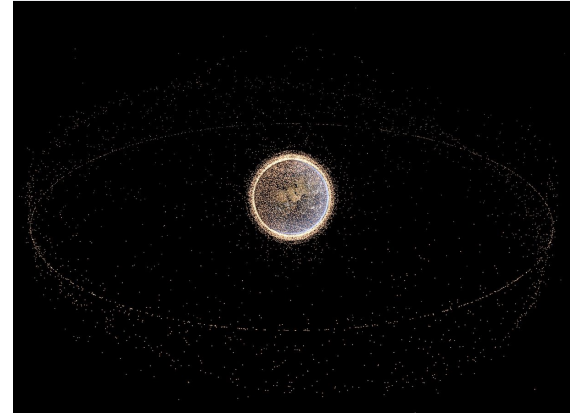


Sharing Space on Earth, in Outer Space, and Cyber Space

An Opening Anecdote

In 1995, after having dragged his feet for several years, the chairman and CEO of Microsoft, Bill Gates, finally decided to go all in on the internet. In a famous memo from that year titled "The Internet Tidal Wave," which he distributed to every employee at his company, he wrote, "now I assign the internet the highest level of importance... the Internet is the most important single development to come along since the IBM PC was introduced in 1981."

Serious competition from Marc Andreessen and other workers at the upstart Netscape Navigator had prompted Bill Gates to belatedly enter the chaotic and wild "frontier" of the World Wide Web. It is not that Gates and other leaders at Microsoft had failed to prepare for a new networked and interactive world. They knew it was coming, but they didn't expect it to take the form of an antiquated and relatively clunky set of protocols and text exchanges that was more closely associated with academia and the military establishment. They were preparing for what folks then referred to as the "information superhighway," which would be based on entertainment delivered through the television, not the computer. The computer, after all, was more closely associated with offices and work. Nonetheless, 1995 marked an important turning point for the internet as Microsoft unleashed its Internet Explorer web browser to compete with the dominant Netscape Navigator and introduced MSN (Microsoft Network) to compete with AOL (America Online), Prodigy, and other online service companies.



SHARING SPACE

AN OPENING ANECDOTE

SPACE, PERHAPS A FRONTIER?

LOVE AND LOATHING (ON) THE INTERNET

GENDERED SPACES

CLIMATE CHANGE AND THE TRAGEDY OF THE COMMONS

CONCLUSION: SHARING SPACE

The internet, sometimes written with a capital “i,” and sometimes pluralized without one, had a contentious and curious birth. However, what makes the virtual space especially unique and unstable, was its rapid and decentralized evolution. A largely unregulated space hosted on servers around the world and governed by open-source protocols, the internet has come to define our information age. Coming to life for the broader public right at the end of the Cold War, it brought with it an idealistic and optimistic attitude toward a new borderless and democratic world where people could meet with one another, exchange ideas, and create and consume content. However, by the mid-2010s, attitudes toward the internet had transformed, with many viewing the so-called Web 2.0 as a conflicted space defined more by its ample production of misinformation, nurturing of extremism, and depression- and anxiety-inducing “social” media.

The final episode in this module focuses on how humans have engaged with old and new spaces in the recent past. It draws from lessons learned in previous episodes, but it also explores new paths. It connects, for instance, theories about freedom of navigation on Earth’s oceans to the treaty of outer space, which once again attempted to create rules of conduct for a space that is difficult to occupy, like water. However, it also challenges the utility of these historical comparisons, noting the uniqueness of some of the spaces, like cyber space. The final section of this episode examines how nation states and national pressures have made it difficult to address global issues, like cyber warfare and climate change. The episode ends on a high note, however, by reflecting on the long and dynamic history of humans’ relationship with different types of space to help us imagine ways to resolve the challenges of the twenty-first century.

Key Terms:

The Space Race

Mutual Assured
Destruction (MAD)

Treaty of Outer Space

William V. S. Tubman

Cyber Space

World Wide Web

Advanced Research
Projects Agency

“Social” Media

Gendered Space

Anita Borg

Climate Change





Earthrise from the moon, 1969

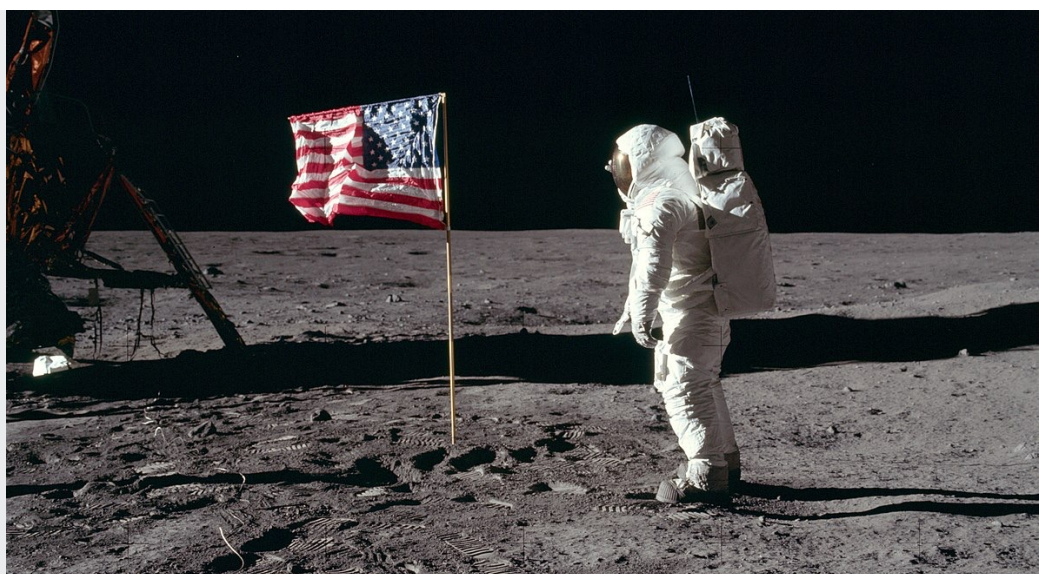
Big-Picture Questions

1. What lessons from the past can we apply to new and old spaces in the present? Is it possible to share space on Earth, in cyber space, and beyond?
2. In what ways are the internet and outer space unique spaces? In other words, why is it difficult to draw direct comparisons with the past when thinking about these spaces?
3. Why did the governance of cyber space and outer space diverge so much? How did these two governing paradigms impact the development of these spaces?
4. Why did the internet transform into such a contested and gendered space? How have countries and individuals adjusted to the toxicity of the internet?

Space, Perhaps a Frontier?

As we observed in the previous episode, a frontier is sometimes defined as “a region that forms the margin of settled or developed territory.” While we critiqued this definition when applied to places on Earth where humans lived, perhaps we would be more forgiving when applying it to outer space, unless, of course, life from other planets discovers us. The television series *Star Trek* famously described space as the “final frontier,” thereby linking its exploration with the long history of maritime and terrestrial voyages on Earth. The show’s creators likely drew this link to build a connection with the long (and dubious) history of colonization on Earth, pique the imagination, and sell people on space exploration during the early space race.

Buzz Aldrin, first man on the moon, salutes the U.S. flag, July 20, 1969

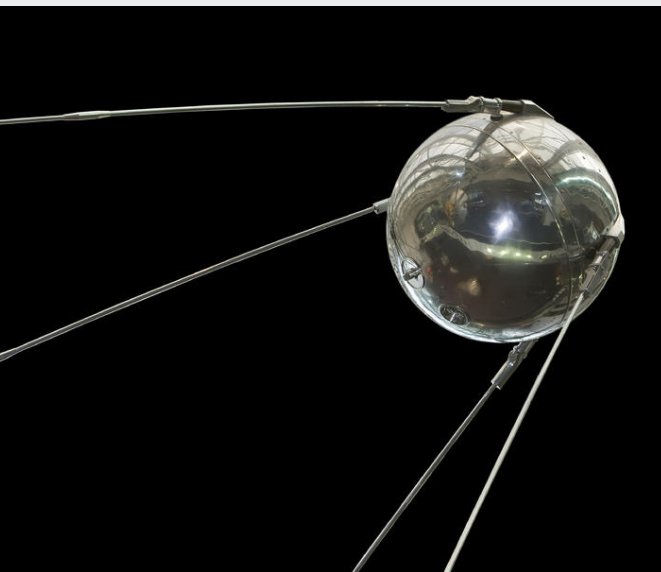


Frame from Méliès film, *Le Voyage dans la Lune*, 1902



Even before humans had managed to take flight in Earth's atmosphere, and even before Star Trek became a syndicated show, people had imagined journeying to outer space. In 1902, for instance, French film pioneer Georges Méliès dazzled the world with his *Le Voyage dans la Lune* (A Trip to the Moon), which offered a subtle critique of colonialism in addition to its eye-popping sets. When Nazi scientists, like Wernher von Braun, who would later design the Saturn V rocket that launched Americans to the moon, began tinkering with rocket technology at internment camps in Germany

during World War II, the realm of outer space began to feel much closer. The Soviet Union made the first leap to space with the aid of captured Nazi scientists of their own when they launched the Sputnik probe on October 4, 1957.



Replica of Sputnik 1 (above); Yuri Gagarin (below)



Sputnik 1 itself was just a spherical hunk of metal that transmitted a radio signal back to Earth, but it signified a new "space race." For citizens of the Soviet Union, it represented a major technological and propagandistic triumph, while for citizens of the United States, it brought about what writer Paul Dickson calls a "sudden crisis of confidence in American technology." A period marked by superpower one-upmanship ensued, with the Soviet Union sending cosmonaut Yuri Gagarin to space, and the United States throwing funds into its own Mercury and Apollo programs which would eventually see humans reach the surface of the Moon. Although Americans and Russians left the planet entirely, they still brought their parochial nationalisms with them. Of course, this competition trickled into other areas of society as well, such as kitchens, as seen in the famous Kitchen Debate at the Moscow Exhibition in 1959, but outer space captured the imagination in ways that kitchens simply could not.

Beyond its use as propaganda, Sputnik's triumph led leaders of the United States and elsewhere to worry about the possibility that the next satellite might contain a nuclear warhead rather than just a radio. Satellites in low-Earth orbit could launch weapons to the surface in mere minutes, which would greatly alter the calculus of countries that were increasingly banking on a nihilistic policy of Mutually Assured Destruction, or M.A.D. to guarantee peace. Mutually Assured Destruction relied on the viability of a retaliatory "second strike" to fulfill the "assured" part of the equation. The idea behind this policy was that countries would refrain from launching nuclear weapons at one another because they feared retaliation, but space would diminish this second-strike capability.

Back on Earth, many countries and individuals still tested the limits of the maddening new nuclear political order by supporting coups, crafting new defense treaties, and launching outright invasions. The American CIA helped coordinate coups in Republic of the Congo, Cuba, Chile, South Vietnam, and elsewhere. Israel and China launched border wars, annexing territory from their neighbors. And the United States and the Soviet Union launched full-scale invasions of Poland, Korea, Afghanistan, and other countries. In other words, although some might have argued that the era of high imperialism had ended with decolonization, it did not feel that way for many living during the time, and people must have assumed that the introduction of outer space to this milieu would only add another arena for conflict.



The International Space Station, May 30, 2011

Space is an odd space, however. With the cost of leaving Earth's orbit prohibitively high for most people and nations, space remained a highly exclusive arena. Unlike the fifteenth and sixteenth centuries, when the private sector and trade interests played a critical role in Chinese and Portuguese maritime endeavors, the early space race relied almost entirely on the academic and the military establishments. The vacuum of space, where limited friction makes Newton's First Law of Motion (inertia) much more relevant, is also a relatively difficult space to occupy, though satellites and space stations come close.

Reaching and maintaining an orbit might have some commonalities with floating on the seas if we would like to draw a comparison with our earlier discussion on the freedom of navigation, but objects in orbit have little regard for territorial sovereignty, buzzing overhead at astronomical speeds. Historical comparisons are helpful, but it is always important that they do not lead us astray. Space is vast, uncompromising, and, with the exception of low Earth orbit, relatively empty.

It might come as a surprise then that the nations that had well-developed space programs, as well as the nations that didn't, agreed to sign a treaty outlining behaviors and norms for outer space in 1967. The Treaty of Outer Space grew out of the Committee on the Peaceful Uses of Outer Space, which the UN established in 1958. The Treaty, which you can find in primary source collection six, called for the demilitarization of space, unrestricted mutual inspection access to facilities in space and on celestial bodies, and the banning of claims to extraterrestrial satellites. The Treaty in many ways preceded the technology that made it relevant, which perhaps made its negotiation and signing easier. To put it another way, it was probably easier to forego rights to colonize the Moon if you had no ability to do so in the first place.



Apollo 10, at the Kennedy Space Center, 1969



Star forming in the Large Magellanic Cloud (above); William V. S. Tubman (below)



The Treaty did not come without controversy, however. President William V.S. Tubman of Liberia, whose speech appears in primary source collection six as well, criticized the Soviet Union and the United States for their cavalier approach to technology and resource exploitation. Reflecting a broader attitude of a growing global counterculture, Tubman called for these superpowers to slow down and invest on Earth before rushing headlong into a new arena of potential conflict and inequality. He questioned the unfettered quest to push scientific boundaries, especially when it came at the expense of others.

Traveling to outer space, which captivated humanity from early science fiction films to Yuri Gagarin's famous mission aboard the Vostok 1 to Sally Ride's expedition aboard the space shuttle to the private missions proliferating today, challenges the paradigms of space and sovereignty that we have encountered thus far in this module. With a few exceptions, humans had ventured across nearly every ocean and sea and landed on nearly every habitable island on Earth before the advent of writing. By contrast, humans only breached the atmosphere, entering the vacuum of space, within the past seventy years. Our engagement with this novel medium is young, but hopefully the Treaty of Outer Space and the possibility of cooperation in space yield new ideas to aid an Earth that is increasingly in crisis. Before we address that topic, however, let us turn to another novel space that has defined our lives, cyber space.

SpaceX's 2020 Headquarters in California



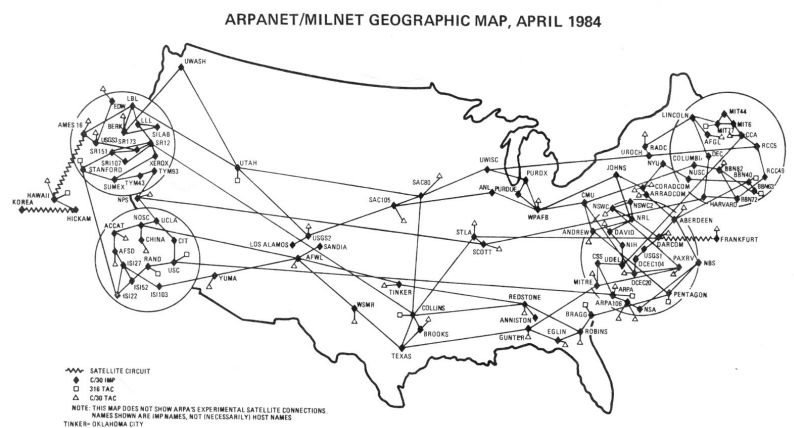


Cables connected to panel patch server

Love and Loathing (on) the Internet

Like outer space, cyber space is young and immersed in technology, but unlike outer space, cyber space is lightly regulated, highly contentious, and easily accessible. Whereas the Treaty of Outer Space largely succeeded in creating a demilitarized, or at least denuclearized space, the absence of any overarching treaty on cyber space is perhaps partially responsible for the growing and increasingly hostile phenomena of cyber warfare, doxing, extremist organizations, information bubbles, and invasions of privacy. Whereas outer space is exclusive due to the prohibitive cost of access, cyber space is highly though unevenly accessible. The CIA estimates that 4.9 billion people, or 63% of the world population had access to the internet in 2021.

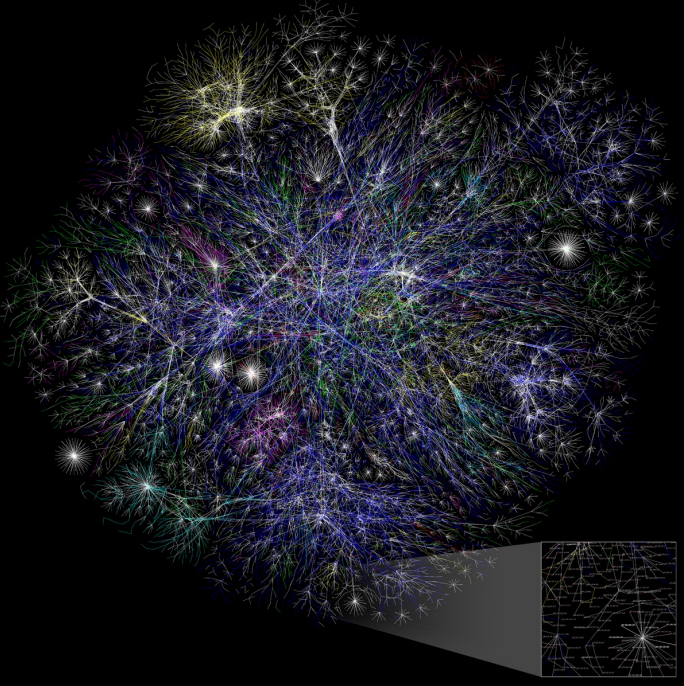
Many historians trace the origins of the internet to the Advanced Research Projects Agency Network, or ARPANET, which linked computers in the Advanced Research Projects Agency of the United States Department of Defense. In other words, the internet also had its origins in the military and academia in the United States during the height of the Cold War, just like many technologies used in the space race. However, this is where the comparison with the space race ends.



ARPANET/MILNET Geographic Map, 1984

The United States military, curiously enough, released their packet-switching protocol, the Transmission Control Protocol and Internet Protocol, or TCP/IP, to the general public in a bid to make their standard global. And they succeeded. TCP/IP has become “a kind of lingua franca for this new internet,” according to historian Roy Rosenzweig.

It would take a while for this new technology and protocol to take off, however. One of the reasons for this slow growth was the steep learning curve required for entry, which guaranteed the early internet would remain a highly academic space. Nonetheless, email and bulletin board systems fostered new forms of interaction and new communities, and the limited number of users made the space somewhat cohesive. This situation began to change with the introduction of the High-Performance Computing Act of 1991, which brought funding and support to the global network, and with the introduction of the World Wide Web (WWW), which brought the Hypertext Transfer Protocol, or HTTP, and the Hypertext Markup Language, or HTML. This protocol and markup language, which were introduced by the visionary scholar Tim Berners-Lee, a researcher at the European Organization for Nuclear Research, or CERN, standardized communications.



Partial map of the internet, 2005

This standardization allowed for new elements, like images, links, and Cascading Style Sheets, or CSS. This, in turn, captured the interest of corporations and advertisers. New web startups, like Netscape, which produced the famous Netscape browser; AOL, which pioneered dial-up services and chatrooms, as well as a CD mailing blitz; and Yahoo!, which pioneered search and web portals, competed with old media companies, like Disney, Time Warner, and NBC. For the most part, established corporations, like Microsoft, entered the World Wide Web belatedly because they saw no means to monetize the space, which led to what many nostalgically recall as an early non-corporate internet golden age. Don't worry about all the acronyms in these past few paragraphs. What is important to know is that the internet became standardized and more accessible.

Many people imagined the internet as an "information superhighway" that would bring knowledge to people and users together in frank and open conversation. If we are sticking with the genre of Star Trek futures to understand the dreams and hopes for these spaces, then Star Trek: The Next Generation, a show that celebrated a harmonious and interconnected "Federation of Planets," might better represent the internet than the dusty original series. Similarly, Larry Page and Sergey Brin, in their initial public offering, or IPO letter, captured all the idealism of this era when they situated their upstart company, Google, as a conduit to an open world where companies lived by the mantra: "don't be evil." In the year 2006, *Time* magazine went so far as to choose "You" as the Person of the Year, oozing with giddiness at a democratized world of user-generated content that the internet supposedly brought. In other words, in the 1990s and early 2000s, people viewed the internet with great optimism. However, if the "frontier" of the American West was merely a fading fiction as we established in the previous episode, then so to was this supposed glorious internet age.

Four years after selecting "You" as the Person of the Year, in a sign of things to come, *Time* magazine chose Mark Zuckerberg, the founder of Facebook, as its Person of the Year. "Social" media, and what some refer to as the Web 2.0, brought a corporatized and highly combative atmosphere to this young space. "Social" media, which might be better described as "connective" media because of the ways it undermines many human social interactions, has transformed the internet into a profit-making enterprise where companies and governments employ algorithms to collect data to profit from or control users. Corporations have discovered that sensationalism, video snippets and memes, and so-called information bubbles increase "clicks" and "likes," which in turn increases profits.

**Founder of Facebook Mark
Zuckerberg, 2008**



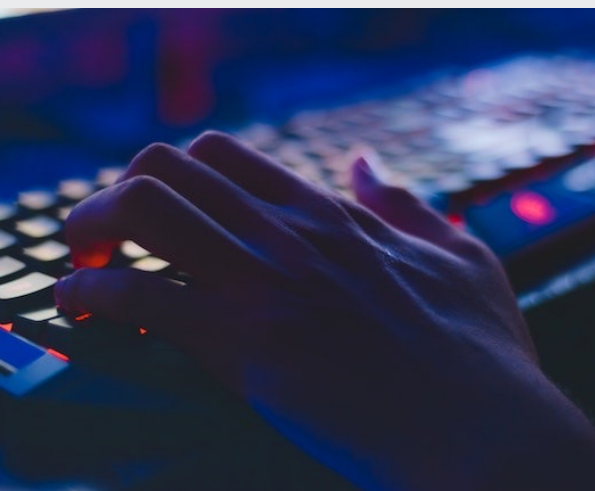
We have spent more time going over the technological building blocks of the internet and pioneering internet companies to highlight how the decentralized project transformed into a ubiquitous and highly contested space. You might have also noticed that we never actually defined the internet. That is because it has transformed so much over time, and it means different things to different people. If we go with the technical definition, it is merely a set of protocols and networked devices. If we zoom out and appreciate how the movement toward the “internet of things,” which calls for hooking up every piece of technology to the internet, has consumed many corporate missions, however, then we might argue that the internet could be almost anything. The internet is both highly accessible, as seen in the number of users who log on any given day, and highly controlled, as seen by the monopoly on standards enjoyed by the Web Hypertext Application Technology Working Group, or WHATWG, and the Unicode Consortium, which are dominated by American tech companies.



Stack of V. 32 modems, 2005

Just as some leaders, like William V.S. Tubman, cautioned people from jumping headlong into new technologies in the space race, many critics today caution people to reassess what the internet is and how it can influence people. Others express their frustration that the virtual space is defined primarily by American standards. As we pointed out earlier, the United States Department of Defense intentionally released TCP/IP protocols with this very intention in mind, but American technology corporations picked up the baton from there. Debates over the spread of new AI applications has only added new layers of complexity and self-reflection as societies grapple with the possibilities of AI-enhanced propaganda, deep-fakes, and job displacement.

Some countries, like China, have opted to remain part of this global space, but to strictly regulate and control it. Pundits from Europe, Japan, the United States, and elsewhere often critique what has come to be known as the “Great Firewall of China” for blocking some foreign companies, like Google and Facebook, from operating in that country. Others, however, like officials from Iran and Russia, have viewed China’s approach as sensible, adopting a similar form of internet control in their countries. Just like in the past when Siamese leaders attempted to make cartography fit their needs, people continue to search for ways to undermine the territorializing power of the internet and shape it to their own interests. For being a theoretically borderless space, the internet has become highly nationalized, and it appears like we are only at the beginning of this process.



Hand at a computer keyboard

For individual users, one of the main strengths and weaknesses of the internet is anonymity. Many sites, like Twitter, allow users to post anonymously, which on the one hand creates space for sharing dissenting opinions in a hostile atmosphere, but on the other allows for doxing, trolling, and other forms of online harassment. Doxing is when users publicize someone’s personal information, which allows others to physically target and threaten them. It is often a way to remove the cover of anonymity for a perceived enemy while preserving one’s own anonymity. Trolling is when users taunt or harass others online. These forms of harassment have transformed the internet into a hostile space for many, but women and members of the LGBTQ+ community have faced an especially troubling digital existence.

Gendered Spaces

***Katherine Johnson at the
Spacecraft Controls Branch of
NASA, 1966***



Despite women having played critical roles in developing the new technologies that allowed for space travel and the internet, many of them have retreated from these high technology fields in recent years. Women and queer individuals around the world have experienced relentless trolling and doxing campaigns. Film director Chen Kaige dramatized this treatment in his 2012 film, *Caught in the Web* (搜索). Increasingly, women are turning up lucrative careers in technology fields because they fear the toxicity of companies that have devolved into “boy’s clubs.” As they desert these fields, they leave them increasingly warped and myopic. In other words, many lucrative high technology fields have become gendered spaces.

Sociologist Daphne Spain, who studies gendered spaces, describes how “architectural and geographical spatial arrangements have reinforced status differences between women and men.” In other words, just like mythical frontiers, gendered spaces change expectations about and treatment of those who occupy them. One’s status and salary are often tied to the type of space one occupies. The receptionist’s desk holds a different value and status than the CEO’s office. Because computer science and engineering have become increasingly gendered, men around the world have unevenly benefited from the high salaries and social statuses they yield, but history has taught us that this shift was not and is not inevitable. In fact, it is arbitrary and intentional. The gendered nature of these spaces erodes women’s power, wealth, and voice, and it could have a major impact in gender relations in the future as these new spaces grow in importance.



Historically, women were at the forefront of creating and reaching these new spaces. Rear Admiral Grace Hopper, who received her PhD in mathematics from Yale University, helped develop and program Mark I during WWII, one of the first computers, as well as UNIVAC I, the first all-electric commercial computer. She also coined the term “bug” to describe an error in a program and co-designed one of the earliest programming languages, COBOL. Adele Goldberg, who received her PhD in information science from the University of Chicago, developed important concepts in object-oriented programming and graphical user interfaces, or GUIs. Engineer and cosmonaut Valentina Tereshkova was the first woman in space. Mathematicians Dorothy Vaughan, Katherine Johnson, and Mary Jackson played a critical role in calculating trajectories for the Mercury and Apollo missions. Anita Borg, who received her PhD in computer science from New York University, not only developed advances in emailing, but she also founded a programming support group for women known as Systems and the Institute for Women and Technology, which was later renamed the Anita Borg Institute for Women and Technology in her honor.

***Grace Murry Hopper in her office
in Washington D.C., 1978***



Industrial zone

Climate Change and the Tragedy of the Commons

Let us wrap up this reading with a brief comment on Earth in the twenty-first century. Space exploration and the advent of cyber space have shrunk the world. Video streaming platforms, like Netflix, have propelled South Korean dramas, like the Squid Game, into a global phenomenon. New internet bulletin boards, like Reddit, allow Europeans, Indians, and Americans to critically compare their health care systems. Web novel portals, like Qidian, launch budding authors to global stardom overnight. Companies like SpaceX livestream their launches for audiences around the world. Even as nationalisms solidify and protectionism reemerges, the world continues to feel smaller. Today we are so connected, yet so distant. This makes global challenges like climate change all the more pressing and complex.

Climate change affects us all, though some more than others. As sea levels rise, super storms ravage towns and cities, prolonged droughts dry up farmland, and heatwaves make living in some areas impossible, we are going to have to come up with new ways to approach our shared and shrinking space on this planet. Nearly two hundred years ago, an economist named William Forster Lloyd described a scenario in which herders who had access to shared, or common land overused that land to the detriment of all.

Many, including the controversial scholar Garrett Hardin, whose article appears in primary source collection seven, have extended this allegory to pollution and the human abuse of natural resources on Earth. These scholars would likely predict a dire end for humanity if they were alive to see the challenge of climate change, but hopefully the lessons we have seen in this module suggest alternative relationships with space and alternative possibilities for our future. We have, after all, proven to be resilient and adaptable.



Grazing sheep



Stars over mountain and lake

Conclusion: Sharing Space

Humans have invented creative ways to occupy, pass through, and share space. While a primary motive has been to maximize gain, be it capital or territory, at the expense of others, as seen in the Portuguese *carreira* "system" in the sixteenth century and British negotiations with Siam in the nineteenth century, efforts to share and preserve space, as seen in the Treaty of Outer Space and in Grotius' treaty on *Mare Liberum*, remind us that alternatives behaviors are possible. The Treaty of Outer Space hints at what we can do if we cooperate. National parks and nature preserves show that we can set aside space for preservation and shared use. In ways, political entities like the European Union and African Union harken back to earlier, more open political entities, like the ones we saw in Zomia and Southeast Asian Mandalas.

The challenges of the twenty-first century are daunting, but we have the tools to meet those challenges. With some spaces growing, like outer space and cyber space, and others shrinking, like habitable land on Earth, we will need to come up with equitable means to share these spaces for all. Fortunately, the past can help guide us, but it still won't bind us.

Globe detail of Southeast Asia



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Katherine Johnson, NASA employee, mathematician and physicist, working at the Spacecraft Controls Branch of NASA, 1966, NASA, Public Domain, https://en.wikipedia.org/wiki/File:Katherine_Johnson_at_NASA,_in_1966.jpg

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Mohan Reddy, Stars over mountain and forest, Public Domain,

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