The Manhattan Project

The story behind the creation of the ‘destroyer of worlds’

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Chain reaction: 1. In physics, a self-sustaining reaction in which the splitting of an atomic nucleus creates particles that in turn split more nuclei, creating yet more particles and unleashing nuclear energy.

2. A series of events in which each event is the result of the one preceding and the cause of the one following.

Photo taken nine seconds after the "Trinity" test explosion at Los Alamos, New Mexico, on July 16, 1945. A mushroom cloud billowed 7 miles high.
A letter from Albert Einstein would demand attention. Delivered to the White House on October 11, 1939, its two typewritten pages were read aloud to President Franklin Roosevelt. Einstein’s letter began with a summary of recent developments in nuclear physics: experiments on uranium to produce a chain reaction. In the third paragraph, however, Einstein offered his urgent concern: “This new phenomenon would also lead to the construction of bombs, and it is conceivable … that extremely powerful bombs of a new type might thus be constructed.” Einstein recommended that the American government accumulate a large supply of uranium and fund further research in nuclear physics. That, he warned, was precisely what Germany was now doing.

The letter, with its arcane science and its frightening implications, required some consideration by President Roosevelt. America was still recovering from the Depression. Beyond the daunting expense of the research, the prevailing political sentiment was for isolationism. But with Germany’s invasion of Poland a month earlier, the war had already begun in Europe. After some deliberation, Roosevelt reportedly concluded: “What you are after is to see that the Nazis don’t blow us up!”

The race had begun. Roosevelt immediately authorized the Advisory Committee on Uranium, comprising government officials and scientists, to organize a program to develop an atomic bomb. The committee’s first meeting was on Oct. 21, just 10 days after Roosevelt received Einstein’s letter. There was some question as to the feasibility of such a bomb, but not among the scientists, and the bureaucrats did agree that further research was warranted. The government would finance the purchase of 50 tons of uranium.

Uranium had been known to the Romans, who ground the stone for a yellow dye. But it was not until 1896 that its connection to radioactivity became clear, when a scientist incidentally placed uranium salts near a photographic plate — and discovered that the salts emitted radiation without any help from sunlight.

Uranium’s volatility was not known until the 1930s, when physicists began experiments in splitting atoms. Some forms of uranium — isotopes — were like bombs, prone to detonating and emitting bursts of energy. Indeed, it was possible for one detonating atom to set off another: a chain reaction. Until the late 1930s, however, creating a chain reaction was still an unpredictable process. To develop a bomb would require novel procedures on a larger scale than ever before undertaken.

The horror of Hitler having the bomb lent urgency, and events were hastening the need for a deterrent. In 1940, Germany attacked Scandinavia, the Netherlands, Belgium and France. All fell. Only Britain withstood the Nazi onslaught. In 1941, Germany conquered Yugoslavia and Greece and had invaded Russia, overrunning Ukraine. Despite the isolationist mood in the United States, President Roosevelt prepared America for war.

American nuclear research was now under the auspices of the renamed Committee of Scientific Research and Development; mention of the word “uranium” was itself a security breach of the top-secret project. The government was funding research around the country. Scientists at Columbia University were working on a nuclear
reactor. At the University of California, researchers had experimented with uranium to create an even more explosive element: plutonium.

By autumn of 1941, America and Germany were waging an undeclared war. American destroyers and German U-boats were dueling in the North Atlantic. Pearl Harbor ended all pretense. Although the country was also at war with Japan, President Roosevelt and his government never veered from the determination that Germany was the greater danger. In June 1942, as the forces of Germany seemed invincible in North Africa and Russia, the U.S. Army Corps of Engineers brought its resources and discipline to the ongoing atomic research. To camouflage their effort to build an atomic bomb, the Corps labeled the operation as “The Manhattan District.” History remembers it as the Manhattan Project. While work originally started at Columbia University, the research on chain reaction was moved to the University of Chicago. It seemed a safer location. U-boats were seen off Long Island, but not in Lake Michigan. An underground squash court at the university was requisitioned for use as the site of a nuclear reactor. Some 45,000 graphite blocks, weighing 360 tons, contained a core of five tons of pure uranium ore and 45 tons of uranium oxides. The goal was to transform the uranium on a massive scale into a volatile isotope. The Atomic Age began December 2, 1942, when the reactor’s designer, Enrico Fermi, and an assembly of his fellow scientists witnessed the first controlled nuclear fission chain reaction.

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eastern Tennessee had been purchased as the site of a massive factory complex and self-contained community. Major General Leslie Groves, the military director of the Project, personally selected the location.

It was sparsely populated, isolated by ridges, yet close to the water and power of the Norris Dam. There, three factories were constructed for the refinement of uranium. The scientists, the workers and their families were provided with all the staples that a wartime economy could offer. There were schools, restaurants, supermarkets, theaters, churches and sports facilities to accommodate a population that would grow to 75,000 by 1945. Yet, the town — Oak Ridge — was fenced and guarded. It was a top-secret military installation. So, too, was Hanford, Washington — a newly formed “town”
of some 40,000. Its business was creating plutonium.

For all its achievements, the Manhattan Project had only succeeded in developing the ammunition for a nuclear weapon. The weapon itself did not yet exist. How could the plutonium or the uranium be conveyed to a target and successfully detonated? General Groves trusted J. Robert Oppenheimer with the challenge. A brilliant man known for his self-discipline, who had graduated summa cum laude from Harvard in three years, Oppenheimer could see the poetry in physics but often forgot such banalities as eating. Yet, this genius of theoretical physics was to find a very practical pursuit. He was the director of Los Alamos Laboratory, an isolated desert site in New Mexico where weapons could be developed and tested.

On July 16, 1945, a bomb was ready for testing. Suspended 100 feet in the air was a 6-foot sphere with a core of plutonium. The plutonium itself was only the size of a grapefruit, yet when detonated by layers of high explosives, the chain reaction’s blast was the equivalent of 20,000 megatons of TNT. The time was 5:30 a.m. when the New Mexico countryside was swept with a searing light. A shock wave could be felt 100 miles away, and a mushroom cloud billowed 7 miles high. The press and the public would be told an ammunitions dump had exploded. Some of the scientists were elated by their success; others were somber. Oppenheimer later said he recalled a line from Hindu scripture: “Now I am become Death, the destroyer of worlds.”

President Harry Truman, who had inherited the project, was immediately informed of the success. At the time, he was in Potsdam, Germany, negotiating with Winston Churchill and Josef Stalin. The war in Europe had ended two months earlier. Hitler was dead, his Reich destroyed. Germany had never seriously pursued the development of nuclear weapons, but had inadvertently contributed to the American efforts: Refugees from Nazi persecution included some of the best physicists of Germany and Central Europe, and the Manhattan Project was eager to have them.

The war continued in the Pacific. Japan refused to surrender; her troops would fight to the death. The invasion and conquest of Japan was likely to cost 800,000 American lives, with the wounded numbering in the millions. Yet, the Los Alamos Laboratory had the components for two more atomic bombs. They might yet serve the purpose of ending the war.

On August 6, 1945, three American planes flew to Hiroshima …. 

The town of Oak Ridge, Tennessee, shown here in 1945, was fenced and guarded.