



# THE END OF OVERKILL?

Reassessing U.S. Nuclear  
Weapons Policy

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## Executive Summary

U.S. security does not require nearly 1,600 nuclear weapons deployed on a triad of systems—bombers, land-based intercontinental ballistic missiles (ICBMs), and submarine-launched ballistic missiles (SLBMs)—to deliver them. A smaller arsenal deployed entirely on submarines would save roughly \$20 billion annually while deterring attacks on the United States and its allies. A missile dyad is more politically feasible but saves less.

The triad grew from the military services' competition to meet the Soviet threat. The arguments for it arrived to rationalize its components. The public rationale was a second strike: a diversity of delivery systems insured the nuclear arsenal's survival against a Soviet preemptive attack. The more sophisticated rationale was a first strike: deterring Soviet aggression against European allies required the ability to preemptively destroy their nuclear forces.

Once competition between the Navy and Air Force diminished in the 1960s, they stopped denigrating each other's nuclear delivery systems and began arguing for the triad's necessity. That agreement prevented appreciation of the flaws in its justifications. The survivability argument exaggerated Soviet capability to threaten U.S. forces. The first-strike argument overlooked the accuracy gains allowing various

weapons to destroy Soviet nuclear forces. And keeping the Soviet army out of Western Europe was never that hard; it did not require the ability to disarm their nuclear deterrent.

U.S. power today makes the case for the triad more dubious. Survivability is no longer a feasible justification. No U.S. adversary has the capability to destroy all U.S. ballistic submarines, let alone all three legs, and there would be time to adjust if that changed. Nuclear weapons are essentially irrelevant in actual U.S. wars, which are against insurgents and weak states without nuclear arsenals. Nuclear threats have a bigger role in hypothetical U.S. wars with nuclear-armed powers. But cases where the success of deterrence hinges on the U.S. capability to destroy enemy nuclear forces are far-fetched. In any case, U.S. submarines and conventional forces can destroy those forces. Even hawkish policies do not require a triad.

Nuclear weapons are no longer central to the identity or budget of the Air Force and Navy. Especially while austerity heightens competition for Pentagon resources, service leaders may see nuclear missions as red-headed step-children that take from true sons. That shift would facilitate major reductions in the nuclear arsenal, the elimination of at least one leg of the triad, and substantial savings.

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## **Introduction**

Fear of mass destruction is crucial to deterrence, which has generally been the use of nuclear weapons. Their contribution to U.S. security then depends on the availability of circumstances where the United States might usefully threaten mass killing.<sup>1</sup> Happily, those circumstances are rare and diminishing, and the forces required for them far fewer than what the U.S. military now operates. In particular, there is no good reason to maintain a triad of nuclear weapons delivery vehicles—bomber aircraft, intercontinental ballistic missiles (ICBMs), and submarine-launched ballistic missiles (SLBMs). Shifting to a submarine-based monad would serve U.S. deterrent needs and eventually save taxpayers roughly \$20 billion a year, with the savings coming from delivery vehicles and support costs.

This paper encourages abandonment of the triad and skepticism about the received wisdom justifying U.S. nuclear weapons' policies. We show how those policies have long rested on myths—about U.S. force plans, enemy capability, and the difficulties of deterrence—invented to manage Pentagon politics, placate allies and, to an extent, to bluff enemies. The first section examines U.S. nuclear policies during the Cold War, focusing on the triad's origins and justifications. We then discuss how the triad overcame those intellectual flaws and survived. The second section shows how peace and relative U.S. power, especially the increased capability of missiles, have made the case for the triad even more dubious. We discuss why political support for nuclear weapons and delivery is weakening, and why the bomber leg of the triad is most politically vulnerable. The conclusion suggests restoring competition over nuclear missions and improving debate.

## **Origins of the Triad**

The triad developed during the Eisenhower administration as a result of compe-

titution—both between the Cold War combatants and the U.S. military services. Dwight Eisenhower introduced the “New Look” strategy, which threatened to use nuclear bombs for “massive retaliation” against communist aggression in Asia and Europe.<sup>2</sup> Though Eisenhower and his advisers largely embraced the Harry S. Truman administration's global anti-communism, they worried that the military spending it required would turn the United States into an economically stunted garrison state.<sup>3</sup> They hoped to avoid more conventional wars like Korea and the cost of matching Soviet conventional military capability in Europe. The New Look strategy, in theory, solved this problem.<sup>4</sup> At least while the Soviet arsenal remained small and vulnerable to a U.S. nuclear strike, nuclear weapons offered a cheap, sustainable way of protecting allies.

The New Look privileged the Air Force.<sup>5</sup> In the early 1950s, Air Force bombers were the nation's primary means for delivering strategic nuclear weapons, and the Air Force also had the lead in developing missile technology. The Air Force's budget authority went from \$11.5 billion in 1954, in the wake of the Korean War, to \$18.6 billion in 1960—about a 25 percent increase, adjusting for inflation.<sup>6</sup> Because the Eisenhower administration wanted to hold down total military spending, the increase essentially came out of the Army and Navy budgets. While the Air Force's share of the military budget grew from 33 to 45 percent in this period, the Navy and Army's collective share fell from 65 to 51 percent.<sup>7</sup>

The New Look also cost the Army and Navy status in the eyes of many of their officers, who worried about being unofficially subordinated to the Air Force.<sup>8</sup> Eisenhower hoped to bring the six army divisions deployed in West Germany home once the allies could afford their own defense.<sup>9</sup> The New Look also saw covert action, prosecuted chiefly by the Central Intelligence Agency, as an alternative to limited wars where massive retaliation was impracticable—leaving little role for the Army in defending major allies.<sup>10</sup>

The Navy initially focused on delivering nuclear weapons via aircraft based on carriers. It had failed in a bid for a nuclear-war fighting role in 1949 when the Truman administration chose to fund the Air Force's B-36, the first bomber with an unrefueled intercontinental range, rather than the supercarrier, which was meant to launch a naval bomber carrying nuclear bombs. That touched off the so-called revolt of the admirals, a public brawl between the administration and the Navy, which led to the firing or resignation of the secretary of the Navy, the chief of naval operations, and a number of high-ranking admirals.<sup>11</sup> Starting in the early 1950s, the Navy began operating "strike carriers," which carried AJ-1 attack aircraft armed with nuclear bombs.<sup>12</sup> Still, because they had far less range and nuclear payload than the Air Force's B-47 and B-52 bombers, the Navy's role in the New Look was secondary.

To regain budget share and relevance, the Army and Navy needed a bigger role in the main U.S. military mission of the day: defending Europe from the Soviet Union.<sup>13</sup> They had two major assets in that struggle. First, ballistic missiles' emergence as an alternative nuclear weapons delivery system threatened the Air Force's preeminence. Second, the Soviet arsenal's growth frightened the U.S. public into supporting multiple delivery methods and undermined the credibility of the threat underlying the New Look, at least in the minds of many defense analysts. They argued that in a world of mutually assured destruction (MAD) massive U.S. retaliation in response to a Soviet invasion of an ally was suicidal and thus unbelievable. The alternative deterrence strategies that emerged to replace massive retaliation helped institutionalize the triad.

### **Bombers, Missiles, and Gaps**

Bombers had several weaknesses as nuclear delivery vehicles, especially once the Soviets had their own nuclear forces. Their size and slowness exposed them to Soviet air defenses.<sup>14</sup> They also seemed vulnerable to surprise attack, especially when stationed near the Soviet Union. If the Soviets believed that they

could destroy the bombers on the ground, they would not only lose deterrent value but might invite attack.<sup>15</sup> These worries dovetailed with the so-called bomber gap, a set of journalistic and intelligence assessments produced in 1954 and 1955 suggesting that the Soviet Union would have a decisive advantage in long-range bombers by the early 1960s.<sup>16</sup> These projections produced fears, fueled by congressional hearings, that the Soviet numerical advantage would encourage them to attempt a bolt-from-the-blue strike on the United States.<sup>17</sup>

Eisenhower was skeptical about these estimates, as were many intelligence analysts. The real change coming, he understood, was that the United States would lose first-strike capability, not that the Soviets would gain it.<sup>18</sup> Overhead photography provided by U-2 aircraft starting in 1956 proved that even the skeptics were overestimating Soviet bomber production. But widespread perceptions of a gap increased pressure on the administration to enhance bombers' survivability and speed missile development.<sup>19</sup>

One solution was to protect bombers on the ground. But Strategic Air Command (SAC), the part of the Air Force that operated the bombers, resisted housing them in hardened hangers or underground bunkers. SAC leaders, most prominently General Curtis LeMay, who took command in 1948, argued that more powerful weapons could simply target the hardened facilities and that runways would be so damaged by the first attack that the aircraft would be inoperable, at least for a time.<sup>20</sup> SAC planned to strike first, hitting Soviet bombers on the ground and destroying most Soviet industry and military facilities in the process, and preferred to reduce vulnerability by buying more bombers, which meant growing its budget.<sup>21</sup>

SAC did agree to vulnerability-reducing measures consistent with their preemptive strike plans. They adopted airborne alert, where a portion of the U.S. bomber force would be maintained in the air, awaiting orders to attack, and launch-on-warning, where the remaining bombers would take off at the

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first hint of trouble—necessitating a crash early-warning program.<sup>22</sup> This posture required robust communications systems so that command authorities could recall aircraft in the event of a false alarm.<sup>23</sup>

Bombers' vulnerabilities and operational difficulties suggested missiles as an alternative. At least since World War II, when German V-2s terrorized London, some scientists and military men saw missiles as the dominant weapons in future wars. Each U.S. military service continued missile research efforts after the war. The Air Force initially focused on cruise missiles, which resembled aircraft, while the Army took the lead on ballistic missiles, then considered almost a species of artillery.<sup>24</sup> These efforts accelerated in the early 1950s, with Truman's defense buildup and the development in both the United States and the Soviet Union of hydrogen or thermonuclear weapons, which opened the possibility of missiles delivering warheads exponentially more powerful than atom bombs. The potential gain in yield (the energy released by explosion) compensated for ballistic missiles' inaccuracy, and theoretically allowed them to destroy any military target in range, at least until the mid 1960s, when the Soviets began to harden missile silos.<sup>25</sup>

By the late 1950s, the Air Force had deployed Thor and Jupiter Intermediate Range Ballistic Missiles (IRBMs) at European bases. First-generation ICBMs capable of reaching the Soviet Union from launch pads in the United States entered service a few years later: the Atlas E in 1960 and the Titan I in 1962. The Air Force soon replaced these with second-generation ICBMs, the Minuteman I and the Titan II.<sup>26</sup> Whereas first-generation Titan and Atlas rockets needed to be fueled prior to launch (a risky and time-consuming operation), later models could be deployed with their fuel on board and thus launched on short notice from silos, leaving them less vulnerable to preemption.<sup>27</sup> They also began to use inertial rather than radio guidance, which was more vulnerable to disruption.<sup>28</sup>

Soviet missile progress, however, threatened the U.S. nuclear deterrent. Though silos,

distribution, and sheer numbers increased survivability, the best defense, even more than with bombers, was offense—reliance on warning to strike first.<sup>29</sup> Missiles' vulnerability to missiles produced concern that Soviet missile development would outpace the United States' and bring a disarming Soviet first strike—or a threat of one that allowed the Soviets to bluff their way into Berlin or Western Europe.

The launch of the Sputnik satellite in 1957 gave many Americans the false impression that the Soviets had a lead in missile development. Many intelligence analysts assumed that the bomber gap had proved nonexistent only because the Soviets had shifted their efforts to missiles. Various intelligence estimates, especially from the Air Force, predicted a coming missile gap.<sup>30</sup> Those fears dovetailed with concerns raised by various studies, most prominently in the 1957 Gaither Report.<sup>31</sup> The RAND Corporation's Albert Wohlstetter coined the dramatic phrase "delicate balance of terror" to describe how the arsenal's vulnerability could easily bring deterrence failure and war.<sup>32</sup> Democratic Senators, especially presidential hopefuls Stuart Symington, Lyndon Johnson, and John F. Kennedy, accused the Eisenhower administration of allowing the country to fall behind in the Cold War and demanded more military spending.<sup>33</sup> Eisenhower assured Americans that the U.S. missile programs were in relatively good shape. But he could not reveal the fact, gleaned from secret U-2 flights, that the Soviets had deployed few missiles.<sup>34</sup>

Under pressure, the administration agreed to slightly increase military spending, especially on missile programs, despite Eisenhower's reluctance.<sup>35</sup> By the start of the Kennedy administration, Corona satellite flights and Soviet defectors had shown that the missile gap had been another wild overstatement of Soviet capability.<sup>36</sup> In fact, government analysts at the time judged that a disarming first strike against Soviet nuclear forces would likely succeed.<sup>37</sup>

The missile alarmism strengthened the Navy's claim to a nuclear deterrence mis-



sion—and the larger budgets that went with it. In 1956 the Eisenhower administration allowed naval leaders to quit a joint program with the Army to develop the intermediate-range Jupiter ballistic missile and instead pursue what became the Polaris submarine program.<sup>38</sup> Missile gap fears brought increased funding for the program.<sup>39</sup> Polaris rapidly proceeded into development and began deployment by 1960, becoming the third leg in the nuclear triad.<sup>40</sup>

### **Doctrinal Competition**

Eisenhower professed hatred of interservice rivalry, but his policies, by producing it, encouraged innovative military doctrine and a choice among means of deterring aggression against allies—what defense intellectuals call extended deterrence.<sup>41</sup> Polaris led the Navy to develop a doctrinal alternative to massive retaliation: finite deterrence. The idea, largely articulated by Admiral Arleigh Burke, the chief of naval operations from 1955 to 1961, was to maintain the smallest number of warheads and delivery vehicles necessary to ensure a survivable second strike.<sup>42</sup> Navy leaders argued that Polaris submarines avoided dangers created by land-based nuclear forces: accidental nuclear war, use-it-or-lose-it dynamics, and arms racing. Because they were so hard to track in the ocean, the Soviets would have little chance at a disarming first strike. Because SLBMs were relatively inaccurate and carried smaller warheads with less yield, they supposedly posed less threat to enemy nuclear forces.<sup>43</sup> Polaris' deployment would then diminish what Thomas Schelling called the “reciprocal fear of surprise attack,” which encouraged both sides to build arms competitively to avoid vulnerability, shoot first in crisis, or adopt the high-alert postures that risked accidental nuclear war.<sup>44</sup> SLBMs, then, theoretically produced a more stable nuclear balance at low cost. Naval officers also pointed out that Polaris would push the Soviet Union to compete at sea, an area where the United States had inherent advantages, and that, should the Soviets attack U.S. submarines, at least U.S. civilians would be spared blast and fallout effects.<sup>45</sup>

Finite deterrence's logic suggested that land-based delivery systems were dangerous and wasteful. Admiral Ruthven E. Libby, the deputy chief of naval operations for plans and policy, argued in a memo to Burke that “the best defense is to remove our atomic retaliatory capability from fixed bases either in the United States or elsewhere and put it afloat.” A few weeks later, Libby stressed that the sea-borne deterrent that he had in mind was not intended to “be superimposed on the SAC capability, but [rather] that it supplant it in substantial measure.”<sup>46</sup> At least one Eisenhower administration official, Budget Director Maurice Stans, agreed, wondering aloud why Polaris should not replace the Air Force's nuclear weapons function.<sup>47</sup> But Burke and most other naval leaders wanted to avoid the appearance of poaching on Air Force turf. Burke asserted that “other retaliatory systems are essential. . . . We do not propose to take over someone else's function.”<sup>48</sup> Eisenhower himself, though he worried about overkill and redundancy in the arsenal and became increasingly supportive of Polaris, never argued that it should replace ICBMs.<sup>49</sup>

By the late 1950s, the Army had its own alternative to massive retaliation: flexible response. Army leaders argued that the scale of destruction would make pyrrhic any victory won by massive nuclear retaliation.<sup>50</sup> Under Maxwell Taylor, who became chief of staff in 1955, they added an argument about deterrence: the Soviet nuclear arsenal's growth undermined the credibility of massive retaliation. Threats leading to self-annihilation would not be credible enough to deter attacks, especially conventional probes against allies.<sup>51</sup> More limited responses to aggression were needed. Those responses could include tactical (battlefield) nuclear weapons, which the Army widely deployed in this period, and, initially, Jupiter missiles, which the Army sought to make accurate enough to discriminately strike tactical targets.<sup>52</sup> To the Army, flexible response most of all meant more U.S. conventional forces in Europe and a larger Army.<sup>53</sup>

Analysts at the RAND Corporation agreed with the Army that nuclear parity might pro-

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duce stalemate allowing conventional war. But they saw U.S. ground forces in Europe less as an alternative to nuclear forces than as a way to make nuclear threats succeed despite the Soviet nuclear arsenal. They reasoned that if the deterring state relinquished some control of its response and put the onus of escalation on the adversary, self-destructive threats could deter.<sup>54</sup> They saw U.S. ground forces as a tripwire that, by dying and heightening U.S. interests, made the escalation from conventional to all-out nuclear war believable. Tactical nuclear weapons, in this thinking, were a part of this escalatory ladder, enhancing the credibility of the U.S. threat to cross the nuclear threshold.<sup>55</sup> The Eisenhower administration officially adopted elements of flexible response, but the president's views about nuclear war changed little. He argued that conventional war between nuclear powers was bound to escalate to a nuclear exchange, making nuclear deterrence robust and heavy spending on conventional means unnecessary.<sup>56</sup>

Spurred by Polaris and finite deterrence, the Air Force adopted its own alternative to massive retaliation: the counterforce/no-cities doctrine.<sup>57</sup> This doctrine was essentially a variant of flexible response focused on nuclear options. It said that if the Soviets launched a major attack, the United States would preemptively destroy Soviet military and especially nuclear forces (counterforce targets) while leaving Soviet population centers (countervalue targets) unharmed, as far as possible, with some missiles kept in reserve to threaten them.<sup>58</sup> That would limit the damage Soviet nuclear weapons could inflict on the United States while leaving the Soviets something to lose. Their cities purportedly became hostages that would discourage Soviet leaders from targeting U.S. cities and continuing the war.

The counterforce doctrine, in theory, offered a division of labor between U.S. delivery vehicles.<sup>59</sup> U.S. ICBMs would attack most Soviet counterforce targets, with bombers initially destroying what the missiles could not—hard targets, meaning those buried underground

or protected by layers of concrete or steel. Polaris missiles, because they were supposedly inaccurate, could be used as a second-strike force that would threaten Soviet cities.

Until 1960 Air Force leaders, especially those in SAC, were hostile to counterforce or any other sort of limited nuclear attack. They argued that restraint in war-fighting yielded the enemy initiative.<sup>60</sup> But with Polaris established under Navy control and threatening their mission, they sought to differentiate their platforms from it and began to promote the new doctrine. In developing Minuteman II, they began to prioritize accuracy.<sup>61</sup> Organizational interests then caused, or at least encouraged, counterforce. And counterforce justified the triad.

## **Keeping the Triad**

Technological and political circumstances conspired to give the Kennedy and Johnson administration's decisions lasting power over the U.S. nuclear arsenal. The structure of the force they established and the arguments they constructed to justify it largely lasted through the Cold War and, in key respects, remain in place today. The interservice debate on how to defend Europe might have produced a choice in the early 1960s among doctrines and nuclear delivery systems that allowed a smaller arsenal. Instead, those administrations embraced all three, at least rhetorically.

Officially, the Kennedy administration endorsed counterforce and flexible response. Kennedy had criticized massive retaliation during the 1960 campaign with advice from RAND analysts, some of whom he appointed to Pentagon posts, where they became known as the "whiz kids."<sup>62</sup> He named Maxwell Taylor, a leading advocate of flexible response, chairman of the Joint Chiefs of Staff. Kennedy's secretary of defense, Robert McNamara, was briefed on both the counterforce and finite deterrence concepts shortly after taking office.<sup>63</sup> His first annual budget justification document drew on both. It listed counterforce as the arsenal's main purpose and sub-

marines as a strategic reserve to threaten Soviet cities. It argued that countervalue threats alone might not deter Soviet aggression but that counterforce would become unaffordable as the Soviets built more weapons.<sup>64</sup> In 1962, McNamara promoted both doctrines in speeches, though he was vague about when the United States would launch a first strike.<sup>65</sup>

Having campaigned on the danger of the missile gap, Kennedy boosted military spending across the board, concentrating especially on missile procurement, even as it became clear that the gap did not exist. Military spending grew by 14 percent in fiscal year 1962, the first full budget the new administration created.<sup>66</sup> Congress agreed with the administration's recommendation to accelerate Polaris production, increasing the planned total from 19 to 41 (304 to 656 missiles). McNamara compromised with the Air Force and its congressional backers to limit Minuteman deployment to 1,000 but managed to speed the retirement of B-47 bombers and eliminate the B-70 bomber, the bomber-launched Skybolt ballistic missile, mobile Minuteman, two planned squadrons of Titan ICBMs, and one B-52 wing (leaving 60).<sup>67</sup> The U.S. strategic bomber inventory fell from a high of more than 1,800 in 1959 to 549 in 1969.<sup>68</sup>

This culling of Air Force nuclear weapons delivery platforms reflected the end of the Air Force's budgetary dominance. By decades' end, the Army and the Air Force both annually got about a third of the Pentagon budget, and the Navy just under 30 percent.<sup>69</sup> Arguably, the new budgetary split reflected the fact that each service now had a clearer role in the defense of Europe under flexible response.

Yet the Kennedy and Johnson administrations actually did little to implement the new doctrines. Contrary to what flexible response proponents like Taylor wanted, Kennedy kept the number of U.S. army forces in Europe about level, and occasionally threatened to remove them. Johnson shifted forces from Europe to Vietnam.<sup>70</sup> Nor did nuclear war plans change much. Like Eisenhower, Kennedy wanted flexibility in protecting Berlin, where

it seemed especially rash to use nuclear weapons in response to limited Soviet actions like a blockade. But he accepted the essence of massive retaliation: a preemptive nuclear attack should the Soviets attack West Germany or other parts of Europe.<sup>71</sup> McNamara requested changes in the newly developed nuclear targeting plan (the Single Integrated Operational Plan or SIOP) to make counterforce-only targeting possible. Yet after the Joint Chiefs and an expert panel reported that it would take years to put those counterforce options in the SIOP, he largely let the matter drop.<sup>72</sup> There remained no official option to attack Soviet nuclear forces that attempted to spare cities.

### **Assuring Mutual Destruction or Escaping It?**

Alliance concerns and Pentagon politics explain why the administration was more interested in promoting new doctrine than implementing it. The Kennedy administration wanted to convince allies, especially the West Germans, not to develop their own nuclear weapons.<sup>73</sup> Though allied nuclear threats are free to U.S. taxpayers and are more credible when it is their territory at stake, the prospect of West Germany armed with its own nuclear weapons enraged the Soviets. The second Berlin crisis began in 1961 when Soviet leader Nikita Khrushchev, to pressure the United States into blocking West Germany's nuclear ambitions, reissued a threat to end western military access to Berlin. The Kennedy administration ultimately ended the crisis by striking an informal deal with the West Germans where U.S. Army divisions would remain in Germany indefinitely. The West Germans helped pay for the U.S. forces and agreed not to develop nuclear weapons, a commitment affirmed by their signing of the Limited Test Ban Treaty in 1963.

Counterforce and flexible response were a way to show NATO allies that the United States was serious about fighting a nuclear war for them. But that did not require actually building up European forces, at considerable expense, or the bureaucratic fight needed to fully implement the flexible attack options

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in the SIOP. The same went for U.S. tactical nuclear weapons in Europe, which increased substantially under Kennedy and Johnson, mostly to assure allies of U.S. commitment.<sup>74</sup>

Initially, flexible response and counterforce also provided McNamara and other administration officials with a means to recast their compromises on military matters as outputs of strategy alone. McNamara, however, quickly changed course. It was becoming clear that a disarming counterforce strike would require ever more ICBMs with diminishing chances of success.<sup>75</sup> Enough Soviet nuclear weapons launchers would likely survive a U.S. first strike to inflict unacceptable damage on U.S. society. And the U.S. strike would have to be so massive that Soviet leaders would not realize it was a limited strike meant to induce bargaining. The Air Force's suggested solution was breakneck ICBM production to maintain a credible first strike. But that would likely encourage an arms race, where the Soviets built more missiles for defense, requiring more U.S. missiles for counterforce, and so on, until someone went broke.

To maintain some fiscal discipline, McNamara made counterforce targeting a secondary mission, which the services were officially forbidden from using to generate force requirements.<sup>76</sup> The 1963 budget memo argued that the arsenal was for "assured destruction" after a Soviet strike. The report calculated what megatonnage that required and called that total a cap for each triad leg, without explaining its implicit judgment that only one leg could survive a Soviet first strike.<sup>77</sup> Conveniently, the calculation fit McNamara's existing plans for the force. McNamara began to discuss nuclear weapons this way publicly.<sup>78</sup> None of this changed the fact that most U.S. nuclear weapons, according to the SIOP, would strike counterforce targets or that U.S. nuclear weapons delivery platforms were built for that purpose.<sup>79</sup>

U.S. nuclear weapons rhetoric, doctrine, plans, and budgetary guidance had diverged. A second-strike story now justified an underfunded first-strike force. In public, U.S. officials said that nuclear weapons were for

a second strike; they were to preserve MAD. But that was not the plan guiding targeting or weapons design. The military still planned to escape MAD. The budget, meanwhile, accepted MAD, both explicitly, and by setting limits insufficient to buy the forces that a true first-strike capability required.<sup>80</sup>

These contradictory elements of U.S. nuclear weapons policy proved durable because each responded to lasting political needs. Absent a fight that no president wanted, the SIOP and military platforms, especially the Air Force's, would continue to seek the ability to preemptively destroy the Soviet arsenal. Technological progress, as we will see, aided that effort. Defense budgets, nonetheless, reflected a societal unwillingness to pay the massive cost of the arms race required to field a force that could credibly threaten to disarm the Soviets. In other words, a disarming first strike was desirable but not at any price; the military could pursue that capability only to a point. The counterforce story wrapped a policy goal around that inherited circumstance, and assured observers, especially allies, that U.S. threats were credible. But that story was too offensive and esoteric for the public. The survivability rationale rebranded the same forces and plans in prudential and defensive language.

Because these political forces lasted, Cold War U.S. military leaders mostly stuck to McNamara's convoluted script. Especially in public, they continued to justify the nuclear arsenal with the argument that it was for a second strike—to the point that the occasional official utterance admitting that it could be used for a first strike created great public consternation.<sup>81</sup> Meanwhile, the services built forces increasingly well-suited for preemptive strikes, while defense analysts and officials tweaked counterforce doctrine in an effort to restore the credibility of U.S. preemptive strikes, despite the Soviet arsenal's growth.<sup>82</sup> The updated argument was that limited preemptive counterforce strikes could demonstrate U.S. resolve, accomplishing counterforce's bargaining function without attempting damage limitation, unless

the Soviets escalated. The Nixon, Ford, and Carter administrations changed the SIOF to create these “controlled escalation” and “limited nuclear” options.<sup>83</sup> Still, the new options were arguably for show, to impress allies and enemies. U.S. political leaders, even during the Reagan administration, were not willing to pay for a force truly capable of credibly threatening a disarming first strike or to undertake politically harmful measures, especially broad civil defense programs, that would have heightened the odds of a first strike succeeding.<sup>84</sup>

The contradictions of U.S. nuclear policy also reflected shared service interests. Two factors caused each to see the intellectual status quo as consistent with its organizational interests. First, McNamara’s power had enhanced cooperative tendencies. By expanding the size of the Office of Secretary of Defense, using budget tools given to him by the Defense Reorganization Act of 1958, and employing subordinates versed in systems analysis, McNamara exercised unprecedented control over military programs.<sup>85</sup> To prevent Pentagon civilians from dominating decisionmaking, the Chiefs learned to join forces and avoid public fights.<sup>86</sup>

Second, the habit of giving each service roughly equal and stable shares of the budget begun under Kennedy held up throughout the Cold War.<sup>87</sup> No Cold War president after Eisenhower made much effort to change this. Whatever their differences, all subscribed to some theory that gave each service a validated role in the provision of extended deterrence, which remained the primary U.S. military goal. The insecurity that caused the services to challenge other’s missions in the 1950s diminished.<sup>88</sup> Rather than arguing against each other’s delivery systems and doctrines, they could build support for their preferred missions by enhancing the general perception of threats, especially from the Soviet Union, that encouraged higher overall military spending. So no powerful Pentagon interest resisted in the early 1970s, when Air Force leaders, apparently “to help explain the continuing need for a manned strategic bomber,” began using

the word “triad” to describe three delivery systems and suggest that their combination increased U.S. security.<sup>89</sup>

### **The Triad Survives the Cold War**

With the services and their congressional backers supporting the triad, it became an entrenched bureaucratic fact that outlived the enemy that was its original justification. The only real official effort to rethink the triad since its inception came when Les Aspin, President Clinton’s first defense secretary, initiated the first Nuclear Posture Review (NPR). He assigned the task to Ashton Carter, assistant secretary of defense for international security policy. Carter convened working groups that considered the role of nuclear weapons in U.S. strategy and the force structure needed to accomplish those missions. He focused on the deteriorating condition of Russian nuclear forces, including poor command and control. He worried about the risks of accidental launch or miscalculation far more than the risk of deliberate attack and privileged survivability over preemption.<sup>90</sup> The review produced several proposed nuclear postures that would have eliminated the land-based missile and manned bomber legs of the triad. Carter suggested a monad including as few as 10 Trident submarines, each carrying 24 missiles armed with six warheads each.<sup>91</sup>

That proposal got nowhere. Aspin had resigned before Carter began making his recommendations, limiting civilian support for them. The services and their congressional backers on the armed services committees, many of them with triad-related jobs in their district, were hostile to abandoning a delivery vehicle, and the Clinton administration was unwilling to fight a major congressional battle on the issue. Sen. Strom Thurmond (R-SC) got U.S. Strategic Command chief Adm. Henry Chiles to testify during a committee hearing “that ICBMs are necessary in our force for the future.”<sup>92</sup> That same day, four other senators reaffirmed the strategic importance of all three delivery systems in a letter to President Clinton.<sup>93</sup> Carter’s failed effort may inadver-

**The triad became an entrenched bureaucratic fact that outlived the enemy that was its original justification.**

tently have preserved the triad by discouraging subsequent challenges.<sup>94</sup>

## Missing Debates

Each triad leg had support from a powerful military constituency and congressmen whose districts benefitted from the associated spending. All had cheerleaders among defense intellectuals who received or sought service grants and political appointments.<sup>95</sup> No similarly powerful interests pushed back. Even the arms control movement, which matured in the 1960s, rarely argued that the triad was excessive to deterrence. That conflicted with the claim that nuclear weapons were vulnerable, which was the key to the arms control case that counterforce could cause preemptive nuclear war and arms racing.<sup>96</sup> Policy debate, or the lack thereof, reflected the political log-roll supporting the triad.<sup>97</sup> Fights about nuclear weapons policy in the late Cold War covered limited ground.

Limited debate obscured several flaws in the triad's rationales. First, the survivability rationale always required a healthy dose of paranoia. The survivability of the U.S. nuclear force was never truly in doubt during the Cold War. Hawks typically argued either that the Soviets had a first strike against U.S. land forces or were close enough to try it or use the possibility of it for blackmail.<sup>98</sup> These claims underestimated the security that warning and silo hardness provided to U.S. forces and overestimated future Soviet missile production; accuracy; and, starting in the 1970s, the deployment rate of multiple independently targeted reentry vehicles (MIRVs).<sup>99</sup> By the 1980s, there was a more credible argument that increased numbers of MIRVed ICBMs and SLBMs would allow the Soviets to destroy both U.S. land-based systems were it not for the fact that the differences between ICBMs and bombers complicated targeting, insuring that at least one would have warning to launch.<sup>100</sup> Even if one accepts the Soviet risk-taking proclivities and worst-case (for the United States) think-

ing underlying that scenario, it simply waved away U.S. SLBM capability.

Those who defended the triad on survivability (second-strike) grounds tended to argue that a Soviet anti-submarine warfare (ASW) breakthrough might occur, so U.S. leaders would be foolish to count on SLBMs if land forces were vulnerable.<sup>101</sup> But U.S. ballistic missile submarines grew quieter with each generation, and the breakthrough was never close.<sup>102</sup> Following the Soviet Union's demise, the General Accounting Office found that U.S. submarines were even less vulnerable to detection than intelligence assessments had assumed.<sup>103</sup>

Other hawkish analysts acknowledged submarines' near invulnerability but argued that an SLBM salvo was not a credible response to a Soviet strike destroying U.S. land-based nuclear weapons. They reasoned that SLBMs were too inaccurate for anything but strikes against cities. And because such strikes would not prevent the Soviets from retaliating with whatever forces they had withheld, the SLBM threat might not deter.<sup>104</sup> One problem with that thinking was that any successful Soviet first strike on U.S. land forces would kill massive numbers of Americans, making an attack on Soviet cities a credible response, even under the stringent rationality criteria imposed by counterforce doctrine.<sup>105</sup>

More importantly, SLBMs could perform counterforce strikes.<sup>106</sup> Their short flight times, even compared to ICBMs, made Polaris missiles useful for hitting time-sensitive targets, and U.S. war plans gave them a counterforce role from the start.<sup>107</sup> In the early 1960s Soviet targets were almost all vulnerable to any nuclear weapon with a megaton yield detonating within five miles, capabilities Polaris missiles had by 1962.<sup>108</sup> Bombers could then deliver bombs with greater accuracy and yield, but not with much success until Soviet air defenses were degraded, by which time most targets would likely be wrecked or emptied of platforms now flying toward the United States.<sup>109</sup> The Navy did not give Poseidon, Polaris' successor, a warhead optimized

**Fights about nuclear weapons policy in the late Cold War covered limited ground.**

for hard target destruction, but improved inertial guidance and the development of MIRVs nonetheless provided considerable capability for that purpose.<sup>110</sup> The Trident II submarine's D-5 missile, deployed at the end of the Cold War, had a better hard-target kill probability than either Air Force alternative (it was more accurate than the B-83 gravity bomb carried by stealth bombers and as accurate with more yield than the MX Peacekeeper ICBM) and comparably reliable communications due to improvement in low-frequency radio transmissions.<sup>111</sup>

That capability left no reason to worry that SLBM strikes would not be credible after a Soviet first strike—besides the Soviets buying into U.S. claims that the weapons were inaccurate. It also undermined the division of labor at the heart of the counterforce rationale for the triad. One could believe that counterforce was necessary to extended deterrence and still advocate scrapping ICBMs, bombers, or both. But the Navy, with little to gain from competing with the Air Force, kept the enhanced capabilities of its submarines under wraps.<sup>112</sup>

SLBMs' increased counterforce capability reflected enormous U.S. gains in targeting—a precision revolution. The key developments were continual improvement of inertial missile guidance, the deployment of satellites for guidance (first, the Navy's Transit system for ships, in service starting in 1964, then the Global Positioning System, which became operational 30 years later), the development of laser guidance for bombs, and the development of various surveillance capabilities to provide targeting information.<sup>113</sup> These capabilities make hard targets vulnerable to more sorts of platforms, including conventional kinds, while reducing the number of missiles or aircraft required to destroy any particular target.

As missiles gained the ability to destroy most hard targets, the cases where bombers were a cost-effective counterforce platform disappeared.<sup>114</sup> The cost of shielding bombers from enemy radars (stealth) was massive, and even the stealth bombers developed in the

late Cold War remained somewhat vulnerable to air defenses. Bombers theoretically gained usefulness by launching nuclear missiles themselves while staying outside the range of enemy air defenses: first the ballistic Skybolt missile, and later the air-launched cruise missile (ALCM), and then the stealthier Advanced Cruise Missile (ACM), both carried by B-52s. But air-launched missiles provide little that ICBMs and SLBMs missiles lack.<sup>115</sup>

These challenges led bomber advocates to other justifications.<sup>116</sup> They argued that pilots' ability to adjust targeting in flight allowed them to find and destroy fleeting targets, especially mobile missiles, which was technically possible but remains exceedingly difficult even with today's vastly improved surveillance capability. Other standard arguments point to bomber's mild advantages while ignoring cheaper ways to achieve them: the opportunity to recall bombers makes them a good signal of resolve; bombers force the Soviets to invest scarce resources on costly air defenses; and bombers can be stationed abroad to reassure allies. There are, however, many ways to show resolve that do not require buying an expensive platform. And capabilities like cruise missiles and ground forces can encourage enemies to waste money while assuring allies.

The most basic flaw in the case for the triad, counterforce, and the size of the U.S. arsenal was that extended deterrence was far easier than generally claimed. The Soviets opportunistically spread communism but were unwilling to fight a major war to conquer West Germany or other parts of Western Europe.<sup>117</sup> Soviet war plans for Europe that are now public were primarily defensive; they assumed Soviet forces would be responding to a NATO attack.<sup>118</sup> The prospect of massive conventional war deterred Soviet leaders, who were not eager to repeat their brutal experiences in the World Wars.<sup>119</sup> And the conventional balance was more favorable to NATO than conventional wisdom held.<sup>120</sup> After the second Berlin crisis, the already-low odds of war plummeted.<sup>121</sup> These observations are not simply hindsight; they were noted at the

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## The shaky Cold War case for the triad has aged badly.

time by analysts and even U.S. officials.<sup>122</sup> In private, both Presidents Kennedy and Nixon rated the odds of a Soviet conventional attack on Western Europe as almost nil.<sup>123</sup>

If an attack did come, it is not clear that U.S. leaders, despite their public threats, would have ordered a nuclear attack to stop it. Preemptive counterforce threats, even before MAD, seem to have been something a bluff—a point that Secretaries of Defense McNamara and Schlesinger and former national security advisor and secretary of state Henry Kissinger acknowledged after leaving office.<sup>124</sup> The point of deterrence, after all, is not necessarily to convince your enemy that your threats are rational, but to convince him that you think that they are rational. The meticulous studies on nuclear exchanges and the well-rehearsed military plans, which were sure to leak eventually, had a theatrical quality. They helped U.S. leaders keep a straight face when they made questionable threats, assuring allies and adding to enemy doubts.

That show, if it was one, was probably unnecessary. Soviet leaders paid great attention to U.S. plans, of course, but they never demonstrated the sort of belief in the possibility of limited war that the flexible response and counterforce doctrines required of them. They never indicated that U.S. deterrence success depended on counterforce targeting—that other conventional or nuclear U.S. threats were insufficiently violent or credible to prevent Soviet forces from invading Western Europe.<sup>125</sup> The Soviets' general view seems to have been similar to Eisenhower's: war was full of uncertainties that made it inherently hard to control and prone to costs far exceeding those originally at stake.<sup>126</sup>

Whatever they said, U.S. leaders behaved as if they agreed.<sup>127</sup> During the early Cold War, including the Cuban missile crisis, when the United States had a better chance at executing a successful first strike than ever after, U.S. leaders did not feel able to coerce the Soviets without diplomatic concessions, let alone shoot first. U.S. leaders later feared that limited war in Vietnam or Korea could lead to a superpower clash involving nuclear weapons.

A Cold War irony, then, was that both sides were so restrained that they avoided admitting it for fear of emboldening the other. Both sides of the esoteric U.S. debates about nuclear postures and growing nuclear arsenals, where hardliners insisted that counterforce capabilities were necessary to preserve peace while arms controllers argued that those steps pushed the doomsday clock closer to midnight, shared the misconception that peace was a delicate creation of intellectual labors. That obscured the robustness of the peace created by the memory of war, which nuclear weapons made more horrible. What was being debated, essentially, was the appropriate form of insurance for a remote cataclysm, which is worth discussing but unlikely to matter. The second-strike survivability of the U.S. arsenal was never truly in doubt. Counterforce was overkill when it came to achieving extended deterrence. And, in any case, the triad was not necessary to counterforce.

## The Case against the Triad Today

The shaky Cold War case for the triad has aged badly. Nuclear weapons have grown less important to U.S. security goals. And a submarine-based force can accomplish those that nuclear weapons are meant to serve.

The first point is straightforward. U.S. military power and peace have diminished nuclear deterrence's relevance to U.S. security.<sup>128</sup> U.S. reliance on nuclear weapons to protect allies during the Cold War resulted from perceived Soviet conventional superiority and the difficulty of defending West Berlin.<sup>129</sup> As we argued earlier, U.S. conventional deterrence of Soviet aggression went far to deter Soviet aggression. Today it goes even further, limiting the reliance on nuclear threats.<sup>130</sup> Also, fewer states have revisionist territorial agendas, let alone the capability to act on them.

Moreover, the wars the United States fights and contemplates are increasingly against



insurgents or weak states without nuclear weapons. Because these wars barely affect the nation's safety, few people support using nuclear weapons to win them.<sup>131</sup> Nuclear threats are therefore not credible and nuclear weapons unusable in the vast majority of real and imagined U.S. military contingencies. These factors explain why U.S. nuclear weapons' share of U.S. defense spending by the Pentagon has fallen from almost 27 percent in 1961 to 4 to 6 percent today, depending on how you count.<sup>132</sup> Because less is asked of nuclear deterrence, it demands fewer weapons.

### **Continuity in U.S. Nuclear Weapons' Missions**

Theories of U.S. nuclear deterrence still come in two variants, corresponding to two missions, as discussed above. First, the United States wants a secure second-strike capability to ensure that no enemy is tempted to preemptively destroy the U.S. arsenal or use that threat for coercion. Second, the defense of allies (extended deterrence) against nuclear-armed rivals is often thought to require the ability to destroy their nuclear arsenals preemptively or limit their damage to acceptable levels. That ability, the thinking goes, prevents enemies' arsenals from undermining the credibility of U.S. alliance commitments. The point of the second mission, to use an old formulation, is not to convince others that you will trade Berlin for New York but to convince them that you think that your nuclear war plan avoids that tradeoff.

Modern defenders of the triad rarely explain why one of those deterrent goals requires it.<sup>133</sup> Instead, they tend to offer combinations of three vaguer arguments. They list each leg's virtue (bombers signal resolve; SSBNs are relatively invulnerable; ICBMs are most secure and ready) without arguing that deterrence would fail in its absence. They note that the triad complicates enemy targeting and ensures survivability without establishing the existence of enemies poised to strike first absent those complications. And they call the triad a "hedge" against the technical failure of one leg or a sudden enemy capabil-

ity against it without substantiating those worries. One could concede these arguments and still support the triad's elimination on efficiency grounds. You can have too much of a good thing, especially when it costs billions.

The Obama administration's 2010 Nuclear Posture Review (NPR) and nuclear employment strategy report, released this year, follow the same script, claiming similar virtues for the triad without explaining why deterrence requires it or even what brand of deterrence is sought.<sup>134</sup> The NPR argues that one goal of U.S. nuclear weapons is "assured second-strike capability," and promises to remove MIRVs from ICBMs, which limits counterforce capability and thus is consistent with a second-strike, countervalue posture.<sup>135</sup> The employment strategy report, likewise, claims that the United States does not intend "to negate Russia's strategic nuclear deterrent," but it then rejects "a 'counter-value' or 'minimum deterrence strategy,'" and says the force should retain "significant counterforce capabilities."<sup>136</sup> There is no discussion of what purpose counterforce capabilities can serve without negating Russia's deterrent or of any apparent contradiction with the NPR.

There is little point in trying to discern an underlying logic from these documents. Their point is marketing, not coherence. The important thing here is their gesture at the two standard Cold War justifications for U.S. nuclear weapons—survivability and counterforce.<sup>137</sup> The case for the triad still depends on its relevance to those goals, and, arguably, a third goal, which official documents avoid mentioning: the United States' ability to conquer states, like North Korea, which would likely require the preemptive destruction of their nuclear force.<sup>138</sup> We assess a submarine-based monad's ability to handle these missions in turn.

### **The Monad Meets Deterrence Goals**

Submarines offer various advantages as nuclear delivery platforms. They are the least vulnerable leg and can covertly approach enemy shores to limit flight times. SSBNs' MIRVed missiles offer superior hard-target

**Nuclear threats are not credible and nuclear weapons unusable in the vast majority of real and imagined U.S. military contingencies.**

## Submarines offer various advantages as nuclear delivery platforms.

kill capability to ICBMs. Should the United States launch an ICBM against Iran or North Korea, the flight path over the North Pole would require it to fly over either Russia or China, a prospect that would leave the United States with the unhappy choice of informing an unfriendly government of the launch or risking a dangerous false alarm.<sup>139</sup> Bombers are relatively slow to targets, and vulnerable to sophisticated air defenses and interception while refueling.<sup>140</sup> Submarines also have the ability to fire conventional missiles.

No state now threatens the survivability of the fourteen *Ohio*-class submarines, each of which carries 24 Trident II D-5 SLBMs armed with six to eight W88 (475 kt) warheads or eight W76 (100 kt) warheads. The current plan is to replace these with 12 of the next-generation SSBN.<sup>141</sup> Given present Russian and Chinese ASW capabilities and their limited efforts to improve them, threats to the survivability of U.S. SSBNs at sea remain a distant prospect.<sup>142</sup>

Defenders of the triad, including the Obama administration, caution against relying on this advantage. A submarine monad puts all deterrent eggs in one basket, they say, and thus might cease to deter due to a technical failure or an adversary's ASW breakthrough. Neither worry is convincing. U.S. SSBNs are a well-tested and refined technology. For an operational problem to cause deterrence failure, an enemy would have to know about it and bet on its occurrence in all deployed submarines. Likewise, to overwhelm that deterrent, an enemy would need not only the capability to track and disable the SSBNs but also near-total confidence that they could employ that capability—one failure, after all, would bring mass destruction. Our proposed monad would actually store the proverbial eggs in at least a dozen, mostly well-hidden baskets.

The Cold War should provide added confidence in U.S. SSBNs' survivability. U.S. success in the undersea competition with the Soviet Union, a relatively motivated and capable adversary, suggests that U.S. gains in quieting submarines can continue to outpace enemy

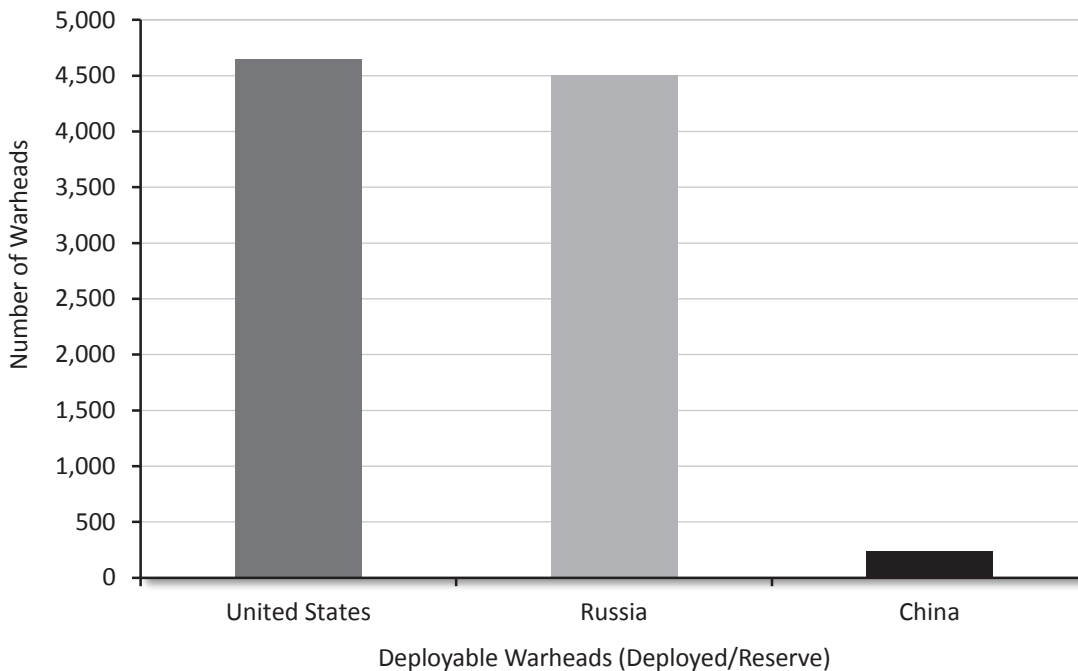
gains in detecting them.<sup>143</sup> Remember that hawks have been warning about future U.S. SSBNs' vulnerability to enemy forces since the 1960s, and it has not yet arrived. Moreover, the effort needed to achieve such technological progress is unlikely to be instant or unknown to U.S. intelligence.<sup>144</sup> The United States would have time to adjust, if need be, by restoring another triad leg.

If that case for the survivability of the SSBN fleet fails to allay concerns about its ability to deter, there are cheaper alternatives than fully maintaining a second triad leg. A small number of nuclear-armed cruise missiles or aircraft-deployable gravity bombs could be maintained in secret locations at relatively low cost. That step would hedge against hypothetical trouble with SSBNs.

Defending allies via counterforce strikes is a more demanding deterrence mission. Before showing that a submarine-based monad can handle this mission, two preliminary points are useful. First, if these alliances lead the United States to maintain expensive nuclear weapons capabilities, that is another reason to consider restructuring these security agreements, most of which are holdovers from the Cold War. Extending security guarantees to countries devastated by World War II might have made sense when they were too weak to defend themselves and we were confronting a common foe. Now these countries have weaker enemies and the resources to repel them.<sup>145</sup>

Second, where extended deterrence does continue, counterforce capability is not needed. Scenarios where countervalue threats fail to deter attacks on allies but counterforce threats succeed are becoming difficult to imagine. Any hypothetical Chinese or Russian regime that is aggressive enough to attack a U.S. ally despite the prospect of a conventional war that could escalate and lead to its nuclear annihilation would not be rational enough to be impressed by counterforce threats; it would be essentially undeterrable. As discussed above, the theory that extended deterrence requires counterforce capability is a Cold War artifact based largely on misperception of the Soviet threat. Historical evi-

**Figure 1**  
**U.S., Russian, and Chinese Strategic Arsenals**



Source: Hans M. Kristensen and Robert S. Norris, “Russian Nuclear Forces, 2013” and “US Nuclear Forces, 2013,” *Bulletin of the Atomic Scientists* 69 (2013): 71–86; “Chinese Nuclear Forces, 2011,” *Bulletin of the Atomic Scientists* 67 (2011): 81–87.

dence suggests that the European Cold War peace would have held firm absent U.S. counterforce threats. And when war threatened, the United States did not behave as if it believed in the theory. Both sides saw a reasonable chance of destruction as too risky, preventing offensive adventures under the nuclear umbrella.

Similarly, today, neither China nor Russia seems greatly concerned by U.S. counterforce capabilities. That is likely because they see even somewhat vulnerable arsenals as sufficient to deter attack.<sup>146</sup> True, both states readily express concern about U.S. first-strike capability.<sup>147</sup> Both are attempting to increase their nuclear arsenals’ second-strike capability by deploying more mobile ICBMs and SLBMs.<sup>148</sup> The pace of these improvements, however, indicates that neither state worries deeply about U.S. first-strike capability. Since its first atomic test in October 1964, China has defied expectations that it would quickly

expand its small nuclear arsenal to escape the prospect of a disarming first strike from the Soviet Union or United States. It still has only 40 mobile ICBMs capable of reaching the United States and does not yet have operational SLBMs. Russia allowed its warning capability and force readiness to decline to the point where studies have recently claimed that the United States had regained a disarming first-strike capability.<sup>149</sup> Its ICBM force is due to shrink by a third in the next decade and its ten ballistic missile submarines no longer continuously patrol, leaving them vulnerable to preemption in port.<sup>150</sup> If China or Russia saw U.S. counterforce capabilities as a potential obstacle to a key military objective, they would be working harder to reduce the chances that the United States could succeed in a disarming first strike. (Figure 1 compares U.S., Russian, and Chinese strategic arsenals).

The most plausible counterforce scenario today involves small nuclear arsenals—North

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Korea and perhaps in the future Iran. In cases where the United States was helping defend an ally like South Korea, conventional deterrence and general nuclear threats would deter, for the reasons just discussed. Counterforce capability would be more useful if the United States sought to conquer one of these states. A state defending its borders is relatively likely to use nuclear weapons. Conquering it would require first destroying its nuclear arsenal.<sup>151</sup>

Though we have raised doubts about the political utility of counterforce, the more important argument for present purposes is that U.S. SSBNs and conventional weapons can destroy counterforce targets as well as other platforms. Note our point is not that attempting a disarming first strike would be wise. The argument instead is that, to the extent U.S. leaders desire the ability to destroy counterforce targets, a submarine-based monad is all the nuclear force needed.

Intelligence now primarily determines U.S. success in counterforce targeting. Accuracy gains, as discussed above, have massively reduced the forces required for any target set. Trident D-5 missiles have the yield and accuracy to destroy silo-based missiles and all essential targets in a small nuclear arsenal. A variety of conventional platforms—starting with Tomahawk cruise missiles deployed on U.S. surface ships and the four *Ohio*-class submarines converted to conventional roles—can also destroy hard targets, provided their location is precisely known.<sup>152</sup> And U.S. surveillance technology can now determine almost all fixed hard targets' locations. Conventional ballistic missiles, which could be deployed on submarines, could be very efficient hard-targets killers because of their global range and speed.<sup>153</sup> A recent report calculates that these various conventional capabilities could destroy practically all targets in North Korea, Iran and Syria now assigned to U.S. nuclear weapons, 30 to 50 percent of China's like targets, and 10 to 30 percent of Russia's.<sup>154</sup>

Mobile missiles are a bigger counterforce challenge—U.S. forces still struggle to

track and destroy such targets.<sup>155</sup> Russia is reportedly developing a new mobile ICBM, augmenting the 36 it now supposedly deploys.<sup>156</sup> China has also been increasing its mobile ICBM capability and now has an estimated 10-20 mobile DF-31A missiles.<sup>157</sup> Because making missiles mobile is not a great technical challenge, North Korea, Iran or Pakistan might deploy them eventually. Mobile missiles are by nature soft targets. Where their location is not precisely known, large nuclear weapons are needed to destroy them. Where their location is precisely known, conventional weapons, including those delivered by bombers, can destroy them. So insofar as U.S. forces can now destroy mobile targets, submarines and conventional weapons can do it. One promising avenue to improving U.S. capability against mobile missile launchers is to use aircraft capable of avoiding enemy air defenses to persistently surveil the target and provide its location to conventional missiles fired by submarines or surface ships.<sup>158</sup>

A final argument used to defend the triad says that current U.S. delivery platforms prevent nuclear proliferation by reassuring allies, and proliferation cascades will occur if particular U.S. nuclear capabilities are no longer operational.<sup>159</sup> Similarly, the Obama administration argues that bombers are a necessary triad leg because the ability to deploy them abroad reassures allies.<sup>160</sup> These arguments are unconvincing for a variety of reasons. First, the U.S. ability to reassure allies depends ultimately on capability to deter, which a submarine-based force maintains, and on U.S. political will, which depends on factors that technologies barely affect. Because a submarine-only monad provides the capability needed for deterrence, it should reassure allies. Second, there are a variety of military and diplomatic methods to assure allies besides expensive nuclear-weapons capabilities. Third, states seek nuclear weapons for reasons other than security, including prestige and domestic political concerns.<sup>161</sup> Nuclear security guarantees do nothing to prevent potential proliferators motivated

by these sorts of concerns. Fourth, in part because of the third reason, predictions of proliferation cascades have rarely proved correct.<sup>162</sup> Finally, if proliferation does occur, its costs may not exceed the costs of preventing it.<sup>163</sup> The French, British, Indian, and Israeli nuclear weapons programs, for example, have not obviously harmed U.S. security and achieve credible local deterrence at no cost to U.S. taxpayers. It is not obvious that allies should always be reassured.

## The Opportunity for Savings

The declining military usefulness of nuclear weapons increases their delivery systems' vulnerability to budget cuts. Though the arsenal retains powerful backers in the Pentagon, national laboratories, the defense industry, and Congress, their budgetary utility for the Air Force and Navy has declined. Especially while austerity restrains military spending and heightens competition for resources in the Pentagon, service leaders may see nuclear weapons as a drain on funding for personnel and platforms better linked to the service's preferred organizational purpose and doctrine.<sup>164</sup> By harvesting those competitive incentives, Pentagon leaders could restore useful debate about nuclear deterrence missions.

Consider, for example, the pressures that the Navy's SSBN modernization program is imposing on the service's other spending priorities. The Navy expects to spend \$75 billion developing 12 SSBN(X)s, the successor to the *Ohio*-class, over three decades.<sup>165</sup> With the Navy's annual shipbuilding budget unlikely to exceed \$20 billion in coming years, that expense will increasingly conflict with the procurement objectives of the surface and aviation communities, generating political pressure to lower SSBN(X)'s cost, delay the buy again, or buy fewer boats.<sup>166</sup>

In the Air Force, the bomber pilots that dominated the top ranks in the 1950s and 1960s long ago gave way to fighter pilots that have no special affinity for nuclear weapons.

The missileer community, always a loose fit in an organization devoted to manned aircraft, has become less important as its relative share of the budget has declined and the missile-centric Cold War gave way to counterinsurgency and wars against weak states. A recent Air Force study characterized the ICBM force as suffering from "sagging morale" and "poor leadership" due to perception that it is a career dead-end.<sup>167</sup> The Air Force plans to ramp up efforts to replace its Minuteman III missiles next decade, possibly even including a costly mobile variant.<sup>168</sup> Given the ICBMs uncertain place among Air Force priorities, that program might be sacrificed to pay for aircraft.

The ICBM force nonetheless retains powerful backers among legislators representing constituencies where Minuteman missiles are based and from the various communities that provide ICBM-related technologies or services.<sup>169</sup> The United States is reducing deployed ICBMs from 450 to 420 to meet the New START treaty's requirements, but, thanks to that political support, little consideration has been given to consolidating the missiles in two bases rather than the three: Wyoming's Warren, Montana's Malmstrom, and North Dakota's Minot Air Force bases.<sup>170</sup>

Nuclear-armed bombers' political support is weaker than ICBMs'. The bomber community and their political supporters are committed to keeping bombers, but not necessarily their nuclear payload. Despite recent delays, the Air Force plans to buy 80 to 100 of its "next generation" bomber, at a cost of \$550 million each and \$40 to 60 billion total.<sup>171</sup> Current plans also call for upgrading the warhead on the bomber's air-launched cruise missile and giving the B-2A stealth bomber, for the first time, the capability to launch it.<sup>172</sup> Air Force leaders acknowledge, however, that the new bomber's cost could lead to its cancellation, which is one reason that they proposed building it initially without the capability to deliver nuclear weapons.<sup>173</sup> Even bomber pilots and their Congressional supporters may be willing to permanently dispense of that capability if

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it helps preserve the new bomber program. That step could also release funds for conventional aircraft and other priorities dear to the rest of the Air Force. These Air Force politics make the bomber the triad leg most vulnerable to elimination.

It is difficult to estimate the savings available from eliminating triad legs. The Defense Department does not comprehensively track what it spends on nuclear weapons, let alone delivery vehicles. The Department of Energy's National Nuclear Security Administration (NNSA) maintains the nuclear weapons stockpile and has a budget that counts toward the government's standard definition of "defense" spending.<sup>174</sup> A comprehensive assessment by the Stimson Center estimates that the Department of Defense spends \$23 billion annually on nuclear forces, including support costs, and that NNSA spends another \$8 billion, for an annual total of \$31 billion. Costs would total between \$352 and \$392 billion over the next decade.<sup>175</sup> A back-of-the-envelope estimate using that report's methodology suggests that savings from a shift to a submarine monad, once implemented, would save as much as \$20 billion a year from the Pentagon and NNSA compared to current spending projections and more if bomber and ICBM modernization plans were fully realized.<sup>176</sup>

Efficiency, not cost alone, drives our recommendations. The SSBN force is more costly to develop, operate, and maintain than the nation's ICBMs and nuclear-capable bombers. But it is more effective for deterrence, and thus a better investment.

### **An Unnecessary Triad**

The arguments that justify an oversized U.S. arsenal and its triad of delivery system revolve around a set of myths inherited from early Cold War politics. The three means of delivering nuclear weapons (more if you count battlefield nuclear weapons and nuclear-armed cruise missiles) developed from the services' scramble to meet the Soviet threat,

prove their relevance and win budget share in the 1950s. That competition encouraged technological and doctrinal innovation, most importantly the development of ballistic missile submarines and finite deterrence. It aligned the Navy's organizational interest with the taxpayer's by encouraging Polaris' advocates to question Air Force notions about deterrence that encouraged budget-busting arms racing. But the stabilization of service budget shares, the idea that each played a large role in defense of European allies through the flexible response doctrine, and the power of Secretary of Defense Robert McNamara and his whiz kids, all encouraged interservice harmony, ending the brief period of strategic fecundity.

Starting in the 1960s, debate about nuclear weapons diminished and the rationales created to justify the triad amid one set of technological circumstances held even as weapons technology drastically changed. The division of labor among delivery systems said to be required to destroy enemy forces and to credibly threaten suicide on behalf of allies never made much sense, except as a way to confuse enemies and assure allies, but it gave the Navy and Air Force a role. Their mutual interests prevented widespread appreciation of the growing capability of missiles, SLBMs especially, to target and destroy hardened enemy forces. The revolution in precision targeting remained something of a secret. Vast potential savings went to capability that was overkill, even when it came to the more demanding counterforce deterrence mission.

Civilians meanwhile employed the myth that U.S. nuclear weapons attempted to maintain a condition of mutually assured destruction rather than escape it. That rationale required systematic exaggeration of Soviet ability to deliver nuclear weapons. The exaggeration served the interests of the services; their congressional, academic, and industrial allies; and political leaders eager to shroud actual U.S. nuclear weapons policy—counterforce—in a defensive-sounding sheen.

The biggest misconception of all was the notion that the Cold War was a delicate bal-

ance of terror. The truth is that the danger in the Cold War's heart—Europe and especially Germany—diminished after the settlement of the second Berlin crisis (which included the Cuban missile crisis). Deterring the Soviets was not as difficult as conventional wisdom says. The sides of the Cold War debate pointing at opposite dangers—a spiral of vulnerability leading to disaster or provocative weakness—both overstated the trouble, though not equally.

Cold War stability never required a triad, a counterforce doctrine, and the massive nuclear arsenal we bought. Post-Cold War stability requires it even less. The stories used to justify our military posture, year after year, exaggerate the precariousness of great power peace and difficulty of deterring aggression. Even if one believes that peace depends on the United States' ability to deter nuclear-armed states' aggression by denuding them of their deterrent, there is no need for three costly delivery systems. A submarine-based monad, along with conventional capability, can provide all the deterrence we need, and save roughly \$20 billion a year. A dyad of ICBMs and SLBMs saves much less, but has a better chance of enactment due the politics of bombers.

Austerity and the declining utility of nuclear weapons in U.S. wars create a possibility that military leaders might agree to sacrifice a triad leg to preserve other capabilities. Policymakers should exploit that circumstance to improve strategic debate. Unity is necessary in war, but dissent is a reliable source of insight in preparing for war. A nuclear weapons policy that better serves the national interest may require the competition of parochial interests.

## Notes

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1. Deterrence here means threats of harm meant to convince an adversary not to act. It is distinct

from compellence, which is a threat meant to induce an adversary to act. Deterrence defends the status quo; compellence tries to change it. Both are forms of coercion, which is different than brute force, where military action forces an adversary's compliance. Theoretically, nuclear weapons can serve any of those purposes, which is why the generalization above is not a rule. These definitions come from Thomas C. Schelling, *Arms and Influence* (New Haven, CT: Yale University Press, 1966).

2. Eisenhower did not actually plan to initiate massive nuclear retaliation in response to all Communist aggression. Outside Europe, the administration was largely focused on covert responses. Even on the main Cold War front, in Germany, it considered various alternative military responses that would later be called "flexible response." Marc Trachtenberg, *A Constructed Peace: The Making of the European Settlement, 1945–1963* (Princeton, NJ: Princeton University Press, 1999), pp. 180–90, 287–88.

3. Aaron Friedberg, *In the Shadow of the Garrison State: America's Anti-Statism and Its Cold War Grand Strategy* (Princeton, NJ: Princeton University Press, 2000).

4. The document articulating the "New Look" recognized that the Soviets would soon have their own nuclear weapons, which might deter the United States from nuclear strikes. United States National Security Council document NSC 162/2, "Basic National Security Policy," October 30, 1953, <http://www.fas.org/irp/offdocs/nsc-hst/nsc-162-2.pdf>. In some ways, the New Look formalized policies begun during the Truman administration, when U.S. policy was vaguer, but the expectation was that the United States would meet a Soviet attack on West Germany with an all-out atomic air assault, albeit with fewer, weaker nuclear bombs. David Alan Rosenberg, "The Origins of Overkill: Nuclear Weapons and American Strategy, 1945–1960," *International Security* 7, no. 1 (Spring 1983): 10–19; Trachtenberg, *A Constructed Peace*, pp. 89–90.

5. See, e.g., Glenn H. Snyder, "The New Look of 1953," in *Strategy, Politics and Defense Budgets*, Warner R. Schilling, Paul Y. Hammond, and Glenn H. Snyder (New York: Columbia University Press, 1962), pp. 393–437.

6. National Defense Budget Estimates for 2013, Office of the Undersecretary of Defense Comptroller, March 2012, pp. 148–49, [comptroller.defense.gov/defbudget/fy2013/FY13\\_Green\\_Book.pdf](http://defense.gov/defbudget/fy2013/FY13_Green_Book.pdf). In today's dollars, \$18.6 billion is about \$168 billion, quite similar to the Air Force's current annual budget.

7. The remainder went to defense-wide activities. The Eisenhower administration dramatically

- cut military spending after the Korean War and then allowed it to grow incrementally from 1955–1960. For analysis of the politics of these changing budget shares, see Arnold Kanter, *Defense Politics: A Budgetary Perspective* (Chicago: University of Chicago Press, 1975), especially p. 31. See also, Harvey M. Sapolsky, *The Polaris System Development: Bureaucratic and Programmatic Success in Government* (Cambridge, MA: Harvard University Press, 1972), pp. 160–78.
8. On the Army, see Andrew Bacevich, *The Pentomic Era: The U.S. Army between Korea and Vietnam* (Washington: National Defense University Press, 1986), pp. 16–21. On the Navy, see Sapolsky, *The Polaris System Development*, pp. 7–9, 37–41; Kanter, pp. 5, 100–101.
  9. Trachtenberg, *A Constructed Peace*, pp. 121–22, 145–54; and James McAllister, *No Exit: America and the German Problem, 1943–1954* (Ithaca, NY: Cornell University Press, 2002), chap. 6.
  10. Bacevich, pp. 12–15.
  11. Jeffrey G. Barlow, *Revolt of the Admirals: The Fight for Naval Aviation, 1945–1950* (Washington: Naval Historical Center, 1994).
  12. Jerry Miller, *Nuclear Weapons and Aircraft Carriers: How the Bomb Saved Naval Aviation* (Washington: Smithsonian, 2001), pp. 90–99; and Milton Leitenberg, “Background Information on Tactical Nuclear Weapons (Primarily in the European Context)” in *Tactical Nuclear Weapons: European Perspectives*, ed. Frank Barnaby (London: Taylor and Francis, 1978), p. 120.
  13. The pursuit of organizational self-interest is not necessarily bad. Public organizations are unlikely to effectively serve their purpose without a sense of self-interest. On the organizational politics of military bureaucracies, see Barry Posen, *The Sources of Military Doctrine: France, Britain, and Germany between the World Wars* (Ithaca, NY: Cornell University Press, 1984).
  14. Norman Polmar and Robert S. Norris, *The U.S. Nuclear Arsenal: A History of Weapons and Delivery Systems since 1945* (Annapolis, MD: Naval Institute Press, 2009), pp. 13–15. Over the years, the Air Force addressed that problem in various ways, including raw numbers; range improvements that kept them safe from Soviet attack aircraft; design changes in 1950s that allowed faster flight at altitudes above air defenses; and then, when that proved infeasible by the 1960s, designs that allowed them to fly low amid ground clutter that confused radar. By the late Cold War, bombers had stealth designs to mask them from radar. On the evolution of bomber capabilities and requirements, see Michael E. Brown, *Flying Blind: The Politics of the U.S. Strategic Bomber Program* (Ithaca, NY: Cornell University Press, 1992).
  15. An influential report on this problem was Albert Wohlstetter et al., *Selection and Use of Strategic Bases, R-266* (Santa Monica, CA: RAND Corporation, 1954). On the effort to reduce the vulnerability of SAC’s bomber force, see Peter J. Roman, *Eisenhower and the Missile Gap* (Ithaca, NY: Cornell University Press, 1995), pp. 153–59.
  16. Most estimates were that the Soviets would then have 500 or more long-range (Bison) bombers. That would be more than what SAC had, unless one counts B-36s and B-47s stationed overseas or in Alaska with ranges that required one-way flights to other friendly territory. Air Force intelligence estimates of Soviet production went even higher. It turned out that the Soviets had only 20 Bison aircraft, and their range was insufficient to allow them to fly from the Soviet Union to the United States and then somewhere safe to land. Lawrence Freedman, *U.S. Intelligence and the Soviet Strategic Threat*, 2nd ed. (Princeton, NJ: Princeton University Press: 1986), pp. 66–67; and John Prados, *The Soviet Estimate: U.S. Intelligence Analysis and the Soviet Strategic Force* (Princeton, NJ: Princeton University Press: 1986), pp. 41–50.
  17. For counts of U.S. deployed bombers by year, see Robert S. Norris and Thomas B. Cochran, “US-USSR/Russian Strategic Offensive Nuclear Forces, 1945–1996,” NWD-97-1 (Natural Resources Defense Council, January 1997), Table 1; Pavel Podvig, ed., *Russian Strategic Nuclear Forces* (Cambridge, MA: MIT Press, 2001), p. 350; and Stephen I. Schwartz, ed., *Atomic Audit: The Costs and Consequences of U.S. Nuclear Weapons Since 1940* (Washington: Brookings Institution Press, 1998), pp. 108–109, 112–18.
  18. Rosenberg, “The Origins of Overkill,” p. 40.
  19. Fred Kaplan, *The Wizards of Armageddon* (Stanford, CA: Stanford University Press, 1983), pp. 129–54.
  20. Lawrence Freedman, *The Evolution of Nuclear Strategy*, 3rd ed. (New York: Palgrave Macmillan, 2003), pp. 146–61. On the political obstacles to shifting nuclear attack options, see David Alan Rosenberg, “Reality and Responsibility: Power and Process in the Making of United States Nuclear Strategy, 1945–1968,” *Journal of Strategic Studies* 9, no. 1 (1986): 46.
  21. On SAC’s plans to strike first see Rosenberg, “The Origins of Overkill,” p. 19. On their approach to bomber vulnerability see Kaplan, *The Wizards of Armageddon*, pp. 166–67. SAC saw nuclear weapons essentially as more powerful munitions to execute the strategic bombing techniques they had perfected during World War II—the mission that won the Air Force independence from the Army. Freed-



man, *The Evolution of Nuclear Strategy*, pp. 21–23, 37–42; and Marc Trachtenberg, *History and Strategy* (Princeton, NJ: Princeton University Press, 1991), chap. 1.

22. By 1959, one third of the SAC bomber force was operating on ground alert. Rosenberg, “The Origins of Overkill,” p. 49. President George H. W. Bush de-alerted all U.S. bombers in 1991. Joseph Cirincione, *Bomb Scare: The History and Future of Nuclear Weapons* (New York: Columbia University Press, 2007), p. 41.

23. U.S. military doctrine never ruled out launch-on-warning, but “there were few enthusiastic proponents,” because launch on warning “increased the danger of accidental war through over-reliance on the means of detecting an attack.” Freedman, *The Evolution of Nuclear Strategy*, pp. 253, 372.

24. Donald Mackenzie, *Inventing Accuracy: A Historical Sociology of Nuclear Missile Guidance* (Cambridge, MA: MIT Press, 1990), pp. 101–104.

25. Owen R. Cote, Jr., “The Politics of Innovative Military Doctrine: The U.S. Navy and Fleet Ballistic Missiles” (PhD Dissertation, Massachusetts Institute of Technology, 1996), pp. 141–42.

26. On the Air Force-Navy missile competition as a prod to adopt solid fuel, see *ibid.*, chap. 4. Technical details on each of these weapons can be found in Polmar and Norris. On the history, deployment, and technological improvements of the U.S. missile programs, see Desmond Ball, *Politics and Force Levels: The Strategic Missile Programs of the Kennedy Administration* (Berkeley, CA: University of California Press, 1980), pp. 41–53; and Peter J. Roman, “Strategic Bombers over the Missile Horizon,” *Journal of Strategic Studies* 18, no. 1 (March 1995): 198–236.

27. Polmar and Norris, pp. 18–20. Much of the work to diversify and stabilize the nuclear deterrent, including the eventual switch to solid fuel and improved early warning, followed recommendations from the Technological Capabilities Panel, a task force headed by James Killian that Eisenhower tasked with studying the challenge of surviving a Soviet surprise attack. See Richard V. Damms, “James Killian, the Technological Capabilities Panel, and the Emergence of President Eisenhower’s ‘Scientific-Technological Elite,’” *Diplomatic History* 24, no. 1 (Winter 2000): 57–78.

28. Mackenzie, pp. 115–23.

29. Kaplan, *The Wizards of Armageddon*, pp. 134–35. The United States moved to reduce ICBM vulnerability—through surveillance systems for warning, solid fuel, and silo hardening—far faster than the Soviets did. U.S. defense analysts were long confused by the Soviets’ seeming indifference

to reducing their arsenal’s vulnerability. Trachtenberg, *A Constructed Peace*, p. 182.

30. See, e.g., Freedman, *U.S. Intelligence and the Soviet Strategic Threat*, pp. 67–80.

31. The report, which the White House commissioned, was eventually declassified and published as *Deterrence and Survival in the Nuclear Age* (Washington: U.S. Congress, Joint Committee on Defense Production, 1976). See also, David L. Snead, *The Gaither Committee, Eisenhower, and the Cold War* (Columbus, OH: Ohio State University Press, 1999).

32. Albert Wohlstetter, “The Delicate Balance of Terror,” *Foreign Affairs* 37, no. 2 (January 1959): 211–34. That article reprises points made in Albert Wohlstetter and Fred S. Hoffman, *Defending a Strategic Force after 1960: With Notes on the Need by Both Sides for Accurate Bomb Delivery, Particularly for the Big Bombs, D-2270* (Santa Monica, CA: RAND Corporation, 1954); and Albert Wohlstetter, Fred S. Hoffman, and Henry Rowen, *Protecting U.S. Power to Strike Back in the 1950s and 1960s, R-290* (Santa Monica, CA: RAND Corporation, 1956). The Air Force organized RAND after World War II, initially as part of Douglass Aircraft Company, largely to maintain its scientific edge in developing missiles. Kaplan, *The Wizards of Armageddon*, pp. 55–56.

33. Christopher Preble, *John F. Kennedy and the Missile Gap* (Dekalb, IL: Northern Illinois University Press, 2004), pp. 52–102; and Kaplan, *The Wizards of Armageddon*, pp. 168–69, 248–49.

34. Robert A. Divine, *The Sputnik Challenge: Eisenhower’s Response to the Soviet Satellite* (New York: Oxford University Press, 1993), pp. 41–42.

35. *Ibid.*, pp. 20–21, 169–70; and Friedberg, p. 37. An overview on this subject is Robert R. Bowie and Richard H. Immerman, *Waging Peace: How Eisenhower Shaped an Enduring Cold War Strategy* (New York: Oxford University Press, 1998).

36. Prados, chap. 8.

37. Francis J. Gavin, *Nuclear Statecraft: History and Strategy in America’s Atomic Age* (Ithaca, NY: Cornell University Press, 2012), pp. 35–38.

38. The Killian Committee recommended the program. See Damms. The Navy, relying on advice from scientific advisers, had shifted its attention from liquid-fueled missiles, potentially based on surface ships, to smaller solid-fueled missiles based on submarines. Sapolsky, *The Polaris System Development*, pp. 21–34.

39. *Ibid.*, pp. 8–9. Still, the budgetary benefit to the Navy was not obvious. At least initially, funds for the program seem to have cannibalized fund-

ing from other Navy programs rather than adding to its top line. *Ibid.*, pp. 160–78.

40. The first Polaris submarine deployed in November 1960, and 41 operated by the late 1960s before being replaced by the Poseidon class. Each Polaris carried 16 missiles, each with a range of 1,200 nautical miles, meaning that it needed to be relatively close to the Soviet Union to attack. Polmar and Norris, pp. 19–20.

41. On interservice competition as a spur to military innovation, see Cote, “The Politics of Innovative Military Doctrine,” chap. 2; and Harvey M. Sapolsky, “The Interservice Competition Solution,” *Breakthroughs* 5, no. 1 (1996): 1–3. Following Barry Posen, doctrine here is the “subcomponent of grand strategy that deals explicitly with military means.” Grand strategy is “a political-military, means-ends chain, a state’s theory about how it can best cause security for itself.” Posen, *The Sources of Military Doctrine*, p. 13. The idea that U.S. security in the Cold War required protecting allies from Communist aggression was a part of U.S. grand strategy. Massive retaliation, finite deterrence, and flexible response (mentioned below) are competing doctrines in service of that grand strategy.

42. For a summary and link to documents on Burke and finite deterrence, see William Burr, ed., “How Much Is Enough? The U.S. Navy and ‘Finite Deterrence’” National Security Archive Electronic Briefing Book No. 275, <http://www.gwu.edu/~nsarchiv/nukevault/ebb275/index.htm>, posted May 1, 2009. Prior to Polaris, Navy leaders critiqued massive retaliation and the Air Force by arguing that targeting civilians was unethical. With Polaris, they abandoned that argument. Sapolsky, *The Polaris System Development*, p. 18.

43. As discussed below, this story is not quite right: SLBMs were always comparable to ICBMs in accuracy and had considerable counterforce capability. The original Polaris A-1 missile had a 1,200 nautical mile range, carried a 600 kiloton (KT) W47 warhead, and had a circular error probable (CEP) of two miles—meaning each warhead had a 50 percent chance of hitting anywhere within a circular area with a two mile radius, using the target as the center point. On CEP and range, see Mackenzie, p. 429. On yield, see Polmar and Norris, p. 188.

44. Thomas Schelling, *Strategy of Conflict* (Cambridge, MA: Harvard University Press, 1960), chap. 9. On accidental nuclear war, see Bruce G. Blair, *The Logic of Accidental Nuclear War* (Washington: Brookings Institution, 1993). On flaws in accidental nuclear war thinking, see, e.g., Marc Trachtenberg, “Robert Jervis and the Nuclear Question,” in James W. Davis, ed., *Psychology, Strategy and Conflict: Perceptions of Insecurity in International Relations* (New York: Routledge, 2013), chap. 6.

45. Harvey M. Sapolsky, “The U.S. Navy’s Fleet Ballistic Missile Program and Finite Deterrence,” in Henry D. Sokolski, ed., *Getting Mad: Nuclear Mutual Assured Destruction, Its Origins and Practice* (Carlisle Barracks, PA: U.S. Army War College, Strategic Studies Institute, 2004), pp. 127–29.

46. Admiral Libby to Chief of Naval Operations, “Railroad: Running of,” 1 February 1957, Top Secret, Source: Washington Navy Yard, U.S. Navy Operational Archives, CNO Double Zero Files 1957, box 12, folder: X-Ordinance, Design, Construction, etc., available at the National Security Archive, [www.gwu.edu/~nsarchiv/nukevault/ebb275/01c.pdf](http://www.gwu.edu/~nsarchiv/nukevault/ebb275/01c.pdf).

47. C. A. Haskins, National Security Council Staff, “Polaris,” 10 February 1960, from Dwight D. Eisenhower Library, Staff Secretary Files, Subject Series, Department of Defense Subseries, box 2, File: Defense Department Vol. IV, March–April 1960 (folder 3) (Note 16), National Security Archive, <http://www.gwu.edu/~nsarchiv/nukevault/ebb275/12.PDF>.

48. In private, Burke was willing to suggest that three delivery systems were excessive: “You very seldom see a cowboy, even in the movies, wearing three guns; two is enough,” he told Henry Kissinger’s students at Harvard in the spring of 1960. Quoted in Rosenberg, “The Origins of Overkill,” p. 181. On Burke’s reluctance to press the case more aggressively see, for example, CNO Personal No. 35, To: Flag and General Officers, Subj: Dope, 5 March 1958, Secret, Excerpt: Item 5 on “Polaris” (pages 13–15), from Washington Navy Yard, Operational Archive, Flag Officers “Dope,” CNO Personal Newsletter # 33-38, January–June 1958, National Security Archive, <http://www.gwu.edu/~nsarchiv/nukevault/ebb275/03.PDF>. On Navy leaders’ disinclination to fight the Air Force on this issue, see Freedman, *U.S. Intelligence and the Soviet Strategic Threat*, pp. 120–21; and Sapolsky, *The Polaris System Development*, p. 17.

49. Preble, *John F. Kennedy and the Missile Gap*, p. 149; Ball, *Politics and Force Levels*, pp. 44–46; and Sapolsky, *The Polaris System Development*, pp. 7–21.

50. Bacevich, p. 28.

51. This is the stability-instability paradox, where the fear of nuclear war is so profound that it does not deter conventional war or other limited provocations. Glenn Snyder, “The Balance of Power and the Balance of Terror,” in Paul Seabury, ed., *The Balance of Power* (San Francisco: Chandler, 1965); and Robert Jervis, *The Meaning of the Nuclear Revolution: Statecraft and the Prospect of Armageddon* (Ithaca, NY: Cornell University Press, 1989), pp. 19–22. See also, Schelling, *Arms and Influence*, chap. 3 (on the “manipulation of risk”).

52. From the 1950s to the end of the 1960s, the

United States deployed 20 different types of nuclear weapons in Europe. The 11 types of missiles were the Thor, Jupiter, Matador, Mace, Redstone, Pershing 1/1A, Lacrosse, Honest John, Corporal, Sergeant, and Lance. Deployments also included 280mm, 155mm, and 8-inch atomic artillery; Nike-Hercules, Air Defense Missiles, and Falcon nuclear defensive systems; Davy Crockett tactical nuclear weapons; Bullpup air-to-ground missiles; and anti-submarine nuclear depth bombs. "History of the Custody and Deployment of Nuclear Weapons (U): July 1945 through September 1977," prepared by Office of the Assistant to the Secretary of Defense (Atomic Energy), February 1978, Appendix B, pp. 6–7, available at National Security Archive, Electronic Briefing Book no. 20, "Companion Page to the *Bulletin of the Atomic Scientists* November/December 1999 Issue," October 20, 1999, <http://www.gwu.edu/~nsarchiv/news/19991020/>. The Army created the Pentomic division in the mid-1950s to have the capability of fighting on a nuclear battlefield. Bacevich, chap. 5. On Jupiter, see Mackenzie, pp. 130–32.

53. Prominent examples of the argument from that time are Henry Kissinger, *Nuclear Weapons and Foreign Policy* (New York: Harper and Brothers, 1957); and Maxwell Taylor, *The Uncertain Trumpet* (New York: Harper and Brothers, 1960).

54. Schelling, *Strategy of Conflict*, pp. 189–99. On the development of this thinking, see Kaplan, *The Wizards of Armageddon*, pp. 194–200, 330–32.

55. Army leaders did not take this view of tactical nuclear weapons, generally seeing them instead as enhanced artillery. Eisenhower saw them mostly as a cost-saving measure. Bacevich, pp. 65–66. See also, Andreas Wenger, "The Politics of Military Planning: Evolution of NATO's Strategy," in Vojtech Mastny, Sven G. Holtsmark, and Andreas Wenger, eds., *War Plans and Alliances in the Cold War: Threat Perceptions in the East and West* (New York: Routledge, 2006), chap. 2.

56. Campbell Craig, *Destroying the Village: Eisenhower and Thermonuclear War* (New York: Columbia University Press, 1998), pp. 49–70, 74–78, 92–100; and McGeorge Bundy, *Danger and Survival: Choices about the Bomb in the First Fifty Years* (New York: Vintage Books, 1988), p. 348.

57. On this competition, see Cote, "The Politics of Innovative Military Doctrine," chap. 4. Below, for simplicity's sake, we use "counterforce" as shorthand for "counterforce/no cities."

58. On the development of the counterforce doctrine at RAND, see Austin Long, *Deterrence—From Cold War to Long War: Lessons from Six Decades of RAND Research* (Santa Monica, CA: RAND Corporation, 2008), pp. 25–32; and Kaplan, *The Wizards of Armageddon*,

pp. 201–19. An articulation of the doctrine by one of its creators is William W. Kaufmann, *The McNamara Strategy* (New York: Harper and Row, 1964), pp. 51–52.

59. A pithy discussion is William W. Kaufmann, *Assessing the Base Force: How Much Is Enough?* (Washington: Brookings Institution, 1992), pp. 36–38.

60. See Rosenberg, "The Origins of Overkill." On the tendency for offensive bias in military organizations, see Posen, *Sources of Military Doctrine*, pp. 47–50.

61. Mackenzie, pp. 152–61. Air Force leaders sought control of nuclear weapons delivery systems, arguing that uncoordinated nuclear salvos were the potentially disastrous alternative. The Eisenhower administration allowed the Air Force to take over the Army's Jupiter missile, but not Polaris, and agreed, despite Navy objections, to develop a Single Integrated Operational Plan, or SIOPlan, a centralized plan for the use of the weapons. SAC was able to dominate the target selection process to heighten requirements for its platforms. Rosenberg, "The Origins of Overkill," pp. 60–66.

62. On RAND and Kennedy, see Kaplan, *The Wizards of Armageddon*, pp. 248–57.

63. On these briefings see Ball, *Politics and Force Levels*, pp. 34–36; and Kaplan, *The Wizards of Armageddon*, pp. 258–62. The latter briefing was based on a report from the Weapons Systems Evaluation Group, WSEG-50, which is available at [http://www.dod.mil/pubs/foi/Science\\_and\\_Technology/WSEG/328.pdf](http://www.dod.mil/pubs/foi/Science_and_Technology/WSEG/328.pdf).

64. Draft Memorandum from Secretary of Defense McNamara to President Kennedy, "Recommended Long Range Nuclear Delivery Forces 1963–67," Washington, September 23, 1961, *Foreign Relations of the United States, 1961–1963*, Vol. VIII, National Security Policy, Document 46, <http://history.state.gov/historicaldocuments/frus1961-63v08/d46>.

65. The administration's effort partly backfired; it caused some allies to worry that the United States was less committed to their defense. Wenger, pp. 174–78.

66. That is measured in budget authority, in real terms. *National Defense Budget Estimates for 2013*, Office of the Undersecretary of Defense Comptroller, March 2012, [http://comptroller.defense.gov/defbudget/fy2013/FY13\\_Green\\_Book.pdf](http://comptroller.defense.gov/defbudget/fy2013/FY13_Green_Book.pdf), p. 149.

67. Bundy, *Danger and Survival*, pp. 352–53; Ball, *Politics and Force Levels*, pp. 107–18, 137, 143–44. On the B-70 decision, see Brown, *Flying Blind*, chap. 6.

68. "Table of U.S. Strategic Bomber Forces," National Resource Defense Council, <http://www.nrdc.org/nuclear/nudb/datab7.asp>.

69. Kanter, pp. 24–44.
70. On Kennedy and Johnson’s positions on ground forces in Europe, see Gavin, *Nuclear Statecraft*, pp. 41–43, 47–52; and Lawrence Kaplan, “McNamara, Vietnam and the Defense of Europe,” in Mastny, Holtsmark, and Wenger, pp. 286–98. A comparison of Eisenhower and Kennedy’s commitment to keeping U.S. forces in Europe is Brendan R. Green, “Two Concepts of Liberty: U.S. Cold War Grand Strategy and the Liberal Tradition,” *International Security* 37, no. 2 (Fall 2012): 9–43.
71. On similarities in Eisenhower and Kennedy’s nuclear deterrence policies, see e.g., Craig, pp. 150–52; and Trachtenberg, *History and Strategy*, pp. 40–43.
72. Gavin, *Nuclear Statecraft*, pp. 34–35; William Burr, “The Nixon Administration, The ‘Horror Strategy,’ and the Search for Limited Nuclear Options, 1969–1972,” *Journal of Cold War Studies* 7, no. 3 (Summer 2005): 47.
73. This discussion relies on Trachtenberg, *A Constructed Peace*, chaps. 5–8; and Gavin, *Nuclear Statecraft*, chap. 3. The Eisenhower administration had finessed the problem by offering to let allies operate nuclear weapons in multilateral frameworks, whether through NATO or what became known as the multilateral force. But by the early 1960s that plan had unraveled, and the French were considering aiding West German nuclear weapons development. A critique of U.S. Cold War alliance commitments based on counterforce targeting’s cost is Earl C. Ravenal, “Counterforce and Alliance: The Ultimate Connection,” *International Security* 6, no. 4 (Spring 1982): 26–43.
74. Gavin, *Nuclear Statecraft*, pp. 40–41. On changes to NATO tactical nuclear weapons employment policy during this period, see Paul Schulte, “Tactical Nuclear Weapons in NATO and Beyond: A Historical and Thematic Examination,” in *Tactical Nuclear Weapons and NATO*, ed. Tom Nichols, Douglas Stuart, and Jeffrey D. McCausland (Carlisle Barracks, PA: U.S. Army War College, Strategic Studies Institute, 2012), pp. 39–43.
75. Bundy, *Danger and Survival*, pp. 546–47. In 1963 a NSC study concluded that a preemptive strike could not destroy enough Soviet forces to prevent an unacceptably destructive reprisal. Trachtenberg, *A Constructed Peace*, pp. 182–83, 318. Some give a slightly later date for the loss of U.S. first-strike capability. See, e.g., Long, p. 34.
76. Kaplan, *The Wizards of Armageddon*, pp. 315–17. McNamara also sought to control missile requirements via treaty—by supporting the Strategic Arms Limitation Talks (SALT) and the Anti-Ballistic Missile Treaty, signed in 1972, and by encouraging the development of multiple independently targeted reentry vehicles (MIRVs), which allowed one missile to deliver several warheads. *Ibid.*, pp. 346–54, 363–64; Milton Leitenberg, “The Origins of MIRV,” Case Study 3 in *Studies of Military R&D and Weapons Development* (Unpublished manuscript, prepared in 1984 for the Office of the United Nations Secretary-General), [www.fas.org/man/eprint/leitenberg/](http://www.fas.org/man/eprint/leitenberg/).
77. Draft Memorandum from Secretary of Defense McNamara to President Johnson, “FY 1965–FY 1969 Strategic Retaliatory Forces,” Washington, December 6, 1963, *Foreign Relations of the United States, 1961–1963*, Vol. VIII, National Security Policy, Document 151, [history.state.gov/historicaldocuments/frus1961-63v08/d151](http://history.state.gov/historicaldocuments/frus1961-63v08/d151). In using assured destruction as a force-sizing construct, the guidance followed WSEG-50. The required damage was 30 percent of the Soviet population, said to require 400 megatons, which was what aides had found to be the point of diminishing returns, where additional damage killed fewer and fewer Soviets, and also about what each triad leg provided. Kaplan, *The Wizards of Armageddon*, pp. 316–18; and Alan Enthoven and K. Wayne Smith, *How Much Is Enough? Shaping the Defense Program, 1961–1969* (New York: Harper & Row, 1971), pp. 207–208.
78. See, e.g., Robert McNamara, Secretary of Defense, “Mutual Deterrence,” speech delivered in San Francisco, September 18, 1967, <http://www.atomicarchive.com/Docs/Deterrence/Deterrence.shtml>.
79. Gavin, *Nuclear Statecraft*, p. 38.
80. Jervis, *The Meaning of the Nuclear Revolution*, chap. 3 (“‘MAD Is a Fact not a Policy.’ Getting the Arguments Straight”); Milton Leitenberg, “Presidential Directive (P.D.) 59: United States Nuclear Weapons Targeting Policy,” *Journal of Peace Research* 18, no. 4 (December 1981): 309–17; Harvey M. Sapolsky, “Strategic ASW: Making the Deterrent Vulnerable,” *Breakthroughs* 8, no. 1 (Spring 2004): 3–7; and Long, pp. 27–28.
81. Kaplan, *The Wizards of Armageddon*, p. 387. On the preservation of “assured destruction” as a criteria for the U.S. nuclear arsenal in Pentagon planning documents through the 1960s and 1970s, see Warner R. Schilling, “U.S. Strategic Nuclear Concepts in the 1970s: The Search for Sufficiently Equivalent Countervailing Parity,” *International Security* 6, no. 2 (Fall 1981): 59.
82. Long, pp. 29–38; and Kaplan, *The Wizards of Armageddon*, pp. 356–60.
83. This set of policies is often called the “countervailing strategy,” but it is actually a doctrine and logically very similar to the counterforce/no-cities doctrine. On these changes to nuclear plans, see Burr,

- “The Nixon Administration, The ‘Horror Strategy,’ and the Search for Limited Nuclear Options, 1969–1972.” Key documents on this shift are available on the National Security Archive’s website. See, especially, Office of Secretary of Defense, “Policy Guidance for the Employment of Nuclear Weapons,” 3 April 1974, with enclosure from Major Gen. John A. Wickham to General Scowcroft, 10 April 1974, Top Secret, Source: NPMP, NSCIF, box 343, folder: NSDM 24, <http://www.gwu.edu/~nsarchiv/NSAEBB/NSAEBB173/SIOP-25.pdf>; and William E. Odom to Zbigniew Brzezinski, “M-B-B Luncheon Item: Targeting,” 5 August 1980, with Presidential Directive 59, “Nuclear Weapons Employment Policy,” 25 July 1980, Top Secret, excised copy, Source: JCL, Brzezinski Collection, box 23, Meetings-Muskie/Brown 7/80-9/81, <http://www.gwu.edu/~nsarchiv/nukevault/ebb390/docs/7-25-80%20PD%2059.pdf>.
84. For arguments that the doctrine was never seriously implemented, see Trachtenberg, “Robert Jervis and the Nuclear Question,” p. 111, footnote 65. On officials wanting a first-strike capability only at a cost unlikely to achieve it, see Schilling, pp. 77–78; Charles Glaser “Nuclear Policy without an Adversary: U.S. Planning for the Post-Soviet Era,” *International Security* 16, no. 4 (Spring 1992): 34–78; and Friedberg.
85. Kanter, chap. 6. On the longevity of this shift, see Sharon Weiner, “The Politics of Resource Allocation in the Post-Cold War Pentagon,” *Security Studies* 5, no. 4 (Summer 1996): 125–42.
86. Splits among the Joint Chiefs of Staff declined radically from 1965 to 1966. See Kanter, p. 26; and Cote, “The Politics of Innovative Military Doctrine,” pp. 18–19.
87. See the chart included in Julian E. Barnes, “Branches of Military Battle over Shrinking War Chest,” *Wall Street Journal*, July 31, 2013, <http://online.wsj.com/article/SB10001424127887324260204578583513940889092.html>.
88. A full explanation of these changed dynamics is Cote, “The Politics of Innovative Military Doctrine,” chap. 6. See also, Kanter, pp. 42–43, 82–83.
89. On the birth of the term, see Col. Charles D. Cooper, USAF, Office of Public Affairs, Department of the Air Force, letter to N. Polmar, 5 February 1981, cited in Polmar and Norris, p. 20.
90. Janne E. Nolan, *An Elusive Consensus: Nuclear Weapons and American Security after the Cold War* (Washington: Brookings Institution, 1999), p. 45.
91. Elaine M. Grossman, “DOD Eyes Reducing to 1,500 Nuclear Weapons under Alternative Force Posture,” *Inside the Air Force* 5, no. 20, May 20, 1994.
92. Elaine M. Grossman, “Four Services Sign Letter to Block Carter’s Nuclear Posture Briefing,” *Inside the Air Force* 5, No. 17, April 29, 1994, p. 9.
93. Conrad Burns et al, “Republicans’ Letter to Clinton on Nuclear Posture,” April 20, 1994, reprinted in *Inside the Air Force* 5, no. 17 (April 29, 1994). On the failure of the review to overcome entrenched interests, see Tom Sauer, *Nuclear Inertia: U.S. Weapons Policy after the Cold War* (New York: I.B. Tauris, 2005), chap. 9.
94. Janne Nolan, “Preparing for the 2001 Nuclear Posture Review,” *Arms Control Today* 30, no. 9 (November 2000): 10–14.
95. On these interlocking interests, see Harvey M. Sapolsky, Eugene Gholz and Caitlin Talmadge, *U.S. Defense Politics: The Origins of Security Policy* (New York: Routledge, 2009), chap. 5.
96. David H. Dunn, *The Politics of Threat: Minute-man Vulnerability in American National Security Policy* (New York: St. Martin’s Press, 1997), pp. 215–17; and Freedman, *U.S. Intelligence and the Soviet Strategic Threat*, p. 161.
97. On how unbalanced interests skew U.S. debate about security, see Benjamin H. Friedman, “The Terrible Ifs,” *Regulation*, 30, no. 4 (Winter 2008): 32–40. A classic general argument about this problem is Jack Snyder, *Myths of Empire: Domestic Politics and International Ambition* (Ithaca, NY: Cornell University Press, 1991).
98. A major example is the “Team B” alternative intelligence exercise hyped by hawks like Democratic Senator Henry “Scoop” Jackson and the members of the Committee on the Present Danger. See also Richard Pipes, “Why the Soviet Union Thinks It Could Fight and Win a Nuclear War,” *Commentary*, July 1977, pp. 21–34.
99. See Prados, pp. 249–57, 305; and Joshua Rovner, *Fixing the Facts: National Security and the Politics of Intelligence* (Ithaca, NY: Cornell University Press, 2011), chap. 6. On the Committee on the Present Danger and its allies, see Dunn, pp. 89–101; and Anne Hessing Cahn, *Killing Détente: The Right Attacks the CIA* (University Park, PA: Penn State University Press, 1998). A definitive accounting of Soviet forces at the time is Pavel Podvig, “The Window of Vulnerability That Wasn’t: Soviet Military Buildup in the 1970s—a Research Note,” *International Security* 33, no. 1 (Summer 2008): 118–138. On the low odds of a “bolt from the blue” surprise attack, see Bernard Brodie, “The Development of Nuclear Strategy,” *International Security* 2, no. 4 (Spring 1978), pp. 68–69; and Robert H. Johnson, *Improbable Dangers, U.S. Conceptions of Threat in the Cold War and After* (New York: St. Martin’s Press, 1994), pp. 100–104.

100. The argument is from the Scowcroft Commission. "Report of the President's Commission on Strategic Forces," Brent Scowcroft, Chairman, The White House, April 6, 1983, pp. 7–8. For doubts about that scenario, see Owen Cote, "The Trident and the Triad: Collecting the D-5 Dividend," *International Security* 16, no. 2 (Fall 1991): 134.
101. Prominent examples are the views of then secretary of defense Melvin Laird in 1969, as discussed in Freedman, *U.S. Intelligence and the Soviet Strategic Threat*, pp. 133–34, and Harold Brown, ed., *Detering through the End of the Century* (Washington: Foreign Policy Institute and CSIS, 1989), pp. 3–4.
102. Cote, "The Trident and the Triad," p. 124.
103. Statement of Eleanor Cheminsky, Assistant Comptroller General, Program Evaluation and Methodology Division, General Accounting Office, "The U.S. Nuclear Triad: GAO's Evaluation of the Strategic Modernization Program," June 10, 1993, [archive.gao.gov/d43t14/149423.pdf](http://archive.gao.gov/d43t14/149423.pdf).
104. Examples are, Paul H. Nitze, "Assuring Strategic Stability in an Era of Détente," *Foreign Affairs* 54, no. 2 (January 1976): 225; and Nixon's 1970 report on foreign policy: Richard Nixon, *U.S. Foreign Policy for the 1970s* (Washington: U.S. Government Printing Office, 1970), p. 122 (cited by Freedman, *U.S. Intelligence and the Soviet Strategic Threat*, p. 134).
105. Freedman, *The Evolution of Nuclear Strategy*, p. 373; and Schilling, p. 71. On the tendency to underestimate fire damage from nuclear attacks, see Lynn Eden, *Whole World on Fire: Organizations, Knowledge, and Nuclear Weapons Devastation* (Ithaca, NY: Cornell University Press, 2006).
106. Cote, "The Politics of Innovative Military Doctrine," pp. 144–51. See also, Desmond J. Ball, "The Counterforce Potential of American SLBM Systems," *Journal of Peace Research* 14, no. 1 (1977): 23–40; and Albert Langer, "Accurate Submarine Launched Ballistic Missiles and Nuclear Strategy," *Journal of Peace Research* 14, no. 1 (1977): 41–58.
107. The Key West agreement of 1948 gave the Navy responsibility for attacking naval targets, including Soviet submarines and ports. Requirements for Polaris reflected that mission. The SIOP likely always called for Polaris missiles to attack Soviet bombers and land-based missiles outside hardened silos. Leitenberg, "The Origins of MIRV," p. 5.
108. See Cote, "The Politics of Innovative Military Doctrine," pp. 141–42. The second Polaris missile (A-2) had a CEP of 2 miles when launched from 1,500 nautical missiles, and a yield of 1.2 megatons. The A-3 had a CEP of .5 miles (less than contemporary Air Force ICBMs) at 2,500 nautical miles and carried three warheads each with 200 KT warheads. On CEP and range, see Mackenzie, p. 429. On yield, see Polmar and Norris, pp. 188–90.
109. See Enthoven and Smith, pp. 245–47; and Michael E. Brown, "The Case against the B-2," *International Security* 15, no. 1 (Summer 1990): 133. On the development of stealth aircraft, see Brown, *Flying Blind*, chaps. 7 and 8.
110. Sapolsky, *The Polaris System Development*, pp. 219–20; and Leitenberg, "The Origins of MIRV," pp. 5–8.
111. On these improvements, see Cote, "The Trident and the Triad," esp. pp. 124–26; and Norman Friedman, *Seapower and Space: From the Dawn of the Missile Age to Net-Centric Warfare* (Annapolis, MD: U.S. Naval Institute Press: 2000), pp. 50–51. Trident II D-5 SLBMs now have a CEP of approximately 200 feet and multiple W-76 and W-88 warheads with respective yields of 100 kilotons (KT) and 475 KT and groundburst capability. U.S. submarines have four communication sources—Very Low Frequency (VLF), Low Frequency (LF), and Extra Low Frequency (ELF) radio transmissions, as well as aircraft borne communication links—to ensure orders are received even in the event of attack. On current Trident capabilities, see Rear Admiral George P. Nanos, "Strategic Systems Upgrade," *Submarine Review* (April 1997): 12–17; "U.S. Nuclear Warhead Enduring Stockpile," Nuclear Weapons Archive, <http://nuclearweaponarchive.org/Usa/Weapons/Wpngall.html>; and Mitch Bott, "Unique and Complementary Characteristics of the U.S. ICBM and SLBM Weapon Systems," in Mark Jansson, ed., *Project on Nuclear Issues Conference Series* (Washington: Center for Strategic and International Studies, 2009), p. 81.
112. Sapolsky, *The Polaris System Development*, pp. 221–22; and Cote, "The Politics of Innovative Military Doctrine," pp. 325–27.
113. See, e.g., Mackenzie; and Michael Russell Rip and James M. Hasik, *The Precision Revolution: GPS and the Future of Aerial Warfare* (Annapolis, MD: Naval Institute Press, 2002).
114. Cote, "The Trident and the Triad," pp. 125–28.
115. On the bombers' limitations discussed in this paragraph, see Enthoven and Smith, pp. 245–247; and Brown, "The Case against the B-2," p. 133.
116. For a skeptical take on these justifications, see William W. Kaufmann, *Glasnost, Perestroika and U.S. Defense Spending* (Washington: Brookings Institution, 1990), pp. 13–17; and Michael C. Brown, "The U.S. Manned Bomber and Strategic Deterrence

in the 1990s,” *International Security* 14, no. 2 (Fall 1990): pp. 13–16.

117. See, e.g., John Lewis Gaddis, *We Now Know: Rethinking Cold War History* (New York: Oxford University Press, 2007) p. 31; and Nicolai Petro and Alvin Rubinstein, *Russian Foreign Policy: From Empire to Nation-State* (New York: Addison-Wesley, 1997), pp. 65–67. For a set of Pentagon-sponsored post-Cold War interviews with Soviet officials generally reflecting this take, see John Hines, Ellis M. Mishulovich, and John F. Shulle, *Soviet Intentions 1965–1985, Volume II: Soviet Post-Cold War Testimonial Evidence* (McLean, VA: BDM Federal Inc., 1995), included in William Burr and Svetlana Savranskaya, eds., “Previously Classified Interviews with Former Soviet Officials Reveal U.S. Strategic Intelligence Failure over Decades,” National Security Archive Briefing Book 285, <http://www.gwu.edu/~nsarchiv/nukevault/ebb285/>, posted on September 11, 2009.

118. Vojtech Mastny, “Imagining War in Europe: Soviet Strategic Planning,” in Mastny, Holtmark and Wenger, eds., pp. 16–18; Robert Jervis, “Was the Cold War a Security Dilemma?” *Journal of Cold War Studies* 3, no. 1 (Winter 2001): 59; and Johnson, *Improbable Dangers*, pp. 75–76.

119. John Mueller, *Atomic Obsession: Nuclear Alarmism from Hiroshima to Al-Qaeda* (New York, Oxford University Press, 2010), pp. 29–38. The same applies in Asia, where geography is even more favorable to defense and made the front-line Communist adversaries less threatening than the Soviets and easily deterred. On the peace-inducing benefits of Asian geography, see Robert S. Ross, “The Geography of Peace: East Asia in the Twenty-first Century,” *International Security* 23, no. 4 (Spring 1999): 81–118.

120. U.S. intelligence estimates tended to be more optimistic than political rhetoric. Johnson, *Improbable Dangers*, pp. 77–78. On the conventional balance at the Cold War’s start, see Matthew Evangelista, “Stalin’s Postwar Army Reappraised,” *International Security* 7, no. 3 (Winter 1982–1983): 110–138. On the later Cold War conventional balance see, Barry R. Posen, “Measuring the European Conventional Balance: Coping with Complexity in Threat Assessment,” *International Security* 9, no. 3 (Winter 1984/1985): 47–88; and John J. Mearsheimer, “Numbers, Strategy and the European Balance,” *International Security* 12, no. 4 (Spring 1988): 174–85.

121. James J. Sheehan, *Where Have the Soldiers Gone? The Transformation of Modern Europe* (Boston: Houghton Mifflin, 2008), p. 165. On the compelling reasons to believe that Europe’s Cold War peace was not precarious, see John Mueller, *Retreat from Doomsday: The Obsolescence of Major War* (New York: Basic Books, 1989); Carl Kaysen, “Is War

Obsolete? A Review Essay,” *International Security* 4, no. 14 (Spring 1990): 42–64; Stephen Van Evera, “Primed for Peace: Europe after the Cold War,” *International Security* 15, no. 3 (Winter 1990/91): 7–57; and Steven Pinker, *The Better Angels of Our Nature: Why Violence Has Declined* (New York: Penguin, 2011).

122. Examples include Walter Lippman, George Kennan, Raymond Garthoff, Nathan Leites, and Bernard Brodie, who helped invent the rational choice-dominated school of deterrence studies popularized at RAND before coming to mostly reject it by the 1960s. On Lippman and Kennan, see Campbell Craig and Fredrik Logevall, *America’s Cold War: The Politics of Insecurity* (Cambridge, MA: Belknap, 2009), pp. 82–86, 99. On Kennan’s late Cold War views, see George F. Kennan, “Containment Then and Now,” *Foreign Affairs* 70, no. 4 (Spring 1987): 885–90. For Garthoff see, e.g., Raymond L. Garthoff, *Soviet Strategy in the Nuclear Age* (New York: Praeger, 1958), pp. 5–7. Leites cited caution as a part of the Politburo’s “operational code” in Nathan Constantin Leites, *The Operational Code of the Politburo* (Santa Monica, CA: RAND Corporation, 1950). On Brodie, see Kaplan, *The Wizards of Armageddon*, pp. 339–42; Bernard Brodie, *Escalation and the Nuclear Option* (Princeton, NJ: Princeton University Press, 1966); and Brodie, “The Development of Nuclear Strategy.”

123. Both nonetheless said that the nuclear balance had diplomatic consequences. On Kennedy, see Gavin, *Nuclear Statecraft*, p. 45. On Nixon, see Burr, “The Nixon Administration, The ‘Horror Strategy,’ and the Search for Limited Nuclear Options,” p. 39.

124. See Robert S. McNamara, “The Military Role of Nuclear Weapons: Perceptions and Misperceptions,” *Foreign Affairs* 62, no. 1 (Fall 1983): 59–80; and Henry Kissinger, “NATO: The Next Thirty Years,” *Atlantic Community Quarterly* 17, no. 4 (Winter 1979/1980): 468, cited in John Mearsheimer, *Why Leaders Lie: The Truth about Lying in International Politics* (New York: Oxford University Press, 2011), p. 37, fn. 24. On Schlesinger, see Jervis, *The Meaning of the Nuclear Revolution*, p. 220; and John Hines, “Interview with James Schlesinger,” October 29, 1991, in Hines, Mishulovich, and Shulle, p. 129 (cited by Trachtenberg, “Robert Jervis and the Nuclear Question,” p. 112). As president, Nixon said in NSC meetings, “we will never use tactical nuclears,” and that the NATO’s nuclear umbrella was “a lot of crap.” *Ibid.*, p. 111.

125. Jervis, *The Meaning of the Nuclear Revolution*, pp. 100–103, 221; Johnson, *Improbable Dangers*, pp. 76–77; and Bundy, *Danger and Survival*, pp. 544–45. On the difficulty of preventing escalation from conventional to nuclear war, see Barry R. Posen, *Inadvertent Escalation: Conventional War and Nuclear Risks* (Ithaca, NY: Cornell University Press, 1991).

126. Of course, saying that can enhance deterrence. On Eisenhower's views on limited war see, Bundy, *Danger and Survival*, p. 348; Kaplan, *Wizards of Armageddon*, p.181; and Bacevich, pp. 38–39.
127. Jervis, *The Meaning of the Nuclear Revolution*, pp. 103–104. Discussions of the small odds of nuclear reprisal sufficient to deter are McGeorge Bundy, "The Bishops and the Bomb," *The New York Review of Books*, June 16, 1983, pp. 3–8; and Kenneth N. Waltz, "Nuclear Myths and Political Realities," *American Political Science Review* 84, no. 3 (September 1990): 731–45.
128. U.S. military spending comprises almost half of the world's, with the rest coming largely from U.S. allies, and the U.S. military enjoys profound qualitative advantages. Christopher Preble, "Your Tax Dollars at Work: Subsidizing the Security of Wealthy Allies," *Cato-at-Liberty*, April 15, 2013, <http://www.cato.org/blog/tax-dollars-work-subsidizing-security-wealthy-allies>.
129. Gavin, *Nuclear Statecraft*, pp. 70–74. On doubts about the accuracy of that perception, see Muller, *Atomic Obsession*, pp. 35–38.
130. An argument that extended deterrence's success turns mostly on local military balances and strength of the deterring state's interests, rather than its total military power, including nuclear capability, is Paul Huth and Bruce Russett, "What Makes Deterrence Work? Cases from 1900 to 1980," *World Politics* 36, no. 4 (July 1984): 496–526. See also, Daryl G. Press, *Calculating Credibility: How Leaders Evaluate Military Threats* (Ithaca, NY: Cornell University Press, 2005); and Vesna Danilovic, "The Sources of Threat Credibility in Extended Deterrence," *Journal of Conflict Resolution* 45, no. 3 (June 2001): 365–66. On the strength of conventional peace in Asia, see James M. Acton, *Deterrence during Disarmament: Deep Nuclear Reductions and International Security* (New York: Routledge, 2011), p. 52. Acton quotes a Japanese diplomat stating that U.S. conventional superiority "obviates the whole debate about whether or not Washington would 'sacrifice Los Angeles to save Tokyo' in a nuclear exchange."
131. A recent study supporting this conclusion is Daryl G. Press, Scott D. Sagan, and Benjamin A. Valentino, "Atomic Aversion: Experimental Evidence on Taboos, Traditions, and the Non-Use of Nuclear Weapons," *American Political Science Review* 107, no. 1 (February 2013): 188–206.
132. The comparison is imprecise because the way the Defense Department counts nuclear weapons expenses has shifted over time. The earlier estimate comes from William W. Kaufmann, *A Reasonable Defense* (Washington: Brookings Institution, 1986), p. 22. The latter uses a range taken from Russell Rumbaugh and Nathan Cohn, "Resolving Ambiguity: Costing Nuclear Weapons," Stimson Center, June 2012, pp. 50–53.
133. See, e.g., William J. Perry et. al., *America's Strategic Posture: The Final Report of the Congressional Commission on the Strategic Posture of the United States* (Washington: U.S. Institute for Peace, 2009), pp. 19–31, [http://www.usip.org/files/America's\\_Strategic\\_Posture\\_Auth\\_Ed.pdf](http://www.usip.org/files/America's_Strategic_Posture_Auth_Ed.pdf); General Robert Kehler, statement before the Senate Committee on Armed Services, Subcommittee on Strategic Forces, June 3, 2011, <http://www.dod.mil/dodgc/olc/docs/testKehler06032011.pdf>; Secretary of the Air Force Michael Donley, "2011 State of the Air Force Speech," Speech at the 2011 Air Force Association Air and Space Conference and Technology Exposition, September 19, 2011, <http://www.af.mil/information/speeches/speech.asp?id=669>; Baker Spring and Michaela Dodge, "Time to Modernize and Revitalize the Nuclear Triad," Heritage Foundation Backgrounder #2646 on Missile Defense, January 27, 2012, [http://www.heritage.org/research/reports/2012/01/time-to-modernize-and-revitalize-the-nuclear-triad#\\_ftn3](http://www.heritage.org/research/reports/2012/01/time-to-modernize-and-revitalize-the-nuclear-triad#_ftn3); and Stephanie Spies and John K. Warden, "Forging a Sustainable U.S. Nuclear Posture: A Report of the CSIS Nuclear Consensus Working Group," Clark Murdock, Study Director, April 2013, [http://csis.org/files/publication/130422\\_Spies\\_ForgingConsensus\\_Web.pdf](http://csis.org/files/publication/130422_Spies_ForgingConsensus_Web.pdf).
134. Department of Defense, *Nuclear Posture Review*, 2010, pp. 21–22, <http://www.defense.gov/npr/docs/2010%20nuclear%20posture%20review%20report.pdf>; and Department of Defense, *Report on Nuclear Weapons Employment Strategy of the United States Specified in Section 491 of U.S.C 10*, 2013, pp. 5–6, [http://www.defense.gov/pubs/reporttoCongressonUSNuclearEmploymentStrategy\\_Section491.pdf](http://www.defense.gov/pubs/reporttoCongressonUSNuclearEmploymentStrategy_Section491.pdf).
135. Department of Defense, *Nuclear Posture Review*, pp. 20, 25, 46. De-MIRVing ICBMs is a way to comply with New START.
136. Department of Defense, *Report on Nuclear Weapons Employment Strategy*, pp. 3–4.
137. A statement of the George W. Bush administration's similarly vague view of nuclear deterrence is Keith B. Payne, "The Nuclear Posture Review: Setting the Record Straight," *Washington Quarterly* 28, no. 3 (Summer 2005): 137–51.
138. Keir A. Lieber and Daryl G. Press, "The Nukes We Need: Preserving the American Deterrent," *Foreign Affairs* 88, no. 6 (November/December 2009): 39–51. This mission is better thought of as brute force than deterrence.
139. Gen. (retired) James Cartwright et al., "Modernizing U.S. Nuclear Strategy, Force Structure, and Posture" (Washington: Global Zero U.S. Nuclear Policy Commission, 2012), p. 7.



140. Cote, "The Trident and the Triad," p. 122.
141. The invulnerability point is acknowledged by the *Nuclear Posture Review* (p. 22) and a recent Pentagon report, *Report on the Strategic Nuclear Forces of the Russian Federation Pursuant to Section 1240 of the National Defense Authorization Act for Fiscal Year 2012* (Washington: Department of Defense, 2010), pp. 6–7, [http://www.fas.org/programs/ssp/nukes/nuclearweapons/DOD2012\\_RussianNukes.pdf](http://www.fas.org/programs/ssp/nukes/nuclearweapons/DOD2012_RussianNukes.pdf). On the Ohio-class' capabilities, see Amy F. Woolf, "U.S. Strategic Nuclear Forces: Background, Developments, and Issues," Congressional Research Service, RL33640, June 14, 2013, p. 18.
142. Cartwright, et. al, p. 7. On the limited Chinese effort to change this circumstance, see Owen R. Cote, Jr., "Assessing the Undersea Balance between the U.S. and China," MIT Security Studies Program Working Paper, February 2011, p. 3, [http://web.mit.edu/ssp/publications/working\\_papers/Undersea%20Balance%20WP11-1.pdf](http://web.mit.edu/ssp/publications/working_papers/Undersea%20Balance%20WP11-1.pdf).
143. A discussion of Cold War ASW supporting this point is Owen R. Cote Jr., *The Third Battle: Innovation in the U.S. Navy's Silent Cold War Struggle with Soviet Submarines*, Naval War College Newport Papers no. 16 (Newport, RI: Naval War College Press, 2003).
144. Richard O. Hundley, *Past Revolutions, Future Transformations: What Can the History of Revolutions in Military Affairs Tell Us About Transforming the U.S. Military?* (Santa Monica, CA: RAND Corporation, 1999), pp. 37–47.
145. On this point see, e.g., Ravenal; Christopher A. Preble, *The Power Problem: How American Military Dominance Makes Us Less Safe, Less Prosperous, and Less Free* (Ithaca, NY: Cornell University Press, 2009), pp. 104–107; and Timothy W. Crawford, "The Endurance of Extended Deterrence: Continuity, Change, and Complexity in Theory and Policy," in *Complex Deterrence: Strategy in the Global Age*, eds. T. V. Paul, Patrick M. Morgan, and James J. Wirtz (Chicago: University of Chicago Press, 2009), pp. 287–88.
146. Long, pp. 63–64; Jeffrey G. Lewis, "Minimum Deterrence," *Bulletin of the Atomic Scientists* 64, no. 3 (July/ August 2008): 38–41; and Tom Sauer, "Correspondence: The Short Shadow of Nuclear Primacy?" *International Security* 31, no. 3 (Winter 2006/7): 177–81.
147. Examples of these concerns are "Russia Warns of Military Response to NATO Antimissile Plans," Global Security Newswire, November 2, 2011, <http://www.nti.org/gsn/article/russia-warns-of-military-response-to-nato-antimissile-plans/>; and "Nuclear Weapons and U.S.-China Relations: A Way Forward," Report of the PONI Working Group on U.S.-China Nuclear Dynamics (Washington: Center for Strategic and International Studies, 2013), pp. 21–22, [http://csis.org/files/publication/130307\\_Colby\\_USChinaNuclear\\_Web.pdf](http://csis.org/files/publication/130307_Colby_USChinaNuclear_Web.pdf).
148. On China's nuclear doctrine and improved second-strike capabilities, see M. Taylor Fravel and Evan Medeiros, "China's Search for Assured Retaliation: The Evolution of Chinese Nuclear Strategy and Force Structure," *International Security* 35, no. 2 (Fall 2010): 48–87; and Thomas J. Christensen, "The Meaning of the Nuclear Evolution: China's Strategic Modernization and US-China Security Relations," *Journal of Strategic Studies* 35, no. 4, (2012): 447–87. On China's current nuclear capabilities, see Hans M. Kristensen and Robert S. Norris, "Chinese Nuclear Forces, 2011," *Bulletin of the Atomic Scientists* 67, no. 6 (November 2011): 81–87. On current Russian nuclear doctrine, see Nikolai Sokov, "The New, 2010 Russian Military Doctrine: The Nuclear Angle," James Martin Center for Nonproliferation Studies, February 5, 2010, [http://cns.miis.edu/stories/100205\\_russian\\_nuclear\\_doctrine](http://cns.miis.edu/stories/100205_russian_nuclear_doctrine). On Russia's current capabilities, see Hans M. Kristensen and Robert S. Norris, "Russian Nuclear Forces, 2012," *Bulletin of the Atomic Scientists* 69, no. 3 (May/June 2013): 71–81.
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176. The estimates were created by reviewing the program lines under the category headings in the Stimson Report to assign costs to delivery vehicles and then by dividing support costs, such as training, among delivery vehicles by using the percentage of personnel working with each.



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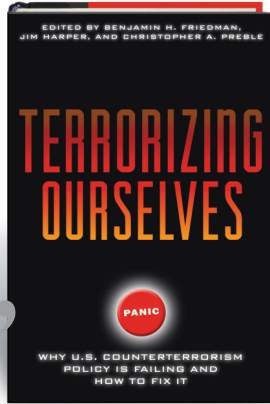


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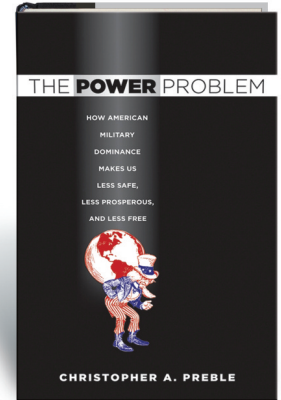
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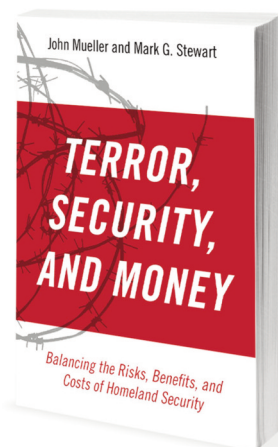
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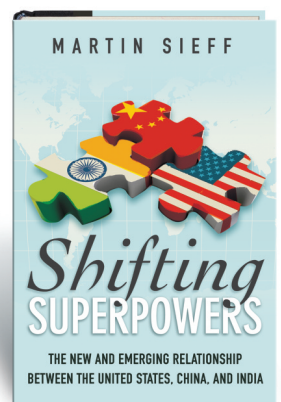
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