

## Center for Strategic and International Studies (CSIS)

---

Report Part Title: Background The Modern History of U.S. Industrial Mobilization

Report Title: Industrial Mobilization

Report Subtitle: Assessing Surge Capabilities, Wartime Risk, and System Brittleness

Report Author(s): Mark F. Cancian and Adam Saxton

Published by: Center for Strategic and International Studies (CSIS) (2020)

Stable URL: <https://www.jstor.org/stable/resrep28656.5>

---

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact [support@jstor.org](mailto:support@jstor.org).

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at <https://about.jstor.org/terms>



JSTOR

*Center for Strategic and International Studies (CSIS)* is collaborating with JSTOR to digitize, preserve and extend access to this content.

# Background

## *The Modern History of U.S. Industrial Mobilization*

Industrial mobilization has a long history in the United States, and that history can illuminate challenges currently facing the Department of Defense (DOD). The major insight that emerges from this history is that industrial mobilization takes a long time—years in many cases. This mobilization finds itself constantly behind where it needs to be because it occurs as demand increases many times over peacetime levels as a result of force expansion and equipment attrition in combat. Other insights arise from this long timeline and constant shortfall:

1. The need for centralized economic planning to cope with the massive dislocations that arise in an industrial mobilization situation;
2. The need to accept foreign designs when they are superior to U.S. designs;
3. The importance of balanced production that includes supporting capabilities as well as major end items;
4. The need to replace some prewar legacy systems that may be adequate for training and regional conflicts but are inadequate for great power conflicts;
5. The tension between efficient peacetime production and maintaining capacity for wartime surge;
6. The value of beginning industrial mobilization before conflict begins; and
7. The key role that senior officials play in pushing sluggish bureaucracies to move quickly.

### **World War I**

When the United States entered World War I on April 6, 1917, it was ill-prepared to meet the challenges and demands of mass industrial mobilization. Prewar efforts to enhance coordination, equipment, and

doctrine were inadequate. The lack of relevant experience and modern designs, resource shortages, and deficiencies in organization, coupled with the immediate need to rapidly expand its production capability, left the United States heavily dependent on its allies to equip and train its forces. Output of most equipment and munitions did not begin to meet wartime requirements until just a few months before armistice on November 11, 1918. Some equipment, such as tanks, never did.

## PREWAR PLANNING AND EARLY WAR YEARS

Just prior to entry into World War I, the United States attempted to address political, social, and economic shortcomings through the “preparedness movement” (1915–1916). A key element was the National Defense Act of 1916, signed in May and enacted in June. The act authorized an expansion of the Regular Army and the National Guard, created an Officers’ Corps and an Enlisted Reserve Corps, and established a Reserve Officers’ Training Corps program, which eventually led to the training of almost 89,500 officers during the war. The act authorized the president to place orders for defense materials and to force industry to fulfill those orders. One month after the enactment of the National Defense Act, the Council of National Defense was established to serve as a central point for the management of military and industrial needs.<sup>3</sup> The United States also moved to improve the defense of U.S. coasts and borders.

Prewar planning did not include plans for the equally important mobilization of industry and munitions production. It soon became apparent that the efforts of the preparedness movement, although useful, were insufficient to meet the high demands of mass mobilization.<sup>4</sup>

As orders for war production went out, shortages appeared, the price of inputs rose, and American factories became inundated with orders that surpassed their capacity. The unprecedented demand and expansion produced competition for resources and confusion about the duties and jurisdiction of government agencies. The Council of National Defense responded to these challenges by creating the War Industries Board in July 1917. The War Industries Board served as the principal agency for coordinating economic and industrial mobilization. With both civilian and military representatives, the board’s function was to analyze the needs of the government, study the extent to which resources could meet the needs, assign priorities and encourage increased production, and disseminate rules and guidance for preventing waste and misuse.<sup>5</sup>

## RELIANCE UPON THE ALLIES

World War I gave rise to the development of thousands of new items of ordnance, which were only generally understood by U.S. officers. The British and French furnished the United States with plans, specifications, working models, and complete manufacturing processes. Although this guidance greatly enhanced mobilization efforts, most U.S. industries were ill-equipped to take advantage of them, and

---

3 Brian Neumann, ed., *The U.S. Army in the World War I Era*, part of the U.S. Army Campaigns of World War I Commemorative Series (Washington, DC: Center of Military History United States Army, 2017), [https://history.army.mil/html/books/077/77-2/cmhPub\\_077-2.pdf](https://history.army.mil/html/books/077/77-2/cmhPub_077-2.pdf).

4 Benedict Crowell, *America’s Munitions 1917-1918* (Washington, DC: Government Printing Office, 1919), 18, [https://history.army.mil/html/bookshelves/resmat/wwi/historical\\_resources/default/sec04/PDF/AmericasMunitions1917-18.pdf](https://history.army.mil/html/bookshelves/resmat/wwi/historical_resources/default/sec04/PDF/AmericasMunitions1917-18.pdf).

5 Bernard M. Baruch and Richard H. Hippelheuser, *American Industry in the War; a Report of the War Industries Board (March 1921)* (New York: Prentice-Hall Incorporated, 1941), 19–21.

production did not move fast enough to fulfill orders. For example, it typically took industry 12 to 18 months to go from the initial order to quantity production of artillery. Because of such shortfalls, much reliance was placed upon the Allies for support, with both the British and French furnishing equipment and munitions to U.S. troops deploying to Europe. The British and French had suffered their own equipment shortages early in the war, but by 1917 and 1918, they had greatly increased their production and could provide material to the Americans. In addition to the masses of tanks, airplanes, artillery, and machine guns provided to U.S. forces, allied assistance included even such mundane items as pyrotechnic supplies, wire cutters, and mortar shells as well as services such as training and transport of manpower.<sup>6</sup>

## **BUILDING PRODUCTION CAPACITY AND REDUCING ALLIED RELIANCE**

Although the United States began to meet the demands of industrialized warfare only toward the final months of the war, the progress of U.S. manufacturing is notable. As outlined below, the United States gained production knowledge for new systems, altered designs to ensure efficiency, improved domestic transportation, modified inputs when necessary, and provided raw materials to allies in compensation for equipment and munitions.

**Artillery:** At the beginning of the war, the United States had only enough light artillery to equip an army of 500,000 and very little medium or heavy artillery. In June 1917, the Army decided to use U.S. guns for training and to equip troops abroad with French and British artillery. An arrangement between United States and the Allies was made so that the first U.S. divisions were equipped with purchased artillery from the British and French in exchange for equivalent amounts of steel, copper, and other raw materials.<sup>7</sup>

**Rifles:** At the outbreak of the war, the Army used its reserve stock of approximately 600,000 M1903 Springfield rifles to equip the first divisions of the Regular Army and National Guard that were organized. Roughly 200,000 older Krag-Jørgensen rifles that were in reserve were used for training. Production of Springfield rifles reached only 1,000 per day, far short of wartime requirements. This led to the decision to switch manufacturing to an entirely different rifle to meet the demand. Since several factories in the United States were completing British orders for Enfield rifles, the United States developed a new M1917 Enfield rifle to resemble the British Enfield, chambered so that it could use the same ammunition as the Springfield. By the end of the war, production of Springfield rifles totaled 900,000, but production of the new Enfield rifle reached nearly 2,300,000.<sup>8</sup>

**Machine Guns:** Before entry into World War I, the United States was vastly under-armed in automatic weapons compared to the Europeans. To address this, the Army conducted a series of tests comparing seven makes of automatic machine guns, with the Vickers machine gun (the British-designed Maxim gun, renamed) proving to be the choice model. However, production was slow, and it was not until mid-1918 that Colt Vickers guns started to be shipped abroad. Thus, the earliest demand for infantry

---

6 Edward M. Coffman, *The War to End All Wars: the American Military Experience in World War I* (Madison, WI: University of Wisconsin Press, 1986), 40.

7 Neumann, ed., *The US Army in the World War I Era*, 28; Leonard Porter Ayres, *The War with Germany: A Statistical Summary* (Washington: Government Printing Office, 1919), 83.

8 Ayres, *The War with Germany*, 63-64; and Crowell, *America's Munitions 1917-1918*, 182.

weapons by U.S. forces abroad had to be met by French supplies, including 5,255 Hotchkiss machine guns and approximately 35,000 Chauchat automatic rifles.<sup>9</sup>

Later, Colt began production of the American designed Browning water-cooled machine gun Model 1917, as the production of the Browning was less complicated than the Vickers gun. Production reached high levels but only toward the end of the war.<sup>10</sup>

**Tanks and Trucks:** Despite the United States pioneering the mass production of cars, it was largely dependent on allies to equip its forces with vehicles. Most U.S. production was delivered after the armistice. For tanks, manufacturing in the United States focused on the improvement of design and mass production of small six-ton tanks for the 1919 campaign. Although only 64 had been completed by the time of the armistice, 799 were produced by March 31, 1919, when wartime contracts ended. U.S. tank units had to use French and British tanks. The French supplied 227 small tanks, and the British supplied 64 heavy tanks.

Of the 30,072 four-wheel-drive trucks that had been ordered, 12,498 had been completed, and 9,420 had been sent overseas by the end of the war. By January 1919, when war production stopped, 23,499 were completed. Thus, about half of production was completed after the armistice.<sup>11</sup>

**Airpower:** In the three years prior to U.S. involvement in World War I, the airplane had undergone a major mechanical evolution which left the U.S. aircraft industry unprepared for full-scale production. Up to this time, no American-made plane had ever mounted a machine gun or carried anything other than simple instruments. Airplanes on order in April 1917 (over 350 of them) were of such an obsolete design that the manufacturers, after increased understanding of war requirements a few months later, asked to be released from their contracts.

In July 1917, the Joint Army and Navy Technical Board recommended that 22,000 training and combat aircraft be produced within 12 months. It soon became clear that the United States could not redesign and expand its aircraft industry and deliver aircraft overseas before the summer of 1918. To cover this gap, the United States and France agreed to exchange 5,875 planes of French design and manufacture for U.S. raw materials. By the armistice, the United States had produced a total of 11,754 airplanes (though with spare parts for only about one-third of them), supported by 48 flying fields, 20,568 air service officers, and 174,456 enlisted men and personnel. However, most of the equipment used by U.S. flying units in theater came from the Allies.<sup>12</sup>

**Naval Expansion:** In the years leading up to World War I, the United States expanded its battlefleet, but with an emphasis on large ships such as battleships. By 1915, the U.S. Navy had 32 battleships and 30 cruisers but only 57 destroyers. The Naval Act of 1916, passed by Congress on August 29, 1916, authorized a large increase in funding for naval construction. However, because Mahanian

---

9 Robert R. Hodges and Robert R. Hodges, Jr., *The Browning Automatic Rifle* (Oxford, UK: Osprey Publishing, April 17, 2012), 29.

10 Crowell, *America's Munitions 1917-1918*, 175-176; Ayres, *The War with Germany*, 65-72; and Robert G. Segel, "U.S. Colt Vickers Model of 1915," *Small Arms Defense Journal* 3, no. 1 (2012), <http://www.sadefensejournal.com/wp/u-s-colt-vickers-model-of-1915/>.

11 Crowell, *America's Munitions 1917-1918*, 148-149.

12 *Ibid.*, 235-243.

views still prevailed, this three-year construction plan did not include measures to meet the strategic threat of submarines. The act called for the construction of 10 battleships, 6 battle cruisers, 10 scout cruisers, 50 destroyers, and 67 submarines. The act also established the Naval Flying Corps, provided improvements to shipyards, and expanded the Marine Corps.<sup>13</sup>

It was not until its entrance into World War I that the United States adjusted to the demands of the war in progress. Because German U-boats were sinking allied ships faster than they could be replaced, the focus shifted from seeking decisive battle to antisubmarine warfare and the protection of convoys. Antisubmarine patrol and escort required small vessels of light draft and high speed, so naval shipbuilding shifted to smaller craft, such as destroyers and patrol boats.<sup>14</sup>

Ten days after the United States declared war, the U.S. Shipping Board created the Emergency Fleet Corporation to build, own, and operate a wartime merchant fleet for the U.S. government. The Emergency Fleet Corporation oversaw the expansion of U.S. shipyards from 61 when the United States entered the war to 216 at the armistice, of which 111 were new yards.<sup>15</sup>

The U.S. shipbuilding program had yet to reach peak production by the end of the World War I. When the armistice was signed on November 11, 1918, the Emergency Fleet Corporation had delivered a total of 470 ships, with a monthly production record of 77 vessels (398,000 deadweight tonnage, or DWT) in October 1918. The U.S. Shipping Board continued its merchant shipbuilding program until 1922, when the Emergency Fleet Corporation finally completed 2,312 ships.<sup>16</sup>

Table 1: U.S. Shipbuilding Program During World War I

	First Keel Laid	First Ship Delivered
Requisitioned Steel	April 20, 1916	August 20, 1917
Contract Steel	July 29, 1917	January 5, 1918
Contract Wood	May 15, 1917	May 24, 1918
Contract Composite	September 27, 1917	August 28, 1918
Contract Concrete	April 20, 1918	October 23, 1919

Source: W. C. Mattox, *Building the Emergency Fleet*, (London, UK: The Penton Publishing Company, 1920), 98.

13 Joshua Keating, "What kind of Navy did we have before World War I?," *Foreign Policy*, 2012, <https://foreignpolicy.com/2012/10/12/what-kind-of-navy-did-we-have-before-world-war-i/>; and Frank A. Blazich Jr., *United States Navy and World War I: 1914–1922* (Washington, DC: Naval History and Heritage Command, n.d.), 16–17, <https://www.history.navy.mil/research/library/online-reading-room/title-list-alphabetically/u/us-navy-world-war-i-redirect.html>.

14 Dudley W. Knox, *American Naval Participation in the Great War (With Special Reference to the European Theater of Operations)* (Washington, DC: Naval History and Heritage Command, n.d.), <https://www.history.navy.mil/research/library/online-reading-room/title-list-alphabetically/a/american-naval-participation-in-the-great-war-with-special-reference-to-the-european-theater-of-operations.html#>.

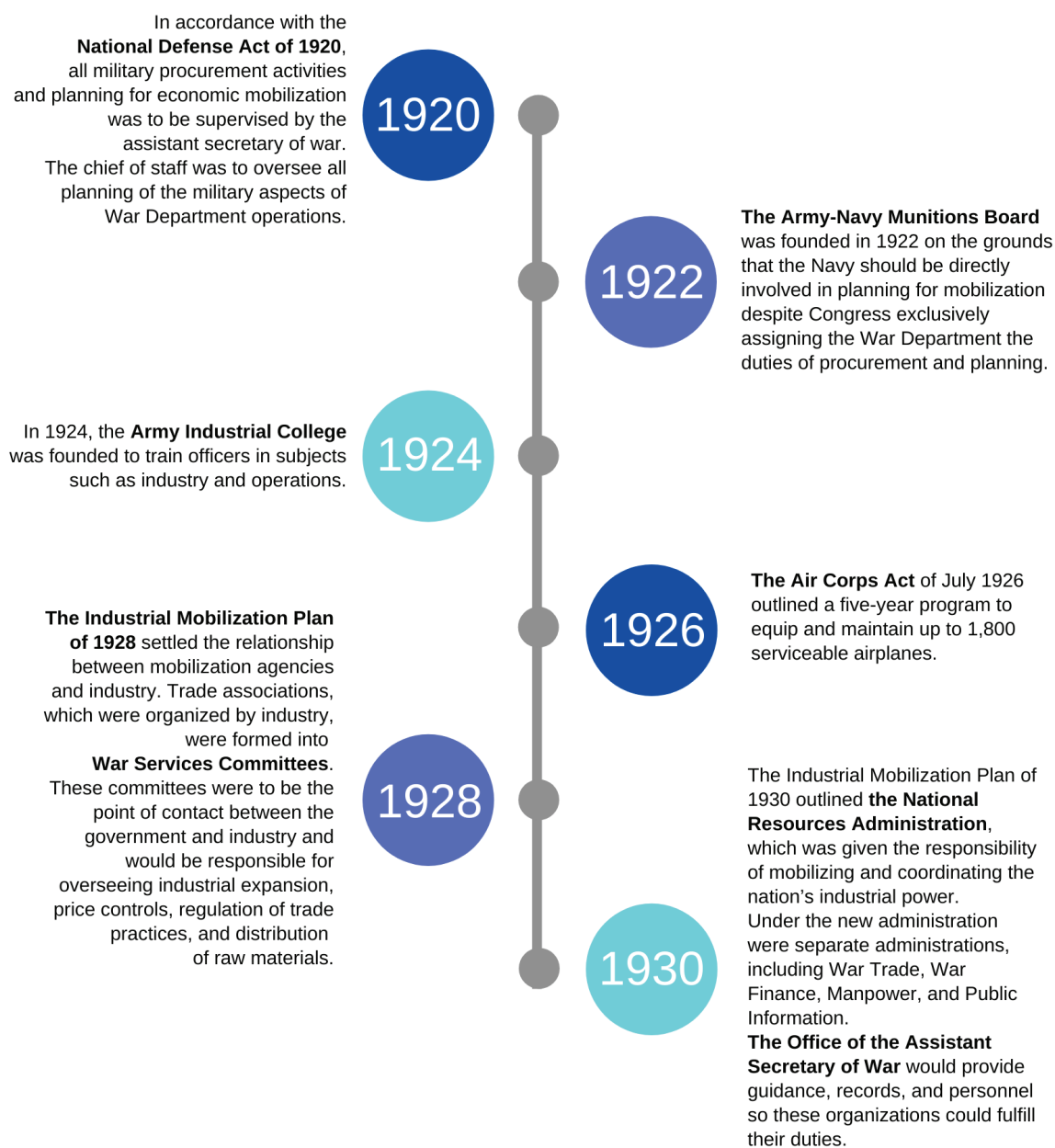
15 W. C. Mattox, *Building the Emergency Fleet* (London, UK: Penton Publishing Company, 1920), 206.

16 "The Maritime Administration's First 100 Years: 1916 – 2016," Department of Transportation Maritime Administration, [https://www.maritime.dot.gov/history/historical-documents-and-resources/maritime-administration%E2%80%99s-first-100-years-1916-%E2%80%93-2016#\\_ftnref1](https://www.maritime.dot.gov/history/historical-documents-and-resources/maritime-administration%E2%80%99s-first-100-years-1916-%E2%80%93-2016#_ftnref1).

## The Interwar Years

The experience of industrial mobilization during 1917 and 1918 served as a model for wartime planning during the interwar years and World War II. In the decades that followed, attempts were made to address the lack of industrial preparedness experienced during World War I, as described in the timeline below. However, the excessive stock of materiel from production for World War I, isolationism, criticism of the defense industry (“merchants of death”), and revulsion against war in general (this was the age of the Kellogg-Briand Pact that outlawed war) meant that planning for a future war received little high-level attention.

Figure 1: The Interwar Years: Major Events in Industrial Mobilization



Source: Authors' own compilation.

During the interwar years, the main concern for the War Department was simply to maintain resources to fulfill peacetime missions. Over time, World War I weapons started to become obsolete, but arsenals and laboratories, struggling with small budgets, were hampered in developing new designs. The Army had to manage with arms left over from World War I since military policy at this time focused on bolstering the U.S. Navy, which was viewed as the nation's first line of defense. The Navy itself was limited by the Washington Naval Treaty of 1922 and the London Treaty of 1930.<sup>17</sup>

## World War II

Industrial mobilization in the United States during World War II was vastly different from that of World War I. Mobilization began years prior to the United States' formal entry into the conflict. Thus, when the United States officially declared war on December 7, 1941, its process of industrial mobilization was far more advanced than had been the case at the declaration of war for World War I. This allowed the United States to eventually supply equipment not only for its own forces but also for those of its allies.

Industrial mobilization for World War II proceeded in three stages. The first stage ("rearmament") ran from the mid-1930s to the fall of France in May 1940. This stage was characterized by a naval buildup and by foreign orders for equipment that spurred U.S. weapons manufacturing. The second phase ("expansion") ran from May 1940 to the formal U.S. entry into the war in December 1941. This phase was marked by rapid expansion of the military sector. For example, the United States instituted a peacetime draft, mobilized its reserves, and built new production facilities. Production orders flooded industry. The third phase ("total mobilization") constituted total economic mobilization, with rationing and the conversion of civilian production to wartime use.

As had happened in World War I, organizational complications such as failure to adopt an industrial mobilization plan and disagreements over governing bodies slowed initial output. Shortages in materials, machine tools, or workforce plagued production throughout every stage of U.S. mobilization.

Nevertheless, despite the many challenges experienced during mobilization, the effort had many successes. Implementation of government-owned, contractor-operated (GOCO) plants as the main mechanism for the expansion of industrial capacity proved successful. Cooperation and innovation among firms allowed weapons to be efficiently produced on multiple production lines. In the end, the achievement of U.S. mobilization during World War II was monumental. The United States developed, produced, and delivered such vast quantities of weapons and supplies that it is still regarded as the classic case of full-scale economic mobilization.<sup>18</sup>

### THE PATH TO MOBILIZATION

In the decade leading up to U.S. involvement in World War II, isolationism had swept the nation. By the mid-1930s, Congress passed two Neutrality Acts, which prohibited U.S. companies from selling equipment to any belligerent involved in an armed conflict.<sup>19</sup> Prewar expenditures on U.S. national

---

17 Center of Military History United States Army, *American Military History* (Washington, DC: 1989), 406–411, <https://history.army.mil/books/AMH/amh-toc.htm>.

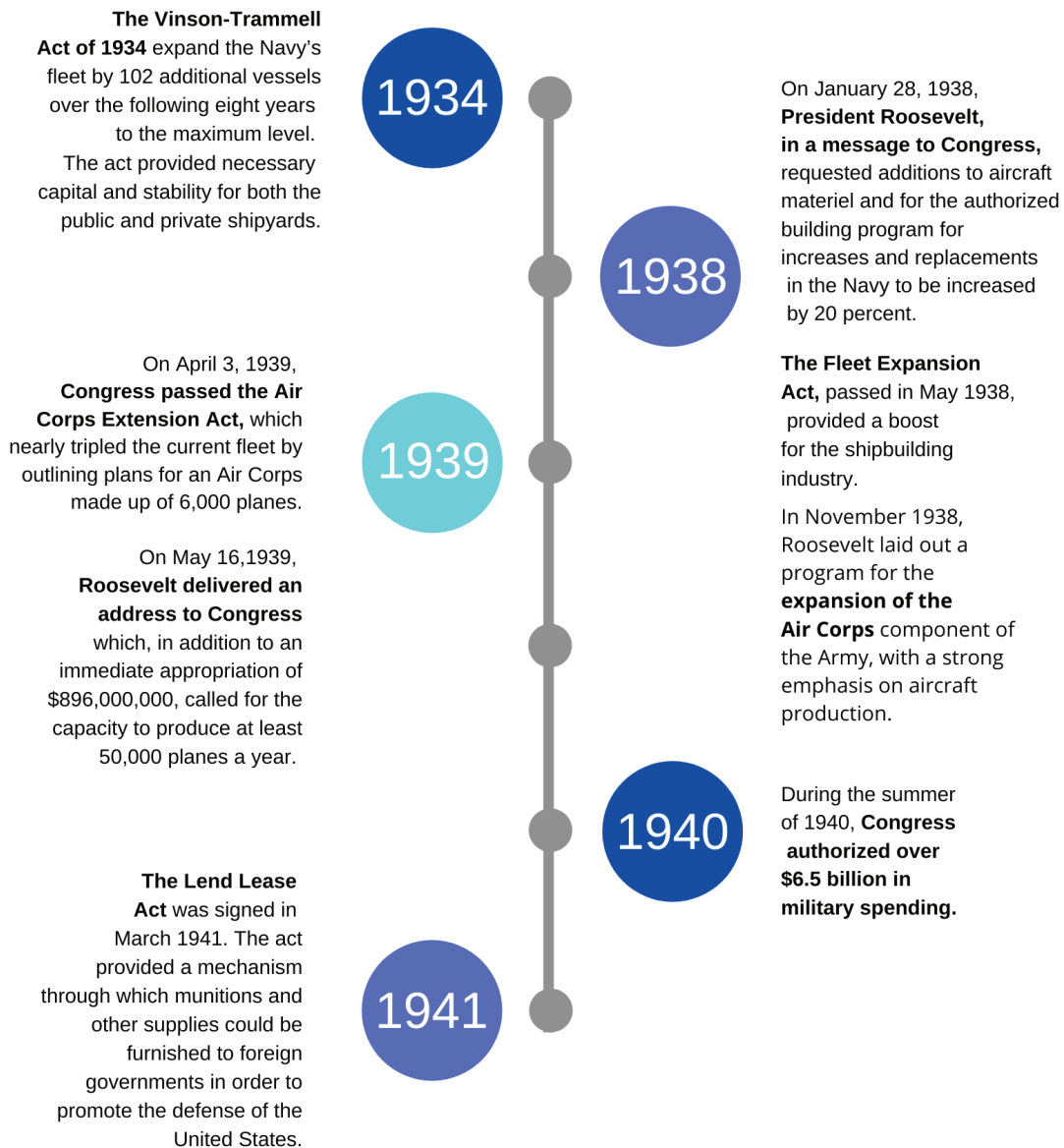
18 Frank N. Schubert, *Mobilization: the U.S. Army in World War II—the 50<sup>th</sup> anniversary* (Washington, DC: U.S. Government Printing Office, 1994), 22.

19 Arthur Herman, *Freedom's Forge: How American Business Produced Victory in World War II* (New York: Random House, 2012), 5–7.



defense had been astonishingly low despite the worsening international situation. Total annual expenditures did not exceed \$980 million from 1931 to 1938.<sup>20</sup> The position of non-involvement and lack of necessary procurement resulted in a level of unpreparedness for the United States. Fortunately, early steps taken to expand U.S. shipbuilding coupled with foreign aircraft exports in the years leading up to the first stage of mobilization helped facilitate a transition to mass production.<sup>21</sup>

Figure 2: Major Milestones on the Path to Mobilizing for World War II



Source: Authors' own compilation.

20 Roughly equivalent to \$15.2 billion in 2020 dollars, about 1.0 to 1.5 percent of GDP.

21 Tom Lilley et al., *Problems of Accelerating Aircraft Production During World War II* (Boston, MA: Harvard University, 1947), 14.

Naval expansion began earliest because it was compatible with isolationist sentiment. The Vinson-Trammell Act of 1934 expand the Navy's fleet by 102 vessels over the following eight years to the maximum level allowed under the Washington and London naval treaties. The act provided necessary capital and stability for both the public and private shipyards. At that time, there had been only six companies in the private sector that were producing major combat vessels.<sup>22</sup>

Of the 1.3 million tons worth of warships available to the Navy in 1940, half had been added to the fleet since 1934. Because warships took years to complete and shipbuilding capacity had to be expanded, the Navy needed an early start to meet wartime demand. Orders placed in 1938 determined the scope of the U.S. Navy fleet that was available immediately after the attack on Pearl Harbor.<sup>23</sup> As evidence of the importance of prewar naval modernization, every Navy capital ship—every fleet carrier and battleship—that fought in World War II was authorized before Pearl Harbor.<sup>24</sup>

### PHASE ONE: REARMAMENT

Because of the gradual involvement of the United States in World War II, there was no M-day scenario as had been envisioned by military planners during the interwar years. However, January 28, 1938 marked a significant step toward mobilization. On this day, President Roosevelt, in a message to Congress, requested additional aircraft and that the Navy's authorized building program be increased by 20 percent.<sup>25</sup>

---

***“As Commander-in-Chief of the Army and Navy of the United States it is my constitutional duty to report to the Congress that our national defense is, in the light of the increasing armaments of other nations, inadequate for purposes of national security and requires increase for that reason.”***

***–Roosevelt (Message to Congress, 1938)***

The Fleet Expansion Act passed by Congress in May 1938 boosted the shipbuilding industry. The Navy was authorized \$1.1 billion to begin increasing the U.S. fleet by 20 percent, as Roosevelt had requested. By the time war had erupted in Europe, two aircraft carriers, eight battleships, five cruisers, and three dozen destroyers were under construction.<sup>26</sup>

---

22 Mark R. Wilson, *Destructive Creation: American Business and the Winning of World War II* (Philadelphia, PA: University of Pennsylvania Press, 2016), 46.

23 Ibid., 46–48.

24 James C. Fahey, *Ships and Aircraft of the United States Fleet: Victory Edition* (Annapolis, MD: Naval Institute Press, 1945 (reprinted 1985)).

25 Franklin D. Roosevelt, “Message to Congress Recommending Increased Defense Appropriations,” American Presidency Project, January 28, 1938, <https://www.presidency.ucsb.edu/documents/message-congress-recommending-increased-defense-appropriations>.

26 Wilson, *Destructive Creation*, 46–48.

After the Munich Agreement in September 1938 and a pessimistic assessment of French combat capacity, the mood in Washington began to shift even further. Roosevelt's foreign policy had relied on the British navy, the French army, and U.S. industry to check global aggression. France's limited air force and defensive orientation coupled with Britain's attitude of appeasement toward Germany led Roosevelt to believe that the prospects for collective security were fading.<sup>27</sup>

In November 1938, Roosevelt laid out a program for the expansion of the Air Corps component of the Army, with a strong emphasis on aircraft production.<sup>28</sup> He also asserted that the United States must prepare to defend the entire Western Hemisphere.<sup>29</sup>

In 1938, the French and British governments began placing large orders for combat aircraft. These foreign orders provided a needed stimulus for the industry. They also provided aircraft companies the incentive to expand and paved the way for the later acceleration of production.<sup>30</sup> However, even though planes and engines could be produced more quickly than large warships, it still took roughly two years to move from design to quantity production. Because of this lag, only a third of the \$300 million of planes and engines ordered by France beginning in 1938 were delivered before the German offensive in the spring of 1940.

Roosevelt's State of the Union and budget request in January 1939 continued his campaign to build support for rearmament. However, rather than launch a large rearmament effort, which might not be supported politically, Roosevelt focused on specific elements of preparedness.<sup>31</sup>

---

***“There comes a time in the affairs of men when they must prepare to defend, not their homes alone, but the tenets of faith and humanity on which their churches, their governments and their very civilization are founded. The defense of religion, of democracy and of good faith among nations is all the same fight. To save one we must now make up our minds to save all.”***

***–Roosevelt (State of the Union, 1939)***

---

27 Michael G. Carew, *Becoming the Arsenal: the American Industrial Mobilization for World War II, 1938-1942* (Lanham, MD: University Press of America, 2010), 10–11.

28 For a full background on aircraft production as it relates to surge rates, see David An and Christopher Bowie, “Aircraft Surge Production Capability: Full Brief,” Northrop Grumman Analysis Center, September 29, 2017 [limited circulation].

29 Marvin A. Kreidberg and Merton G. Henry, *History of Military Mobilization in the United States Army 1775 - 1945* (Washington, DC: Department of the Army, 1955), 542.

30 Lilley, *Problems of Accelerating Aircraft Production*, 7.

31 Carew, *Becoming the Arsenal*, 12–13.

For example, concerns arose because the Army Air Corps had only 2,665 aircraft, a size thought to be much smaller than the Luftwaffe. Therefore, on April 3, 1939, Congress passed the Air Corps Extension Act, which proposed to triple the current fleet. By August, the aircraft industry received \$100 million in new orders from the U.S. military. This act initiated the production of most of the bombers that would be flown during World War II.<sup>32</sup>

## PHASE TWO: EXPANSION

The second phase of mobilization began on May 10, 1940, when the “phony war” ended and German forces advanced into Belgium, Holland, Luxembourg, and France. On May 16, 1940, Roosevelt delivered an address to Congress which, in addition to an immediate appropriation of \$896,000,000, called for the capacity to produce at least 50,000 aircraft a year.

---

***“Our task is plain. The road we must take is clearly indicated. Our defenses must be invulnerable, our security absolute. But our defense as it was yesterday, or even as it is today, does not provide security against potential developments and dangers of the future.”***

***–Roosevelt (Address to Congress, May 16, 1940)***

By July, Congress had appropriated funds for 24,000 more planes for the Air Corps and Navy. During the summer of 1940, Congress authorized over \$6.5 billion in military spending. Even before the Selective Service Act of 1940, the War Department started to order supplies to equip an army of 2 million. Despite these increased orders, production was still modest compared to the total quantity needed. Mobilization takes time.<sup>33</sup>

As the U.S. economy rebounded in the expanded mobilization effort from 1940 to 1941, domestic orders and investment competed for resources with military production. Further, the large amount of equipment purchased by foreign nations began to interfere with the procurement objectives for U.S. forces. The War Department started to oppose additional sales of munitions and equipment abroad because it diverted weapons from U.S. training programs and force buildup. For example, the limited number of planes that were available resulted in reduced pilot training quotas by 50 percent at the end of 1940. To protect U.S. force expansion, the War Department sought to keep the planes already in Air Corps possession from being released to allies.<sup>34</sup>

For the United States to become the great arsenal for democracy, it was essential that production, allocation of natural resources, transportation management, and price controls be managed effectively.

---

32 Wilson, *Destructive Creation*, 58.

33 Ibid., 53.

34 Kreidberg and Henry, *History of Military Mobilization in the United States Army*, 671–672.

Those duties fell upon the National Defense Advisory Commission, which was established in May 1940. Only a few months later, many of its duties were taken over by the Office of Production Management.<sup>35</sup>

This phase of mobilization was characterized by the establishment of the government-owned, contractor-operated (GOCO) facilities. Under this approach, the government paid for large plants that were built, leased, and managed by a contractor in the private sector. Thus, the government had the value of business expertise, but business did not take the risk of building a plant that might not have any postwar value. Because of the large scale of these industrial efforts, military procurement began to depend on “big” business rather than mid-sized contractors. This GOCO strategy had been used to a degree during World War I but became central during World War II.<sup>36</sup>

The first contract for a new GOCO plant was signed with DuPont Company in July 1940, followed by signing with the Chrysler Corporation in August. DuPont was responsible for the construction of a smokeless powder facility, and Chrysler Corporation undertook the construction of a tank arsenal.<sup>37</sup>

In addition to the GOCOs, the government invested roughly \$2 billion in preexisting government-owned and operated plants, such as the arsenals and armories of the Ordnance Department.

In December 1940, Roosevelt introduced a new policy initiative in response to Britain’s dwindling gold reserves. Rather than selling, the United States would “lend” military supplies to the British to ensure the security of the United States. Following two months of debate, the Lend-Lease Act was signed in March 1941. The act provided a mechanism through which munitions and other supplies could be furnished to foreign governments in order to promote the defense of the United States. Over the course of the war, approximately 792,000 trucks, 43,000 aircraft, and 37,000 tanks, along with an abundance of other items such as ammunition and prefabricated barracks, were shipped to foreign governments.<sup>38</sup>

### PHASE THREE: FULL-SCALE MOBILIZATION

Following the attack on Pearl Harbor, the United States needed enough industrial capacity to fight a war in two theaters. On January 6, 1942, Roosevelt addressed Congress and asked for 60,000 planes and 45,000 tanks to be produced, with approximately \$50 billion for war-related spending for the year. The GOCO arrangement was no longer sufficient. Conversion of manufacturing facilities from civilian to military production was now required to meet these production targets. Hundreds of firms and plants that had not participated in the first two stages of mobilization were folded into the war economy.<sup>39</sup>

Naval Vessels: Starting with the Vinson-Trammell Naval Act of 1934 and the Merchant Marine Act of 1936, the U.S. shipbuilding industry began groundwork for the battlefleet and merchant fleet that

---

35 Wilson, *Destructive Creation*, 53.

36 Ibid., 55–56.

37 Harry C. Thomson and Lida Mayo, *United States Army in World War II, The Technical Services, The Ordnance Department: Procurement and Supply* (Washington, DC: Center of Military History, 1960), 32.

38 Office of the Chief of Military History, *The United States Army in World War II, Statistics, Lend Lease* (Washington, DC: Department of the Army, 1952), 8–9, <http://cgsc.contentdm.oclc.org/cdm/ref/collection/p4013coll8/id/2421>.

39 Wilson, *Destructive Creation*, 67.

served during World War II. When the United States entered World War II, the U.S. fleet totaled 337 warships. The rearmament effort during the interwar years had produced over 40 percent of this fleet. Even though U.S. naval preparations were well under way prior to the attack on Pearl Harbor, significant increases in capacity and production coupled with major changes in naval doctrine were necessary to meet the demands of a global war.<sup>40</sup>

Table 2: Select U.S. Weapons Production in World War II

	1941	1943	Wartime Total
Artillery Pieces	10,918	98,387	173,675
Combat Aircraft	8,531	52,443	197,760
Merchant Tonnage (million tons)	794	7,191	20,903
Munitions—Artillery (million rounds)	2,748	111,180	266,000
Naval Ship Launched	53	414	1,202
Radar Sets	800	11,500	53,967
Tanks	4,052	29,497	88,410
Servicemembers	1,801,998	9,045,102	12,123,373

Source: Michael G. Carew, *Becoming the Arsenal: The American Industrial Mobilization for World War II, 1938-1942* (Lanham, MD: University Press of America, 2010), 264.

Prior to U.S. entry into World War II, large U.S. shipbuilding programs and British orders for new construction and repairs already had shipyards filled beyond their capacity. The creation of a “Two-Ocean Navy” outlined in the Vinson-Walsh Act signed on July 19, 1940 authorized vast new construction.<sup>41</sup>

At this time, more than 500,000 tons of naval vessels were already scheduled for construction in U.S. shipyards. Because of the high demand and insufficient capacity, more than half of all ships authorized under the program were not laid down for two years, and some were never started. While the Vinson-Walsh Act, and the acts that preceded it, laid the foundation for industrial mobilization and naval expansion, it took several years before the necessary volume of production for war was achieved. Meanwhile, the fleet often fought outnumbered and struggled to hold the line in the Pacific and protect convoys in the Atlantic.<sup>42</sup>

Navy shipbuilding faced a particular challenge: after the attack on Pearl Harbor, naval doctrine changed and, with it, so did the ships to be built. Before the war, as before World War I, the emphasis had been placed on capital ships as the main source of naval power. However, after the attack on Pearl Harbor,

40 Jamie McGrath, “Peacetime Naval Rearmament, 1933–39: Lessons for Today,” *Naval War College Review* 72, no. 2 (2019): 83–103, <https://digital-commons.usnwc.edu/nwc-review/vol72/iss2/7/>.

41 John A., Jr. Hutcheson, *Encyclopedia of World War II: A Political, Social, and Military History* (Santa Barbara, CA: ABC-CLIO, 2005), 1541.

42 Carew, *Becoming the Arsenal*, 41–42.

the Navy recognized the need for escorts to deal with the U-boat menace in the Atlantic and masses of auxiliaries to support a global conflict.<sup>43</sup>

To meet these demands, the U.S. shipbuilding industry greatly increased capacity and quickened the shipbuilding process. Through a massive expansion of shipyard capacity, government funding for new facilities, and standardization of ship design, U.S. shipyards were able to produce 1,500 naval vessels.<sup>44</sup> By 1945, the U.S. Navy eclipsed all other naval powers of the world combined.<sup>45</sup>

The United States also needed a vast merchant fleet both to support a global conflict and to replace merchant ships faster than they were being sunk. Over the course of the war, 733 merchant ships of over 1,000 tons were lost. It was not until 1943 that U.S. cargo ship production finally outpaced losses.

New shipyards arose to build the ships. Standardization of design—the Liberty Ship, followed by the improved Victory ship—also helped mass production. By the fall of 1943, the United States was producing 160 merchant ships per month, with a total of 208 merchant ships in the month of December. In July 1942, it took 105 days to construct a Liberty ship. By 1943, it took just over 50 days. By the end of the war, it only took 40 days from laying the keel to delivery.<sup>46</sup>

When the war began, the United States had approximately 1,340 cargo ships and tankers. By the end of the war, the merchant fleet reached 4,221.<sup>47</sup>

**Aircraft:** From 1939 to 1944, output by the aircraft industry expanded 70-fold in monetary terms—from approximately \$225 million in 1939 to more than \$16 billion. This scale of output is even more impressive when considering that production was delayed in the early stages due to lack of fully developed and tactically suitable models readily available for manufacture. For example, only 4 out of the 19 major airplane models used during World War II had been constructed by mid-1940. This left production during 1940 and 1941 limited to low-altitude fighters and light bombers.

Over the course of the war, the United States produced 303,713 military aircraft, compared to German output of 111,787 and Japanese output of 76,320.<sup>48</sup> Air Force procurement deliveries totaled more than \$43 billion, or 37 percent of all War Department procurement, in the period from July 1940 through August 1945.<sup>49</sup>

---

43 Thomas Heinrich, "Fighting Ships That Require Knowledge and Experience: Industrial Mobilization in American Naval Shipbuilding, 1940-1945," *Business History Review* 88, no. 2 (2014): 273-301, doi:10.1017/S0007680514000038.

44 Maury Klein, *A Call to Arms: Mobilizing America for World War II* (New York: Bloomsbury Press, 2013), 516.

45 Carew, *Becoming the Arsenal*, 171.

46 "Naval Armed Guard Service in World War II," Naval Heritage and History Command, April 16, 2020, <https://www.history.navy.mil/research/library/online-reading-room/title-list-alphabetically/n/naval-armed-guard-service-in-world-war-ii.html>; Alan L. Gropman, *Mobilizing U.S. Industry in World War II: Myth and Reality* (Washington, DC: Institute for National Strategic Studies, National Defense University, 1996), 123.

47 "Naval Armed Guard Service in World War II," Naval Heritage and History Command.

48 Klein, *A Call to Arms*, 515.

49 Richard H. Crawford and Lindsley F. Cook, *The US Army in World War II: Statistics-Procurement* (Washington,

**Tanks:** With tanks, the Army was not plagued by an inventory of obsolete weapons as it was in other areas. However, the challenge was a lack of suitable designs. Early designs were too light for modern tank warfare, and it took several years to standardize production on the Sherman medium tank. In 1940, the U.S. Army had no first-rate medium or heavy tanks on hand. The production of heavy tanks in volume was not achieved until 1945, so they reached the front only at the end of the war.<sup>50</sup>

Changes in design were a major challenge. As with aircraft, tank design evolved rapidly during the war. It often took several months to transition to a new design due to the need for retooling. During this time, production suffered. Nevertheless, production increased from 331 in 1940 to 29,497 in 1944. From 1940 through 1945, U.S. industry delivered more than 88,000 tanks.<sup>51</sup>

**Artillery:** The lack of funds during the interwar period had slowed development and all but halted procurement of new artillery. Thus, in 1940, most field artillery consisted of antiquated pieces from World War I, with about 40 percent of the weapons being of vintage French manufacture. The light antitank weapons on hand were ineffective against the heavier tanks that were being fielded in Europe. The only relatively up-to-date weapons were the 105-mm Howitzer, the 155-mm “Long Tom” guns, and the 75-mm pack Howitzers.

Although stockpiles were small and obsolete, as had been the case during World War I, ordnance arsenals had recently been equipped with new tools and a skilled workforce, which prepared them for mobilization. Further, the Army had placed “education orders” to prepare companies new to the industry.

Nevertheless, the existence of a large legacy inventory slowed action. Only after the attack on Pearl Harbor, when President Roosevelt set a new and even more challenging objective for the production of artillery—200,000 pieces of artillery in 1942—did major production begin. Heavy investment in plant capacity during 1941 and 1942 made this possible. By August 1945, U.S. plants had produced 257,390 pieces of all types.<sup>52</sup>

**Machine Guns and Rifles (Small Arms):** Small-arms production before 1940 was low because the large inventory of World War I weapons had been adequate for U.S. forces.<sup>53</sup> The Army had developed enhanced models (such as the BAR) and access to new designs (such as the M1 Garand rifle), but the lack of funds and immediate need prevented quantity production. During the rearmament period, the Army placed “education orders” as it had in other areas. Foreign orders also helped, although the lack of facilities, machine tools, and workforce slowed response.

In the summer of 1940, as industrial mobilization entered its second phase, Roosevelt transferred to British forces all weapons and ammunition considered surplus. This transfer significantly reduced America’s small arms stockpile while instilling a sense of urgency for increased production.

---

DC: 1952), 10, [http://www.alternatewars.com/BBOW/Stats/USA\\_in\\_WW2\\_Stats-Procure\\_9-APR-52.PDF](http://www.alternatewars.com/BBOW/Stats/USA_in_WW2_Stats-Procure_9-APR-52.PDF).

50 Crawford and Cook, *The US Army in World War II: Statistics-Procurement*, 9.

51 Thomson and Mayo, *The Ordnance Department: Procurement and Supply*, 242–264.

52 *Ibid.*, 68–103; and Klein, *A Call to Arms*, 516.

53 “Small arms” are generally defined as weapons with bore diameter of .60-inch (.60-caliber) or less, whether pistols, revolvers, rifles, carbines, submachine guns, or machine guns.



Ultimately, investment in government depots, expansion of the civilian arms industry, and development of new entrants produced a massive increase in production. To give a sense of the scale of expansion, machine gun production increased by a factor of nearly 100, from 8,819 in 1942 to 799,000 in 1944.<sup>54</sup>

## From the Cold War to Great Power Competition

Although the Cold War period saw the United States fight multiple limited conflicts, these never required industry to mobilize in the same manner as it had for the two world wars. However, U.S. industrial capacity always maintained a high level of readiness for mobilization in the event of a conflict with the Soviet Union. When the Cold War ended, the need for industrial mobilization faded, and the defense industrial base contracted. With the return of great power competition with Russia and China, interest in long-duration conflicts has revived. However, the literature on the industrial base has not adapted. It still focuses primarily on peacetime efficiency and sustainability.

### THE WAR IN KOREA: COLD WAR INDUSTRIAL PREPARATION BEGINS

In contrast to the World War II, U.S. mobilization for the Korean War relied initially on existing stocks of weapons and munitions—the surplus left over from the war in the Pacific theater.<sup>55</sup> These seemed adequate for a limited “police action.” When Communist China intervened, however, the U.S.-led coalition faced a sustained conflict that required more industrial and financial resources than expected.

The National Security Act of 1947 had created new organizations such as the National Security Resources Board, the National Security Council, and the Department of Defense itself, but these proved inadequate for meeting the industrial demands of the Korean War.<sup>56</sup>

To manage mobilization activity, Congress authorized the Office of Defense Mobilization in 1950. Truman stood the office up “to direct, control and coordinate all mobilization activities of the Executive Branch of the Government including but not limited to production, procurement, manpower stabilization and transport activities.”<sup>57</sup>

The Korean War’s major effect on industrial preparedness was enactment of the Defense Production Act (DPA) in September 1950. This act gave the president broad powers to manage the domestic economy in support of national security objectives.

While the DPA authorities were substantial, presidential authority did have limits. President Truman sought to seize control of steel factories in order to keep them operating during a strike by

---

54 Thomson and Mayo, *The Ordnance Department: Procurement and Supply*, 154–185.

55 Robert Coakley, *Highlights of Mobilization, Korean War* (Washington, DC: Office of the Chief of Military History: Department of the Army, March 10, 1959).

56 Conrad Crane et al., “Introduction,” in *“Come As You Are” War: U.S. Readiness for the Korean Conflict* (Carlisle, PA: U.S. Army Heritage and Education Center, 2019), i–iv, [https://ahec.armywarcollege.edu/documents/U.S.\\_Readiness.pdf](https://ahec.armywarcollege.edu/documents/U.S._Readiness.pdf).

57 Rodolfo A. Correa, “The Organization for Defense Mobilization,” *Federal Bar Journal* 13, no. 1 (September 1952): 2–3, quoted in Roderick L. Vawter, *Industrial Mobilization: The Relevant History* (Washington, DC: National Defense University Press, 1983), 16, <https://apps.dtic.mil/dtic/tr/fulltext/u2/a135528.pdf>.

steelworkers.<sup>58</sup> However, the Supreme Court struck down the action, finding in *Youngtown Sheet & Tube Co. v. Sawyer* that the president did not have the legal authority to claim private property, even in the interest of national security.<sup>59</sup>

Driven by these concerns about the DPA's intrusions into the private sector, Congress allowed four of the original seven titles to lapse. These titles were related to "requisitioning, rationing, wage and price fixing, labor disputes, and credit controls and regulation."<sup>60</sup> Nevertheless, the DPA continues to be a powerful tool available to the president for industrial mobilization. It has been continually reauthorized, with its most recent authorization coming in 2018.

Indeed, while some of its authorities were eliminated, the DPA's scope has been expanded since its creation in 1950 to include preparedness for domestic emergencies, such as natural disasters, terrorist attacks, and pandemics.<sup>61</sup>

The DPA currently contains three main authorities:<sup>62</sup>

- **Title I: Priorities and Allocations** allows the president to require persons and corporations to accept and prioritize contracts for materials and services to promote the national defense.
- **Title III: Expansion of Productive Capacity and Supply** allows the president to incentivize the domestic industrial base to expand the production and supply of critical materials and goods. Authorized incentives include loans, loan guarantees, direct purchases and purchase commitments, and the authority to procure and install equipment in private industrial facilities. Title III allows sustainment of critical production, commercialization of R&D investments, and the scaling of emerging technologies.
- **Title VII: General Provisions** includes a variety of authorities: to establish voluntary agreements with private industry; to block proposed or pending foreign corporate mergers, acquisitions, or takeovers that threaten national security; to employ persons of outstanding experience and ability; and to establish a volunteer pool of industry executives who could be called to government service in the interest of the national defense.

After the Korean conflict, these authorities became part of a broader effort to sustain a long-term competition against the Soviet Union.<sup>63</sup> The vision of long-term, strategic competition was laid out in *NSC 68: United States Objectives and Programs for National Security* (NSC 68), a classified national security

---

58 "Executive Order 10340," Harry Truman Library and Museum, <https://www.trumanlibrary.gov/library/executive-orders/10340/executive-order-10340>.

59 *Youngtown Sheet & Tube Co. v. Sawyer*, 343 U. S. 579 (1952), <https://law.justia.com/cases/federal/district-courts/FSupp/103/569/1469038/>.

60 Jared T. Brown and Moshe Schwartz, *The Defense Production Act of 1950: History, Authorities, and Considerations for Congress*, CRS Report No. R43767 (Washington, DC: Congressional Research Service, November 20, 2018), <https://fas.org/sgp/crs/natsec/R43767.pdf>.

61 "DPA Title III Overview," Industrial Policy, Department of Defense (DOD), <https://www.businessdefense.gov/DPA-Title-III/Overview/>.

62 50 USC 4501 and 4502.

63 Roderick L. Vawter, *Industrial Mobilization: the Relevant History* (Washington, DC: National Defense University Press, 1983), 17.

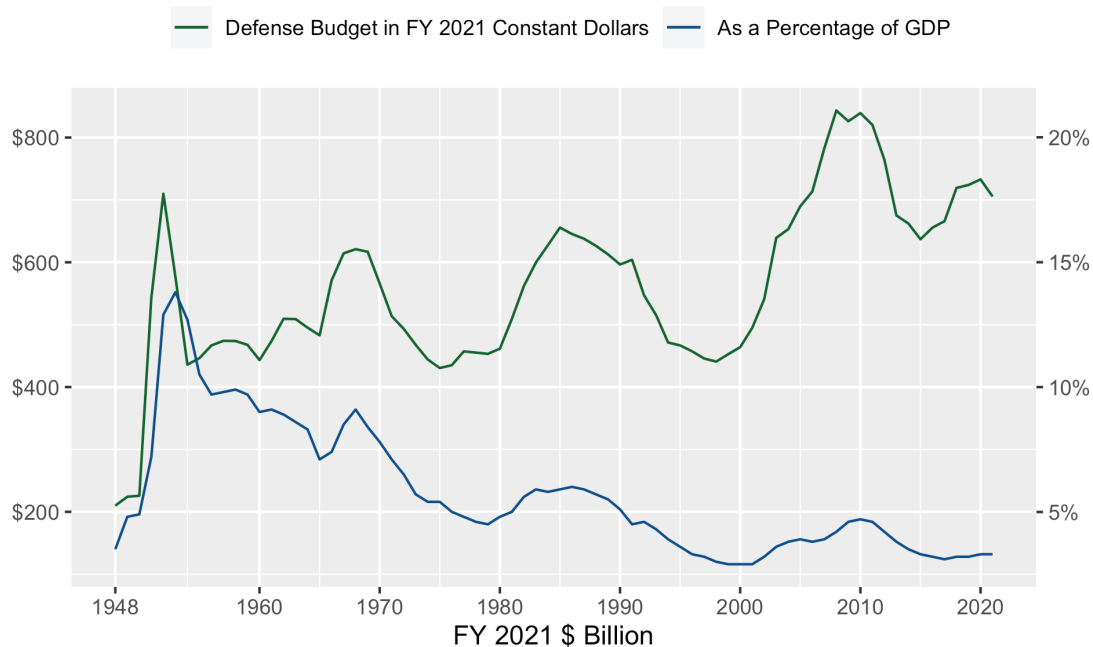
document whose primary objective was to recognize the threat the Soviet Union posed and design a U.S. response through containment. NSC 68 argued that the greatest threat to the prosperity of the United States in the post-World War II order was the conventional, nuclear, and ideological ambitions of the Soviet Union.<sup>64</sup> Recognizing the risk of war with the Soviet Union, the document recommended that the United States establish military readiness to contain the Soviet threat. Alongside George Kennan’s “long telegram,” NSC 68 was the intellectual foundation of the sustained government effort by which the United States eventually prevailed in the Cold War.

While the American economy was not engaged in total war production as in World War II, these authorities created a corpus of mobilization readiness authorities that would allow rapid expansion in the event of a national security crisis. Thus, the Korean War, while not requiring the level of mobilization of the early-1940s, induced the United States to develop an industrial mobilization strategy, first for the immediate needs of the war and then for a long-term competition with the Soviet Union.

### INDUSTRIAL MOBILIZATION AFTER THE KOREAN WAR

Following the Korean War, defense budgets remained high and sustained much larger military forces at a far higher level of readiness and modernization than had been the case before the Korean War. Thus, the United States was able to fight the various regional wars of the Cold War period—in Vietnam, Panama, Kuwait (Desert Shield/Desert Storm), Bosnia/Kosovo, Afghanistan, and Iraq—without having to mobilize the defense industry. Peacetime budgeting and authorities were generally adequate, with limited and targeted interventions allowed by the DPA.

Figure 3: U.S. Historical Defense Spending



Source: U.S. Department of Defense, *National Budget Defense Estimate for 2021* (Washington, DC: April 2020), [https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2021/FY21\\_Green\\_Book.pdf](https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2021/FY21_Green_Book.pdf).

64 NSC 68: *United States Objectives and Programs for National Security* (Washington, DC: National Security Council, April 7, 1950), <https://fas.org/irp/offdocs/nsc-hst/nsc-68.htm>.

The Reagan administration took a more confrontational approach to the Soviet Union, boosting defense spending, especially for procurement, which doubled between 1980 and 1985. This expanded peacetime industrial capabilities and provided a stronger foundation for potential wartime expansion.

In theory, the Reagan national security strategy required preparation for a global war that would require sustained mobilization, but the administration took few actions to implement such a policy.<sup>65</sup> For example, there was no creation of standby industrial capacity. The administration's most visible policies, such as nuclear modernization, the Strategic Defense Initiative, and naval force expansion, had priority over an industrial mobilization.<sup>66</sup>

There was some modest intellectual focus on surge capacity and industrial mobilization. For example, the United States Military Academy at West Point held a conference on industrial planning with senior civilian, military, and industry leaders, concluding that in order to have the capacity to sustain production in conflict, the peacetime industrial base must overproduce and sustain the cost of this inefficiency.<sup>67</sup> That tension between procurement efficiency and surge capacity undermined peacetime industrial mobilization activities throughout the entire post-World War II era.

## CONSOLIDATION OF THE DEFENSE INDUSTRY AFTER THE COLD WAR

The end of the Cold War brought deep cuts in the U.S. defense budget as the nation sought a “peace dividend” to invest in domestic needs. Between 1989 and 1998, the defense budget decreased by 40 percent in constant dollars, and military personnel declined by a third. Procurement spending fell 60 percent from its 1985 peak.<sup>68</sup> Thus, this period became a “procurement holiday” during which the services relied on systems inherited from the Reagan and Bush administrations rather than buying new systems.<sup>69</sup> In 1995, for example, the Air Force bought no new fighter aircraft, down from a peak of 250 per year during the height of the Reagan buildup.<sup>70</sup> Although many members of Congress feared the loss of jobs in their district, the academic and policy community saw this overcapacity as a problem, cutting into the efficiency of the defense industrial base and outstripping the strategic needs of the U.S. military.<sup>71</sup> The industrial base needed to eliminate overcapacity if it was going to survive in this post-Cold War world.

---

65 Office of the President, “National Security Decision Directive Number 32,” White House, May 20, 1982, <https://fas.org/irp/offdocs/nsdd/nsdd-32.pdf>.

66 Barry R. Posen and Stephen Van Evera, “Defense Policy and the Reagan Administration: Departure from Containment,” *International Security* 8, no. 1 (1983): 35, doi:10.2307/2538484.

67 United States Military Academy, *Senior Conference on Industrial Capacity and Defense Planning: Final Report, 4-6 June 1981* (West Point, NY: U.S. Military Academy, 1981), [https://books.google.com/books?id=2VffAAAAMAAJ&printsec=frontcover&source=gbs\\_ge\\_summary\\_r&cad=0#v=onepage&q&f=false](https://books.google.com/books?id=2VffAAAAMAAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false).

68 Office of the Undersecretary of Defense (Comptroller), *National Defense Budget Estimates for FY 2021* (Washington, DC: DOD, April 2020), table 6-1, [https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2021/FY21\\_Green\\_Book.pdf](https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2021/FY21_Green_Book.pdf).

69 Ibid.

70 Congressional Budget Office, *A Look at Tomorrow's Tactical Forces* (Washington, DC: January 1997), <https://www.cbo.gov/sites/default/files/105th-congress-1997-1998/reports/97doc29.pdf>.

71 Eugene Gholz and Harvey M. Sapolsky, “Restructuring the U.S. Defense Industry,” *International Security* 24, no. 3 (July 31, 2000): 5–51, [http://muse.jhu.edu/journals/international\\_security/v024/24.3.gholz.html](http://muse.jhu.edu/journals/international_security/v024/24.3.gholz.html).

With defense cuts in full force, Deputy Defense Secretary William Perry sat down with heads of the leading defense firms for what is now colloquially known as the “last supper.” Perry informed them that the defense budget would continue to shrink, hurting the bottom line of these firms.<sup>72</sup> Perry told the assembled CEOs that DOD would not step in to protect firms and that it was the market’s duty to determine the outcome of the industry downsizing. Perry went so far as to say: “We expect defense companies to go out of business. We will stand by and watch it happen.”

The Clinton administration eased enforcement of antitrust rules to allow mergers that would consolidate defense industry into a lean, efficient set of firms that could survive in the post-Cold War environment.<sup>73</sup> The U.S. defense industry responded with a wave of mergers. The Lockheed and Martin Marietta merger alone was valued at \$10 billion dollars. The resulting firm, Lockheed Martin, became the largest defense corporation in the United States. Boeing bought McDonnell Douglas for \$13.3 billion, making Lockheed Martin and Boeing prime competitors for shrinking defense dollars. Others, such as Raytheon and Northrop Grumman, followed suit, each buying several smaller defense companies. From 1992 to 1997, a total of \$55 billion in mergers took place in the defense sector.<sup>74</sup>

By merging assets, the companies were able to cut excess production lines, lay off unneeded workers, lower overhead, and avoid large increases in per-unit costs.<sup>75</sup> This allowed them to operate efficiently in an era of low procurement funding and few contracts. However, the consolidated defense industrial base lost the capacity to surge production in times of crisis. Even amid the “merger mania” of the industry, some DOD officials were concerned the merger spree would go too far. Nevertheless, the defense industry moved decisively in the direction of peacetime efficiency.<sup>76</sup>

---

72 John Mintz, “How a dinner led to a feeding frenzy,” *Washington Post*, July 4, 1997, <https://www.washingtonpost.com/archive/business/1997/07/04/how-a-dinner-led-to-a-feeding-frenzy/13961ba2-5908-4992-8335-c3c087cdebc6/>.

73 James Sterngold, “Boeing’s deal quickens pace for arms industry takeovers,” *New York Times*, December 17, 1996, <https://www.nytimes.com/1996/12/17/business/boeing-s-deal-quickens-pace-for-arms-industry-takeovers.html>; Malcolm D. Knight, Delano Villanueva, and Norman Loayza, “The Peace Dividend: Military Spending Cuts and Economic Growth,” *Policy Research Working Paper Series* 1577, February 1996, <https://www.jstor.org/stable/3867351>.

74 Jack Lynch, “Lockheed and Martin Marietta set to merge in \$10 billion deal,” *New York Times*, August 30, 1994, <https://www.nytimes.com/1994/08/30/business/lockheed-and-martin-marietta-set-to-merge-in-10-billion-deal.html>; Jeff Cole, “Joining forces: Merger of Lockheed and Martin Marietta pushes industry trend --- combination would create A giant aerospace firm with \$23 billion in sales --- further consolidation seen,” *Wall Street Journal*, August 30, 1994, <https://www.wsj.com/articles/SB980786648156606188>; Greg Schneider, “Boeing Buys McDonnell Douglas \$13.3 Billion Deal Will Create World’s Largest Aerospace Company; Antitrust Approval Needed; Lockheed Martin Left as Firm’s Lone Rival in Defense Industry,” *Baltimore Sun*, December 16, 1996, <https://www.baltimoresun.com/news/bs-xpm-1996-12-16-1996351017-story.html>; and Leslie Wayne, “The shrinking military complex: After the cold war, the pentagon is just another customer military contractors now answer market forces,” *New York Times*, February 27, 1998, <https://www.nytimes.com/1998/02/27/business/shrinking-military-complex-after-cold-war-pentagon-just-another-customer.html>.

75 Richard W. Stevenson, “Peace starts to take toll,” *New York Times*, July 23, 1990, <https://www.nytimes.com/1990/07/23/business/peace-starts-to-take-toll.html>.

76 Leslie Wayne, “The shrinking military complex: After the cold war, the pentagon is just another customer military contractors now answer market forces,” *New York Times*, February 27, 1998, <https://www.nytimes.com/1998/02/27/business/shrinking-military-complex-after-cold-war-pentagon-just-another-customer.html>.

## MINI-SURGES FOR WARS IN IRAQ AND AFGHANISTAN

The shock of 9/11, the invasion of Afghanistan, and the later invasion of Iraq ended the post-Cold War environment of the 1990s. The need to fight two long insurgencies not only increased defense budgets but also required a mini-surge from the defense industry.

Production on existing production lines increased to replace equipment losses, modernize forces, and equip new units. Production of H-60 helicopters, for example, increased from 19 in FY 2000 to 78 in FY 2008. Production of medium trucks (Family of Medium Tactical Trucks, or FMTVs) increased from 2,115 in FY 2000 to a peak of 11,460 in FY 2007.

The defense industrial base also had to produce systems specifically for counterinsurgency. One ambitious DOD undertaking was the 2006 establishment of the Joint IED Defeat Organization (JIEDDO), created for the sole purpose of defeating IEDs, which were causing up to 60 percent of all U.S. casualties in Iraq.<sup>77</sup> JIEDDO enabled DOD to quickly turn to industry to come up with systems and equipment that could meet the changing tactics of insurgent groups. Pivotal to the rapid acquisition process was the establishment of the Joint IED Defeat Capability Approval and Acquisition Management Process (JCAAMP) to identify requirements and acquire

both materiel and non-materiel solutions rapidly.<sup>78</sup> By using the JCAAMP process, JIEDDO was able to articulate capability gaps to industry via Broad Area Announcements (BAAs) and then rapidly fund, test, and deploy new systems to theatre in a matter of months rather than years.<sup>79</sup>

Trucks were a prominent example of industrial surge during this period, combining existing production lines and traditional acquisition with new designs and rapid acquisition processes.

The initial troop transport in Iraq and Afghanistan was the High Mobility Multi-Purpose Wheeled Vehicles (commonly referred to as HMMWVs). HMMWVs lacked protective armor because that had not been needed in the past. However, these unarmored vehicles were vulnerable to IED attacks, which became increasingly common.

In response to the rising IED threat, the military added improvised armor to the existing HMMWVs. While this “Mad Max” style of armor upgrades helped survivability, it was not a sustainable solution. The additional armor made it difficult for troops to exit in the event of an IED attack and stressed the vehicle’s suspension.<sup>80</sup> As casualties continued from IED blasts, pressure built to find a better solution.<sup>81</sup>

---

77 Schmidt Lamb and Breit Fitzsimmons, *MRAPs, Irregular Warfare, and Pentagon Reform* (Washington, DC: National Defense University Press, June 2009), 16–17, <https://apps.dtic.mil/dtic/tr/fulltext/u2/a502129.pdf>.

78 Joint Improvised Explosive Device Defeat Capability Approval and Acquisition Management Process (JCAAMP), DOD JIEDDO Instruction 5000.01 (November 9, 2007).

79 Subcommittee on Oversight & Investigations, *The Joint Improvised Explosive Device Defeat Organization: DOD’s Fight Against IEDs Today and Tomorrow* (Washington, DC: U.S. House of Representatives, Committee on Armed Services, 2008), 16, <https://www.hsdl.org/?abstract&did=231992>.

80 Norman Friedman and Scott C. Truver, *This Truck Saved My Life!: Lessons Learned from the MRAP Vehicle Program* (Washington, DC: Joint Program Office, Mine Resistant Ambush-Protected Vehicles, 2013), 25, 315.

81 Christopher J. Lamb, Matthew J. Schmidt, and Berit G. Fitzsimmons, *MRAPs, Irregular Warfare, and Pentagon Reform* (Washington, DC: National Defense University Press, 2009), 7.

Next, DOD vastly expanded production of the M1114 Up-Armored HMMWVs (UAHs), a version with integral armor and a stronger suspension to support the weight. These had been built in small numbers for the military police after experience with rioting crowds in Bosnia. During the first year of Operation Iraqi Freedom in 2003, the Army increased its orders of M1114s from 235 to 2,957 units.<sup>82</sup> By 2006, the main production center of the M114s—the Armor Holdings plant in West Chester Township, Ohio—was able to produce 650 M114s a month.<sup>83</sup>

Although the UAHs were an improvement, they were still heavy, vulnerable to IEDs, and susceptible to rollover.<sup>84</sup> Secretary of Defense Robert Gates turned to Mine-Resistant Ambush Protected (MRAP) vehicles, with a V shaped hull designed to deflect IED blasts and specifically designed for this environment. While DOD had a few MRAPs already in service, these were limited to mine clearing operations. Gates became personally involved, establishing an MRAP task force to move the MRAP acquisition to center stage.<sup>85</sup> To produce MRAPs as quickly as possible, DOD called on the entirety of the industrial base. A total of 12 firms began production of MRAPs, of which five produced the bulk of vehicles. This broad participation led to many variants being fielded, including the Navistar Defense Maxx Pro, General Dynamics RG 31, Force Protection Cougar, and Force Protection Buffalo.

A 2008 report by the Government Accountability Office described the MRAP acquisition as follows:

DOD used a tailored acquisition approach to rapidly acquire and field MRAP vehicles. The program established minimal operational requirements and relied heavily on commercially available products. The program also undertook a concurrent approach to producing, testing, and fielding the vehicles. To expand limited existing production capacity, the department awarded indefinite delivery, indefinite quantity (IDIQ) contracts to nine commercial sources for the purchase of up to 4,100 vehicles per year from each vendor. To evaluate design, performance, producibility, and sustainability, DOD committed to buy at least 4 vehicles from all vendors. According to program officials, subsequent delivery orders were based on a phased testing approach with progressively more advanced vehicle test results and other assessments. To expedite the fielding of the vehicles, mission equipment packages including radios and other equipment were integrated into the vehicles after they were purchased. Finally, DOD designated the MRAP program as DOD's highest priority acquisition, which helped contractors and other industry partners to more rapidly respond to the urgent need and meet production requirements.<sup>86</sup>

---

82 Fara Warner, "Army Stepping Up Its Humvee Orders For Troops in Iraq," *New York Times*, December 25, 2003, <https://www.nytimes.com/2003/12/25/business/army-stepping-up-its-humvee-orders-for-troops-in-iraq.html>.

83 "'Up-Armored' Humvees More Likely to Roll," *Baltimore Sun*, June 11, 2006, <https://www.baltimoresun.com/news/bs-xpm-2006-06-11-0606110022-story.html>.

84 Ibid.

85 Anthony Cordesman, *Success or Failure? Iraq's Insurgency and Civil Violence and US Strategy: Developments through June 2007* (Washington, DC: CSIS, 2007), [https://csis-website-prod.s3.amazonaws.com/s3fs-public/legacy\\_files/files/media/csis/pubs/070709\\_iraqinsurgupdate.pdf](https://csis-website-prod.s3.amazonaws.com/s3fs-public/legacy_files/files/media/csis/pubs/070709_iraqinsurgupdate.pdf).

86 Government Accountability Office (GAO), *Rapid Acquisition of Mine Resistant Ambush Protected Vehicles* (Washington, DC: 2008), <https://www.gao.gov/products/GAO-08-884R>.

The surge production of the MRAPs demonstrated that the industrial base could quickly respond to a theater-specific threat and that DOD could bypass normal acquisition procedures if the operational environment required it.<sup>87</sup> Several insights emerged from this experience:

- 1. Involve the senior leadership.** Without Secretary Gates' personal involvement, the program would not have moved forward quickly or at all.
- 2. Allow multiple producers.** Realizing that no single vendor had enough capacity to meet the demand, DOD engaged a total of 12 manufacturers, some of which used foreign designs. This approach accepted the logistics and maintenance complications arising from sustaining multiple types of vehicles.
- 3. Minimize requirements.** The need for rapid fielding allowed only a few, minimal operational requirements. In effect, it relied on existing vehicles.<sup>88</sup>
- 4. Ease regulations to allow faster deployment of the platform.** Instead of standard and lengthy testing procedures, the Pentagon took a concurrent approach to testing.<sup>89</sup> Doing so enabled a faster fielding of the vehicles, following up with more advanced ballistic tests after adoption of the MRAPs.<sup>90</sup>
- 5. Standardize variations once widespread fielding has occurred.** The rapid fielding of systems from many different companies meant that there were many variants and subvariants, with estimates ranging from 50 to 300. While the massive amount of variation in the MRAP was driven by operational needs at the time, the platform needed standardization in the long term for interoperability and logistics sustainability. This occurred after fielding during periodic maintenance.<sup>91</sup>

---

87 Jen Judson, "30 Years: MRAP - Rapid Acquisition Success," Defense News, August 8, 2017, <https://www.defensenews.com/30th-anniversary/2016/10/25/30-years-mrap-rapid-acquisition-success/>.

88 GAO, *Rapid Acquisition of Mine Resistant Ambush Protected Vehicles*.

89 GAO, *Defense Acquisitions: Rapid Acquisition of MRAP Vehicles* (Washington, DC: Government Accountability Office, 2009), <https://www.gao.gov/products/GAO-10-155T>.

90 GAO, *Rapid Acquisition of Mine Resistant Ambush Protected Vehicles*.

91 Friedman and Truver, *This Truck Saved My Life*, 5.