International Journal of Communication 16(2022), 4739–4757 1932–8036/20220005

The Sociotechnical Imaginaries of 1968

ANDREA ALARCON
SOLEDAD ALTRUDI
FRANCES CORRY
University of Southern California, USA

MC FORELLE
Cornell Tech, USA

The following article is adapted from a multimedia research performance held at the conference The Fire This Time: Afterlives of 1968. In it, we delve into four case studies that exemplify a moment in the sociotechnical imaginaries of 1968: *Earthrise*, the iconic full photograph of the Earth; the tech demo that predicted the personal computer; a policy debate over the balance of power in the air quality control crisis; and the taken-for-granted emergency line, 911. Our analysis reveals how these technological moments, each of which represented a vision of a better world, were inextricable from the social realities and power dynamics present in their making. Furthermore, this work surfaces the nuances and unique perspectives that the sociotechnical imaginary as a theoretical framework can provide.

Keywords: science and technology studies, 1968, sociotechnical imaginaries, communication history

In 1968, the Foreign Policy Association released a book called *Toward the Year 2018*. In it, a group of prominent American professors, politicians, and researchers offered predictions spanning weaponry and weather, computers and communications, transportation and population, and beyond. Their visions ranged from the fantastic to the mundane, aiming to "set the technological context of social and international policy over the next fifty years" (Foreign Policy Association, 1968, p. vii). These experts predicted futures where scenarios as varied as computerized travel documents, weather control, and robotic warfare had all been invented, for the betterment of all mankind. For all the breadth of the scenarios these men imagined, what tied them together was an unshakeable, almost taken-for-granted belief that the solution to all the social unrest they were seeing around them could be found in and through technology.

Andrea Alarcon: alar450@usc.edu
Soledad Altrudi: altrudi@usc.edu
Frances Corry: corry@usc.edu
MC Forelle: forelle@cornell.edu
Date submitted: 2020-05-27

These visions are part of what science and technology scholars Sheila Jasanoff and Sang-Hyun Kim (2009) call sociotechnical imaginaries: "collectively held, institutionally stabilized and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology" (p. 5). Sociotechnical imaginaries are enacted through scientific or technological practices and are "almost always imbued with implicit understandings of what is good or desirable in the social world writ large" (Jasanoff & Kim, 2009, p. 122). Considered in these terms, it makes sense that alongside the authors' claims to expert prediction was the somber question: "Will our children in 2018 still be wrestling with racial problems, economic depressions, other Vietnams?" (Foreign Policy Association, 1968, book jacket).

That the book's concluding questions feel grimly ironic in the present inspires us to return to 1968. Yet we do so, not to understand the Foreign Policy Association's (1968) fantastic visions of the future, but to reexamine how the questions of social revolution posed that year were answered in part by technological means, each attached to their own vision of a particular future. Specifically, we approach this year as a historiographical point that, although clearly marked by social unrest and political struggles, was also the visible cultural highpoint of American techno-utopianism, an outlook that positioned science and technology as the engines for desirable improvements in near-future society (Nellis, 2013). Technological utopianism "does not refer to the technologies themselves. It refers to analyses in which the use of specific technologies plays a role in shaping an ideal or perfect world" (Iacono & Kling, 1996, p. 92).

To this end, we delve into four case studies that exemplify moments in the techno-utopian sociotechnical imaginaries of 1968.[1] The first is *Earthrise*, the photograph of the Earth taken by the first humans to orbit the moon. The second is the technological demonstration (popularly known as *tech demo*) that set the stage for the development of the personal computer. The third was the fruition of a longstanding policy debate over the balance of power in the air quality control crisis. The final considers the deployment of the now-taken-for-granted emergency line in the United States, 911.

The objects discussed in these four case studies let us glimpse the specific scientific and technological aspirations of 1968 and what they put forward as good, yet we fundamentally approach them as media that were instrumental in helping realize those imaginaries. Moreover, they reveal the institutionalization of techno-utopianism in the American governmental, corporate, and academic spheres. Through this, we see how those with power within them pushed techno-utopian thinking through different media to generate a certain "future-mindedness" (see Zelinsky, 1973, p. 54), cultivating an innate receptivity to innovation that would consequently legitimate grand, transformative projects.

[1]This article is adapted from a multimedia research performance that took place on October 5, 2018, as part of the conference The Fire This Time: Afterlives of 1968, which was held at the University of Southern California. The performance featured two large screens that displayed images, text, sounds, and video, a selection of which are included in this print adaptation.

Imaginaries of the Global

When asked to produce a mental image of the Earth, people today likely imagine something that resembles a blue round planet, a distinct colorful sphere against a dark background. This "blue marble" is a common representation of the modern imaginary of the global, understood as a shared visual impression of the space we inhabit as a species. Although it only became possible to actually *see* the whole Earth in space in the latter half of the 20th century, *imagining* what the planet looked like had long been done before that. Indeed, cosmography has an extensive and varied genealogy that has been expertly discussed by Cosgrove (2001), especially in what pertains to historical discourses of globalism. In this trajectory, our current mental image of the Earth as a symbolic signifier for our collective existence is something that can be traced back to the first actual photographs of the *entire* Earth, which entered the public domain in 1968. At the time, this imagery helped catalyze the environmental movements of the late 1960s and 1970s as it evoked a "one-world" discourse that promoted an a-political and unifying globalism. However, a critical recontextualization of these images as part of the Cold War Space Race sheds light on their political valence as technological instruments of hegemonic power.

Between 1966 and 1972, the National Aeronautics and Space Administration (NASA) ran the Apollo program as part of a military strategy that was, according to Kennedy (1961), committed to "achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to the earth" (para. 5). However, although the Apollo program was justified in terms of lunar exploration and the achievement of technological might, its most enduring cultural impact has not been knowledge of the Moon but an altered image of the Earth that has since shaped our collective imaginations of the global. Indeed, the most significant legacy of the Space Age is a photograph that would come to be known as *Earthrise*. Taken by the Apollo 8 crew on December 24, 1968, *Earthrise* marked the moment in history when a human being gazed at the *whole* Earth for the first time (Figure 1).

Figure 1. Earthrise, the photograph taken by Apollo 8 during the first manned mission to the Moon in 1968 (NASA, 2021).

Earthrise revolutionized our previous understanding of the earth and resonated with an emerging environmental movement. By showing a small and delicate blue planet spinning in space, suspended alone against the infinite, the photograph evoked the themes of finiteness, fragility, and human dependence on the biosphere, all of which have provided the chief impetus for environmental mobilization since the 1960s (Jasanoff, 2001). More importantly, in providing seemingly incontrovertible proof that "whatever else might separate us, we are all part of one species, forced to live together on the same fragile planet" (Boes, 2014, p. 157), *Earthrise* spawned a new globalism that transformed earlier imaginaries grounded in conceptions of the nation-state. Unsurprisingly, *Earthrise* has been credited with inducing a sudden and far-ranging shift in political consciousness; in this telling, the image inspired a "one-world" re-conception of life on earth and generated a heightened sense of interconnection (Cosgrove, 1994). Certainly, the picture itself sustains this globalist imaginary because it upsets the Western cartographic conventions as it erases the graticule, the principal signifier of Western knowledge and control. In this sense, *Earthrise* can be construed as a deeply political image that subordinates the boundaries of sovereign power to the movements of clouds, which evade human conquest or legislation.

However, the photograph is deeply political because it was bound up with institutions of power that had a vested interest in promoting that particular "one-world" imaginary (Jasanoff, 2015). As Jasanoff (2001) warns, images become persuasive only when ways of looking at them have been carefully prepared in advance, particularly through the creation of a stylized visual idiom or an interpretative tradition. Here, a fascinated media coverage of *Earthrise* consistently invoked the political idioms of unity and brotherhood under the benevolent-yet-powerful watch of the United States government. In fact, the entire Apollo project was a "highly choreographed affair in which the rhetoric of scientific exploration as a common human endeavor neatly coincided with its role as spectacular public entertainment" (Cosgrove, 2001, p. 256). Television was a key medium: almost all the missions were night launches, which worked to increase the televised drama of a burning inferno from which the elegant and technologically innovative rocket escaped into an ethereal space, and the dates of the missions were linked to public holidays, which guaranteed mass audiences (see Poole, 2008). For its part, the Apollo 8 mission spanned the Christmas period, which not only enhanced its public reach but also harnessed the ideas of peace and goodwill that are associated with this Christian festival—not incidentally, the live TV broadcasts of the crew in space started with a reading of the Genesis (Cosgrove, 2001; see also Poole, 2008, for controversy around such reading).

Print media further anchored this techno-globalist imaginary. *The New York Times* editorial on Christmas Day—a piece widely reproduced by the press across America and the English-speaking world—was titled "Riders of the Earth" and stated that

> [t]o see the earth as it truly is, small and blue and beautiful in that eternal silence in which it floats, is to see ourselves as riders on the earth together, brothers in that bright loveliness in the eternal cold—brothers who know now that they are truly brothers. (MacLeish, 1968, para. 5)

Similarly, *Time Magazine* heralded the Apollo 8 crew as "men of the year" pictured against *Earthrise*, which was equated to a "Dawn"—"not merely for the dazzling technology of their achievement, but for the larger view of our planet and the fundamental unity of mankind" (*Time Magazine*, as cited in

Cosgrove, 2001, p. 260). This enthusiasm also reached the counterculture, as Stuart Brand's (1968) the *Whole Earth Catalog* (especially the second and third editions) functioned as a site that welcomed the transforming impact of the view of the whole earth and held it as the ultimate example of how the experience of a few individuals could be disseminated by technology throughout the whole "global village" (Poole, 2008, p. 149).

Yet this last media example lets us begin to appreciate how these carefully orchestrated presentations—of the Apollo program as a force of modernity and progress brought about by science and technology, and of *Earthrise* within a "one-world" discourse—obscure power by normalizing an implicitly imperial spatiality, one where the proclaimed equality of locations is at odds with the reality of privileged hubs and centers of control. Here, whoever picked up a copy of the *Whole Earth Catalog* instantly became a visionary of sorts, someone who could suddenly enjoy "the power of a god to survey the whole earth below him" (Turner, 2010, p. 83). In this sense, *Earthrise* and the photographs taken during subsequent Apollo missions attest to the close relationship between gazing upon the world and striving to master it, one that places "seeing as the foundation of knowledge and power, and [. . .] the gaze–distanced, objective, and penetrating–as symbolically mastering, masculine and modern" (Cosgrove, 1994, p. 272).

Moreover, this program and its photographs need to be further situated within the intense geopolitical turmoil of the Cold War. Cemented by the launch of the USSR's *Sputnik* in 1957, the association between space and national security dominated the first space age (Poole, 2008). During this time, the geophysical sciences arose to prominence in the interest of defense because the surveillance of nuclear activity in the territory of the enemy demanded the ability to explore and patrol outer space. Consequently, the earth was strategically placed under surveillance through the gaze of technology at a time when gathering information about the earth became intimately linked to new information on enemies or potential enemies (Turchetti & Roberts, 2014). Thus, the infrastructure and research of the space program were deeply associated with the imperatives of surveillance, exploitation, control, and power.

Ultimately, *Earthrise* as media itself, as a captivating and widely reproduced photograph, helped bring about a planetary imaginary central to our current cosmic imaginations. But, for all its implications in the creation of a global-brotherhood consciousness, *Earthrise* and its corresponding one-world globalist imaginary arose out of scientific, political, and military assemblages that rendered geophysical data a valuable commodity in the fight for global hegemony and that trusted technology to bring about a *good* future. At the same time, the equally technocentric attitude of the counterculture evidenced in the *Whole Earth Catalog* further extended the ideals of the cold war American technocracy. Considering that our imaginaries of the global help organize "a myriad of political, moral, scientific and commercial imaginations" (Lazier, 2011, p. 606), it is crucial that we continue to expose whom they were wielded by and how they keep excluding those without the power to fully gaze or map the sky.

Imaginaries Through Performance

By 1968 computers were large, punched-card-reading machines, solving complex mathematical problems for the universities that housed them. Some technologists in California, aligned with the time's counterculture, pushed back on this institutional model, espousing individual access to computing as a tool

for equality (Turner, 2010). Among these engineers was inventor Douglass Engelbart, who, heeding Vannevar Bush's (1945) call to shift cheap electronics developed for World War II from destructive to constructive, began to build a collaborative-knowledge machine. Engelbart empathized with "the counterculture's notions of community and how that could help with creativity, rationality, and how a group works together" (Turner, 2010, p. 109). By using screens resembling those he used as a wartime radar technician, what Engelbart called a "workstation" aimed to better integrate material tools (pens, papers, meeting rooms) with human tools (language, memory, and communication; Doug Engelbart Institute, n.d.). His overarching goal was to increase human ability to deal with complex problems by facilitating collaboration and teamwork.

To gain support, Engelbart and his team produced a 90-minute public multimedia presentation to a room of 3,000 scientists and engineers to the Fall Joint Computer Conference in San Francisco in 1968 (Figure 2). The mouse, hypertext links, windowed user interface, and electronic mail all made their debut. The demo emphasized the "how" in conjunction with the "what": Engelbart typed a grocery list, for example, to display the machine's potential uses, its design, speed, and flow. As he later recalled, "The superimposed video image of the display screen showed that the cursor would follow it exactly . . . the audience could watch my hands in the lower window and see the computer in action in the upper window" (Engelbart, 1988, as cited in Bardini, 2000, p. 141). It displayed the computer response (clicking), to a human action (finger pressing): the first live public demonstration of human–computer "interactivity."

Figure 2. Live, 30 miles away from the lab at Stanford Research Institute (SRI), funded by the Defense Advanced Research Projects Agency (DARPA), the U.S. Department of Defense division responsible for developing military technologies (Courtesy of Douglas Engelbart Institute, n.d.).

According to Jasanoff (2015), theatricality gets short shrift in theorizing about imaginaries despite how "through the imaginative work of varied social actors, science and technology become enmeshed in performing

and producing diverse visions of the collective good" (p. 11). In this case, the enmeshment of the actors involved created a demonstration of part of Engelbart's own vision of the collective good, just as innovative as the vision itself. Engelbart described the experience as an actor performing in a spectacular play:

> I sat on stage in front of this large, packed auditorium . . . The lights were so bright I couldn't see the audience. I had these earphones on . . . I could hear Bill English . . . giving directions to the team . . . the show was carefully scripted, and I followed the script. The room was silent the whole time, and I had no idea how we were being received. Then, when it was all over and nothing had failed—phew . . . So the stage lights went down . . . I looked up and everyone was standing, cheering like crazy. (Jordan, 2004, para. 8)

His face projected largely on a 22-feet-high screen; the layout of the room and the audience chair setup created a movie theater-like experience: a collapse of the screen and the human, theater with movie. The behind-the-scenes production was lengthy, well-crafted, and costly, enlisting 17 engineers, designers, and different infrastructures. Since the computer sat at the Stanford Research Institute (SRI) 30 miles away, the team beamed the video along two microwave links to the venue, where Engelbart sat on stage. NASA loaned them the only video projector on the West Coast capable of projecting the transmission.

The convening of important players evidenced the concentration of institutional power (DARPA, Stanford, NASA, City of San Francisco for the cables) as well as scientific and technological knowledge, which culminated in the spectacular event (Landau, 2018). For example, the aforementioned Stewart Brand, editor of the *Whole Earth Catalog*, operated one of the cameras (Turner, 2010). Engineer Bill English, who had theater stage-manager experience, mixed and projected four different video signals beaming from the lab. Via intercom, he directed the team to generate the computer images or handle the cameras (Bardini, 2000, p. 140). Specially built electronics "picked up the control inputs from [Engelbart's] mouse, keyset, and keyboard and piped them down to SRI over a telephone hookup" (Bardini, 2000, p. 140). It all resulted in the debut of the first-ever teleconference, and the debut of the presentation format "demo," which refers to one specific form of *demonstration* that exhibits "a technological device, such as a piece of computer software, in action" (Rosental, 2014, p. 358). It is the *action* that distinguishes it from other types of presentations: the audience can witness the proof that this imaginary is possible, and more than that, that it works in the *now.*

Public demonstrations are (and have historically) been used across sectors, ranging from academic conferences to technology salespeople, marketing pitches, to street protests, and of course, in scientific and technological introductions to the public. Sociologist Erving Goffman (1974) explains demonstrations as "performances of a task-like activity out of its usual functional context in order to allow someone who is not the performer to obtain a close picture of the doing of the activity" (p. 66). Goffman (1974) spoke of ready-to-sell consumer products, such as a vacuum-cleaner salesman in a department store. His dramaturgical framework is employed in studies of "technoscientific drama" as an alignment practice between scientists and those who fund them (Möllers, 2016). The demo then is a mediated version of the "front stage," a polished demonstration of action, and the "backstage" where the unseen labor, entanglements, tensions, mistakes, interests, and politics that led to it remain.

The Engelbart demonstration, or "mother of all demos" (p. 42), as later called by journalist Steven Levy (1994), did not aim to set a scientific "truth" such as public scientific demonstrations in 17th-century England (Shapin & Schaffer, 1985). Since this was not a finished product, it was not a launch or a marketing pitch. However, like Goffman's (1974) assessment, it did allow the audience to immerse itself in a context-removed, close picture of a working human–computer interaction in real time. It was the inventor of an idea taking it directly to his audience: The demo was invested in enlisting support for his collaborative work philosophy. Rosental (2014) argues that currently demos serve a plethora of social purposes in addition to spectacle and persuasion. Through studying contemporary NASA demos, he states they "helped determine the very nature of the relationship between science and the public—not simply through the concepts they popularized but through the utopia they sometimes conveyed" (Rosental, 2014, p. 360).

However, in the context of 1968, the medium was as futuristic as the message. The combination of technological sophistication, creativity, and the novelty of interactive computing combined in an awe-eliciting spectacle, rather than feedback from the tech-savvy audience. Unlike the static, procured-from-above image of *Earthrise*, the demo invited the audience to imagine the uses alongside the team: unlike space travel, this was not only available to the military or the state, it had been created by one of them. After clapping, the audience left the room knowing that "the compulsion to interact with the machine no longer needed to be seen as a random oddity or weakness" (Streeter, 2011, p. 42). Some audience members later described Engelbart's vision as too abstract and removed from their lived, working reality (Landau, 2018). Yet for others, the real-time interactivity catalyzed thoughts of play with the machine, sparking engineering dreams rather than social problem-solving dreams more in line with Engelbart.

With time and lower cost of technology production, communication contexts for demos proliferated and purposes varied. 1985 MIT Media Lab's Nicholas Negroponte coined the phrase "demo or die" as his lab motto (Brand & Crandall, 1988). In 2014, then Director Joy Ito (2014) proposed moving from "future-predicting" to "future-making" in the TED talk titled "Want to innovate? Become a 'now-ist'":

> The demo only has to work once . . . [to have] companies being inspired by us and creating things like the Kindle or Lego Mindstorms. But today, with the ability to deploy things into the real world at low cost, I'm changing the motto . . . to "deploy or die." (Ito, 2014, 4:36)

Engelbart demoed (and clearly impacted the future), yet he did not deploy it in his present. The mouse and other computing features are embedded in contemporary personal computers, evidencing the team's impact. This marked separation between dreams of collaboration and the computing industry as we know it. Apple's engineers, for example, now demo for each proposed feature as it goes up the corporate ladder (behind closed doors), until the product is finished and ready to be deployed (Kocienda, 2018). At that point they use another type of demo, the spectacle-aimed demo for public product launches (Simakova, 2010) such as Steve Jobs's famous 1984 release of the Macintosh personal computer (Levy, 1994).

Engelbart wanted support for his sociotechnical imaginary: the utopian networked collaboration to solve humanity's problems. Part of his "failure" and eventual defunding was insisting on a holistic need for a "backstage" of the machine: the human environment meant to be used for and in. This included the layout of the workspace, as well as the—invisible in the demo—labor, including female anthropologists and

sociologists who he hired to facilitate the culture of community cooperation (Landau, 2018). He refused to let go of his vision, and eventually his key engineers moved to Xerox PARC lab to develop a personal computer geared for individual productivity rather than collaboration (Landau, 2018). An unexpected impact, however, was of the imaginary's presentation format; the demo is not only a technology-industry but also scientific community communication standard.

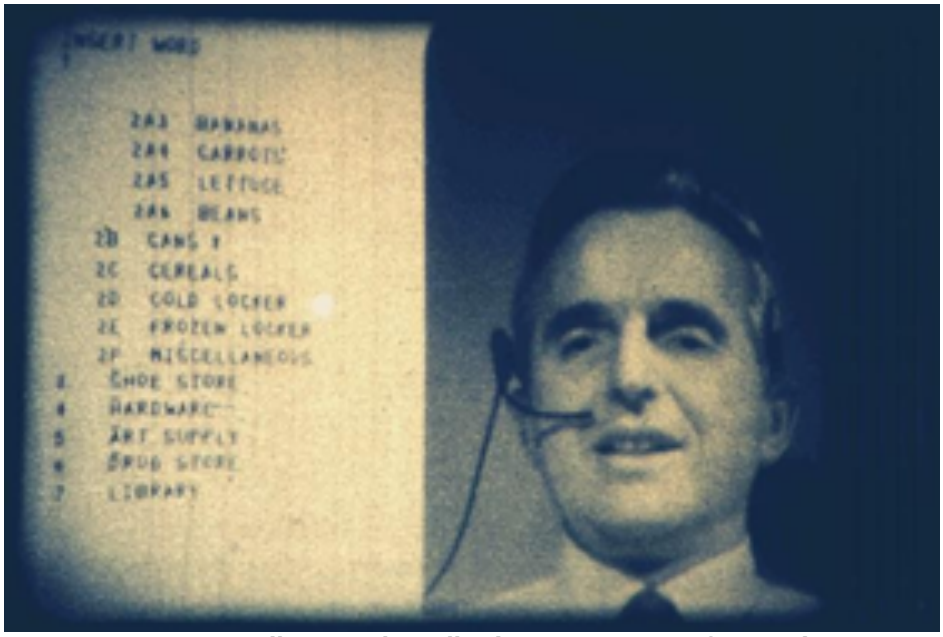

Figure 3. Large screen, Engelbart, at the Fall Joint Computer Conference in San Francisco's Civic Auditorium (Courtesy of Douglas Engelbart Institute, n.d.).

Imaginaries Through Policy

Jasanoff and Kim (2015) argue that "law . . . emerges as an especially fruitful site in which to examine imaginaries in practice. Legal disputes are in their very nature moments of contestation between disparate understandings of the good" (p. 26). Close examination of legal disputes reveals that imaginaries are built in layers, wherein policymakers debate not only the shape of a technological solution, but how the law itself will recognize, require, and accredit that technology—and even these seemingly procedural decisions still encode visions of what is good. By conducting an analysis of these procedural moments, we can explore not just *what* imaginary is being enacted, but *how* the law proposes to enact it—thus providing new insights into the ways that sociotechnical imaginaries assume, reinscribe, or occasionally redirect certain configurations of power.

In 1968, Americans saw the results of a decades-old policy debate over the government's ability and responsibility to address the air quality crisis, which culminated that year in the first deadline for the first federal technological requirements ever on automotive emissions. That is, in 1968, American consumers saw the initial results of the government's attempts to solve an environmental and public health problem by

mandating a design decision in a major consumer product, rather than leaving design decisions to industry. The implementation of this mandate was an instantiation of a sociotechnical imaginary, wherein clean air is a common good that the government must protect from corporate greed and industrial hubris through technological means. To accomplish this, the policy was written to compel the automotive industry to fulfill the technological goals of the government, whereas before the government had fashioned its goals after the imaginaries that the auto manufacturers themselves provided. In so doing, the government harnessed a growing cynicism about relying on corporations to act in the public good and rewrote the power dynamics between itself and the automotive industry, showing that the power of sociotechnical imaginaries comes not just from the technological visions they put forward, but also the policy approaches they use to accomplish those visions.

In the 1960s, future imaginaries of the car were in full force. The atomic age had enthralled car designers, with major manufacturers presenting an imagined future of cars where consumers would be driving faster, sleeker, and more stylishly. Under the hood, manufacturers were also experimenting with new kinds of engines that would provide drivers with more power and more speed. These innovations were producing impressive results; as engines became more powerful, American car ownership boomed, increasing nearly 50% nationwide during the 1960s (U.S. Census Bureau, 1999, p. 885). However, with this boom, harmful emissions from consumer vehicles amassed at an alarming pace. Car manufacturers were building more powerful engines, but not building them to run cleaner or more efficiently. As a result, these emissions were accumulating into smog, becoming a public health issue in many regions of the United States—but nowhere more so than in California.

Starting in the 1950s, California had been working to establish automotive emissions regulations at the state level, instead of waiting for the federal government to intervene. Rather than set a hard deadline that the automotive industry would have to meet, the California legislature took an approach that instead allowed the industry to work at their own pace. In 1960, the state legislature passed a law establishing a state board responsible for accrediting new emissions-control devices. Once the board had approved at least two control devices for use, all new vehicle registrations in the following year included the requirement that the vehicle be equipped with one of the devices.[2] With this regulation, California took what public policy scholars call a technology-following approach, whereby regulatory standards are presumed to be achievable using existing technology. Allowing the automotive industry to submit devices for accreditation at their own pace, rather than setting a deadline for submissions, assumed that the industry had already been working on such devices to begin with, or that they would quickly pivot to invest in developing them. As Krier and Ursin (1977) detail in their history of air pollution control legislation, this technology-following approach made sense at the time given that the California legislature assumed "automotive air pollution control technology existed and would soon be perfected; thus, the vehicular pollution problem could be 'solved' simply by requiring installation of the control technology" (p. 139). As a result, they conceived of the law as a force that could merely harness existing technological solutions, not compel the production of new ones.

[2] The board set the threshold at having two such devices approved to avoid creating a state-mandated monopoly; with two devices approved, consumers could choose between them, and the manufacturers would be forced to compete with each other.

The limits of the technology-following approach quickly became apparent. After all, technological solutions do not happen in a vacuum, but rather within complicated networks of economic, institutional, and social circumstances. On its face, the law did seem to take into account the financial challenges of implementing a new standard. The requirement that two devices must pass testing before the state would mandate their use was written with the industry's needs in mind, but in reality, this gave the auto industry the excuse to drag their feet. Consequently, in March 1964, four years after the requirement had been established, automakers told the California government that they still would not be able to produce devices to meet their standards until 1967. Just a few months later, though, independent manufacturers had submitted four separate devices to the state for testing, which were quickly approved. Within weeks, automakers announced that they had, in fact, developed devices that met these standards and, what's more, that they worked better than the independent products did. According to Miller and Solomon (2009), the speed with which auto manufacturers were able to jump in with their own emissions control technologies, seemingly in response to the threat of competition from independent manufacturers, raised many eyebrows within state and federal agencies.

Skepticism about the industry's motives was compounded by another scandal that was unfolding at the time. In 1965, Ralph Nader, then a young lawyer, had published *Unsafe at Any Speed*, a journalistic exposé revealing the corner-cutting practices in the automotive industry that put consumers at risk. Following the book's publication, the automotive industry responded by attempting to destroy Nader's image, going so far as to hire women to try to entrap him in illicit relationships. These plans were discovered, forcing GM President James Roche to publicly apologize to Nader in front of a Congressional committee.

Taken together, these events inspired lawmakers to reconsider the effectiveness of a technology-following regulatory approach: could an industry that so clearly prioritized the status quo really be relied upon to invest in developing new technologies for the public good? The federal government instead shifted to a technology-forcing approach, where the presumption is that regulatory standards cannot be met with existing technology; instead, industry must be compelled to develop new technologies to meet the regulatory requirements. These standards were established as part of a 1965 amendment to the Clean Air Act, which targeted cars produced for the 1968 model year. Unlike the California regulations, which made the activation of the standards contingent on the availability of the technology, these federal regulations made 1968 a strict cut-off year—essentially forcing auto manufacturers to have the technology ready by then.

This shift reflected a new approach to the power and purpose of legal regulation vis-a-vis technological innovation. Rather than running purely on the logic of technological progress, it became clear that the automotive industry was motivated by other concerns as well: public relations worries, market control, institutional foot-dragging. This series of missteps by the automotive industry allowed legislators to shift the power over the pace and direction of technological innovation from the private sector to the public. Once seen beholden to the industry's technical and economic expertise, now public policy was seen as a tool that could legitimately determine the pace and direction of technological innovation. This illustrates the utility of sociotechnical imaginaries not just in elucidating the imaginaries themselves, but also the mechanisms of power by which those imaginaries are put into practice.

Imaginaries Through Crisis

At 2:00 p.m. on February 16, 1968, the first 911 call was placed from a red telephone in the small town of Haleyville, Alabama. State senator Rankin Fite made the call from the Haleyville mayor's office, which was answered at the police station by U.S. representative Tom Bevill, who was joined by the head of the state's Public Service Commission and the president of the Alabama Telephone Company (Eschner, 2017). However, it wasn't an emergency that warranted the call, but rather celebration: a triumphant marker that the Alabama Telephone Company had successfully launched the United States' new, national emergency number 911.

Fifty years on, it is hard to conceive of 911 as a vehicle for imagining a technologized future. Unlike digital networks or space travel, 911 is a technology that feels unremarkable or apolitical; after all, infrastructure tends to fade from consciousness as it becomes integrated into the social world (Star, 1999). Close analysis of this artifact and its attendant discourses, however, reveals complex social, technical, and political relations.

Using 911 is largely celebrated as a life-saving technology, speeding connection to emergency services and ending the previous confusion over which 6- or 10-digit number to call when emergency services were needed. It is also heralded as a successful example of public communication, as it was rapidly explained to and adopted by the public, through programs in schools, on TV, and in newspapers. Its framing as a success story continues today. To wit, in 2018, to mark the 50th anniversary of the first call, the red telephone from Haleyville went on loan to the Smithsonian's National Museum of American History (Eschner, 2017).

These discourses position 911 as a supremely American invention, a small-town symbol of U.S. exceptionalism. However, the United States was not the first to implement a centralized emergency line. The United Kingdom first did with 999 in 1937 in response to a deadly London fire (McAlpine, 2015). This 31-year lag between the United Kingdom's implementation of an emergency line and its implementation in the United States is remarkable. If the technology had been feasible since at least 1937, why was the first emergency number not implemented in the United States until 1968? What "desirable futures" motivated the United States to finally catch up, and what "shared understandings of forms of social life and social order" animated them (Jasanoff, 2015, p. 4)?

We enter these questions of the sociotechnical imaginary through the frame of *crisis*, and position 911 as a type of *crisis communication*. Crisis speaks to 911 in a few senses. There is one specific to this case, of 911 being the number called in times of perceived crisis. It is also specific to this special issue, of 1968 as a time of crisis in that it is a year understood as an inflection point for political, moral, and cultural changes. The mid-to-late 1960s were also seen as a time of crisis by American politicians and much of mainstream America, as a crisis in cities, a time of urban "rioting," and also of "urban crime," as newspapers from this era attest to (e.g., "Bring Battle Equipment," 1968). These were problems largely blamed on the poor, on communities of color—particularly Black communities—in the United States' urban metropolises (Hall, Critcher, Jefferson, & Roberts, 1978; Hinton, 2016).

Political discourse from 1968 also centered the idea of crisis, especially in relation to rising crime rates. As Richard Nixon and Hubert Humphrey faced off in that year's presidential election, Nixon chose "law and order" as his major platform. A campaign commercial from that year offers a vivid illustration of the crisis framing. Drug use, weapons, and struggles with police flash at increasing speed, screeching music plays, as Nixon's voice narrates:

> We owe it to the decent and law-abiding citizens of America to take the offensive against the criminal forces that threaten their peace and their security and to rebuild respect for law across this country. I pledge to you: the wave of crime is not going to be the wave of the future in America. (New York Historical Society, 2020, 0:00:27)

While the crisis seems to reach an historiographical apex in 1968, the moral panic about a crime wave had been around for several years. In the 1964 presidential campaign, Republican candidate Barry Goldwater reminded everyone that "the war against crime [is] the only needed war" (Rovere, 1964, para. 3), and LBJ's term from 1965 to 1968 was marked by sweeping legislation waged as his own "war on crime" (Hinton, 2015). As Stuart Hall and colleagues (1978) note in *Policing the Crisis: Mugging, the State, and Law and Order*, this moral panic around crime was significantly mapped to Black communities and radical political movements of that era. As Hall and colleagues (1978) describe, terms assigned to this crisis, like "mugging," became proxies for a "whole complex of social themes in which the 'crisis of American society' was reflected:

> These themes included: the involvement of blacks and drug addicts in crime; the expansion of the black ghettos, coupled with the growth of black social and political militancy; the threatened crisis and collapse of the cities; the crime panic and the appeal to 'law and order'; the sharpening political tensions and protest movements of the 1960s leading into and out from the Nixon-Agnew mobilization of 'the silent majority' and their presidential victory in 1968. These topics and themes were not as clearly separated as these headings imply. They tended, in public discussion, to come together into a general scenario of conflict and crisis. (pp. 19–20)

When we examine this "general scenario of conflict and crisis" (Hall et al., 1978, p. 20), 911 stops seeming so benign. We start to glimpse how an imaginary of crisis that surrounds political and racial tensions could motivate technological implementation not purely toward a desired future, but rather, from a defensive stance—that without some technological innovation, an *undesirable* future would be wrought. Thus, while imaginaries are typically thought of as motivating development in the direction of a desired future, they are also significantly motivated by fear, panic, and crisis. As Jasanoff (2004) explains, "imaginations of desirable and desired futures correlate, tacitly or explicitly, with the obverse—shared fears of harms that might be incurred through invention and innovation, or the failure to innovate" (pp. 4–5). Indeed, there was an attempt to implement a common emergency line in 1961 in Los Angeles; the campaign for it emphasized fire, medical, and police services equally. It was ultimately shelved because of bothersome jurisdiction squabbles (Fontenot, 2014).

Crisis, then, is the context in which 911 ultimately emerged. Motivated by widespread cultural panic about law and order, Johnson's war on crime included a landmark study by the President's Commission on Law Enforcement and Administration of Justice that culminated in the 1967 report "The Challenge of Crime in a Free

Society." The report issued 200 specific recommendations: one of these was 911. Couched between proposals for systems analysis and command and control, the report recommended that "a single police telephone number should be established, at least within a metropolitan area and eventually over the entire United States" (President's Commission on Law Enforcement and Administration of Justice, 1967, p. 250). The number, they explain, should be created to speed the apprehension of criminals and stop crime in its tracks. Thus, 911 was made to *first* call the police, though all emergency services would later be collapsed under this number. What this suggests, then, is that the perception of a crime crisis—one wrought by racialized others against White communities—became the ultimate motivating factor in this technology's implementation.

Reading 911 through the lens of crisis reveals not just a racialized story of the emergency line but also shows that technological implementation is not simply a triumphant march of American innovation, as the red telephone at the Smithsonian might have us think. Rather, the implementation of technology is deeply tied to the political, social, moral and cultural conditions of its era. The creation of 911 is one of many controversial artifacts of 1968—a year of crisis, a year of moral panic with racialized roots, a year when fights for liberation came up against forceful and calculated backlash—that continues to shape life today, however discreetly.

Conclusion

As the other articles in this special issue show, 1968 is a rich site for studying the ways that social movements, political resistance, and cultural upheaval catalyzed visions of the future that contended with the roles of politics and power. But for each of the case studies in this article, these dynamics were not always evident in the face of the techno-utopianism that was dominant at the time. By using the framework of sociotechnical imaginaries, our case studies surface the nuanced entanglements and motivations (ideological, material, and political) behind the technological developments presented to the public as ideal solutions.

On the one hand, critically recontextualizing Engelbart's demo and *Earthrise* reveals their dependence on the material, political, and sociotechnical imaginary capabilities of NASA and DARPA. Additionally, it reveals how, as media, both cases acted as proof of technoscientific advancement for public consumption while they dictated the terms of global, utopian sociotechnical imaginaries. Although enveloped in a "one-world" imaginary, *Earthrise* arose out of scientific, political, and military assemblages that rendered geophysical data a valuable, hegemonic commodity, locating technology as the purveyor of a *good* future, one with a normalized, American, imperial spatiality. This case also shows that enthusiastic media coverage as well as the seemingly incontrovertible piece of photographic evidence of global brotherhood and progress worked to cement the sociotechnical imaginary of the American Cold War technocracy. Engelbart's sociotechnical imaginary of countercultural, collective problem solving did not fully translate into his awe-inspiring demo. Yet the case underscores the impact of the magic of technology display as a medium through which imaginaries enlist support. While the mouse, hyperlinks, and other computing features proposed were absorbed by the personal computing industry worldwide, the leaving-behind of Engelbart's imaginary of collaboration shows the risks of sociotechnical "inspiration," and the eventual triumph of mass commodity production for individual productivity.

On the other hand, through air pollution legislation and 911 we can see the ways that techno-utopianism is motivated not only by visions of "hope" and "progress," but by dystopian visions of cynicism and fear. In the instance of automotive technology air pollution control regulation, 1968 marked a shift from previous policy approaches that deferred to the authority of the private sector to an approach that compelled compliance. Here, we see how sociotechnical imaginaries play out not only in public discourse, where automakers lost the trust of the public, but also in the intricacies of policymaking, where this loss of trust inspired a turn to new regulatory mechanisms. Finally, the implementation of a common emergency line shows how racialized discourses powerfully shape technological development in the United States, resulting in artifacts that continue to be used today but whose politics have faded from mainstream view. Through 911, we see the founding of infrastructure based on an imaginary of a 'secure' future, in control or dominance of those we are told to fear.

Revisiting these sites through the lens of the sociotechnical imaginary helps us foreground the political, economic, cultural, and racial circumstances that shaped them. Moreover, it shows the ways that in times of complex social struggle, technologies have been offered up as panacea. Techno-utopianism, the ideological line that cuts across these imaginaries, can flatten or obscure the social trajectories (and interests) behind the eventual culmination of proposals for social good. As we've shown here, these technological fixes are, in fact, never outside of already dominant vectors of power; rather, following contemporary analyses (e.g., Ferrari, 2020), we can see how these technological solutions may become a means of intensifying these power relations. In the context of 1968, this included an imagined future that, even if intending to disrupt the status quo, attended above all to the interests of state power.

This article, then, points at once toward an understanding of 1968 as a year of radical potential met in part by sociotechnical imagining, just as it underscores how sociotechnical imaginaries may bring about futures where power relations are not radically reshaped so much as furthered according to those already in power. Crucially, while the technologies of 1968 may have mutated as powerful symbols ushering in a renewed future, technology is still offered as the best solution for our most pressing social problems—but in ways that still benefit the already-powerful, rather than actually refiguring power relations. Notably, they are problems that, in some ways, look very similar to those that arose in 1968: for instance, that global unity will be achieved through social media, that problems of labor will be fixed with AI, that the climate crisis might be solved by electric cars, or that crime will be stopped through predictive policing. If anything, these technological solutions emphasize the increasing presence of corporate dictations of the future.

Providing a detailed genealogy of each of these technologies is beyond the purview of this article. Moreover, the analysis is circumscribed to separate instances of American imaginaries in terms of who gets to construct the one-world imaginary, define what collaboration through computing should look like, or determine how technologies should solve problems of pollution or crime. Yet it offers a provocation to examine eras of great upheaval—like today—and refuse to take for granted the technological utopias offered to us. Instead, it asks us to interrogate those visions of the good as sociotechnical imaginaries presented as radical change, but that rather come from, and continue to serve, the already powerful institutions in our world.

References

Bardini, T. (2000). *Bootstrapping: Douglas Engelbart, coevolution, and the origins of personal computing*. Stanford, CA: Stanford University Press.

Boes, T. (2014). Beyond whole earth: Planetary mediation and the Anthropocene. *Environmental Humanities, 5*(1), 155–170. doi:10.1215/22011919-3615460

Bring battle equipment; riots ease mayor sets curfew for all under 21. (1968, December 31). *Chicago Tribune* (1963–1996). Retrieved from https://www.proquest.com/historical-newspapers/bring-battle-equipment-riots-ease-mayor-sets/docview/175866497/se-2?accountid=14749

Brand, S. (1968). *Whole Earth catalog*. Menlo Park, CA: Portola Institute, 1968–1970.

Brand, S., & Crandall, R. E. (1988). The media lab: Inventing the future at MIT. *Computers in Physics, 2*(1), 91–92. doi:10.1063/1.4822669

Bush, V. (1945). As we may think. *The Atlantic Monthly, 176*(1), 101–108. Retrieved from http://web.mit.edu/STS.035/www/PDFs/think.pdf

Cosgrove, D. (1994). Contested global visions: One-world, whole-earth, and the Apollo space photographs. *Annals of the Association of American Geographers*, *84*(2), 270–294.

Cosgrove, D. (2001). *Apollo's eye: A cartographic genealogy of the earth in the western imagination*. Baltimore, MD: Johns Hopkins University Press.

Doug Engelbart Institute. (n.d.). *Archive collection*. Retrieved from https://www.dougengelbart.org/content/view/243/253/#Firsts

Eschner, K. (2017, February 16). *"9-1-1" has meant "Help, please" for 49 years*. Retrieved from www.smithsonianmag.com/smart-news/9-1-1-has-meant-help-please-49-years-180962143

Ferrari, E. (2020). Technocracy meets populism: The dominant technological imaginary of Silicon Valley. *Communication, Culture and Critique, 13*(1), 121–124. doi:10.1093/ccc/tcz051

Fontenot, D. R. (2014). *Crime, emergency, discourse, and technology: The war on crime and the 9-1-1 Emergency Response System* (Unpublished doctoral dissertation). University of California, Irvine, CA.

Foreign Policy Association. (1968). *Toward the year 2018*. New York, NY: Cowles Education Corporation.

Goffman, E. (1974). *Frame analysis: An essay on the organization of experience*. Cambridge, MA: Harvard University Press.

Hall, S., Critcher, C., Jefferson, T., & Roberts, B. (1978). *Policing the crisis: Mugging, the state, and law and order*. London, UK: MacMillan Press.

Hinton, E. (2015). "A war within our own boundaries": Lyndon Johnson's great society and the rise of the carceral state. *The Journal of American History, 102*(1), 100–112.

Hinton, E. (2016). *From the war on poverty to the war on crime: The making of mass incarceration in America*. Cambridge, MA: Harvard University Press.

Iacono, S., & Kling, R. (1996). Computerization movements and tales of technological utopianism. In R. Kling (Ed.), *Computerization and controversy* (2nd ed., p. 92). San Diego, CA: Academic Press.

Ito, J. (2014, March). *Want to innovate? Become a "now-ist"* [Video file]. Retrieved from https://www.ted.com/talks/joi_ito_want_to_innovate_become_a_now_ist

Jasanoff, S. (2001). Image and imagination: The formation of global environmental consciousness. In E. Miller, (Ed.), *Changing the atmosphere: Expert knowledge and environmental governance* (pp. 309–337). Cambridge, MA: MIT Press.

Jasanoff, S. (2015). Future imperfect: Science, technology, and the imaginations of modernity. In S. Jasanoff & S. H. Kim (Eds.), *Dreamscapes of modernity: Sociotechnical imaginaries and the fabrication of power* (pp. 1–33). Chicago, IL: University of Chicago Press.

Jasanoff, S. (Ed.). (2004). *States of knowledge: The co-production of science and the social order*. New York, NY: Routledge.

Jasanoff, S., & Kim, S. H. (2009). Containing the atom: Sociotechnical imaginaries and nuclear power in the United States and South Korea. *Minerva, 47*(2), 119–146. doi:10.1007/s11024-009-9124-4

Jordan, K. (2004, January 1). The click heard round the world. *Wired*. Retrieved from https://www.wired.com/2004/01/mouse

Kennedy, J. F. (1961, May 15). *Address to Joint Session of Congress May 25, 1961 | JFK Library*. Retrieved from https://www.jfklibrary.org/learn/about-jfk/historic-speeches/address-to-joint-session-of-congress-may-25-1961

Kocienda, K. (2018). *Creative selection: Inside Apple's design process during the golden age of Steve Jobs*. New York, NY: St. Martin's Press.

Krier, J. E., & Ursin, E. (1977). *Pollution and policy: A case essay on California and federal experience with motor vehicle air pollution, 1940–1975*. Berkeley: University of California Press.

Landau, V. (2018, January). How Douglas Engelbart invented the future. *Smithsonian Magazine*. Retrieved from https://www.smithsonianmag.com/innovation/douglas-engelbart-invented-future-180967498/

Lazier, B. (2011). Earthrise; or, the globalization of the world picture. *The American Historical Review, 116*(3), 602–630. doi:10.1086/ahr.116.3.602

Levy, S. (1994). *Insanely great: The life and times of Macintosh, the computer that changed everything*. New York, NY: Viking.

MacLeish, A. (1968, December 25). A reflection: Riders on Earth together, brothers in eternal cold. *The New York Times*.

McAlpine, F. (2015). *999 vs 911: How did Brits and Americans get their emergency numbers?* BBC America. Retrieved from https://web.archive.org/web/20200926000711/https://bbcamerica.com/shows/anglophenia/blog/2014/11/999-vs-911-brits-americans-get-emergency-numbers

Miller, P., & Solomon, M. (2009, June). A brief history of technology-forcing motor vehicle regulations. *EM Magazine*, 4–8.

Möllers, N. (2016). Shifting in and out of context: Technoscientific drama as technology of the self. *Social Studies of Science*, *46*(3), 351–373. doi:10.1177/0306312716638951.

NASA. (2021). *Earthrise* [Photograph]. NASA. Retrieved from https://www.nasa.gov/multimedia/imagegallery/image_feature_1249.html

Nellis, M. (2013). Techno-utopianism, science fiction and penal innovation: The case of electronically monitored control. In M. Malloch & B. Munro (Eds.), *Crime, critique and utopia* (pp. 164–189). London, UK: Palgrave Macmillan.

New York Historical Society. (2020, May 28). *Presidential ad: "Crime" Richard Nixon (R) v. Hubert Humphrey (D) v. George Wallace (I)* [1968—FEAR] [Video file]. Retrieved from https://www.youtube.com/watch?v=UcgedBioXDQ

Poole, R. (2008). *Earthrise: How man first saw the Earth*. New Haven, CT: Yale University Press.

Rosental, C. (2014). Toward a sociology of public demonstrations. *Sociological Theory, 31*(4), 343–365. doi:10.1177/0735275113513454

Rovere, R. H. (1964, September 26). The Goldwater campaign. *The New Yorker*. Retrieved from https://www.newyorker.com/magazine/1964/10/03/the-campaign-goldwater

Shapin, S., & Schaffer, S. (2011). *Leviathan and the air-pump: Hobbes, Boyle, and the experimental life*. Princeton, NJ: Princeton University Press.

Simakova, E. (2010). RFID "Theatre of the proof": Product launch and technology demonstration as corporate practices. *Social Studies of Science, 40*(4), 549–576. doi:10.1177/0306312710365587

Star, S. L. (1999). The ethnography of infrastructure. *American Behavioral Scientist*, *43*(3), 377–391. doi:10.1177/00027649921955326

Streeter, T. (2011). *The net effect: Romanticism, capitalism, and the Internet*. New York, NY: New York University Press.

Turchetti, S., & Roberts, P. (2014). Knowing the enemy, knowing the Earth. In S. Turchetti & P. Roberts (Eds.), *The surveillance imperative: Geosciences during the cold war and beyond* (pp. 1–19). New York, NY: Palgrave Macmillan.

Turner, F. (2010). *From counterculture to cyberculture: Stewart Brand, the whole Earth network, and the rise of digital utopianism*. Chicago, IL: University of Chicago Press.

U.S. Census Bureau. (1999). *Statistical abstract of the United States: 1999*. U.S. Census Bureau. Retrieved from https://www.census.gov/library/publications/1999/compendia/statab/119ed.html

United States Government. President's Commission on Law Enforcement and Administration of Justice. (1967). *The challenge of crime in a free society*. Washington, DC: US Government Printing Office.

Zelinsky, W. (1973). *The cultural geography of the United States*. Englewood Cliffs, NJ: Prentice Hall.