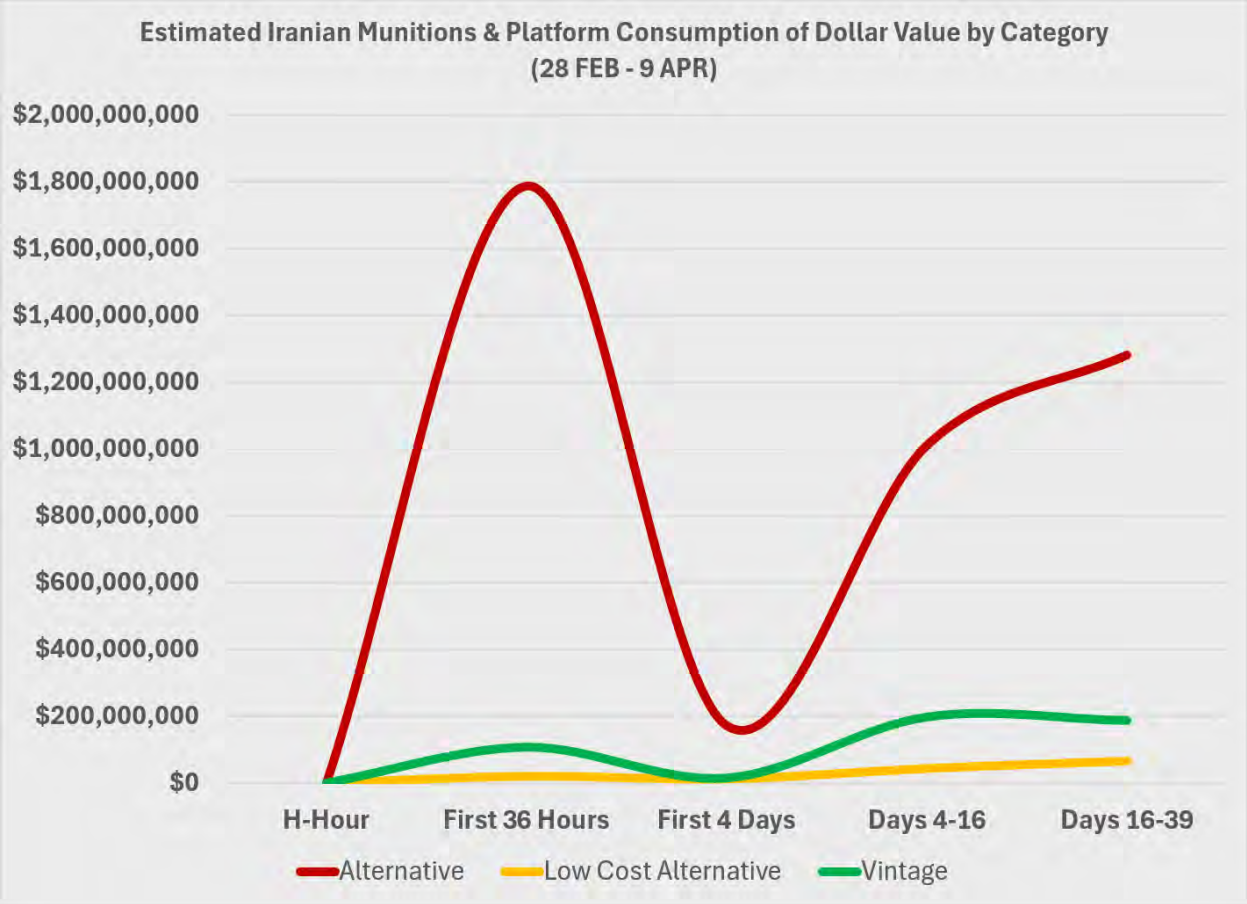


Figure 77: Estimated Iranian Munitions & Platform Consumption of Dollar Value by Category

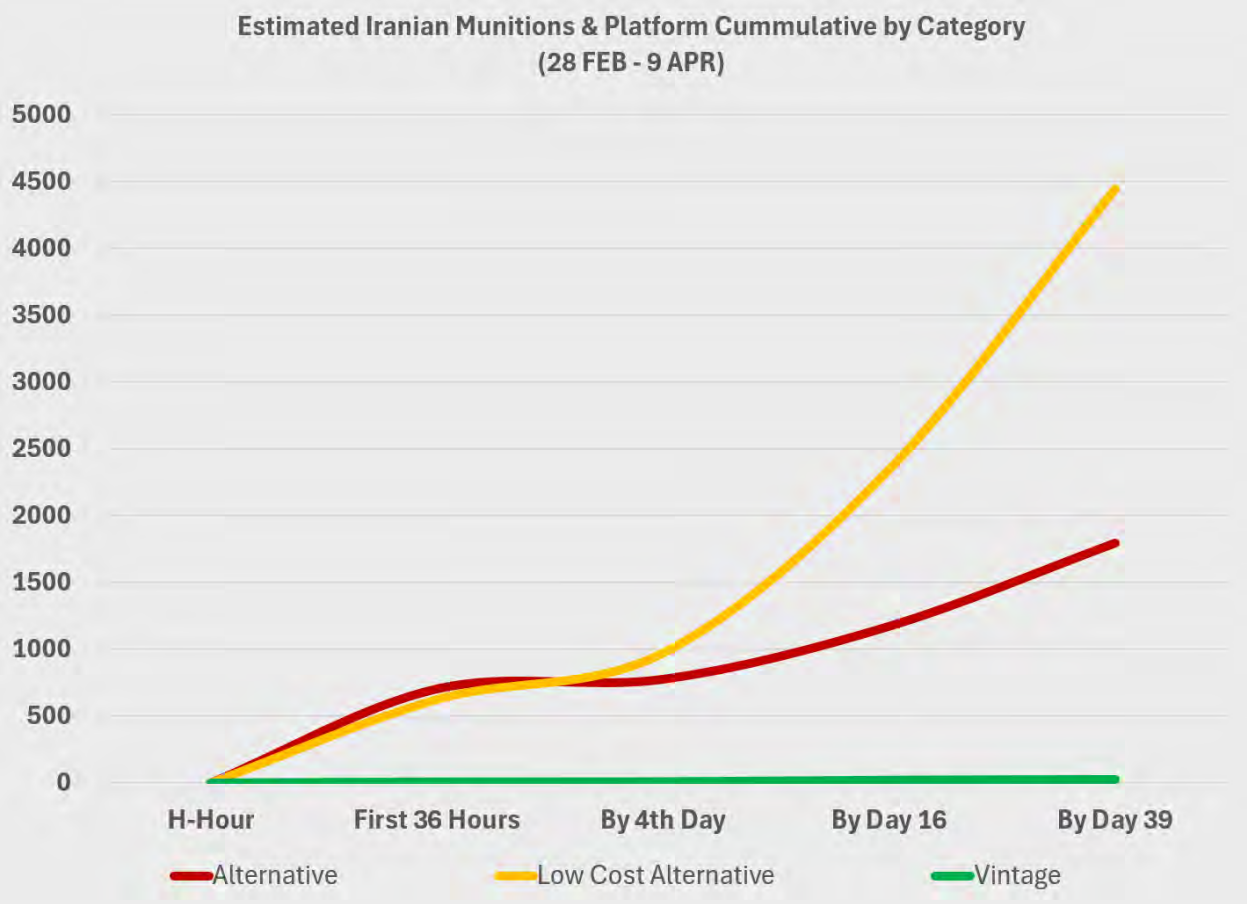


Figure 78: Estimated Iranian Munitions & Platform Cumulative by Category

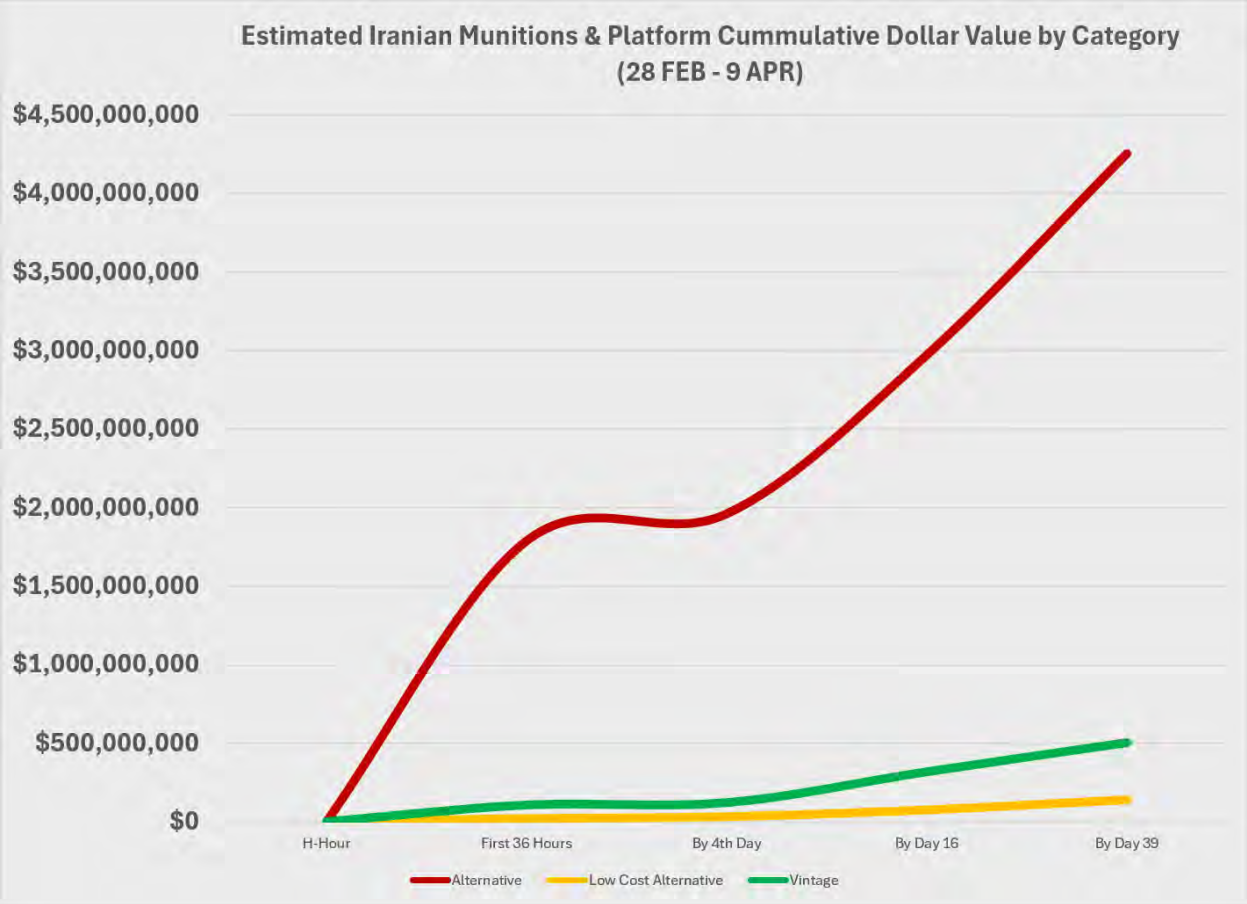


Figure 79: Estimated Iranian Munitions & Platform Cumulative Dollar Value by Category

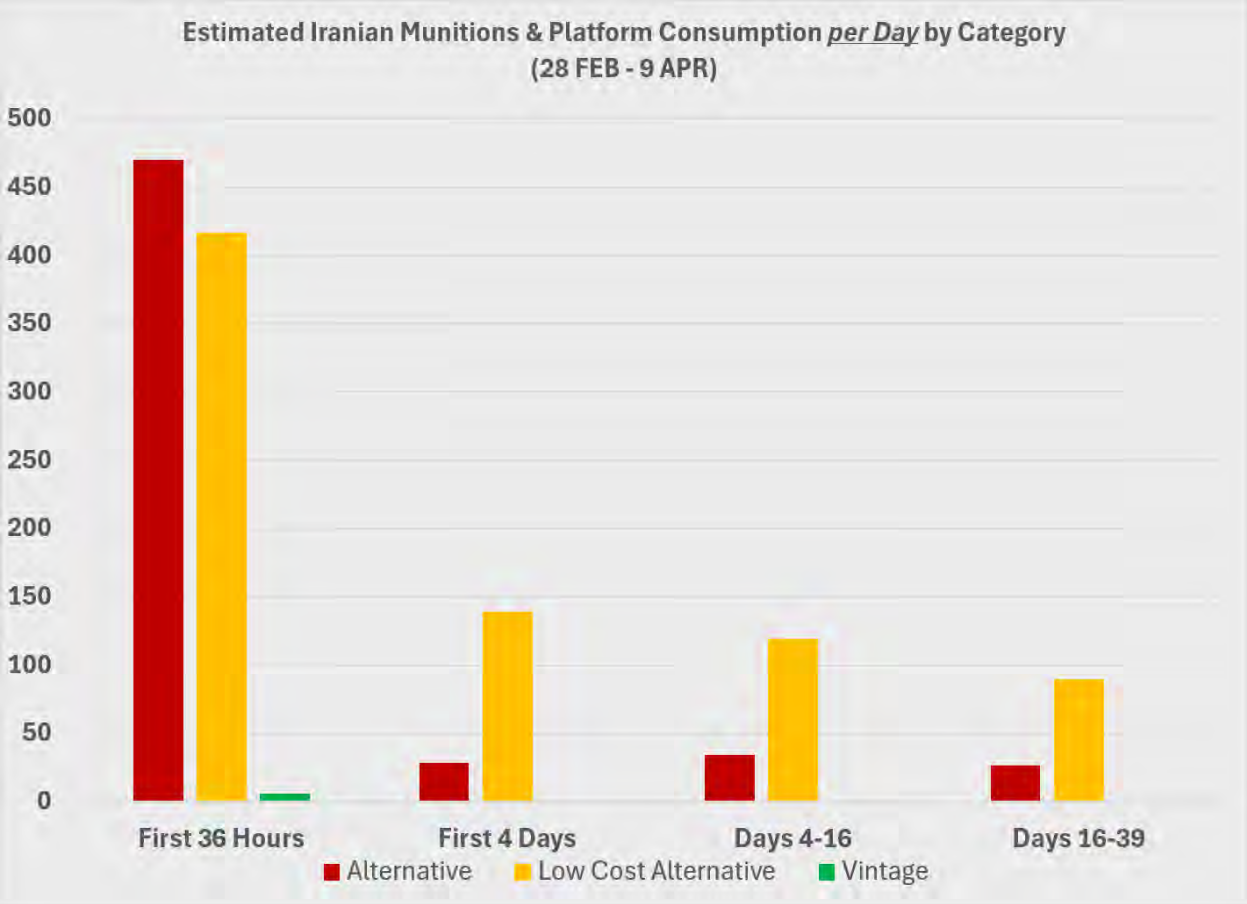


Figure 80: Estimated Iranian Munitions & Platform Consumption per Day by Category

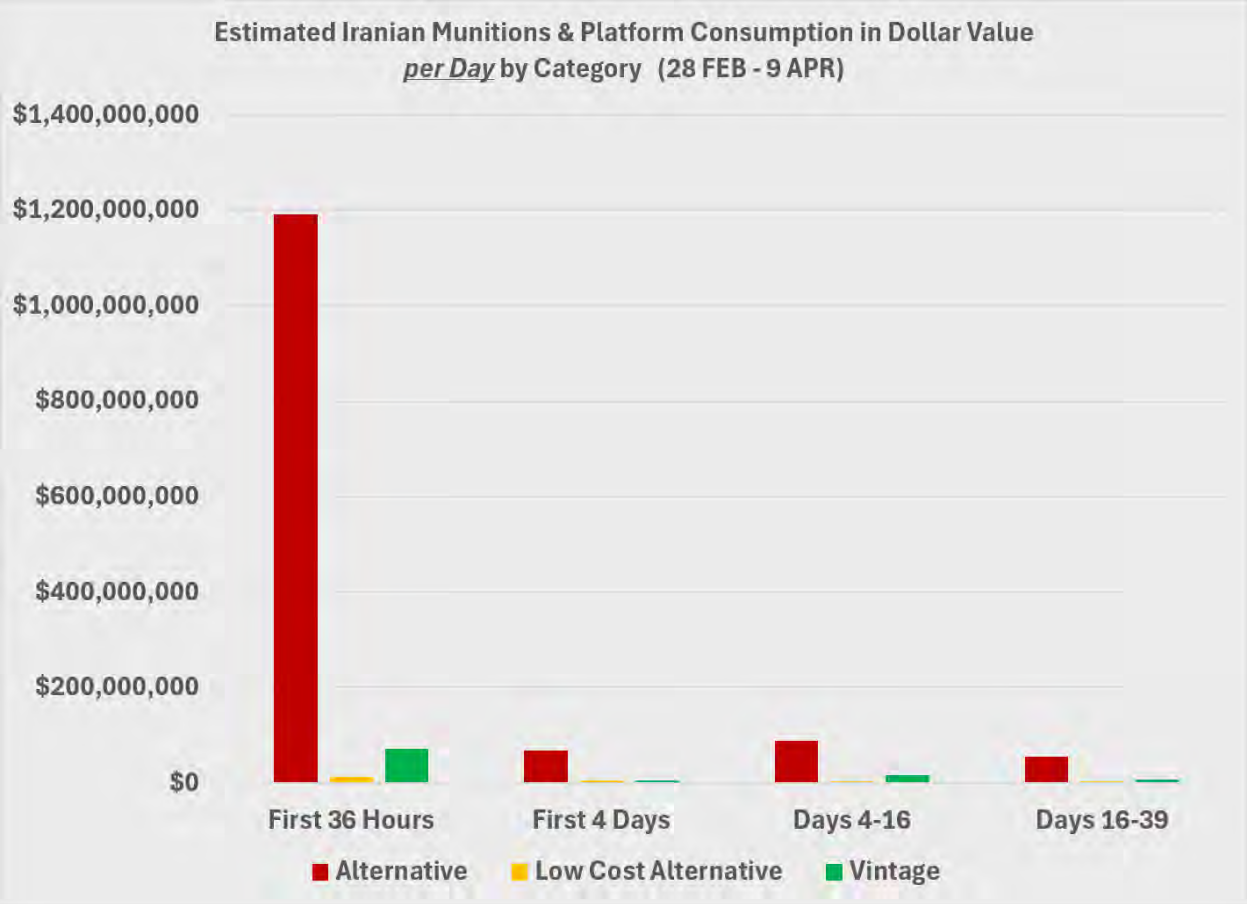


Figure 81: Estimated Iranian Munitions & Platform Consumption in Dollar Value

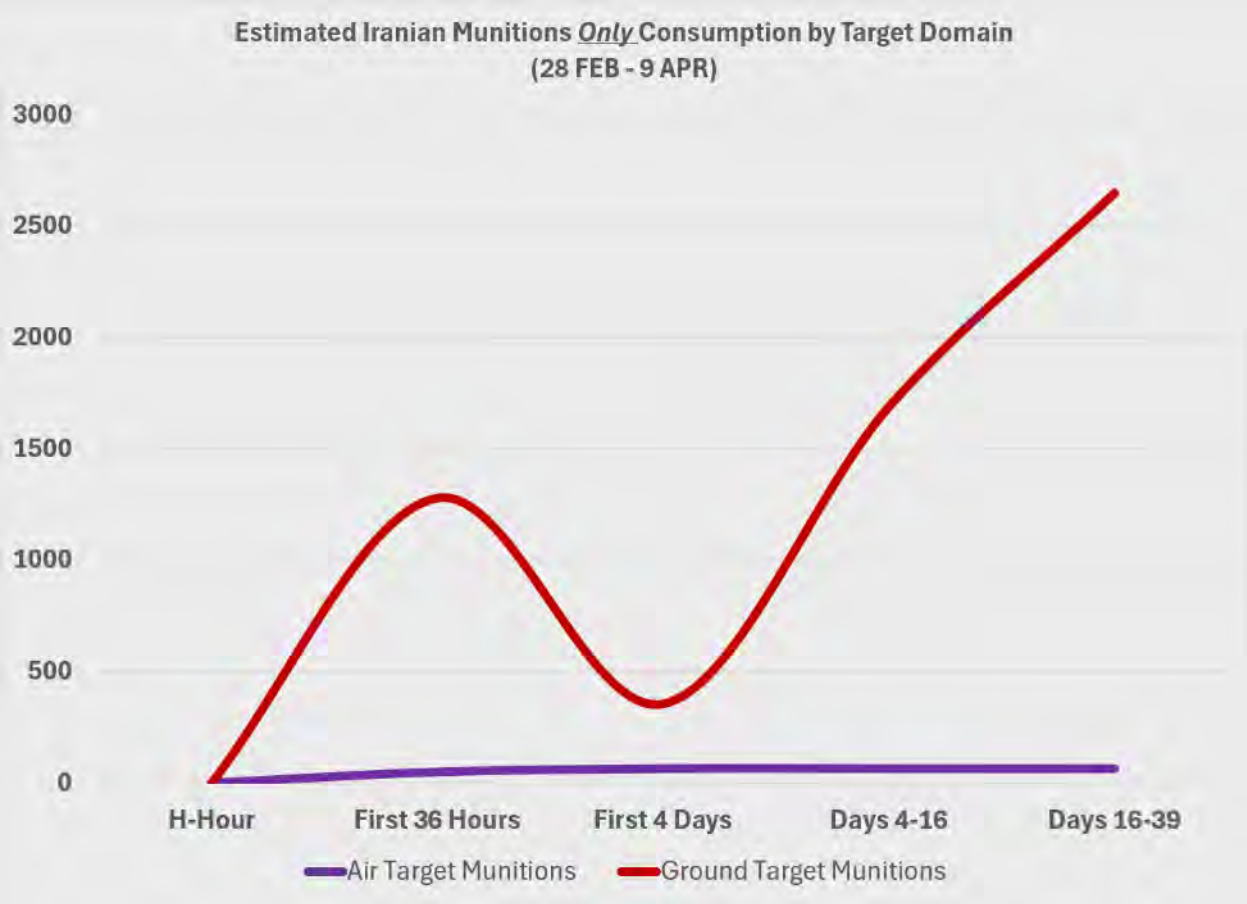


Figure 82: Estimated Iranian Munitions Only Consumption by Target Domain

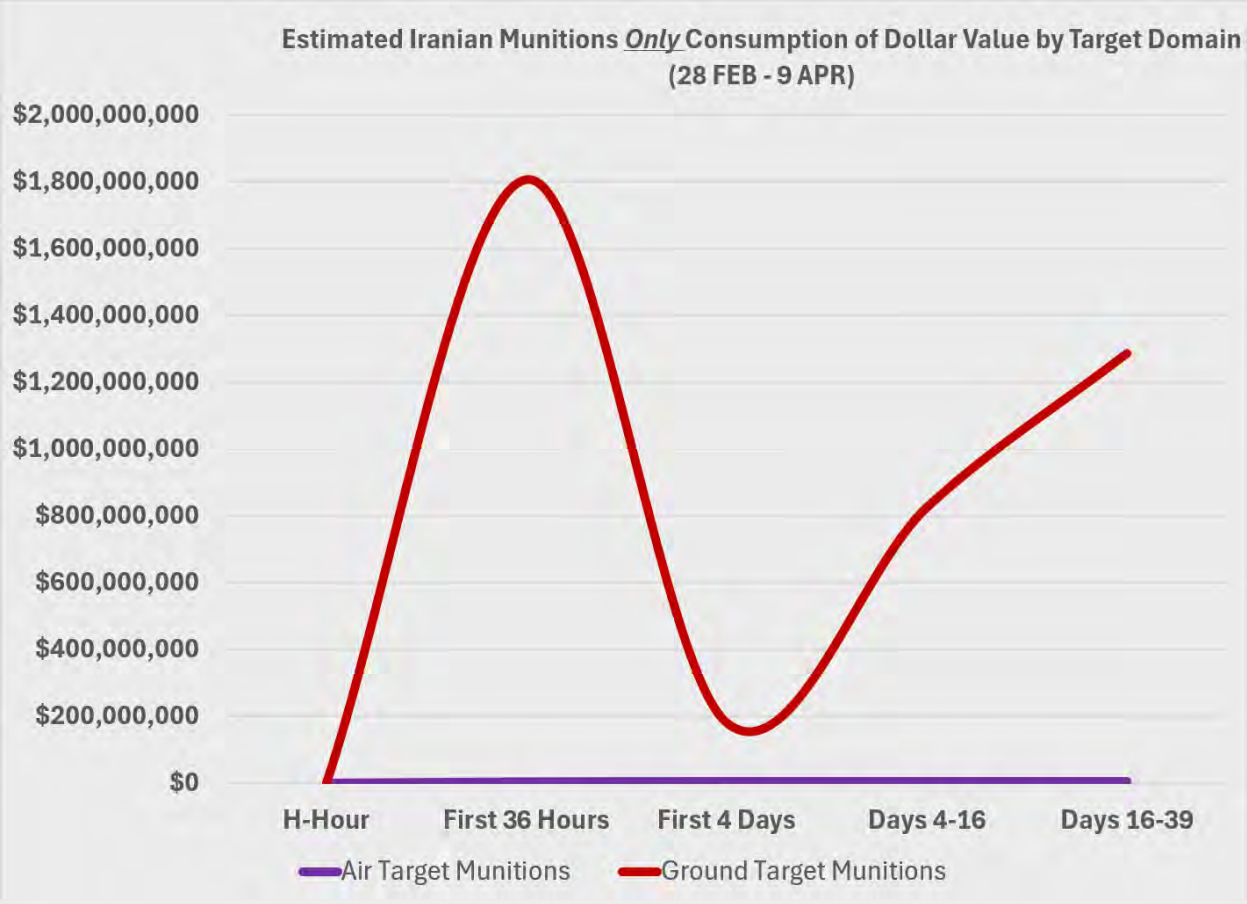


Figure 83: Estimated Iranian Munitions Only Consumption of Dollar Value by Target Domain

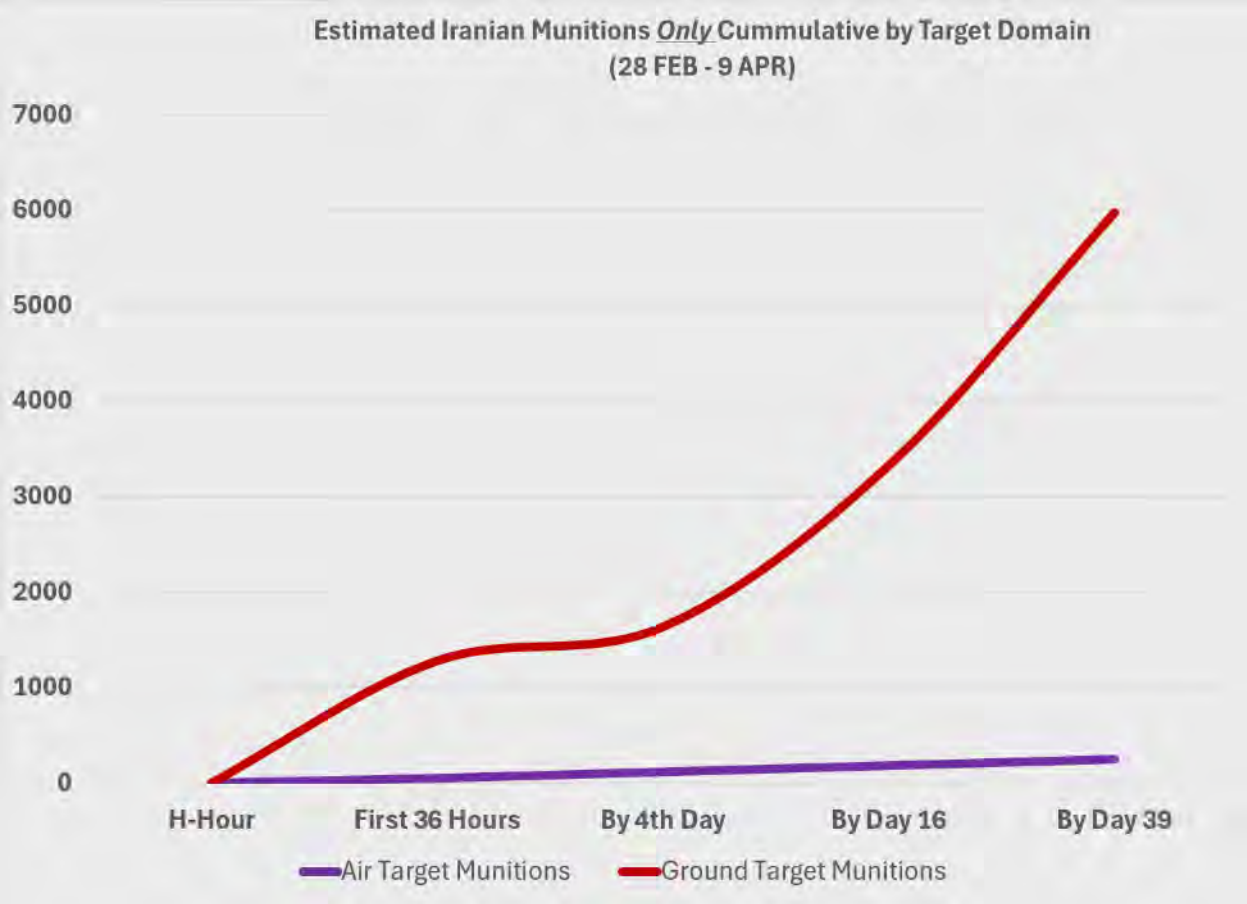


Figure 84: Estimated Iranian Munitions Only Cumulative by Target Domain

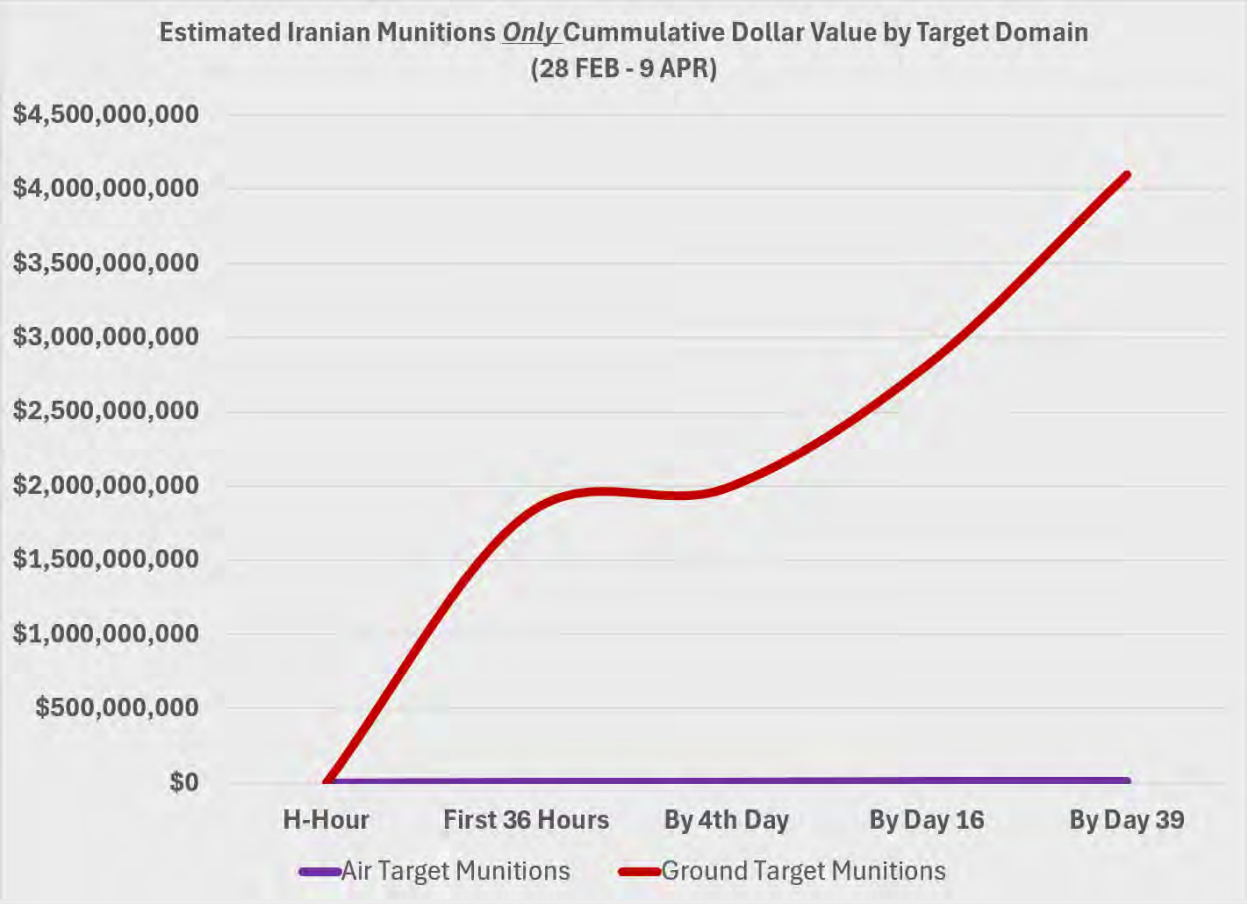


Figure 85: Estimated Iranian Munitions Only Cumulative Dollar Value by Target Domain

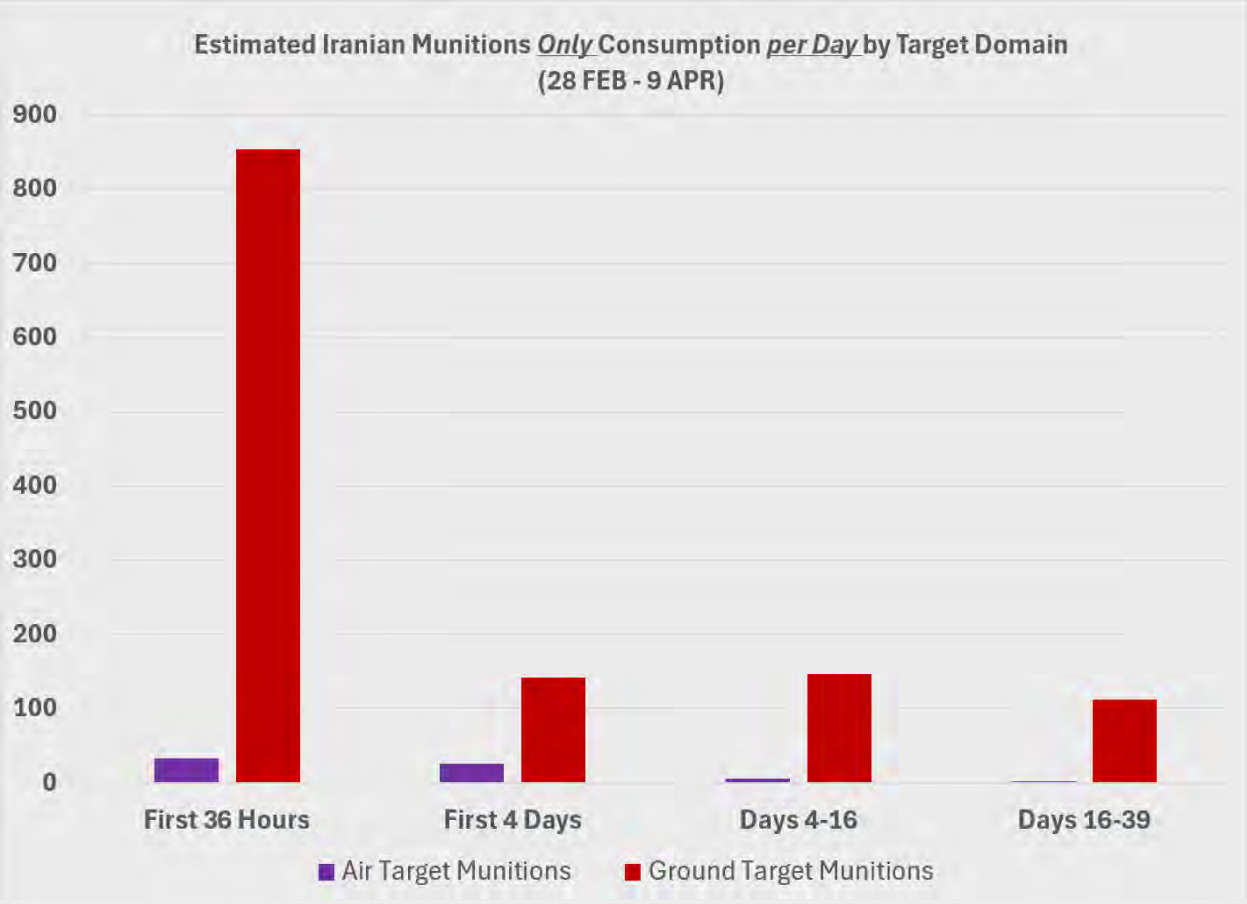


Figure 86: Estimated Iranian Munitions Only Consumption per Day by Target Domain

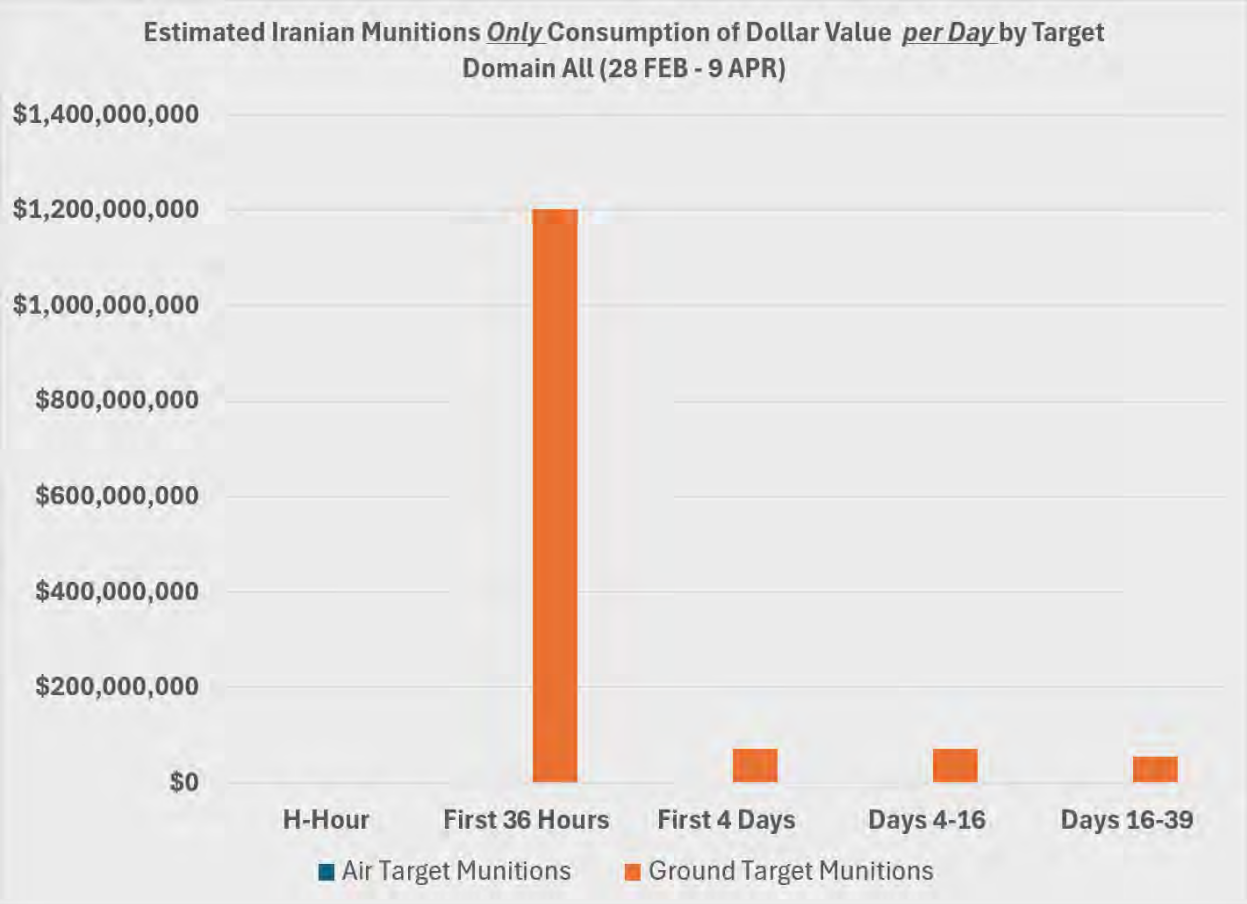


Figure 87: Estimated Iranian Munitions Only Consumption of Dollar Value per Day by Target Domain All

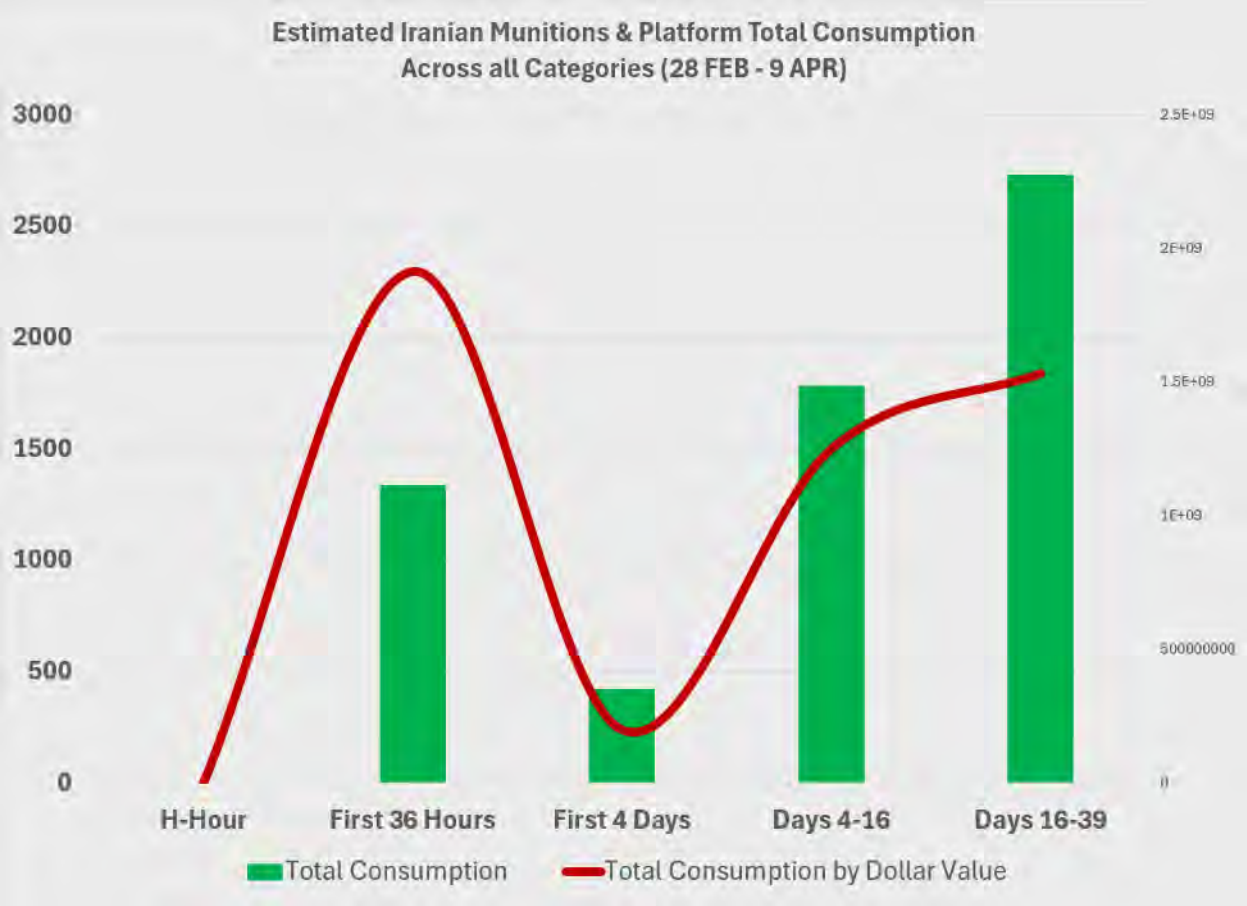


Figure 88: Estimated Iranian Munitions & Platform Total Consumption Across all Categories

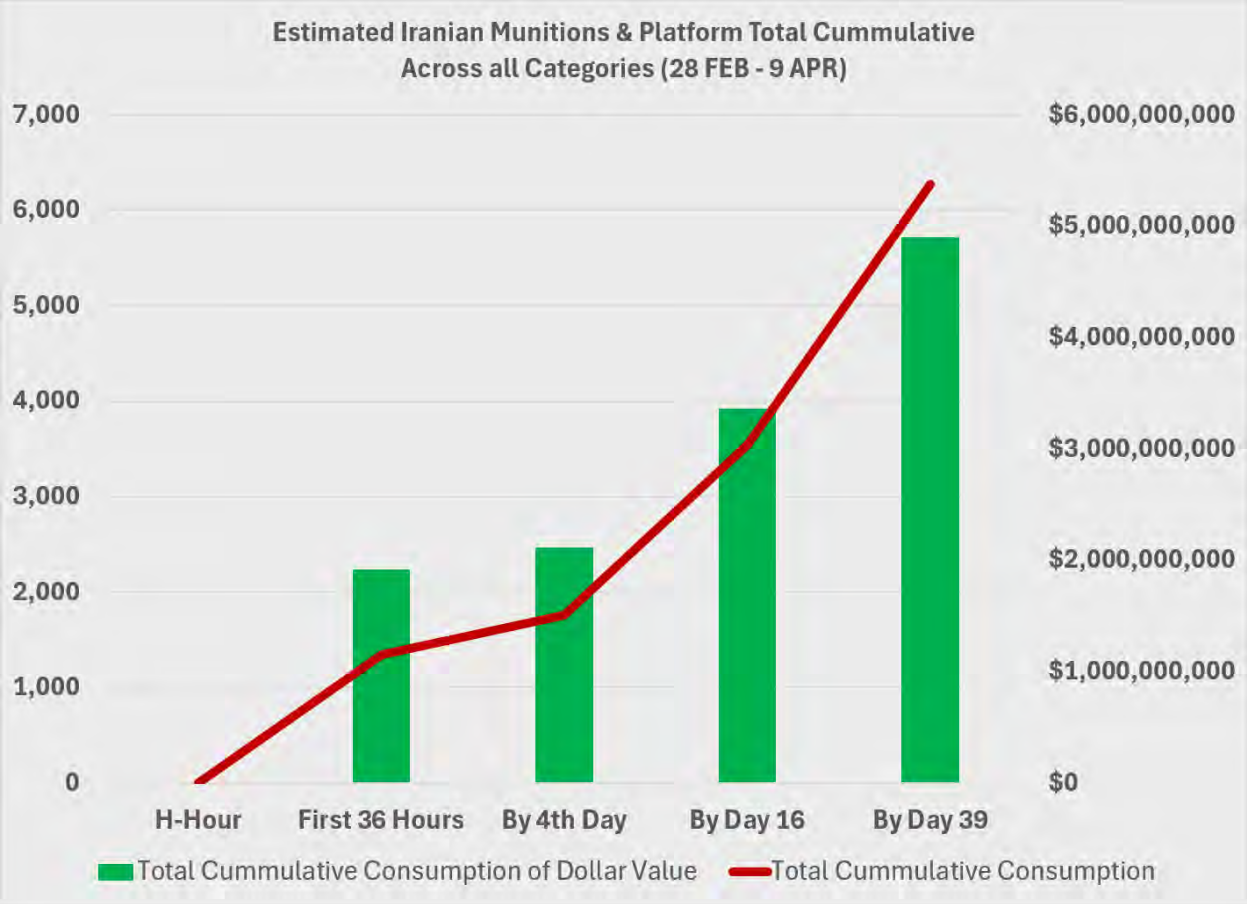


Figure 89: Estimated Iranian Munitions & Platform Total Cumulative Across all Categories

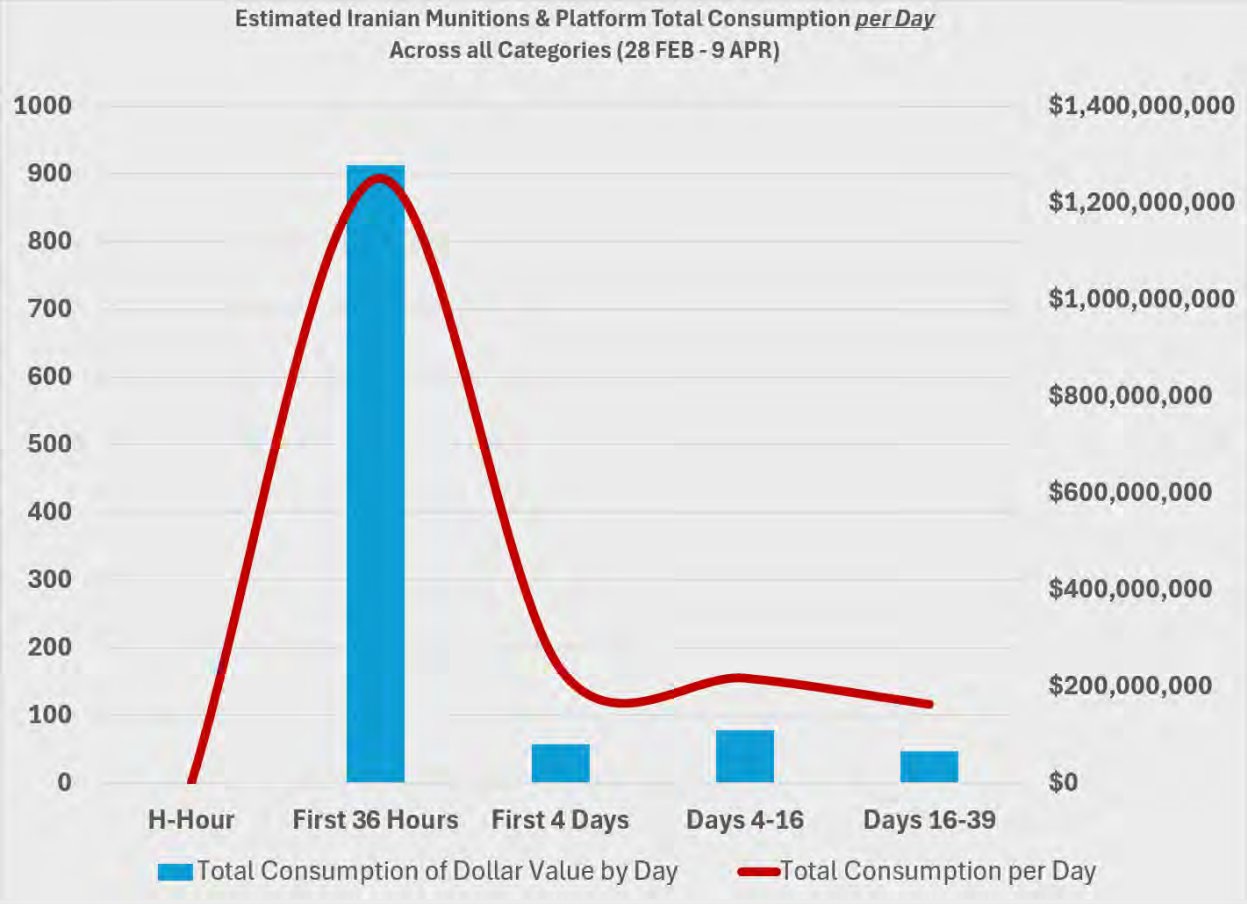


Figure 90: Estimated Iranian Munitions & Platform Total Consumption per Day Across all Categories

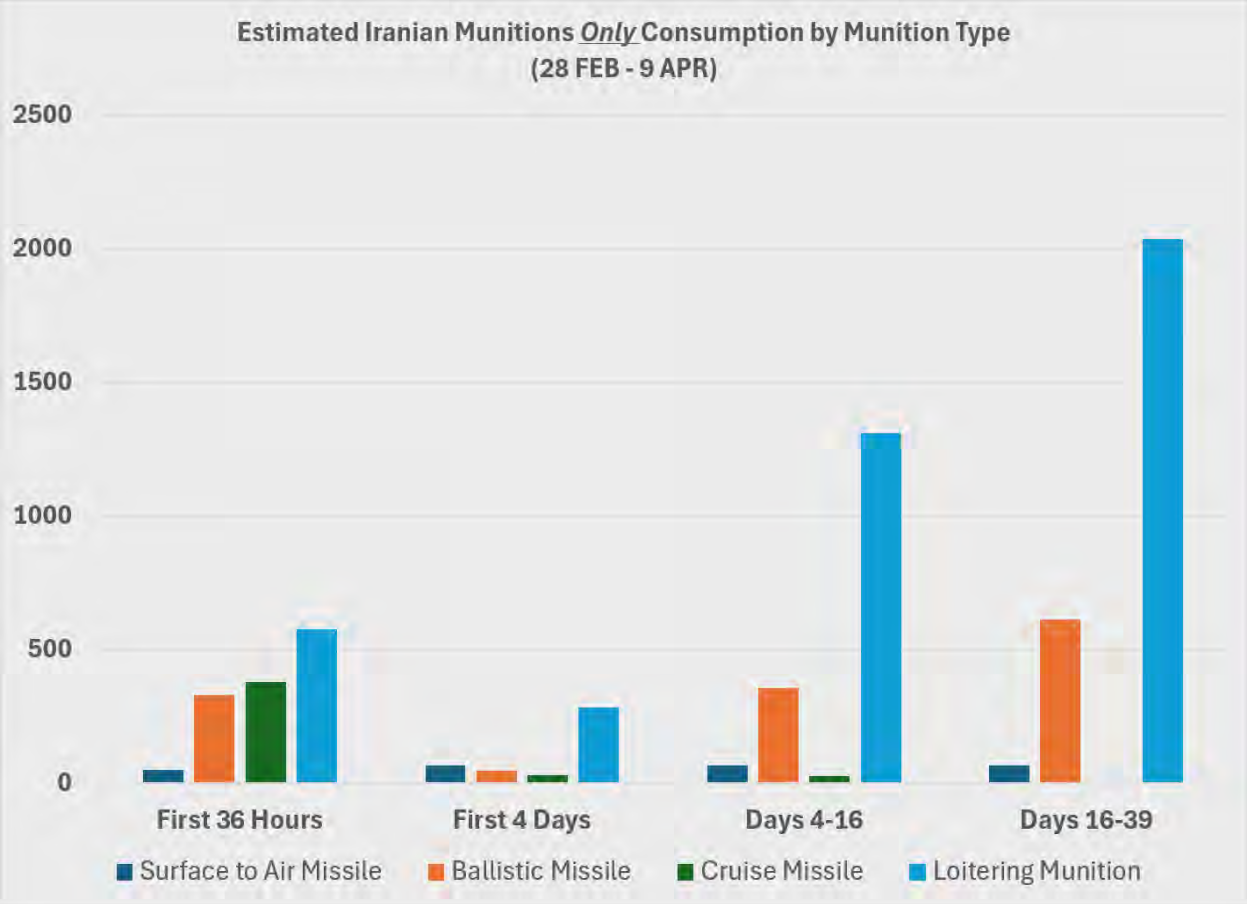


Figure 91: Estimated Iranian Munitions Only by Munition Type

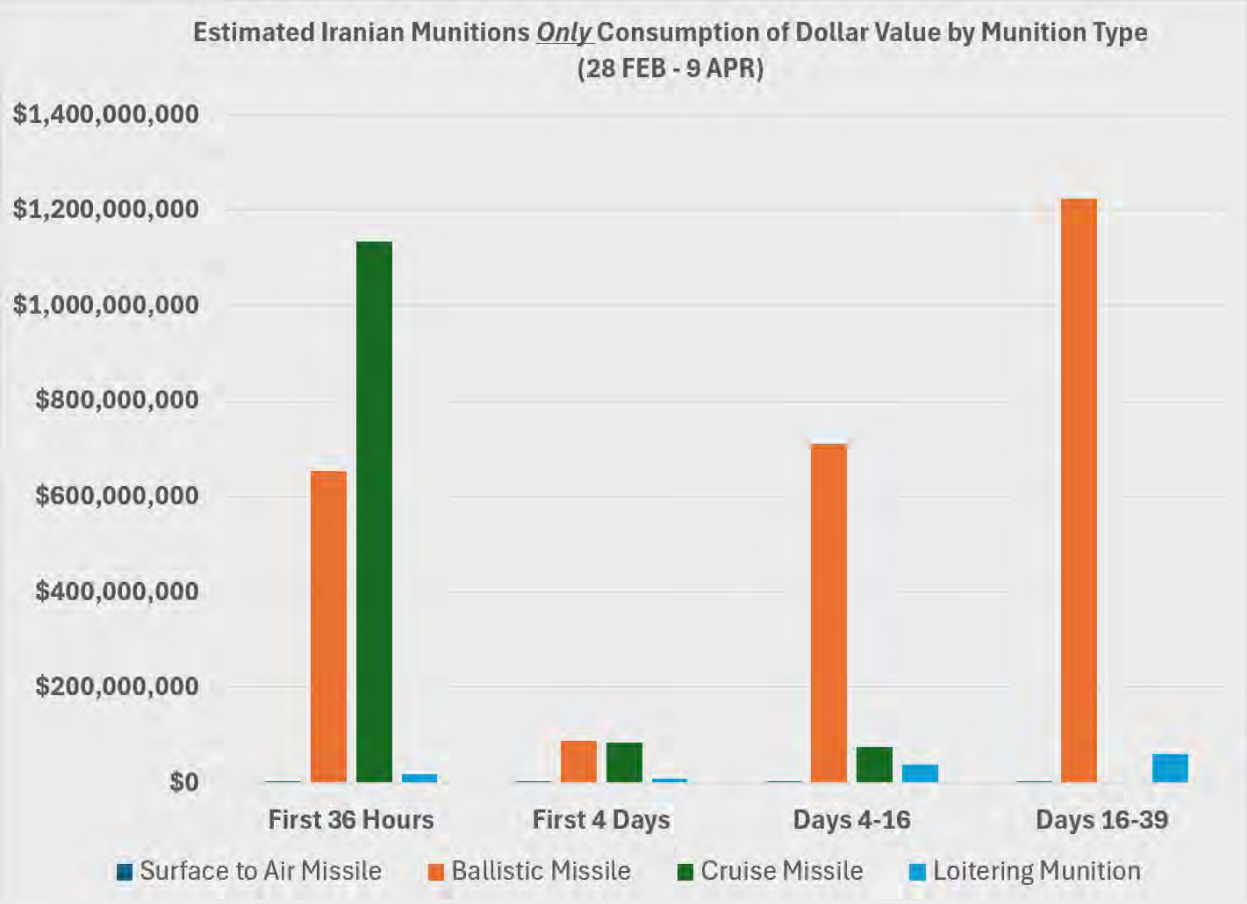


Figure 92: Estimated Iranian Munitions Only Consumption of Dollar Value by Munition Type

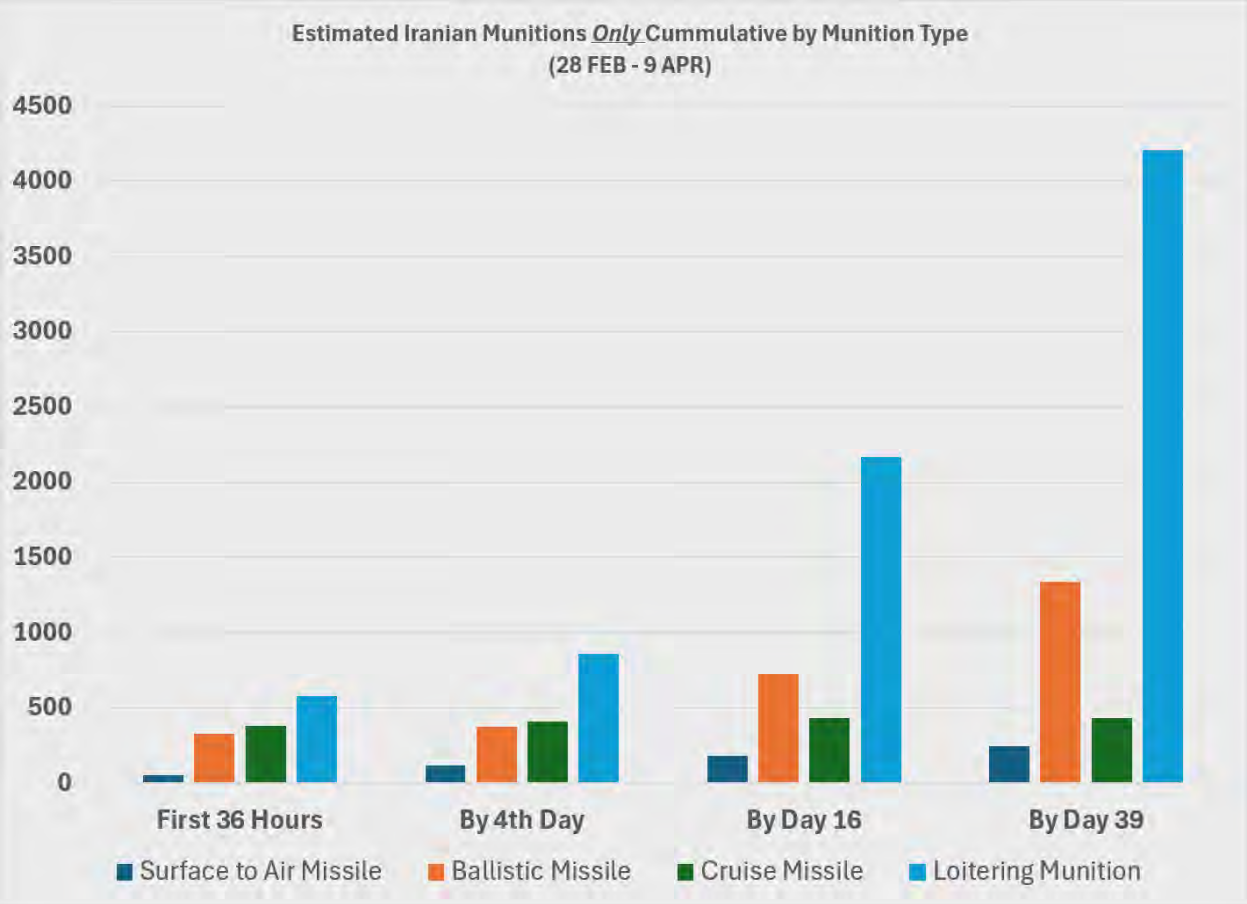


Figure 93: Estimated Iranian Munitions Only Cumulative by Munition Type

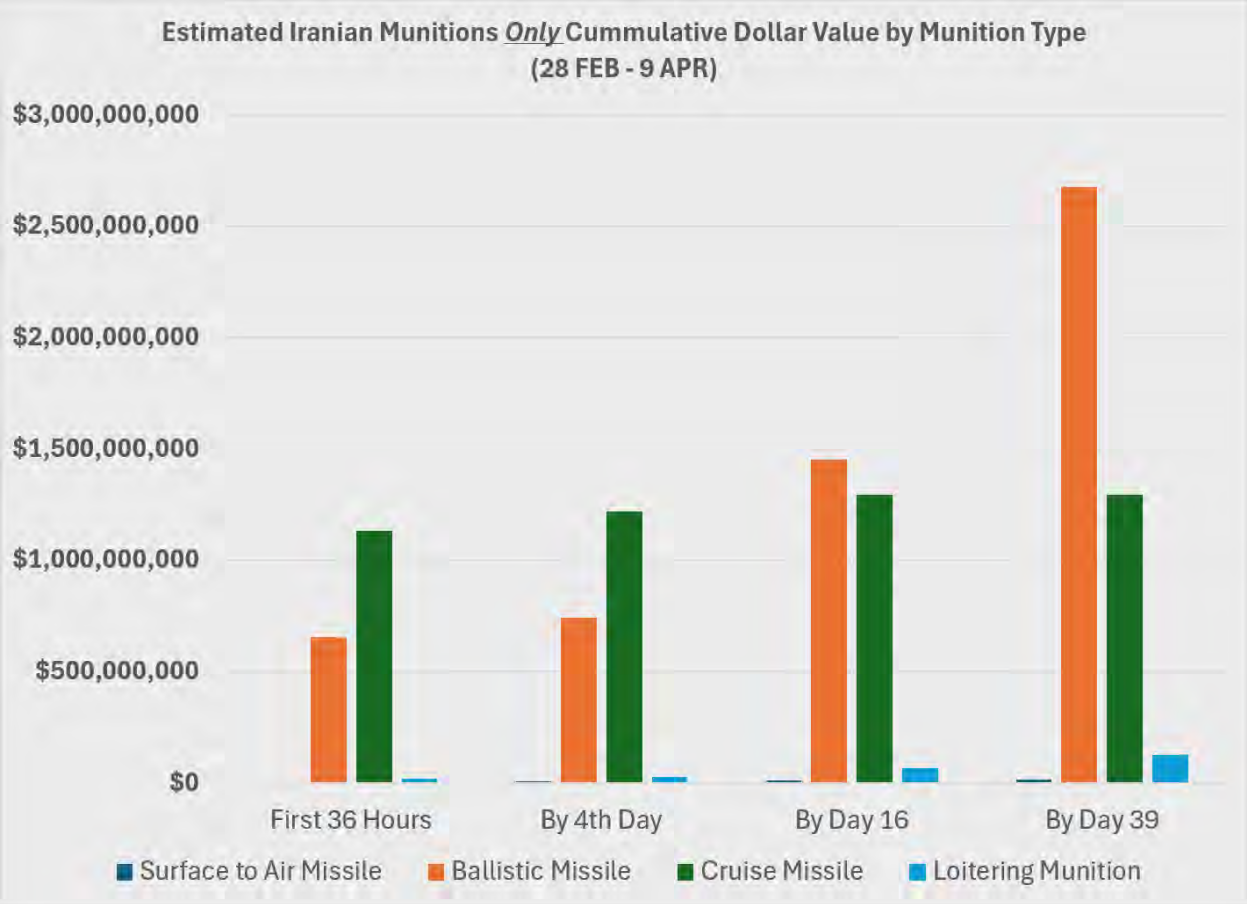


Figure 94: Estimated Iranian Munitions Only Cumulative Dollar Value by Munition Type

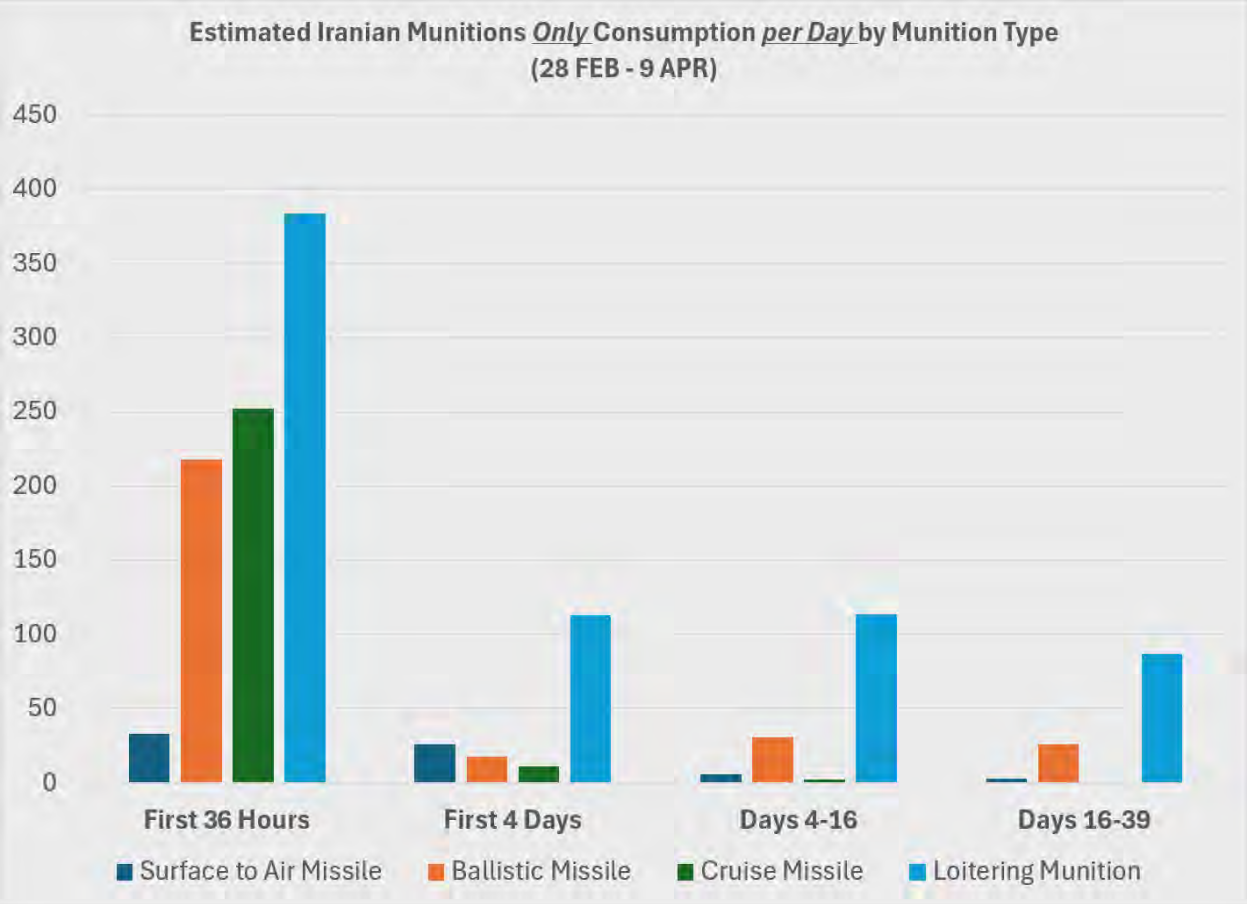


Figure 95: Estimated Iranian Munitions Only Consumption per Day by Munition Type

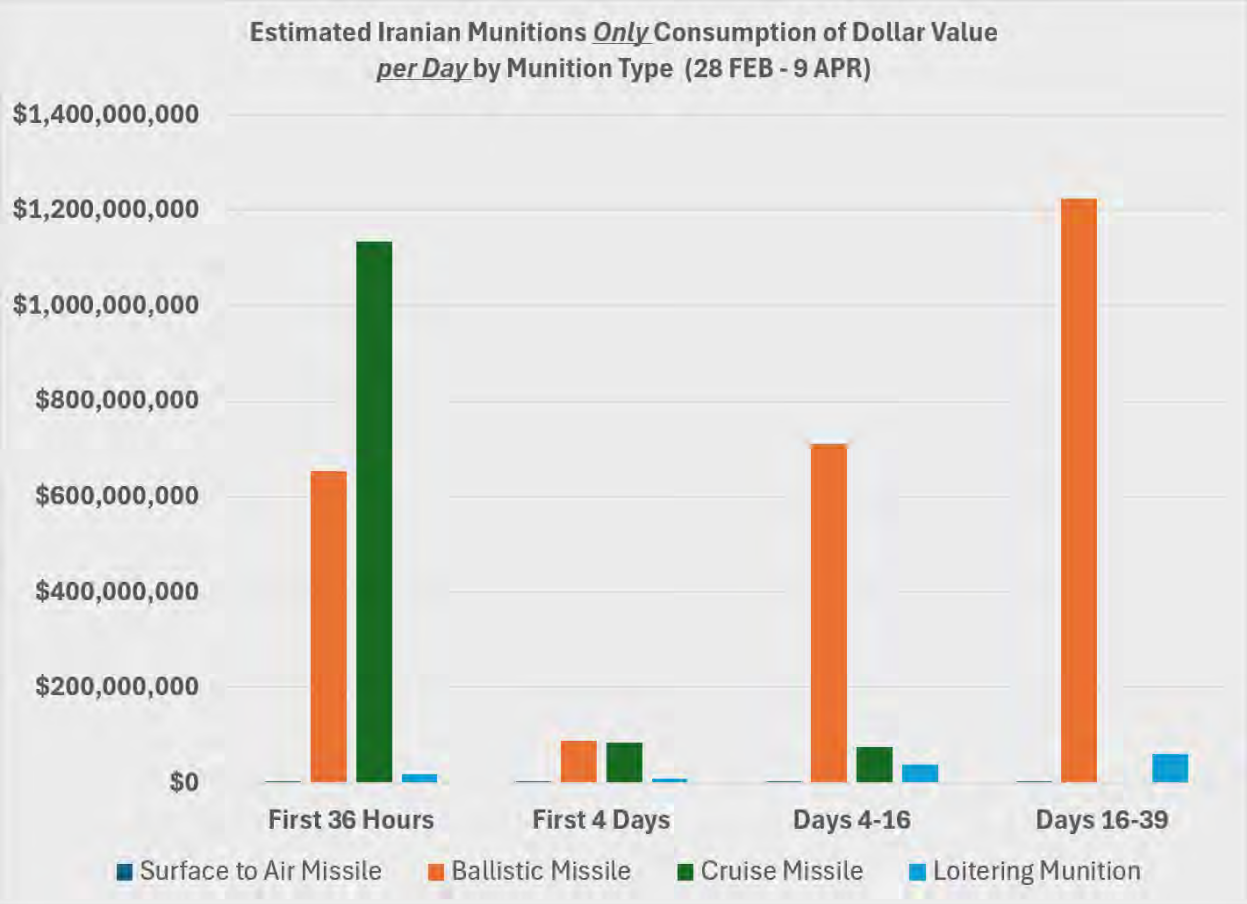


Figure 96: Estimated Iranian Munitions Only Consumption of Dollar Value per Day by Munition Type

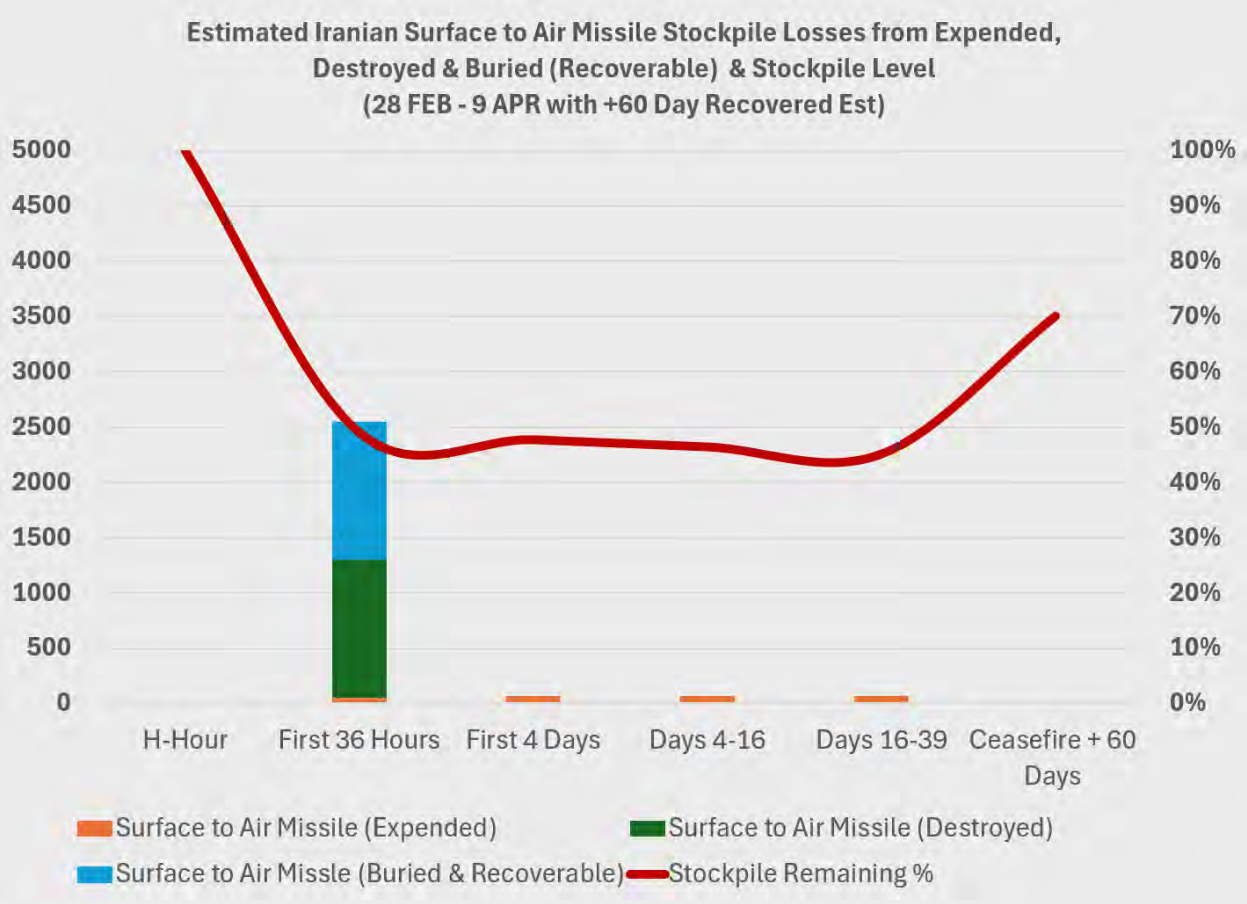



Figure 97: Estimated Iranian Surface to Air Missile Stockpile Losses from Expended, Destroyed & Buried (Recovered) & Stockpile Level

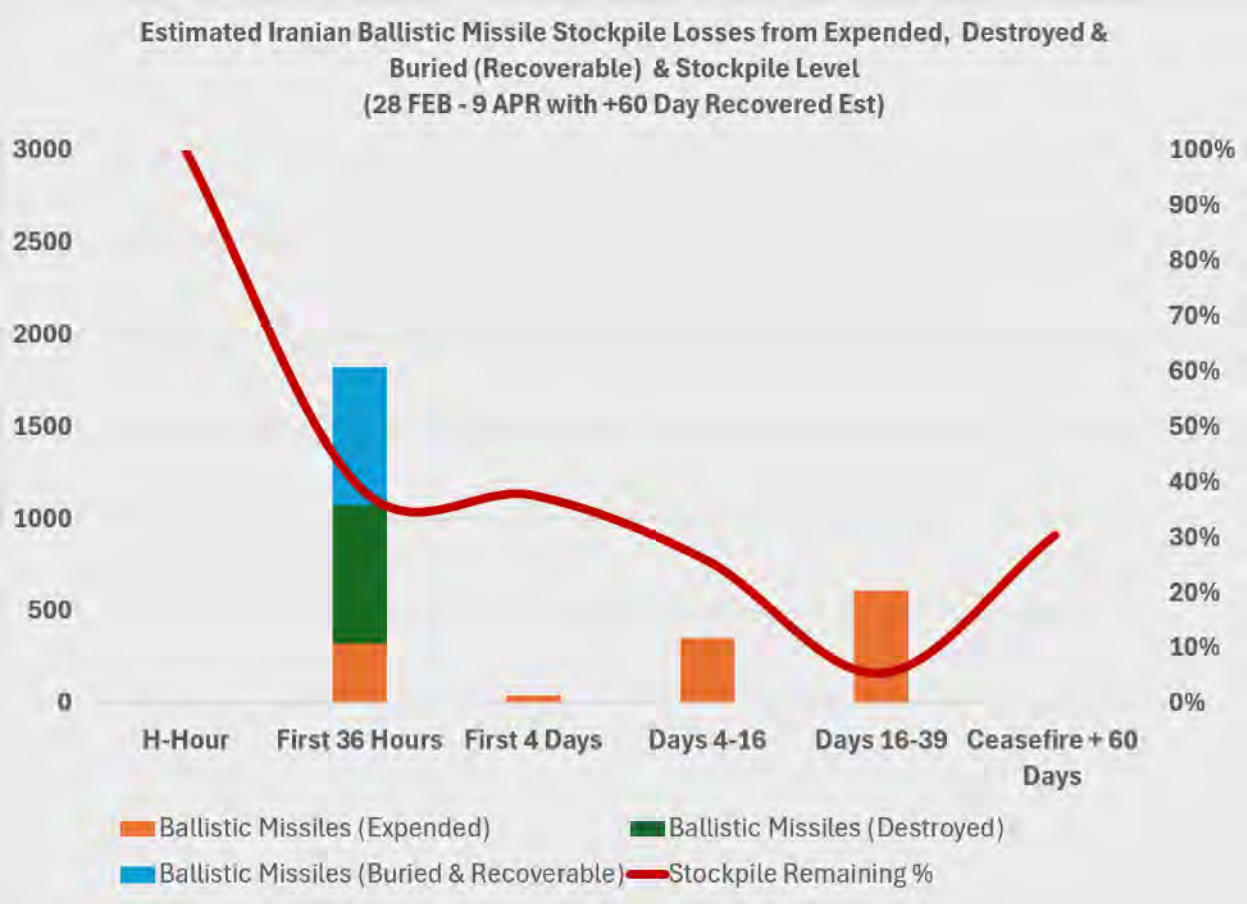


Figure 98: Estimated Iranian Ballistic Missile Stockpile Losses from Expended, Destroyed & Buried (Recovered) & Stockpile Level

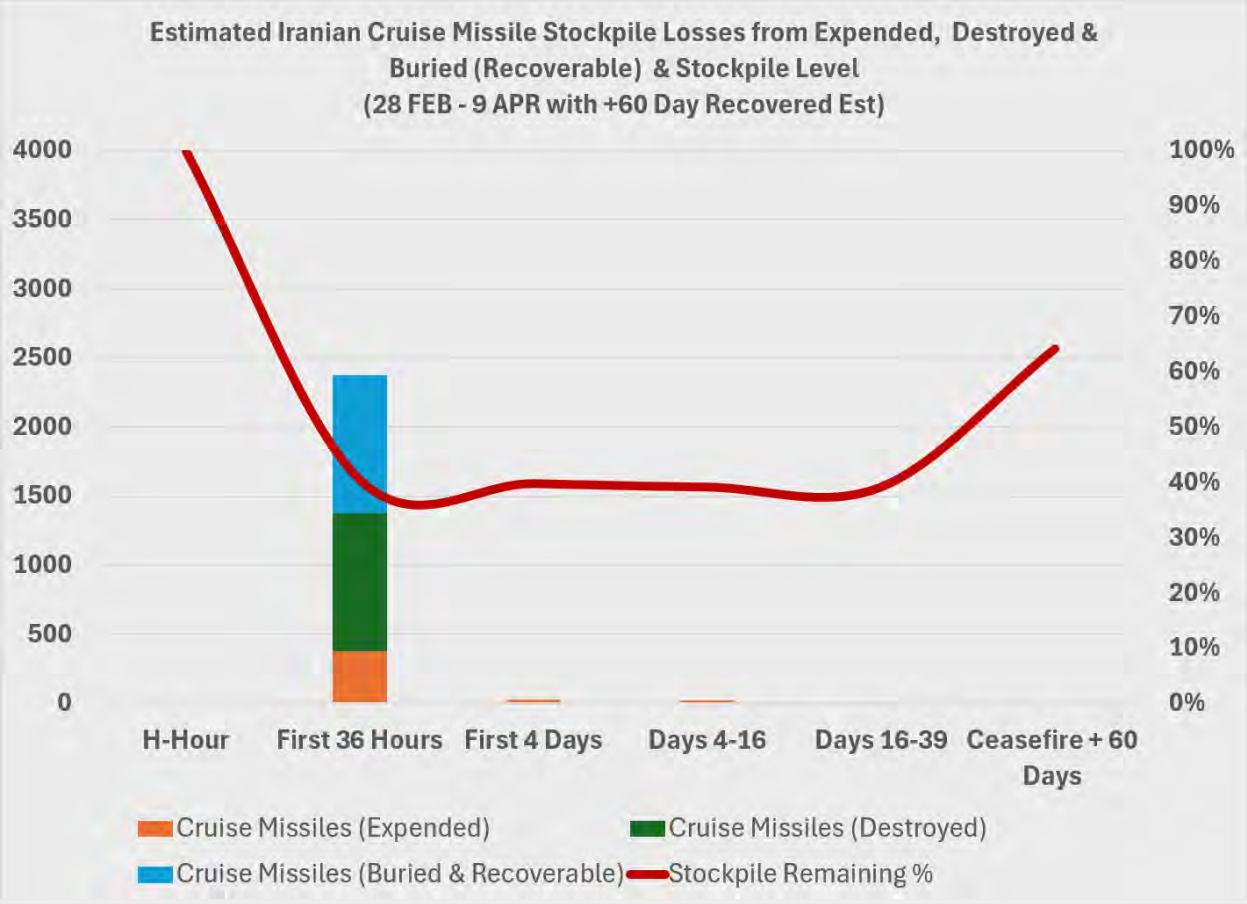


Figure 99: Estimated Iranian Cruise Missile Stockpile Losses from Expended, Destroyed & Buried (Recovered) & Stockpile Level

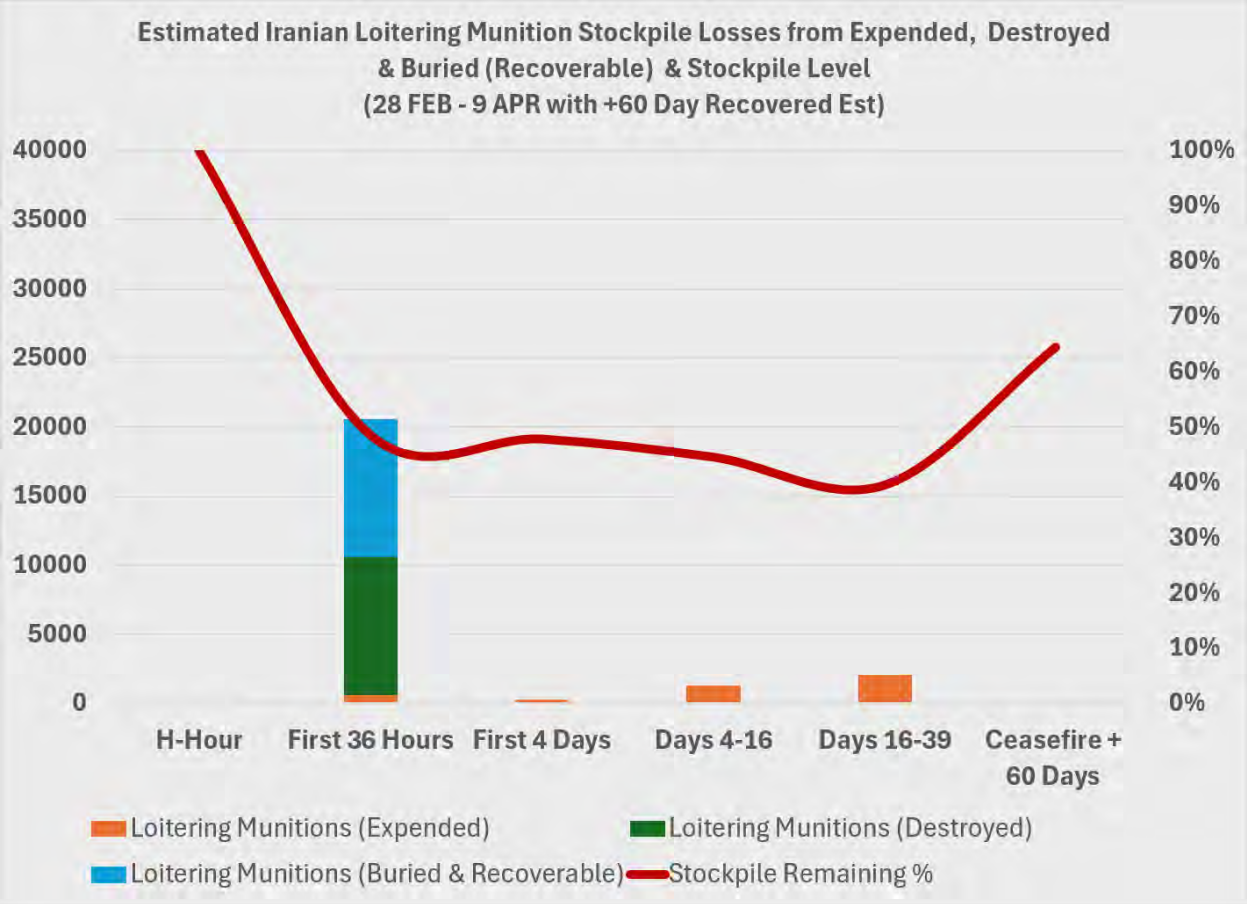


Figure 100: Estimated Iranian Loitering Munition Missile Stockpile Losses from Expended, Destroyed & Buried (Recovered) & Stockpile Level

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