

Spaceflight Between Peaceful Vision and War

Thoughts on Wernher von Braun's 100th birthday

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Spaceflight – envisioned as a key to a bright and peaceful future, but advanced by political conflicts and war. These two extremes also dominated the life of Wernher von Braun.

The conquer of space was Wernher von Braun's lifetime dream, and everything else was only secondary for him. Without doubt, von Braun was one of the key figures of spaceflight, and he still polarizes: Some see him as the epitome of opportunism, a person who willingly accepted the deaths of innocent people to achieve his great goal. Others see an exceptional engineer and manager, a man of action, who, once he had taken his path, never had a real choice in his decisions due to the circumstances that developed around him.

His life and his achievements are scrutinized in detail in countless essays and books,³ as is the question for his personal share of guilt in the days of the German Nazi regime. These widely discussed issues are therefore not further analyzed here.

Spaceflight as a Child of War

For centuries, curiosity and the lust for adventure inspired mankind to think about traveling to space, and both are still seen as a core motivation for spaceflight. But only giving these aspects the credit that the old dream became reality, as it is frequently done today, is too narrow-minded, and the role of the military aspect – war! – is too often neglected. In fact, only the military benefits of spaceflight allowed the space enthusiasts to access the funding and develop the technology that was required to let their dream come true. And with defense and security as dominating aspects for the development of spaceflight, scientific discoveries and commercial applications have to be seen more as byproducts than as incentives. From the beginning to the greatest achievements, spaceflight was a means to political and military ends. And only a very special constellation – in which Wernher von Braun played a central role – allowed mankind, within a few decades, to master the great leap from the Earth to the Moon.

A Special Constellation

All too often, great achievements are accredited to a single scientist with bad hair and a lab coat, who somehow discovered a secret formula. However, in reality, a successful realization requires three things:

(1) At first, a clear **task**, a well-defined mission, or at least an objective that is not

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³ Renowned publications are, for example, Ernst Stuhlinger und Frederick I. Ordway III, „Wernher von Braun – Crusader for Space“, Krieger Publishing Company, Florida, 1994, and Michael J. Neufeld, „Wernher von Braun – Dreamer of Space, Engineer of War“, Random House, New York, 2009.

- totally out of this world (at least figuratively).
- (2) Then, a person is needed that is best characterized by the German term “Macher”, meaning a doer, an exceptional **manager**, a man of action who is supported by a capable team, managing and executing the given task.
 - (3) And finally, a potent **customer** is required, someone who is really interested in the project, who has a real demand, and – most important of all – who is willing as well as capable to finance the project.

So, what was the situation when Wernher von Braun discovered his interest in spaceflight? In spite of their remarkable achievements, the numerous rocket societies and other amateur groups that formed in the late 1920s certainly never had a real chance of successfully turning spaceflight from dream to reality. They had no customer of the previously defined type, no one who was capable to cover the staggering expenses. Wernher von Braun, however, was well aware that only public funding could finance the huge efforts that were required to go into space. And by its character, military spending always offered a good access to almost unlimited funds.

The prerequisite for public demand are pressing national tasks, for example security or national prestige. Hereby, competition can act as a catalyst – and in the world of politics, competition actually means a rivalry among nations, extending up to cold or even hot war. The noted demand can only be met by exceptional doers with organizational and technical skills, and it requires customers with extraordinary political and financial competencies.

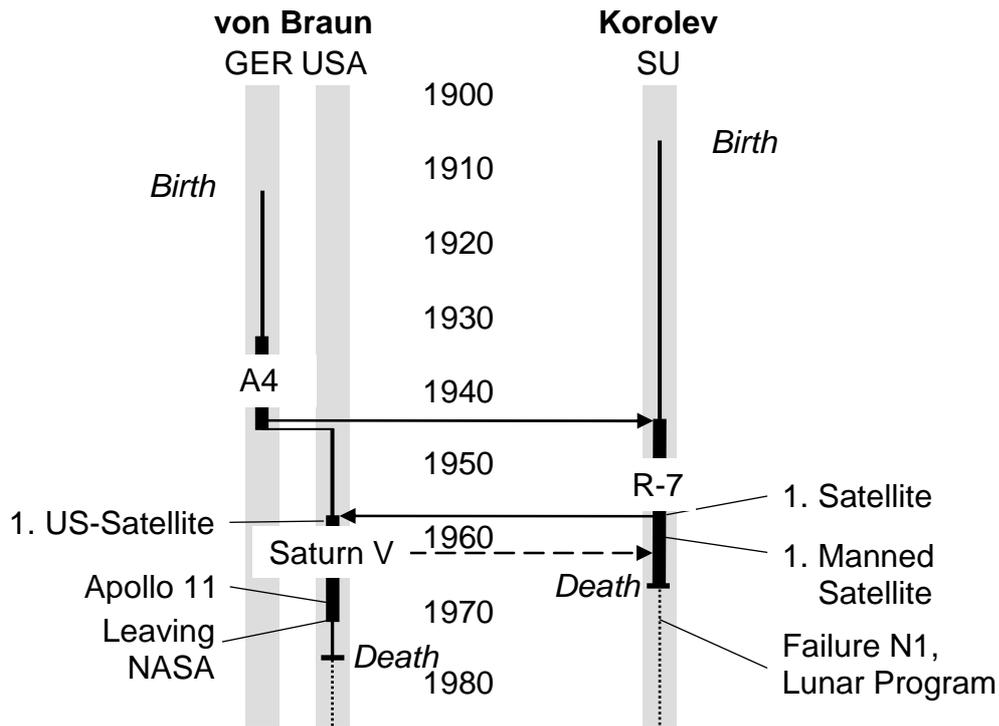
For rocketry, these customers changed in the course of history, but Wernher von Braun was the perfect match for “doer” position: A manager with excellent leadership skills, a charismatic organizer and a sales talent, with technical knowledge and human resource skills. Without doubt, his aristocratic provenience, his good looks, and his charming and courteous appearance were also helpful to reach his goals. In Germany and, later, in the U.S., he had access to a network of high-ranking supporters and a loyal team of co-workers. The prerequisites were there, and the path to the space age was open.

Aside of these prerequisites, there also were several historical events that put things on the right track for spaceflight, ranging from Germany’s defeat in World War I and the resulting Treaty of Versailles up to the Navy’s Vanguard launch failure, or Kennedy’s election and his announcement of landing on the Moon, but also his assassination.

Another phenomenon also played an important role: The mutual effect that the achievements of Wernher von Braun and his Soviet counterpart, Sergey Korolev, had on each other’s work. The resulting “competition” was a major contributor to Wernher von Braun’s later successes.

Three steps of Spaceflight – From the Beginnings to the Zenith

The development of spaceflight may be divided into three parts: The first successful development of large rockets as a means of transportation, the time until the first artificial Earth satellite was launched, and the zenith of spaceflight with its greatest achievements, culminating in the 1969 Moon landing of Apollo 11.



Von Braun's and Korolev's Alternating Effects on Spaceflight

Wernher von Braun played a major role in all of these three episodes. Between 1932 and 1945, he decisively advanced the development of rocketry, from 1945 to 1957 he worked hard to make spaceflight popular, and from 1957 to 1971 he was a key figure in the race to the Moon.

1932 – 1945: Rocket Development for Weapon Applications

The *Heereswaffenamt's* (Army Ordnance Department) interest in rockets in the year 1932 started the whole chain of events. In the wake of World War I, Germany was not allowed to possess long range artillery weapons, but the Treaty of Versailles did not mention rockets or missiles. Walter Dornberger was the financier at the military side, and a young Wernher von Braun was trusted with the technical side. The final goal of these efforts clearly was the serial production of a missile of considerable range, only intended for use as a weapon. But in 1932, it was far from obvious that this weapon would be used soon.

When the Nazis seized power in 1933, the activities continued. The A4, later known as *Vergeltungswaffe 2* (Vengeance Weapon 2) or V2, was defined under von Braun's lead, developed, produced – also by forced laborers –, and finally massively used in the final months of World War II.

Wernher von Braun's promises of the A4/V2's performance and of its availability within a few years certainly played an important role for the decision to advance the program by all means. The unfavorable course of the war for Germany, and the irrational hopes that the new weapon was a "silver bullet" that might turn things around guaranteed the support of Speer, Himmler and Hitler, who granted the rocket program the highest priority.



Even when high-ranking visitors came to Peenemünde (here Grand Admiral Dönitz in May 1943), Wernher von Braun (at the far right) always wore a civil suit.

The special constellation reveals itself for the first time:

- National task: Rockets (missiles) to avoid the imminent defeat.
- Customer: The Nazi leadership (Hitler, Himmler, Speer) with public funding and use of forced labor.
- Manager: Wernher von Braun.

Without any doubt, Wernher von Braun had a decisive part in the development of the V2. Even though he had no sympathy for the Nazi ideology, he used the means of the Nazi regime for his higher goal, which was the development of rockets for later space applications. How far he was responsible for the use of slave laborers is controversially discussed. His difficult position is nonetheless obvious by his arrest in 1944 due to an alleged lack of focus on the V2's development: He had made a Faustian bargain from which he could not simply withdraw without endangering his own life.

1945 – 1957: ICBM Development in the Soviet Union

After World War II, the rivalry between USA and USSR started to escalate. Wanting to exceed the U.S. wherever he could, Stalin focused some of his efforts on rocketry. Led by the capable Sergey Korolev, the Soviets initiated a massive development and production program. As with the German program before, spaceflight was had no meaning in this context, at least in the beginning, and within a good decade, the world's first Intercontinental Ballistic Missile (ICBM) became reality.

Again, the mentioned special constellation led to success, if only with Korolev instead of von Braun:

- National task: Rockets (missiles) to achieve military parity with the United States.
- Customer: At first Stalin, later Khrushchev, with public funding and massive use of laborers.
- Manager: Sergey Korolev.

Since the U.S. showed only very limited interest in space, Wernher von Braun decided to publicly act as a space advocate. He was supported by Collier's magazine where he published his ideas, illustrated by spectacular colorful drawings, and he also collaborated with Walt Disney on several television shows. This way, Wernher von Braun soon became the most prominent space advocate of his time, even

though he was widely barred from real development work.

At that time, he only lacked the political support (the customer!) to make his dream finally come true. But he had to sit and watch as others were entrusted with the task of advancing rocketry toward spaceflight. But with the launch of the Soviet Sputnik in 1957 and the failure of the U.S. Navy's Vanguard rocket, the situation changed abruptly.

1957 – 1971: Zenith and Moon Landing

The Sputnik launch shook up the USA. All of a sudden, space was an area where the Soviets had to be beaten. Again, war – but this time Cold War – became the essential reason for the advancement of rocket (and space) technology:

- National task: Spaceflight to demonstrate the superiority against the USSR.
- Customer: Kennedy with massive public funding.
- Manager: Wernher von Braun.

And the same situation could be observed in the Soviet Union:

- National task: Spaceflight to demonstrate the superiority against the USA.
- Customer: Khrushchev with massive public funding.
- Manager: Sergey Korolev.

With access to almost unlimited financial means, Wernher von Braun finally could turn his dream – that now was an official national goal – into reality. Even though the Soviets led the race in 1957, the U.S. quickly caught up with massive efforts. When Kennedy was shot, these efforts – at that time already questioned as a waste of money – became the president's legacy and were not further disputed.



*Wernher von Braun
and John F. Kennedy.*

But in the Soviet Union, the constellation shattered with Khrushchev's removal and

Korolev's untimely death. This led to the Soviet space program's reorientation, and led to the program's slow but steady demise. However, the successful landing of Apollo 11 on the Moon also heralded the end of the special constellation in the USA.

1971 – 1977: Epilogue

Once the race to the Moon was won, the interest in space faded in the USA, and other issues became more important. Three of the planned Apollo missions were cancelled in 1970, and the last human left the Moon in 1972. Wernher von Braun had done his part and was not further needed, and he soon left NASA. Nonetheless, he had high hopes for the new Space Shuttle that should finally enable routine flights into space. But he was diagnosed with cancer, and in 1977, four years before the Shuttle's first flight, von Braun – just like Korolev before – met an untimely death.

Spaceflight had passed its zenith and the funding was cut back. From then on, spaceflight was put on the back burner.

Wernher von Braun – Engineer and Manager

The three phases of spaceflight, that also were three phases in Wernher von Braun's life, clearly show that von Braun was not a detached genius scientist who spent his life in labs and libraries. He was a man of action, a doer. He knew how to convince others of his ideas and visions, and he had the capability to make these visions come true. He was an enthusiastic realist who could turn ideas into reality, who could see through problems and understand their character, and who could present these problems to others in a comprehensible way, someone who understood the interactions and dependencies of a system's details without losing the view for the complete system.

With that, he was much less a scientist than an engineer and manager, with a brilliant knowledge of the task at hand, with an understanding of the big picture and the capability to distinguish between important and unimportant details. It is hard to say if this type of engineers is an exception only today – these engineers certainly were rare already during von Braun's days. In this regard, Wernher von Braun undoubtedly still has to be considered a role model.

Wernher von Braun's Legacy

The engineering achievements of Wernher von Braun and his team were mastered by following some simple guidelines:

- Everything out of one hand,
- development start only once technology research was completed,
- technical proof only by numerous real tests,
- continuity, maintaining proven solutions,
- no fear of great leaps.

The last aspect is obvious by a look at the size of the various rockets that Wernher von Braun's team developed:

From A1 to A4	150 times bigger
From A4 to Jupiter	4 times bigger
From Jupiter to Saturn V	60 times bigger

From A1 to Saturn V

30,000 times bigger!

Without courage, trust in his team and the guidelines mentioned above, it is likely that no man would yet have set his foot on the Moon – at least not as early as 1969. But there also are lessons to be learned for the future:

Spaceflight can be done either commercial, or it has to be funded by the government. Large scale commercial topics that go beyond today's limited activities still have to be identified. This is not because spaceflight is expensive and requires investments that are too high, but because the expected profits of current commercial ideas are too low. And even today's commercial successes would not be possible without governmental backings and subsidies!

The great successes of the past were based entirely on public funding. This means nothing else than, to continue these successes, another constellation of national interest is required, a new competition between nations, most important, the special interaction of special personalities on the technical-organizational side and on the political-financial side. This constellation is the prerequisite for a revival of spaceflight on a large scale. Future spectacular projects, such as a permanently manned lunar base, a manned asteroid landing, or the flight to Mars, will only then be done when the identified situation prevails. Else, these visions will always stay dreams.



*Wernher von Braun's masterpiece,
the Saturn V Moon rocket.*

And one final fact should not be forgotten, even though it is frequently ignored: The defense sector was – and still is – an important pacemaker of spaceflight. With its space based elements and the creation of the space launcher's ancestor, the nuclear missile, it played a major role in securing a global period of peace that now lasts almost seven decades, making World Wars a thing of the distant past. This lasting peace is perhaps the most important part of Wernher von Braun's legacy.

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