

## HISTORY OF NASA

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### Absztrakt

#### *A NASA TÖRTÉNETE*

A világ legismertebb és leghatékonyabb űrügynöksége. Létrehozását előrelátás és folyamatos küzdelmek, olykor előforduló kudarcok alakították. A szervezet fő feladata az emberrel kapcsolatos ismérvek átültetése a világűrbe, így küldetését tekintve is egyedülállónak tekinthetjük. Létezése azonban nem egyedülálló, hiszen számos nagyszabású szervezet ugyanezen filozófia mentén jött létre: egy adott feladat konkrét és teljeskörű, szabályozott végrehajtása. Látni fogjuk, hogy milyen politikai és gazdasági erők, személyek, események hozták létre, valamint választ kapunk arra, hogy miért a legkülönlegesebb intézmény a maga területén, hogyan formálta az USA repüléssel kapcsolatos szervezetrendszerét. A NASA kialakulását a témát elemezve a világűr területéhez kapcsolhatjuk, azonban, ha mélyebben szemügyre vesszük, úgy látható, hogy egy ilyen szervezet létrehozására kizárólag egy kiemelkedő, mind állami, mind társadalmi, gazdasági összhanggal rendelkező ország képes. A világ legismertebb űrszervezete létrejöttének bemutatása során nagyon sokat tanulhatunk arról, hogyan hozunk létre közigazgatási és magán szervezeteket, valamint azok megalapozásához milyen feltételekkel kell rendelkezünk. Ennek felismerése előnyt jelent a döntéshozóknak vagy az adott területtel foglalkozóknak.

**Kulcsszavak:** NASA, űrügynökség, human küldetés, szervezetrendszer, űrkutatás, űrrepülés

**Diszciplínák:** politikatudomány, történelem

### Abstract

NASA is the best known and most efficient space agency in the world. His creation was shaped by foresight and constant struggles, sometimes failures. The main task of the organization is to transfer the criteria related to man into space, so we can consider it unique in terms of its mission. However, its existence is not unique, as many large-scale organizations

were created along the same philosophy: the concrete and complete, regulated execution of a given task. We will see what political and economic forces, persons and events have created it and its centers, and we will get an answer to why it is the most special institution in its field, how it had been shaped and how it shaped the US aviation-related organizational system. Analyzing the subject, NASA can be linked to the realm of space. On closer analyzing, it can be seen that only a prominent country with solid base establishment and social and economic harmony can create such an organization. In presenting the creation of the world's best-known space organization we can learn a great deal about how to create administrative and private organizations and what conditions we need to have to establish them. Recognizing this is an advantage for decision makers or those working in the field.

**Keywords:** NASA, space agency, human mission, organizational system, space research, space fights

**Disciplines:** Political science, History

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The NASA (National Aeronautics and Space Administration) began its operation on October 1, 1958. On July 29, 1958, the Congress of the United States of America ("USA" or "US") passed the National Aeronautics and Space Act.

The Organization was under state control, but in its structure and in its outward communication it served civilian purposes and at the same time created an opportunity for all states interested in space travel to share knowledge. This purpose was set out in the law established by NASA and some of these declarations were later adopted by the Outer Space Treaty and the Antarctic Treaty.

U.S. society and lawmakers had the desire to take the lead role in space travel and to

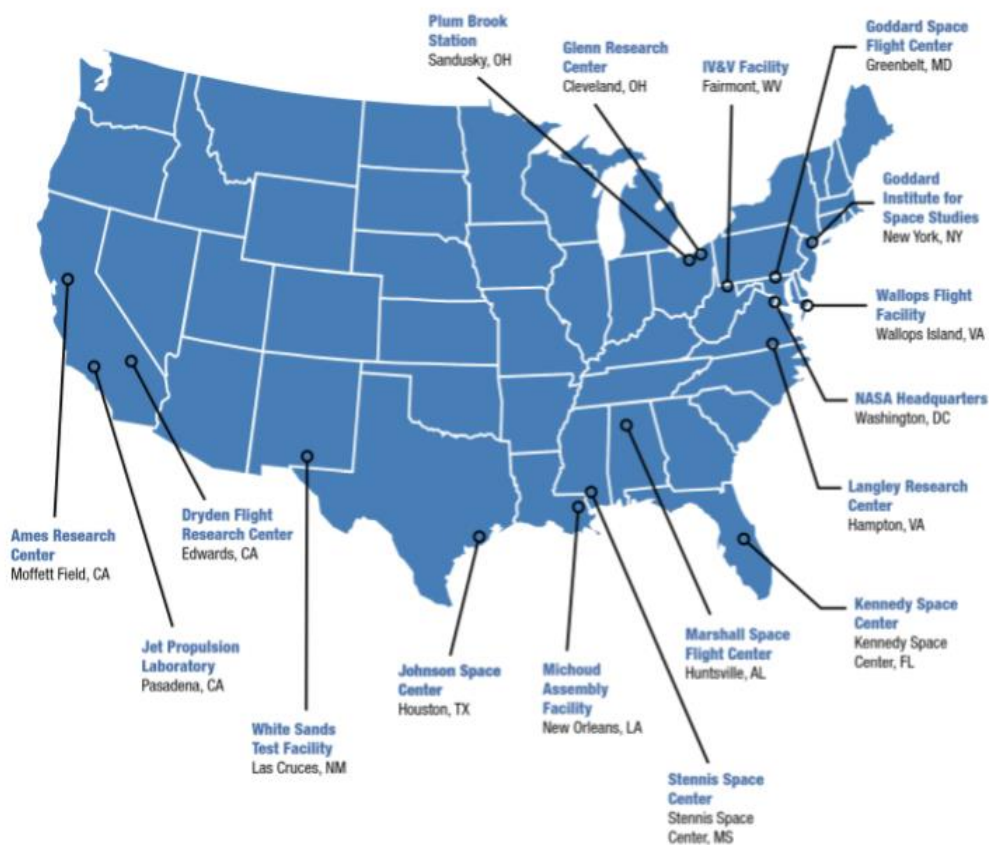
develop to the furthest extent the disciplines needed and supported it.

Like all organizations, NASA needed an infrastructure that consisted of the implementation and creation of forces, assets, and buildings that had developed in the years before and in the period that followed. In the following, let's look at what places and units were created to help establish NASA's status quo.

In Figure1, NASA has 17 institutions that are directly involved in the organizational structure. According to their operational purpose, we can categorize them as the following.

More importantly (NET1), the Kennedy Space Center in Florida is being used for a

Figure 1: Institutions of the NASA (Source: nasa.gov, 2011)



rocket launch facility. In addition, it is possible to launch missiles at the Wallops Flight Facility on Wallops Island, Virginia, but while in the first case there is a possibility of an extraterrestrial space flight beyond the atmosphere, the latter from Wallops Island of is to the upper atmosphere, possibly up to the altitude of 1000-2000 km of sounding rockets will be launched and yet cargo is to be planned for the International Space Station.

Out of the 17 departments, the IV. & V. Facility, Wallops Flight Facility, Goddard Institute for Space Studies are to Goddard Space Flight Center, Michoud Assembly Facility is to Marshall Space Flight Center, Plum Brooke Station is to Glenn Research Center, White Sands Test Facility is to Johnson Space Center, while the Jet Propulsion Laboratory is part of the University of California. Thus, the research is carried out in a total of 11 main areas.

Without listing the whole structure of the organizational level, it can be said that all the scientific work, takes place in these places, is related to the observation of the atmosphere, the study of the human body, and the technical possibilities of space travel. In these areas, they measure the biological and physical components of the atmosphere, the impact of external factors on the human body, and the design and implementation of engines, bodies, propellants, and execute the experiment with other materials and designs in the field of space-rocket systems.

NASA is headquartered in the capital, Washington, from where all its units in the country are controlled.

### **The structural origin of NASA**

The commencement of the formation of the organizational structure is related to the previous chapter.

As early as 1915, the United States established the National Advisory Committee for Aeronautics (NACA) (Roger E. Bilstein, 1989), which can be considered as a precursor to NASA. Then in 1958, it was repealed and terminated by the law establishing NASA. However, typically in the internal structure of the United States, some civilians, as well as civil society organizations and business corporations, played a significant role in the creation of NACA. Recognition of aviation-related factors came primarily from a civilian perspective but was also closely followed by a military concentration.

The Wright brothers soon recognized the potential for aviation advantage after their initial flight, and the U.S. Navy and the U.S.

Army had already played a significant role in the creation of NACA. The Navy provided the Goddard Space Flight Center division and the Army Ballistic Missile Agency (ABMA) division. A number of joint projects have been launched with NACA. By the way, the U.S. Air Force was also present at all times since the beginning. Air Force and NACA jointly achieved Mach-1 (speed of sound) in 1947 (William J. Bennett and John T.E. Cribb, 2008). Then in a joint program, the U.S. Army, U.S. Navy, and NACA experimented with the X-15 as a type Mach 6. At the same time, the U.S. Navy and the U.S. Air Force launched their own communications satellite programs in the 1950s.

However, rather than gradual patching, the U.S. has sought to create a fixed Establishment clearing to everyone in terms of its organization and has the full legal capacity to third parties. Based on this, American space companies and government research departments have increasingly annexed. There were those who came under NASA with his entire organization and there were those who only continued to execute certain tasks.

First, NASA was not only connected to organizations that had been operating so far. He used and took over the individual researches. NASA relied heavily on the initial steps then maintained or improved them

- Viking, Polaris missile systems, and the Vanguard satellite family developed by the US Navy
- by US Army (ABMA) Jupiter, Juno, Redstone missile systems, and the Explorer satellite family

- the Titan, Atlas, Thor missile systems developed by US Air Force, as rocket systems Thor-Delta from 1959 and Atlas-Centaur from 1960 was developed by NASA itself. As well as the

Pioneer deep space program launched by the U.S. Air Force, to explore space in greater depth.

NASA's fully self-developed rocket was the Nova (John M. Logsdon, 1999), which had been even anticipated as an alternative to Saturn V in the Apollo (Landing on the Moon) program. The most, NASA used a rocket, called the Scout (John M. Logsdon, 1999), during its missions whose draft plans were also transferred from the design table of the US Air Force to NASA.

### **The namesakes of NASA's organizational system**

In fact, NASA's current organizational system was already available in the first half of the 20th century, as its 'quasi' predecessor, NACA had already dealt with space exploration continuously. In 1957, half of its programs were space exploration. Without deeper analysis, we can't even tell why NASA actually had to be created (NET2).

Nevertheless acquiring each activity, NASA's lifelong struggle with the Navy, Air Force, Atomic Energy Commission (AEC), and Army, while avoiding duplication, can be observed both during its formation and during its later operation. Initially, NASA relied on DoD (Department of Defense) systems until it developed its own tools.

The AEC was a similarly big opponent, as the adaptation of the nuclear program to

NASA, as a non-governmental organization, provoked resentment from many leaders. The AEC brought together all the things involved in atomic experimentation centrally so it also served as an example of how NASA could have been founded and how to focus on a specific goal to coordinate it through departments. In 1956, the AEC even had a missile program. The International Atomic Energy Agency, proposed by US President Dwight D. Eisenhower in 1953 and then established in 1957, which regulates the handling of relevant materials and experiments, helped to strengthen its position. However, with the establishment of NASA, the question was resolved breaking through the strict framework of nuclear regulation, and NASA was also authorized to conduct nuclear testing alongside to AEC in the event of peaceful purpose (Linda Neuman Ezell, 1988).

NASA's formation was rejected by both the Navy and the Army and it was outcried unnecessary. Fortunately, a few statesmen, such as the later US President, Texas senator Lyndon B. Johnson and the real pioneer of the flight Orville Wright (1911-1948) had previously supported building a more complex organization.

Naturally many others opposed the creation of NASA but this was not unusual. As early as 1921, the existence of NACA was shaken as they wanted to install its means for the National Bureau of Standardization (NBS) under the U.S. Department of Commerce and distribute its task forces to other government agencies (Alice R. Buchalter, 2014). However, the coordinated consultations of many scholars and politicians had prevented this.

Who could also resist an initiative where initially the entire governing board took over the management of the NACA for no payment package (Alex Roland, 1985).

In this chapter, I analyze which individuals and organizations had NASA made up. Aside from the detailed space exploration programs I discuss the main individuals and organizations by which guidelines were set.

By coordinating the work of running scientists in the US, as well as the hundreds of German scientists taken over after World War II, also helped maintain the work programs that were revealed during the establishment of NASA.

At the end of the War Werner von Braun, escaping Hitler's 'suicide' action, surrendered to the U.S., considered its more favorable material characteristics as well as greater opportunities for scientific advancement. Von Braun will transfer from the U.S. Army (ABMA) missile research division to NASA-like missile program Saturn (Steven J. Dick, 2009).

Karman Teodor, a Hungarian-born physicist was attracted to the USA by the Guggenheim Fund, who accepted an offer taken by Caltech (University of California) in 1929 and continued his scientific work thereafter in Germany. He was able to define most precisely the demarcation line between Outer Space and the Earth's atmosphere, which is still recognized by the scientific profession as the boundary of Outer Space (NET3).

The work of Samuel P. Langley was already known to the Wright brothers in the late 1800s so we can truly call him a pioneer of aviation (Roger E. Bilstein, 1989). He was also

secretary of the scientific Smithsonian Institution (since 1847) which had been running many scientific researches on human life for nearly 100 years by then.

Robert Hutchings Goddard received his Ph.D. in physics at Clark University (1921). A few years later he was among the firsts to write about plans for a liquid-fueled rocket, similarly, that of which was parallel formulated by von Braun and Russian physicist Tsiolkovsky (John M. Logsdon, 1999).

Physicist Dr. Joseph Ames, member and head of the NACA and namesaker of the San Francisco Moffett area in California which has been officially named Ames Aeronautical Laboratory since 1940 (Alex Roland, 1985).

It is clear from the names of the above-mentioned scientists that they are eponymous names of each NASA base. This honor was given to astronaut Neil Armstrong who first entered the moon in 1969, or astronaut John C. Glenn, who first orbited Earth in 1962, or WWII General George C. Marshall, late U.S. Secretary of Defense.

A common point of the above persons is that they are all committed to space activities as are U.S. Presidents Lyndon B. Johnson and John Fitzgerald Kennedy. Senator John C. Stennis (Mississippi) also came from political life.

However, departments have been renamed several times. Glenn Research Center was initially named after NACA President George W. Lewis, as Lewis Flight Propulsion Center, which held it until its renaming in 1999. As well as the NACA Muroc Flight Test Unit (1946), then the Dryden Research Center (1976) named after physicist Hugh L. Dryden,

has been renamed Armstrong Flight Research Center since 2014, in honor of Neil Armstrong. Wallops Flight Facility, formerly known as the Pilotless Aircraft Research Station (NACA PARS), transferred from the direction of one NASA center, Langely Research Center, to another NASA center, Goddard Space Flight Center.

Honestly, we would not be able to list the merits of contributions by them, but based on American culture these individuals best represented space goals naming some bases after them.

### **The companies that makeup NASA's organizational system**

In this chapter, I analyze the companies and cooperations involved in NASA's plans, experiments, and implementation, in which the importance of the 'bottom-up' system – exceeding the role of the state and the single idea of administrative organizations – becomes visible, as it represents the will of the whole nation, not a will only from the direction of government but from society to promote the development of the nation.

Jet Propulsion Laboratory (JPL) has been in existence since 1936 and operates under the management of the University of California. Primarily, it developed missile engineering projects for the U.S. Army and had its own moon and planet program making up decades of improvements in fuel use (NET4). Only with JPL thousands of staff and experts have been transferred to NASA. From the beginning, JPL was actively involved in NASA's Deep Space Network program developing the tools needed to explore space.

Experts from the Langely Research Center (1920), Ames Research Center (1940), Glenn Research Center (1942) were transferred to NASA as former divisions of NACA, continuing their work to date.

The Washington-based Smithsonian Institution (1846) was established by a group of scientists in the early 1800s referring its mission to 'establishing for knowledge itself' (Charles Greeley Abbot, Dsc., 1929). Several famous French and American Englishmen were among members of the group, which numbered a few dozen and were joined by president Thomas Jefferson, too. It was given its current name in the mid-1800s and endowed with specific state goals. However, its central goal remained to support development in all areas of science. At the time of its establishment NASA, it was involved with Harvard University in the Explorer satellite program, the development of the first satellite system in the United States (NET5).

Dozens of similar associations were formed in the early 20th century, in which companies actively took part in developing air and space transportation (Table 1).

In the present study, I have listed the companies that still exist and have been operating continuously for up to 100 years, however, we can also meet them anywhere by their name.

### **The immediate years before NASA was founded, 1957-1958**

In fact, NACA and the U.S. Army already planned robotic space travel into space, but how I mentioned in the first section, the

*Table 1: Programs and Projects 1958-1968 (based on NASA Historical Data Book, 1988)*

Vanguard project (1955)	US Navy & Martin Company (+ Chrysler Corporation)
Saturn project (from 1946) von Braun working group	Rocketdyne, Chrysler Corporation, Douglas, Pratt & Whitney, Boeing Cooperation.
Moon walker	Boeing Company & Eastmen Kodak
Thor (1956) rocket (payload to orbit) & Atlas rocket for US Air Force	Douglas Aircraft, Rocketdyne, Convair, Lockheed & Bell Aerospace
Centaur, Atlas-Centaur rocket development (1958)	General Dynamics, Convair, Rocketdyne & JPL
Apollo preparation	North American Aviation
Redstone rocket development (1960s)	Chrysler Corporation (Stellantis)
Titan II., (1960s, Gemini)	Martin Company
Ranger capsula design (1959)	Ford Motor Company, JPL & Universities
Mercury program (1960)	McDonnell Aircraft Corporation

exceptional nature of NASA's goal has been guided by human space travel from the beginning. Nevertheless, this would not be sufficient for exceptionalism and particularity, as the Air Force had already researched human-related activities (Man in Space Soonest, 1956), to which it invited the NACA in early 1958 (NET6). Then the Navy and the U.S. Army tried to come up with a similar program that was embodied in the ADAM program. Later, with the formation of NASA, the 'Man in Space Soonest' program was canceled and its entire budget was transferred to NASA. Similarly, ARPA deleted ADAM. Thus, it became clear again that concentration in civil space programs had to go to one organization (NET7).

Even though the above-mentioned programs were canceled and at the same time transferred to NASA, DoD bodies played a prominent role in assisting space travel making a significant contribution to the foundation of NASA's mission. This was followed by NASA's Mercury project in the 1960s, which was tasked with proving that man can live in outer space. US Army missiles (Redstone, Jupiter) were used for the implementation of tasks, too. The Gemini program was a continuation of this intention and its realization was embodied in the Apollo program.

Based on the facts, it is even more possible to say that NASA has become a competitor to its own creators and there has sometimes been fear at DoD bodies about what the next task will be redirected to NASA.

However, it was clear that NASA remains a civil corp and its primary goal, as George Kisitiakowsky President's Science Advisory Committee and Manhattan Plan Supervisor said, was a prestigious task of sending man above atmosphere space while thinking it was too expensive and provoking opposition from many others (NET8). However, its central goal and human space travel were thought of as good by several opponents.

In those years the decision of the establishment was seemed to be more than an internal structural debate. During the International Geophysical Year in Washington in 1957, decisions acceded on future developments in satellite and rocket systems and research of the upper atmosphere. By the way on the basis of a report by Lloyd V. Berkner (NET9) and other organizational reports a new single



corporation had been needed to be created for these tasks. In early 1958, the Advanced Research Projects Agency (ARPA, now DARPA) was established within the DoD to oversee all major scientific projects in the United States. However, following the establishment of NASA the oversight and budget for projects on human space travel have been transferred from ARPA to NASA (NET10).

In the first full year of NASA (1959), the United Nations organization COPUOS was established, as a space commission at United Nations, to oversee human space challenges (NET11). At the same time Space Task Group (STG, 1958) was established at Langley Research Center overseeing and developing human space (Mercury, Gemini, Apollo) programs NET12).

To set up the UN Space Commission (COPUOS), US has inspected over its birth to reaffirm the importance of the area on the rules of the new world order. The NASA offices are checked and the direct supervision of their programs is conducted by the Program Planning Office (1959) at NASA Headquarters, Washington.

After its establishment, NASA soon began developing its own Earth observation programs, such as the Orbiting Geophysical Observatory (OGO), the Orbiting Solar Observatory (OSO), the Orbital Astronomical Observatory (OAO) which showed signs of continuity regarding devices and means in use and system was fed much by running works of US Naval Observatory for nearly 100 years (Steven J. Dick, 2009). Then, a number of projects were launched in the

1960s that were unrelated to the missile program such as the Ranger Capsula, the Surveyor or the Mariner which studied, photographed, observed the world outside the 'Earth' like the Moon, Mars, Venus, and their environment, by the way, behavior of solar flares and magnetic fields.

Soon after beginning, NASA started to shape the space activities of its allies in accordance with the international relations enshrined in the Treaty (NASA Act Section (102) c.) article 7). He has stepped in contact with space organizations in the UK, France, Italy, ESRO, Canada, Sweden, the Netherlands, Norway, Denmark, and universities in each country. It also offered close cooperation to the governments of Mexico, Bermuda, Australia, Spain, Zanzibar, and Nigeria for the deployment of the satellite system around the Earth (Linda Neuman Ezzel,1988).

### **Summary**

The most important goal of my present study is that NASA became not by chance or extremely economic power the owner of the world's most modern system of space research organizations. This kind of awareness and power for continuous improvement is most characteristic of the American people, without shying away from the pioneering role. The creation of NASA has been achieved through a number of debates that have analyzed the aspects both horizontally and vertically. Not only the government was able to fulfill the task but also the civil actors gradually helped to implement the plans. By the way, to its own self-created units NASA felt a lot of energy to help other countries to

step up on the path of development. Naturally, ahead of the Eisenhower domino principle, the US supported the individual key countries for their own benefit, even before they started to negotiate and compete in the other stage of the world. At the same time the goal, ratified in NASA's basic document that NASA is "for the benefit of all mankind", still exists at present. Despite many countries and organizations feeling differently about NASA they are constantly meeting this goal, most recently with a program called Didymos. (Didymos: NASA's DART planetary defense program to avert an asteroid with an atomic detonation in 2022).

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