

the start of World War I, during which we then rapidly had to find substitutes. This led to the first great partly understood realization of that part of our national power in the United States that the role of science and engineering, and of research and development play in total national power.

If you will accept, then, this role throughout history of the constructive use of energy through applied science and technology, and likewise that of research and development, as the main force for developing in the civilized nations their respective positions as world powers, well and good. I doubt that one can find any other substitute. I do not believe it depends upon the political system. I doubt that one can find out how it happened except through applied science and technology and its new knowledge.

Now, I would like to talk about the enormous growth of research and development in the United States. You have heard it referred to this morning and at other times, and you will have it again in your courses. But I would like to put it in a little longer perspective. Because I am old enough, I can remember things personally that you may only read about. I can remember the famous House of Magic in Schenectady, the first modern type American research and development laboratory in industry. It goes back to 1903. In those days there was little money for the Federal Government's encouragement of research except in such instances as for the Bureau of Standards to develop precision measurements for legal standards, or certain work done in entomology on bugs and insects and other pests in agriculture, or for such studies as plant science and agronomy, et cetera, all with a specific economic point of view. There was really comparatively little done until World War I, after which we woke up with a terrific headache, realizing that we did not have the needed resources in these and so many other areas.

During World War I Thomas Edison the great inventor, was brought out of retirement, to try to improvise solutions to new needs necessary for the nations war economy. He was put in charge of a committee to try to find out how to get creativity out of the American scene in World War I. This all served to emphasize our deficiencies in scientific and technological endeavors.

Even at the beginning of World War II, in the years 1938 and 1939, when any thinking member of the Armed Forces, or when those who dealt with the Armed Forces or were in touch with world currents, knew that there was about to break a world war in which we would be involved, and before Poland was invaded, the