



THE INFLUENCE OF WWII IN THE CREATION OF COMPUTERS

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World War Two fueled technological advances at an incredible pace, from tanks to submarines, to bombs and weapons, but also it contributed to the creation of computers and their evolution. Although computers appeared as the war was raging, there are two current lines of thought. Many historians, physiologist and authors, believe that the creation of the computer was an immediate consequence of the war, and that therefore computers were made for war. Frederich H. Kittler, the main leader on this theory, sustains that without World War Two the computer wouldn't have existed. He believes that the computer was built over the “need both to encrypt and decode military intelligence and to compute missile trajectories¹”, and that the computer are war machines. The second line of thought is that the evolution of computers had nothing to do with the war, and that it was a mere coincidence that both occurred at the same time. Konrad Zuse's book “The computer, My Life”, would be a perfect example to maintain this theory. Therefore, up to what point was the war involved in the creation and evolution of computers?

Before dwelling deeper in the issue, it is in order to have a concrete understanding of what is considered a computer. According to the Encyclopedia Britannica, computer is “Programmable machine that can store, retrieve, and process data.”. In the most basic form, computers are instruments that calculate automatically, with minimal user input. It is important to understand that using these criteria, we would include instruments as old as the Chinese's Abacus and slide rules. Therefore, in these essay the term computer will be understood only as an electronic digital machine based on binary language, which were created at the same time as WWII.

After WWI, communications was of great concern among the European countries that feared for another war. Many of companies started developing cyphering machines to avoid intelligence leaks, one of the most important and well received was the German Enigma. Twenty years before WWII on 1920, the Enigma cyphering machine, was created and sold to the public. Immediately, the Enigma was adopted by the German army and perfected, although other nation's army's took some ideas from the Enigma the mayor influence it had was within Germany. It is important to understand that this was not a computer, it was a coding instrument that consisted of rotors and switches, similar to a typewriter but with a mechanical system that would code the message. The enigma machine was used extensively during the war and is thought to be the main cause of the creation of computers.

It is slightly difficulty to pin-point which was the first computer because many countries mainly Britain, USA, and Germany where drafting computers under top secret projects. Interestingly, these projects where started before the war, which would seem to contradict Kittler's theory, but in fact most of them where finished during the war and immediately put to action or used as bases for other war computers.

In 1936, Konrad Zuse, a German engineer, started to create a computer that would be called the Z1. This was a binary electrically driven mechanical calculator with limited programmability. The machine itself was finished on 1838, but it didn't work well because of the lack of material and precise pieces. Although it was built out of the curiosity of Zuse and in no way was it inspired by war, when Zuse was called for military service his new invention was put into work for the production of Gliding Bombs. After 1939, Zuse, who had been called upon to the army and joined the *Aerodynamische Versuchsanstalt* (AVA, Aerodynamic Research Institute), was not able to contact the Americans nor the British to continue investigating and developing his creation, so the other countries never knew that a

1 Cited from the introduction of Geofry Winterhop-young, Translator of Frederich H. Kittler book “Gramophone, film, typewriter”, Germany, Standford University Press, P. xxxvi

computer had been built on Germany.

By the time that Konrad Zuse was developing his first computer, American engineers on the Iowa State University were drafting a computer similar to Zuse's. This was the Atanasoff–Berry Computer, named after its creators John Vincent Atanasoff and Clifford Berry. It was a single purpose, non-programmable computer. It was America's first computer, and much like Zuse, this computer was built for the sole purpose of solving linear equations and was not geared for war. In 1942, the computer was successfully tested, but due to the war it was left unused and it was forgotten.

Both the Z1 and the Atanasoff–Berry Computer are considered the first computers created, and both were designed for solving calculations, instead of war. This would make Kittler's theory invalid, Computers were not created for military reasons, but for academic math research. Still, Kittler was not completely incorrect for the next computers would take a swift turn from mathematics to war.

World War Two was devastating Europe, leaving millions dead and many more wounded, intelligence was crucial at the time, knowing when the enemy was going to attack and from where could save you thousands of lives and the outcome of the battle. Messages had to be delivered with caution, the radio had been recently introduced only some years before and it was still being perfected, both the allies and the Axis needed some way of encrypting their messages, that's where the Computer played a role. Although the world had not witnessed the ABC computer or the Z1, both the United States' Government and the United Kingdom's government started investing on the creations of computers for war.

In America, on the Harvard campus, the IBM team joined Howard H. Aiken to develop the Harvard Mark I, although seemingly unimportant the creation of this machine supports Kittler's theory because after it was first successfully tested on 1944, it was immediately shipped to work at the U.S. Navy Bureau of Ships, finally in August it was presented to the university of Harvard where it had been conceived.

Meanwhile, United Kingdom, being closest to the enemy, desperately needed a deciphering machine that could save them time and help them react better against U-Boat attacks, air raids, and any German infiltration on the mainland. Although UK had decrypted some of the Enigma machines, the Germans released a machine called the Lorenz SZ 40/42 which was much difficult to decipher and usually carried more important messages. So in February, 1943, Britain started drafting the Colossus Mark I, this machine was to become one of the most important creations in UK at the time of the war. This machine was created as the ultimate deciphering machine on all the world. Tommy Flowers, the leader and brain behind the Colossus spent eleven months constructing it, and in January 1944, when it was finished it was shipped to Bletchly Park. Just a month later it successfully attacked a message. Days later, the creation of more Colossus started and by the end of the war UK had successfully installed 10 on mainland.

This meant that now the United Kingdom had access to the German Cyphered Intelligence, this immediately boosted the “ULTRA” intelligence. The ULTRA was all of the intelligence that was gathered during the war from deciphering the Enigma machines and the Lorenz SZ 40/42. It is known that thanks to this boost many were won, as British Prime Minister Winston Churchill said "It was thanks to Ultra that we won the war."² .Kittler agrees that the creation of the Colossus was also intended to avoid “possibly would have filtered through the German army, [...] the fact that interception

2 An exhibit in 2003 on "Secret War" at the Imperial War Museum, in London. Quote from Winston Churchill speaking to King George VI.

and type-computing machines respectively rendered secret services and agents superfluous”³ and unlike people it was left always on “Once switched on, the colossi were never switched off until the end of the war”⁴ Therefore not only did the invention of the Colossus was directly inclined towards war and deciphering data but it was actually creating a safer environment because it relayed on less people.

While the Colossus was an astonishing success, The United States’ government had a different issue, deciphering the Japanese code had already been done successful, even before entering the war. Their main issue was the mathematical calculation of ballistic missiles, therefore they started founding the “Electronic Numerical Integrator and Computer” otherwise known as ENIAC. On June 5, the secret construction contract of the ENIAC computer was signed by the United States Army, and so construction started secretly on the University of Pennsylvania's Moore School of Electrical Engineering under the codename “project PX”. The ENIAC was a multi-purpose machine, it was announced by the press as a “Giant Brain” on 1946.

Unfortunately the ENIAC was successfully finished on 1946, after the war ended, but even still at time of peace, the ENIAC immediately started to work making calculation for the creation of Helium Bomb because “The Mathematics involved is immensely complicated, and only the ENIAC was capable of computing it in reasonable time”⁵. The “The ENIAC itself, [...] was built to meet a military need”⁶ therefore, following Kittler's way of thought we could argue that even at times of peace the Computer was still used for war, perhaps for preventive war.

Curiously, the German's who had a fully functional and relatively cheap computer since even before the war, did not explore the possibilities to the maximum. Konrad Zuse after having developed the Z1, and the Z2, created a company “*Zuse-Ingenieurbüro Hopferau*” that manufactured Z2s and Z3s. Actually, Zuse writes on his autobiography “My design for a coding device first met approval, but soon I was given to understand they already had good machines of these type. They were talking about the enigma, the considered to be absolutely undecipherable, as we all know today this assumption would be proven wrong, for the British were indeed successful in cracking the enigma code with [...] the Colossus.”⁷ Later Zuse tried to offer his Z1 to the Luftwaffe and they responded “What does it mean here when it says that your machine has applications in aircraft construction. The German Luftwaffe is top-notch what needs to be calculated here.”⁸ And so, Zuse continued developing the Z3 which was even programmable and multi-functional, not as strong as the Colossus or ENIAC, but considering the simplicity and the cost, it was very powerful. Even still only the AVA used few of his inventions for simpler projects such as the creation of bombs and some Aviation experiments, but they surely did not explore the possibilities of Zuse's creations.

It appears as though the German army was overconfident with their communications and their army and so a tad skeptical over the use of Computers, or maybe they did not see the need for it. Either way, what we can surely say is that Zuse's creations would have been of great help in the area of Encryption and many others. These is one of the main contradictions that Kittler's theory present, why is it that those who invented the cheap and functional computer never used it for war as frequently as the others.

3 Kittler, Frederich A. Gramophone, Film, Typewriter, P.261

4 Copeland, Jack B., Colossus: the secrets of Bletchley Park's codebreaking computers, P. 72

5 Hally, Mike, Electronic brains: stories from the dawn of the computer age, P.20

6 Ceruzzi, Paul E., A History Of Modern Computing, P. 7

7 Zuse, Konrad, The Computer - My Life, P. 58

8 Ibid. 57

Taking into consideration the evolution of computers during WWII, we could speculate, that computers were more of a coincidence, a necessary step in the technological evolution, that just happened to coincide with WWII, but immediately after the creation of the rapid progress was stimulated by the War. We can see how in USA, the first computer was not for war, but immediately after, thanks to the money and effort put in by the government or military entities, the ABC evolved into the ENIAC supercomputer, and instead in Germany, because there was no founding or stimulus in the computer industry, there was no other worthy competitor against Zuse, who kept manufacturing simple machines for the people. It is possible that Kittler is right when saying that the rapid growth is basically pushed by the war, but the idea for the computer itself was just a natural step on the technological ladder and therefore not developed by war.

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