

## Heritage of Our Times

If / we get through 1972, Fuller says, we've / got it made  
—John Cage, *A Year from Monday*



The move away from a monolithic model of federally funded R&D defense labs toward a complex public-private model of symbiotic entrepreneurship has, since the late 1960s, massively redistributed and dispersed relations among science, technology, business, and government to the point where there is often no clear distinction between private tech entrepreneurialism and federal sponsorship. The free-market model of defense R&D, though, is entirely in keeping with the broader reshaping of economic and institutional life along neoliberal lines that has occurred since the 1970s. Here, as Philip Mirowski has made plain, Cold War math and physics and the theoretical models they produced leaked into economics through the influence of cybernetics and interactions between the Cowles Commission at the University of Chicago and RAND (Mirowski 2002, 215–222; see also Christ 1994; Van Horn and Klaes 2011). Among the key participants here was economist and mathematician Kenneth Arrow, who, with Gérard Debreu, developed formal proof of “general equilibrium,” a model of the perfect free market (see Amadae 2003, 83–132). As markets came to be seen as too complex to be understood (and thus managed), the notion of the autonomous and self-correcting market not only appealed to the cybernetically inclined but also seemed to confirm suspicions that the New

Deal model of a planned economy was, like its Soviet cousin, not only ideologically dubious but unscientific. Public choice theory, developed by Mont Pelerin Society members James Buchanan and Gordon Tullock, which applied economic tools to the study of political behavior, drew directly on the rational choice models worked out at RAND that concluded that rational individuals do not cooperate to achieve common goals unless coerced.

As we have seen, progressive liberalism delivered a conception of science and technology as coterminous with democracy and creativity that was realigned during and after World War II as a mode of expert technocratic managerialism. The emerging neoliberal conception of the rational individual preserves the Enlightenment virtues of rationality and the free individual that underpinned progressivism but effectively jettisons the notion of the public sphere and its associated attributes (deliberation, cooperation, the idea of a common good) that were taken to underpin the liberal project. Rational choice liberalism delivered a scientific understanding of human interaction as a riposte to the purported scientific theory of Marxism and communism but, as S. M. Amadae notes, it is “not without historical irony that the ideological front of American society’s hard-fought war against communism and the Soviet Union may, inadvertently, have eroded the meaningfulness of the term ‘American society’” (2003, 4). The restricted neoliberal conception of the state—that it serve largely as the guarantor of free competition—is already there in the late 1960s realignment of the military-industrial complex according to the entrepreneurial model.

One of the effects of growing public challenges to the entwined militarized relation between government and science during the late 1960s and 1970s was the retreat of the direct military funding of university research. The Mansfield Amendment to the Military Procurement Authorization Act of 1970 (Public Law 91-121), for example, required agencies to divest themselves of non-mission-oriented research. Though this led the military to cancel a number of projects that were not obviously related to defense, while allowing directly defense-oriented research to continue, other organizations such as the National Science Foundation (NSF) took over the funding of programs previously supported by the Defense Advanced Research Projects Agency (DARPA). Student protests during the period also led some universities to formally separate themselves from military-funded research units (such as the Stanford Research Institute, and the Draper Laboratory at MIT), which were reconstituted as independent not-for-profit organizations that continued to receive military support (see Weiss 2014, 36). A commercial rerouting of funding streams also occurred in biotechnology. Antiwar sentiment in the US

led President Nixon to ban the development of offensive biological weapons in November 1969, and the UN Biological Weapons Convention, aimed at prohibiting the development, production, and stockpiling of such weapons, was ratified by the US in 1972. Nevertheless, aware that a secretive state like the USSR would have the advantage in any biotech arms race, the US kick-started a commercial dual-use biotech industry, shifting over into the commercial sector the research previously undertaken in government labs (34–35).

This realignment, however, did not solve the growing sense, during the 1970s, that the US government was no longer the dominant force in technological innovation. The most enterprising firms in electronics increasingly preferred the commercial market to the government sector. The economic challenges of the 1970s and the rising technological leadership of Japan, along with recognition by US intelligence in 1977 that the Soviet Union had reached parity with the US in terms of nuclear capability and shrinking government investment in R&D, demanded a new strategy through which the US could recapture its dominant position. Secretary of Defense Harold Brown charged William Perry, deputy director of research and engineering, with implementing what Brown called the Offset Strategy. Focusing on information technology, Perry had to find new ways for the DoD to tap into the advanced technologies no longer generated by big government defense contractors but by commercial tech companies (Weiss 2014, 37). Through the 1980s, programmatic, procurement, and institutional reforms were introduced that were designed to create a more effective fit between defense and commerce. This included two reforms of 1980, signed into law by the outgoing President Carter, that incentivized both the DoD and the commercial sector to work for their mutual benefit. The Bayh–Dole Act allowed small companies and universities to retain ownership over government-sponsored innovations (Crow and Tucker 2001, 7–8), while the Stevenson–Wydler Technology Innovation Act was the first in a series of laws designed to encourage the Department of Energy’s National Laboratories to commercialize their research (Mirowski and Sent 2007, 657). From the end of the 1970s, defense research became increasingly conceived as an entrepreneurial activity (Weiss 2014, 40).

Although the emphasis has changed over subsequent decades, with Reagan militarizing technology during the 1980s and Clinton civilianizing technology in the 1990s, the broad effect of each approach recognized the interrelationship of commercial and defense R&D and their combined importance in furthering US strategic dominance. The Reagan administration pushed hard toward commercial innovation as a way to maintain technological leadership through patent, procurement, and organizational reforms, the promotion of

US semiconductor, silicon-based, and software research and development, and by revamping Department of Energy labs as drivers of entrepreneurial and commercial innovation. The trend since the 1980s has been less about finding commercially relevant applications for military technologies, one of the main public justifications for military R&D expenditure during the 1950s and 1960s, and more about the military making greater use of commercial or nontraditional suppliers. By the end of the twentieth century, as Linda Weiss explains, the US military technology enterprise “embraced a vast array of innovation hybrids, national labs, industry, and university contractors” (47).

As the Cold War binary model gave way to perceived multiple threats to national security, including pandemics, environmental crises, terrorism, and cyberattacks, new bureaucracies and new hybrid forms of research innovation have proliferated. Post-9/11, the surge in funding for security and antiterrorism allowed the newly formed Department of Homeland Security, for example, to form its own R&D agency, the Homeland Security Advanced Research Projects Agency (HSARPA), in 2003. Modeled after DARPA, HSARPA was charged with developing transformative innovations in homeland security technology. Other DARPA-like agencies appeared within the intelligence sector, the Department of Energy, and the army. Among the latter’s innovative hybrids were a venture capital fund called On Point Technologies and an MIT-based nanotechnology development institute focused on high-tech combat equipment (47–48). As Weiss argues, the national security state’s willingness to support and even run venture capital initiatives demonstrates “the critical role of government-backed venture funding for the majority of high-risk startups and early-stage technology enterprise—the very entrepreneurial activities in which the United States reportedly leads” (53).

The rise of the 1960s art-and-technology collaborations is most easily understood as an example of corporate liberalism’s faith in the deployment of expertise and public funding to intervene in solving social problems and build an American future according to the benign management of accelerating technological innovation. The fall of the art-and-technology projects can equally be understood as a consequence of the collapse of confidence in that vision of the future. The escalation of the war in Vietnam undermined LBJ’s project of a Great Society masterminded by think tank research and science and technology, the main planks of the postwar platform for American (and, through the de-ideologized rhetoric of democratic virtue, global) modernization, came to be seen, as technological pessimists had long feared, as agents of imperial mastery. The turn against the utopian promise of technology as such, and in particular the tendency in the US to conflate technological innovation with the

enlargement of democratic potential, can be seen in, for example, the growing public indifference to the space program and in a general suspicion of expertise and bureaucratic control. For some, such as Stewart Brand, the technocratic model could be preserved through some inventive cross-pollination with the utopianism of the counterculture, but for many by the end of the 1960s, advanced science and technology had come to represent the enemy of democracy. Projects like E.A.T. and A & T were not so much ill-conceived as ill-timed, though the striking absence of critical reflection on the politics of art-and-tech collaboration among the organizers and contributors, at least in the documentation and in much of the work, suggests a troubling blind spot or, worse, indifference toward the broader political ramifications of working with corporations and universities engaged in, and supported by, defense-related research. The Vietnam War made plain for many Americans, including those working in universities and the arts, the extent to which creative and intellectual labor had become entwined with state-sponsored military-industrial enterprise. While government got busy redistributing and reimagining the relation between defense funding and research establishments, the kind of institutional critique that failed to inform the art-and-tech projects, though operating at least in latent form in placements like John Chamberlain's at RAND, came to shape the politics of art in the US through much of the 1970s.

### Timing and the Avant-Garde

The discourse of failure surrounding the avant-garde has been a persistent feature of critical accounts for many years, and especially since Peter Bürger's influential 1974 (translated into English in 1984) assessment of the historical avant-garde and what he sees as the degraded and redundant repetitions of the neo-avant-garde. Bürger's pessimistic account, as noted by Benjamin Buchloh (1986), Hal Foster (1994), and John Roberts (2015), among others, is an articulation of post-1968 disenchantment that sees only empty, bad faith repetitions of the historical avant-garde's best moves in the art of the 1950s and 1960s. The retrieval of elements of Dada, Futurism, Surrealism, and Constructivism by the neo-avant-garde is, for Bürger, evidence of an exhausted project. For Foster, however, it is precisely the relation between prewar and postwar avant-gardes, not least in terms of the importance of repetition for the neo-avant-garde, that opens up crucial questions regarding "avant-garde causality, temporality, and narrativity" (1994, 10).

As we have recognized here, the ideas, and often the personnel, driving 1960s art-and-tech initiatives shared a lineage with the early twentieth-century

avant-gardes, funneled through the Bauhaus, Black Mountain College, and Fluxus. This avant-garde underpinning brought a commitment to experimental, often process-based collaborative practice, usually uninterested in outcome-oriented productivity; a willingness to move beyond disciplinary boundaries to the point where art and the aesthetic dissolved as distinct spheres; and a utopian spirit in keeping with the techno-optimism characteristic of the early years of the decade. Foster is right to note that, in the US context, awareness of the historical avant-garde often came through the very institutions of art the avant-garde intended to demolish—through increasingly professionalized university education such as MFAs, and, as we have seen in the case of MoMA, through galleries and museums. The recovery of the avant-garde in the US was largely already institutionally mediated and, as such, the repetition of avant-garde strategies was critically and theoretically self-aware. For Foster, the relevance of, say, Marcel Duchamp, to modern art was to a significant degree retroactive inasmuch as it was the retrieval of Duchamp in the 1960s that led to him being anointed the key figure of twentieth-century art. Bürger's tendency to read the avant-garde as an evolutionary tendency, despite his recognition of the historical rupture the avant-garde instantiates, blinds him, according to Foster, to the "deferred temporality of artistic signification" (1994, 11). In other words, Bürger's linear, evolutionary model led him to identify the historical avant-garde as a failure (the category of art was not destroyed) and the neo-avant-garde as a farcical retread of that original failure (13–16).

Foster, by contrast, sees the avant-garde (especially Duchamp) and the neo-avant-garde (including Robert Rauschenberg and Allan Kaprow) as less focused on the negation of art or the romantic reconciliation of art and life and more concerned with the "perpetual testing of the conventions of both" (18). In this way, according to Foster, "rather than false, circular, and otherwise affirmative, avant-garde practice at its best is contradictory, mobile, and dialectical, even rhizomatic" (18). It is in sustaining a tension between art and life, in testing what constitutes aesthetic experience, that Foster locates the neo-avant-garde not as the farcical return of a heroic past but a project enacted "for the first time—a first time that . . . is theoretically endless" (20). The historical avant-garde, according to this reading, is effective only when it is worked through by the neo-avant-garde; what Foster calls the "becoming-institutional of the avant-garde" does not "doom all subsequent art to court buffoonery" but prompts a process of ongoing, reflexive critique of "acculturation and/or accommodation" and a "creative analysis" of the limitations of precursor avant-gardes (23).

The 1960s art-and-technology initiatives explored in this book, in their inability or unwillingness to account for, and respond to, the challenges of a

militarized scientific and technological avant-garde to which they sought to align themselves, certainly appear to fit the narrative of failure typical of assessments like Bürger's. The narrative of collaboration that chimed with the avant-garde rejection of the expressive subject soon came to signify a more compliant collaborationist tendency as art's position within the university or corporation appeared to achieve no more than provide a flimsy screen for the technocratic implementation of a US imperial project. Yet, as Foster's proposal for an expanded temporal reading of the avant-garde project and its failures suggests, there are grounds for avoiding Bürger's disenchanting outlook on the thwarted ambitions of once radical projects. An adequately historicized account of the avant-garde project would do better to understand any moment of failure as a marker or an impact crater—as an indication or trace of activity the significance of which remains contested and unresolved. The avant-garde, as John Roberts claims, “is inseparable from the absences and discontinuities that *it carries with it*” (2015, 15, original emphasis).

The complex temporalities at work in the art-and-tech projects of the 1960s therefore require some consideration, not only to avoid the enticing but inadequate temptation to dismiss them out of hand as inevitably complicit with the institutions of power they appeared to court and redeem, but because these very projects have, in recent years, themselves been subject to the processes of retrieval and recuperation. CAVS, E.A.T., and A&T are currently reanimated and have come to represent important precursor projects in a revitalized art-and-technology sector. The ambitions of the 1960s projects, their desire to generate interdisciplinary, collaborative, creative research, is no longer perceived as a relic of the doomed utopianism of their historical moment but as a deferred dream the twenty-first century can finally deliver. In order to understand what is at stake in the recent art-and-tech reboot—beyond the obvious synergies between what the art-and-tech projects stood, and continue to stand, for, and the rise of ubiquitous computation and the financial and social power wielded by contemporary tech giants—we would do well to approach the knotted histories of the artistic avant-garde, American progressive politics, and the military-industrial state that have been partially outlined in these pages in the light of the expanded temporal horizons suggested by Foster and Roberts.

The revival of art-and-tech collaboration as a concern among universities, galleries, museums, and other institutions has been, like the neo-avant-garde, a return that relies upon recognition of predecessors. In 2013, LACMA launched the Art + Technology (A + T) Lab (a plus sign substituted for the ampersand of the 1960s version), intended to provide, as the museum explained, “grants, in-kind support, and facilities at the museum to help artists take purposeful risks



in order to explore new boundaries in both art and science” (quoted in Chang 2013). Sponsored by Hyundai, the program drew on staff and facilities from big tech companies Accenture, Daqri, Nvidia, Gensler, Google, and SpaceX. Artists were promised “access to robotics, EEG, sensors, big data-crunching machines, and even SpaceX flight information” (Savov 2013). In 2015, MIT’s Center for Art, Science, and Technology (CAST) received a \$1.5 million Mellon Foundation grant to further promote and enable the center’s mission to inspire teaching, research, and programming that operate at the experimental intersections of art, science, and engineering. In the official news article about the grant, MIT stressed its fifty years of pioneering work integrating the arts into its engineering and science programs. The news release explicitly links the CAST project of “arts on a civic scale” back to György Kepes’s CAVS, which it identifies as the progenitor of CAST’s studio/lab ambitions (CAST 2015). In 2016, Nokia Bell Labs marked the fiftieth anniversary of Billy Klüver’s art and technology collaboration by introducing the E.A.T. Salon, bringing together a wide range of artists and Bell Labs researchers. In a welcoming address, Marcus Weldon, president of Nokia Bell Labs and chief technology officer of Nokia, said that E.A.T. “has been a little dormant for the past decades, because in many ways the ideas were so ‘avant-garde’ that they were well ahead of their time.” Now, however, with the “rise of smartphones and their canonical apps, cloud based creative software platforms, sophisticated digital image capture devices, and immersive, large scale digital displays or head-mounted VR goggles, art and technology are becoming truly coupled, or perhaps even symbiotic.” The “time to E.A.T.,” writes Weldon, “has come” (Weldon 2016).

Interest in collaborative arts-and-technology research is higher than it has been since the 1960s, and the LACMA initiative, along with the CAST grant and the E.A.T. Salon, are among many indicators of the trend in the arts toward interdisciplinary collaboration and the notion of art as research. Indeed, there are over one hundred such programs and sites in the US alone at the time of writing (see Shanken 2005; Wisnioski and Zacharias 2014). Re-awakened interest in art-and-tech labs is a consequence, on one hand, of the enlargement of art’s field of operations post-Conceptual Art, and on the other, of the restructuring of the technology sector in the wake of the digital revolution. For John Roberts, since Conceptual Art, or what he calls, following Rosalind Krauss, “art after art in the expanded field,” the collective, reflexive strategies of the avant-garde have become “the grammar of a viable and active art production” (2015, 23). This expansive plurality of forms has emerged as the official art world of global stars, blockbuster exhibits, elite institutions, and dealerships has increasingly rendered itself irrelevant to the concerns and interests of a



critical art practice, even though, as Roberts suggests, there is no clear-cut or complete separation between the art world and the enlarged sector of art workers he designates art's "second economy" (23).

The vigorous growth since the 1990s of participatory and other discursive and pedagogic practice, often foregrounding an avant-garde lineage and explicitly radical aims, cannot be separated from or understood outside the deregulated labor market under neoliberalism that has demanded increased worker flexibility, adaptability, and entrepreneurialism. The model here is, of course, the tech sector, its countercultural bona fides shored up through the 1970s and 1980s by the techno-utopianism of apologists like Stewart Brand and the frontier ethos of what Richard Barbrook and Andy Cameron (1996) called "the Californian ideology," undergirded by the deregulated market and its capacity to create new modes of cultural production and exchange.<sup>1</sup>

The renewed interest in art-and-tech projects, then, may preserve the names and the legacies of earlier iterations, but the historical circumstances within which they have arisen are radically different from the situation in the late 1960s. Foster's purpose in reexamining the temporality of the avant-garde recognized that the "becoming-institutional" aspect of the neo-avant-garde marked a reflexive capacity to undertake a critique of "acculturation and/or accommodation"; it appears that this part of the neo-avant-garde legacy has itself been institutionalized in the form of art-and-tech projects fully capable of absorbing their failed histories back into themselves. Yet there is little mention of failure in the press releases and websites promoting CAST, E.A.T. Salon, or the LACMA A + T program. Not only is the criticism leveled at the 1960s projects underplayed to the point of invisibility, but the prospect that these projects have laid "dormant" is suggested as an indication that they were somehow ahead of their time, cryogenically preserved for the purpose of reheating in the present. It is through this narrative of reanimation that MIT, Nokia, and LACMA are able to position themselves as the guardians of underestimated initiatives that can now be allowed to flower. A more skeptical reading might conclude that it is only through historical amnesia and the erasure of the circumstances through which artists came to service the public relations arm of the defense industry and its government backers that it is possible to retrieve a usable past from the art-and-tech adventures of the 1960s.

A navigation of the significance of the twenty-first-century art-and-tech revivals requires a sense of the complex forces that brought about their 1960s ancestors. What is hopefully clear from our account of CAVS, E.A.T., and A & T is that these ambitious, if flawed, initiatives themselves emerged out of, on the one hand, the historical avant-garde's challenge to bourgeois art and its fixation

on the creativity of the autonomous individual, and, on the other, progressive liberalism's claims for science as a generalized means for realizing a radically democratic community. The particular art-and-tech formations considered here, while forged in the historical circumstances of an ascendant industrial modernity, come to fruition, however, at the point where the social, economic and ideological conditions that might support them were no longer available. The Pax Americana may have sought to naturalize and universalize democracy, but the means through which democracy might be realized were increasingly bureaucratic, technocratic, and hierarchical. Indeed, the Cold War liberalism that developed during the 1950s and 1960s had little room for the definitions of science and democracy, of collectivism and creativity as they had been used during the 1920s and 1930s, and as such art-and-tech projects like CAVS, E.A.T., and A & T, despite their high-grade artistic input and high-tech apparatus, were singularly out of step with the realities of the technological agenda represented by elite institutions and policy-makers.

The two main, interwoven stories we have outlined in this book—the pursuit of an emancipatory fusion of art and technology, and the emergence of a corporate military-industrial machine—are not simply narratives that converge with the triumph of a neoliberalism borne out of RAND theories of strategic self-interest, though that is part of it. They are also stories about misaligned and out-of-kilter temporalities, contested pasts, and struggles over the definition of the future. It may be, as Foster (1994) suggests in terms of the avant-garde project, that it is only through the repetitions of new formations that the first iteration might be comprehended.

### **The Art of the Reboot**

The explicit positioning of initiatives like CAVS, A & T, and E.A.T. as the germinal ground for twenty-first-century projects marks not only a recognition of the ways the histories of art and technology share a common, if not untroubled, recent history, but it is also an indication of the ways in which the repositioning of historical legacies can legitimate current practice. This historicizing move is one of the ways that current art-and-tech labs significantly differ from their precursors, where the retrospective shoring up of the archive as evidence of a legitimating precedent is markedly absent. In the Cold War moment of the 1960s art-and-tech labs, the temporal perspective was that of JFK's New Frontier, a world of the future that left behind the traumas of the recent past (the Great Depression and World War II) and cast an unblinking eye on the horizon ahead.

The current retrospective move, of course, is entirely consistent with the retemporalized history of the avant-garde, where each iteration must reflexively include knowledge of its precursors. What is downplayed in the foregrounding of the 1960s art-and-tech legacy, though, is precisely the extent to which, and the reasons why, those projects were unable to deliver on their utopian collaborative promise. In other words, the claims made now by, respectively, MIT, LACMA, and Nokia for CAVS, A&T, and E.A.T. at once retrieve and construct a prehistory of the art-and-tech lab that resists a full investigation of the complex interplay among art, technology, institutions, and business that shaped and troubled the Cold War-era labs and continues to determine, despite their depoliticized self-presentation, their contemporary descendants. This is akin to a neo-Constructivist avant-garde addressing the history of the Russian avant-garde without accounting for Stalin.

While the A&T program, for example, successfully attracted high-profile artists and paired them with the industrial giants of the Southern California tech sector, many of the collaborations choked or fizzled out, and the resulting exhibition was poorly received and drew heavy fire. The current A + T initiative is shrewd enough to establish some distance from the original model, claiming it is “inspired by the spirit” of A&T but is much less wedded to the reliance on art stars and the climactic exhibit and more committed to facilitating open-ended exploration conducted by artists recruited through competitive open calls. What A + T has preserved of the original project, aside from hooking up with major tech players, is the stress on documentation. It is largely through the report produced by Tuchman’s initiative (and which served as the catalog for the 1971 LACMA show) that the original program has gained art historical traction and from which the current A + T project derives much of its inspiration (Tuchman 1971). In locating a significant part of its activity in the archiving of its own operations, A + T almost acknowledges the fact that the 1960s project presented itself best and most fulsomely through its documentation. It would not, indeed, be remarkable if it turned out that A + T is inspired more by Tuchman’s report than by Tuchman’s project itself. The report has all the seductions of the archive and none of the messiness of the workshop, laboratory, or boardroom. Certainly, no small part of the function of the revived lab is, as we have suggested, to promote and trade on the historical value now ascribed to the original. The new lab has a ready-made prehistory (or, at least, a prehistory in the process of ongoing curation by LACMA), a line-up of (now, if not already at the time) celebrated past contributors, and an in-house archive to draw upon. The new lab, the LACMA website explains, is “inspired by the transparency” of the original program and offers full digital disclosure of all the lab’s work.<sup>2</sup>

The appeal to transparency is an oddly preemptive move, as if the museum anticipates accountability to be an issue it must address from the outset. Among the problems encountered by the 1960s labs was growing suspicion of the projects as a means of softening the public face of corporate military-industrial enterprise, especially as opposition to the Vietnam War intensified and became more widespread toward the end of the decade. By flagging “transparency,” A + T forecloses on any charge that its intentions might be anything other than in the spirit of open exploration and knowledge exchange. Yet the very claim to transparency calls up questions of opacity and concealment, and draws attention to the regulation of the archive as a primary means through which legitimacy can be instantiated and sustained. While A + T does not address in detail the context of the original A&T program, it does benefit from a prophylactic move that brackets off dissent in order to seal in the critical heat generated by the 1971 exhibit. In this way, LACMA’s celebration of A&T’s exemplary transparency operates as a firewall in at least two ways. First, it separates the earlier program from the “system” it was charged, at the time, with being part of and beholden to, making A&T safe as a precursor. Second, that original transparency can be presented as part of the legacy on which the new iteration builds, while filtering out the malware of history that might otherwise corrupt the archive.

The proclaimed openness of A + T is part of a broader narrative common among rebooted art and technology projects that has found a way to draw upon the appeal of illustrious countercultural precursors, providing a much desired “edge” while capitalizing on the equally legitimizing heritage dimension of the new initiatives. The E.A.T. Salon v2.0 website is, inevitably, illustrated with Bell Labs’ archival images of Klüver and Rauschenberg’s 9 Evenings series, and Weldon provides a brief history of Bell’s contributions to the expansion of the human senses and perception (including hi-fi stereo recordings, sound for the first talkies, the first singing computer voice, and algorithm developments found in current music and video production).<sup>3</sup> He concludes by moving into direct second-person address in order to state that these artistic achievements and tools will be challenged by “you, as artists and creatives,” who will further the aesthetic complexity available through technological interfaces and thus “be able to arrive at the upper levels of Maslow’s hierarchy of human needs and achieve ‘transcendence’” (Weldon 2016). Clearly, Bell Labs customers have their work cut out for them, even with the assistance of the beneficent company. The goals for the E.A.T. Salon echo some of the more visionary elements of Kepes’s proselytizing, combined with Negroponte’s consumer-driven amateur-artist aesthetic revolution for the contemporary innovation economy. It is a

deft move, from the vanguardism of Cage and Rauschenberg to the supposedly redistributed creativity of the internet age, that purports to deliver, finally, the promised democratization of expertise and resources once anticipated by the utopian energies of the 1960s projects. Those who push the kind of accountability inadvertently flagged by LACMA's promise of transparency, however, would do well to recognize the vexed relationship between the artistic and military-industrial avant-gardes that rendered the 1960s projects politically untenable despite their often radical underpinning in movements committed to a restructuring of the relation between art and life. Yet this enlarged consideration of what art-and-technology collaboration might look like outside its corporate managerial frame is hardly possible when the twenty-first-century art-and-tech labs are as networked into the military-industrial-entertainment complex as their Cold War predecessors, this time without the residual, and to an extent redemptive, vanguardism.

It is true that from the outset, the 1960s projects, while sharing broadly the same ambitions for the union of art and technology, placed their emphasis on different outcomes. CAVS was intended, to an extent, to redeem the research university through an injection of the arts into the heavily instrumentalized world of Cold War science and technology. In his pitch to the university, Kepes (though clearly writing to university administrators) suggested that art might heal what military-industrial applications of science had wrought asunder, arguing that "a place for the visual arts in a scientific university is imperative for a reunification of Man's outlook on life" (quoted in Ragain 2012). Klüver, more at home in the corporate world and more sympathetic to the practicalities of collaboration, imagined E.A.T. as an organization that, if successful, would dissolve along with the disciplinary distinctions it set out to challenge. The LACMA program, among the three projects considered here, was perhaps the most obviously interested in courting business and integrating the museum into the broader LA enterprise zone. To varying degrees, though, each of the projects remained wedded to a notion of arts-and-technology collaboration that had little directly to say about politics and relied on a set of (already old-fashioned and often naive) working assumptions about objectivity and disinterested attention in research and artistic practice that left them unable to adequately confront the Cold War contradictions of their respective enterprises. Not only did CAVS, E.A.T., and A&T emerge just as public opinion took a skeptical, and often hostile, turn away from technology, but they arrived too early to benefit from the kind of reflexive contextualization that the social constructionists might have provided. The kind of institutional critique underway in the art world by the late 1960s certainly contributed to Jack Burnham's read-

ing of art-and-technology initiatives, and helped frame the critical reception of projects like the final A&T exhibition, but it is largely lacking on the inside of the projects. The absence of sustained critical friction among participants in the projects is not surprising given that the aim of art-and-tech initiatives was to facilitate collaborative labor among disparate, and often mutually suspicious, constituencies. The search for common ground and a common idiom tended to take precedent over broader conceptual or ideological questions regarding the nature of the enterprise. Yet the baseline assumption that art and technology could be mutually productive nevertheless hampered the pursuit of a more probing investigation of the structural support required for such collaborations. The emerging frustration among artists critical of art-and-tech projects was largely due to this perceived collaborationist tendency, which for those who remained aligned to the more overtly political ramifications of the avant-garde project was untenable if art was to maintain its radically transformative capacity.

### **Retemporalizing the Avant-Garde**

Contemporary art-and-technology projects have been able to safely reboot without the opprobrium heaped upon their predecessors in part because of the normalized relations among defense and tech sectors, made possible by the post-1960s distribution of defense contracts more deeply among the private sector. Not only has US military action itself become commonplace and frequent, and the spectacle of military high-tech hardware in action a staple of the news cycle, but the business of military-industrial research and development is also now more integrated into American business culture. The military is more likely to buy in innovation from ambitious private sector firms than to rely on Cold War corporate giants like Lockheed or Boeing. A 2014 Reuters article, for example, reports that “the Pentagon has switched from taking the lead in developing technologies like GPS satellites and now looks to commercial players for innovations like 3D printing” (Shalal 2014). Former Raytheon chief engineer Andy Lowery explains in the article how defense suppliers are adopting virtual-reality technologies to cut costs, and smaller, more commercially oriented firms are quicker to utilize such technologies. Lowery is president of Daqri, a VR-software company currently marketing the “Smart Helmet,” promoted as the “World’s First Wearable Human Machine Interface,” and one of LACMA’s A + T sponsors. The example Lowery offers of a lithe new player in the defense business is SpaceX, Elon Musk’s company, which in 2015 beat Lockheed and Boeing to win its first defense contract, a US Air Force GPS

satellite (Isadore 2015). SpaceX is another A + T sponsor. Hyundai, the major sponsor of the A + T program, includes the Hyundai WIA Corporation, which produces remote weapons systems for global markets. As part of its deal with LACMA, Hyundai funded the acquisition of works by Robert Irwin and James Turrell, both of whom featured in the original A&T exhibition (Tewksbury 2015). Similarly, Nvidia produces military-grade supercomputer chips; the architecture giant Gensler's client base, needless to say, includes defense and aerospace interests. The links of high-tech to military research is as apparent in the present as it was in the mid-twentieth century, though the shift to fully neoliberal economic markets and the attendant rise of the digital revolution in both sectors has shaped the nature of the relationship.

LACMA's claim of "transparency," then and now, is not much of a claim, though there is often a certain luster to be attained through overt displays of integrity, as in Google's by-now notorious motto, "don't be evil." The marketplace has proved an effective solvent, and the notion of tech R&D simultaneously serving defense and culture is no longer news. A similar convergence of interests has meant that moves toward the interdisciplinary integration of the arts and sciences in universities, galleries, museums, and research institutes across the globe have also been met with broad acceptance. In order to provide cross-institutional support for the explosion in arts-based interdisciplinary programs and centers, two recent North American associations, the Alliance for the Arts in Research Universities (a2ru) and Science, Technology, Engineering, Art, and Mathematics Education (STEAMedu), serve as advocates and facilitators for what a2ru calls "arts-integrative research."<sup>4</sup> Despite the public rhetoric of support for such endeavors, which often echoes the 1960s idiom of creative solutions to global problems, the associations understand full well, as do the universities housing them, the dangers inherent within the innovation economy that demands instrumental results and often very speedy ones—a set of demands that Kepes and others were able to negotiate somewhat more easily than those operative in the present. Over forty US universities, as well as the University of Technology in Sydney, are members of a2ru, with the common purpose of raising the profile of, and justification for, arts-based research. STEAMedu furthers these institutional agendas through conferences and workshops, with the arts often positioned as a kind of public relations medium or visualization platform for abstruse STEM research otherwise beyond the understanding of specialist audiences. With claims often couched in the process-oriented discourse familiar to readers of Dewey or other mid-twentieth-century advocates of "learning by doing," the a2ru website offers an explanation of the STEAM acronym that seeks to demonstrate in common-



sense terms the relation among the parts: “Science and Technology, interpreted through the Arts and Engineering, all based in Mathematical elements.”<sup>5</sup> The role of interpretation here conforms to the loose-limbed manner in which science, cybernetics, systems theory, and information theory were put to use by Kepes and others, though while Klüver might have recognized and accepted the way engineering is conceived here as the application of science, he would doubtless have been concerned about the instrumentalized deployment of the arts and of engineering as merely interpretive. The final phrase about the basis of inquiry being grounded in mathematical elements provides a tip of the hat to universal computation as the engine for global change in the current moment, and it is a pedagogical sentiment that would have likely had Norbert Wiener and Charles Eames nodding in agreement, with Gregory Bateson and Margaret Mead probably abstaining.

Current science, engineering, art, and design (SEAD) collaborations and research, as organized by a2ru and STEAMedu, face a number of challenges, including funding and the pressure to deliver outcomes in the form of sponsorship for collaborations, “measurable impact, and reputable research” (Zacharias and Wisnioski 2019). These concerns are compounded by demands for institution-building, spinoffs, interdisciplinary research advancements and profitable outputs that Zacharias and Wisnioski say have been present from the avant-garde origin stories surrounding art and technology movements. The runaway “success” of neoliberal enterprises such as the MIT Media Lab only add to the burden, with researchers and artists battling institutional demands, research ideals, multiple and often contradictory stakeholder demands, and financial pressures. Similarly the conflation of the digital with the technological generally—a conflation made in public discourse for decades but also one in this instance largely resultant from the success of the Media Lab—has led to the inextricable entwining of art and digitally led media research, which lends a specific profit-driven and instrumental justification for the linkage as well as the institutional investment.<sup>6</sup>

From one point of view, the assault on the romantic formation of the artist as a social anomaly gifted with distinctive creative powers conducted by the twentieth-century avant-garde has been successful. Artists are now, as organizations like a2ru are happy to claim, conceived as researchers undertaking project-based work in a collaborative interdisciplinary environment. The problem, however, as the Belgian sociologist Pascal Gielen has argued (2013), is that the very things once championed as putting an end to the myth of the creative genius and the expressive self have effectively come to serve in the reproduction of the neoliberal subject. Notions of the network and collaboration have redistributed

or erased questions of authorship and signature, and a horizontal definition of creativity as democratically accessible to all has overridden the elitism of a vertical model that placed the artist at the top. Problem-solving rather than problem creation (or favoring Chamberlain's project over Byars's) has become the focus of temporary project-based work reliant on a mobile, interchangeable staff tasked with completing the job. Such a model has tapped in to the artist's or curator's longstanding entrepreneurial capacities and fits comfortably with the competitive, ambitious environment within which arts workers vie for space and attention among museums and galleries, festivals and biennials, and with universities, cities, and nations looking to enhance their cultural capital.

Among the consequences of this new model of artistic production is the idea that the enterprising individual—as opposed to, say, the critical citizen or public servant—has “little use for solidarity,” Gielen suggests, which is “only temporarily functional, usually only for the duration of a project” (39–40). Unconnected to a permanent workplace that might provide social solidarity and economic security, not to mention labor protection, and at the mercy of the often trend-driven time-limited project, the free-floating creative individual is in many ways the model neoliberal subject, endlessly—and necessarily—dynamic, flexible, mobile, communicative, and resourceful. Furthermore, the time-limited aspect of the project means that while the project may demand total commitment and focus during its execution, the participants, well aware of its temporary existence, will have to be simultaneously on the lookout for future opportunities. This, for Gielen, produces a creative worker who is “in a permanent state of being alert and doubtful at the same time” (50). Within such a fluid situation, workers are able, on the positive side, to “accumulate specialized, creative and highly personalized knowledge,” but the “downside is that it is much harder to embed historically or institutionalize. After all, network relationships do not easily build a memory” (50–51). In other words, the conventional notion of the artist as nomadic bohemian is catered for under the entrepreneurial model, and indeed encouraged, yet the price is any sense of sustained or shared commitment to anything beyond the demands of the project. “In short,” writes Gielen, “the de-institutionalization of creativity not only cuts away depth and height, but also durable character building. Put simply, creativity becomes disengaged from faith or conviction” (51).

The stress on fluidity across sectors as a mode of facilitating innovation is often foregrounded as a key attribute of contemporary art-and-technology projects. For example, discussing A + T artist John Craig Freeman's project *EEG AR: Things We Have Lost*, Brian Mullins, founder and CEO of Daqri, enthuses about the ease of the collaboration because “the relationship between technol-

ogist and artist is extremely fluid as both are constantly pushing the limits of what's possible in both of their mediums, which is pretty exciting. It opens up the possibilities for all kinds of interesting innovation.”<sup>7</sup> Freeman follows up by stating that such apparently easy collaborations are really a matter of sorting out transactional relations within the innovation economy, and he claims that “although there is an inherent tension between the proprietary, often secret, profit motivation of successful technology companies and the public service mission of large institutions like LACMA, the Art + Technology Lab seems committed to exploring and possibly overcoming this tension.” Freeman expresses his belief that the success or otherwise of art and technology collaborations hinges on “how fluid the roles between artists and technologist are, and on how willing each party is to freely share intellectual property.”

Despite Freeman's blunt explanation of the real stumbling block in the current collaborative configuration, he brings the short interview around to his own work and its artistic lineage. The role that chance plays in the augmented reality work he produced with Daqri, according to Freeman, connects to Duchamp's *Three Standard Stoppages* (1913/14) and John Cage's experiments with the *I Ching*, thus throwing down the project's avant-garde bona fides while finding a place for the notion of chance in a world in which memories are materialized on screens through brain-wave-visualization technologies. Mullins speculates on the increased interest in the tools on display as potentially leading to cheaper and better quality machines and software. Billy Klüver, for one, was never convinced that engineers should see themselves as artists, any more that he expected artists to be able to become engineers. The point of collaboration was, particularly at E.A.T., to facilitate the realization of the artist's investigation into materials. In the twenty-first century, not only has the artist become fluid enough to find a place within the tech sector, but also, for Mullins, technology is itself conceived of as an artistic “medium” and the technologist can liken himself to Cage or Duchamp.

What is perhaps most striking about Mullins's discussion here, though, is that innovation itself has become an empty signifier of virtue and the role of A + T is to overcome “tension” between private enterprise and social mission. The invocation of *Three Standard Stoppages* in this context is revealing, not only in the way that Duchamp has been recruited by the tech sector, but because the term “stoppage” refers to tailoring and a technique for the invisible repair of garments. The role of the art-and-tech project as a means of stitching up the ragged edge between business and polis ought to register as a veiled allusion to the collaborationist claims made by critics of the 1960s art-and-tech ventures, but here it is delivered, post-ironically, as an achievement.

What are at issue in current art-and-tech initiatives are the same questions that dogged their earlier incarnations, questions surrounding, for example, the nature of experiment and the prospect for a plausible means for artists and technologists to break out of the operating paradigms they usually work within. The institutions of art, as the narrative of failed avant-gardes suggests, are capable of converting challenges into product and absorbing dissent as efficiently as corporate or government institutions. Part of the challenge here—and this accounts to an extent for the delimiting of Dewey’s potentially radical conception of an experimental democracy—is the sense that, as philosopher of science Ian Hacking argues, “the boundaries of knowledge are formed by the direction of actual knowledge” (1986, 239). Writing in the context of weapons research, Hacking suggests that “when so much knowledge is created by and for weaponry, it is not only our actual facts, the content of knowledge, that are affected. The possible facts, the nature of the (ideal) world in which we live itself becomes determined” (239). Massive defense spending, in other words, produces knowledge within the context of, and is shaped by, military interests.<sup>8</sup> An awareness that the realm of the possible is constructed within “what is held to be thinkable” (243) at any given time is rarely evident in the 1960s art-and-tech projects, and far from widespread in their twenty-first-century reboots. If collaboration among artists, scientists, and engineers is to amount to anything more than the reproduction of the status quo, where terms such as “innovation” serve as hollowed out references to increased efficiency and new product ranges, the friction, disagreement, distrust, false starts, and failures that collaboration brings with it—the resistance and struggle within and between art and technology—need to be given more space. The desire in the 1960s projects for unity among collaborators understandably derived from the aim of bringing diverse participants together. Art-and-tech projects were, in this way, a version of the postwar ambitions to forge a unity of science. Yet if Hacking is right that such a unity is “an idle pipe-dream” since “the forms of different bits of knowledge are brought into being by unrelated and unreliable chains of events” (246), a more plausible version of collaboration might require a stronger sense of the agonistic and incendiary. A more purposeful goal than ensuring that technologists and artists share a common purpose might be generating heat from their differences. John Chamberlain sensed as much during his time at RAND, and it is the resistance from both sides that produced a work that, while to all intents and purposes a failed collaboration, gnawed a small hole in the largely closed worlds of art and the think tank.

Such an agonistic approach to art-and-tech projects would have little space for invisible repairs since it would be attentive to the tears and rips. Tuch-

man's report on LACMA'S A&T program (1971), among the 1960s projects, comes closest to embracing the resistance coming from both artists and businesses, and this is what gives the document weight since it accepts that a failed experiment is still an experiment. The notion of failure, however, in light of our discussion of the avant-garde, ought to be reconsidered or at least repositioned within a broader temporality that might also help to prevent the sense of foreclosure that has attended the rise of neoliberalism as the most recent purported post-ideological ideology. According to this familiar narrative, the failure of twentieth-century collectivist projects has given way to the natural order of the free market as the inadequacy of planning and regulation has become evident. Under the sign of strategic self-interest, any attempt to engineer economic and social problems outside the marketplace is to tinker with the self-regulating order of things. Within such a conception of society as the mere aggregation of self-interested units, references to abstractions such as the "common good" sound not only antiquated but also fatally naive. The diminished status of a thinker such as Dewey during the second half of the twentieth century, despite various attempts to resuscitate his reputation, is indicative of the direction of travel.

The Deweyan model of creativity, as an active, experimental encounter with the world that was broadly synonymous with both democracy and the scientific method as unfinished projects could conceive of project-based labor as more than narrowly instrumental because it retained a conviction in the idea of collective action. The Dewey School's occupation-driven curriculum, while carrying the unfortunate connotation of being merely vocational, was reliant upon a capacious interpretation of what an occupation might mean. The shrinkage that occurred, during the second half of the twentieth century, in the definition of the terms in which Dewey outlined his philosophy—science, method, democracy, art—left his arguments vulnerable to adaptation and dismemberment, first by Cold War liberalism's contraction of what constituted the meaning of science in a democratic society, and then by an increasingly algorithmic understanding of how strategic self-interest operated. The erosion of faith or conviction in democracy as the constitution of a public sphere already, by the 1960s, meant that art-and-technology projects driven by a residual progressivist commitment to the enlargement of collective potentialities were out of step with the broader perception of science and technology as instruments of elite bureaucratic control and coercion. Rebooting "dormant" art-and-tech initiatives in the twenty-first century does not have to involve worrying about such skepticism since expectations of what a society based on the public good might look like have contracted so far as to be insignificant.

It might be argued that the avant-garde and its celebrated capacity for creative destruction has had a hand in creating the environment in which the disruptions of radical innovation promoted by the convergence of art and technology have become normative, as affirmative accounts such as Weldon's suggest. Certainly, Jean-François Lyotard understood as much when he observed "a kind of collusion between capital and the avant-garde" due to the dependency of both on "the force of skepticism and even of destruction," a mistrust of rules (and materials) and destruction of the status quo (1991, 104–105). The capitalist economy relies on and is regulated by "an Idea" of pure wealth or power for which it offers no example from reality as proof. Indeed, through the operations of technologies that have made "science subordinate to itself," Lyotard claims that reality has become "increasingly ungraspable, subject to doubt, unsteady" (105). Lyotard's charge, though, is a familiar one that is consonant with Bürger's melancholy backward glance at the failed promise of the historical avant-garde, and while it is hard to argue that vanguardist moves have not been more effective in the hands of economists and corporations than they were with artists, the one-way street Lyotard outlines leads in the same direction as the collectivism-as-failed-experiment narrative and is something of a dead end.

It is here that we need to return to Foster's expanded temporality of the avant-garde, since Lyotard's foreclosed future presupposes the achieved convergence of capitalist and avant-garde destruction. Foster's enlarged sense of avant-garde temporality, as we have seen, allows for the prospect that the neo-avant-garde may have comprehended the historical avant-garde for the first time (1994, 16). In other words, the idea that an avant-garde can succeed or fail misses the point, which is that there is no completion or conclusion to the avant-garde process: "in art," Foster writes, "creative analysis is *interminable*" (16, original emphasis). It is the sense of interminable inquiry that John Roberts (2015) develops in his consideration of the "revolutionary time" of the avant-garde, which he conceives not merely as a series of historically locatable movements or tendencies but, following Imre Lakatos, as a research program. Broadly, the historical avant-garde outlined a set of propositions that, for Roberts, constitute the ongoing avant-garde research program. These are: that art is not an object or set of objects but an eventual process that may or may not include objects; that art is determined by its social and political conditions of possibility; that art is a theoretically driven process; that art is a collective or collaborative process at all times and therefore comprehensible as a social practice; that notions of the artist and artistic skill are functions of general social practices and therefore interdisciplinary and processual; and finally, that art "sets itself the historical and critical task of incorporating its speculative strategies and



practices into the advanced scientific and technological forms of general social technique; art participates in the advanced relations of production” (3).

As a research program, this might sound like a set of principles that could be adopted without controversy by an art-and-tech project without any of the utopian aspirations toward the transvaluation of art and life more commonly associated with the avant-garde. However, this would be a narrow reading of what Lakatos means by a research program, which, for him, is closer, as Ian Hacking explains, to a form of knowledge than it is to a set of proposals and procedures to be followed (1986, 254). For Lakatos, a research program may last a century or lay forgotten for decades: “we may be frustrated by a long series of ‘refutations’ before ingenious and lucky content-increasing auxiliary hypotheses turn a chain of defeats—*with hindsight*—into a resounding success story, either by revising some false ‘facts’ or by adding novel auxiliary hypotheses” (1980, 48, original emphasis). Over time, a series of steps may constitute a “consistently progressive theoretical problem shift [but] we do not demand that each step produce *immediately* an *observed* new fact” (49, original emphasis). It is with this sense of a research program in mind that Roberts can write that “the function of the avant-garde today is inseparable from the absences and discontinuities that *it carries with it*” (2015, 15, original emphasis). The point is that the Lakatos model allows for refutations that may be perceived as failures within the scope of the present but which may later be retrospectively understood differently. In a sense, this is partly what Foster is claiming about Bürger’s premature dismissal of the neo-avant-garde. Roberts’s adoption of the research program model, however, is especially pertinent given the rise of the art-as-research paradigm and its deployment by the neoliberal university, global art museums, and the tech sector to instrumentalize and appropriate the collectivist capacities made possible by ubiquitous computing but politically uncoupled from a viable definition of the public good.

### Apertures of Hope

On the surface, the art and technology projects of the 1960s appeared to fit comfortably with the techno-utopianism of corporate liberalism. The virtues of creativity and interdisciplinary collaboration institutionalized through the embrace of systems-thinking in the sciences, business, and government did not seem to be out of step with advanced artistic tendencies that likewise sought to slough off the residual romanticism of individual authorship, medium specificity, and the autonomy of the art object. The assessment, by Jack Burnham and others, that the failure of the art-and-tech projects to adequately deliver on



their promise was largely one of timing also seems right. The shift in attitudes toward technology and the institutional models that promoted technocratic solutions to the problems of modernity was rapid and decisive during the last years of the 1960s, and the art-and-technology projects were too closely aligned with the institutions and assumptions of the technocratic project to survive the backlash. The current willingness of artists and institutions to return to the 1960s projects, furthermore, is understandable given the ways that the ubiquity of advanced technology in contemporary life appears to have confirmed some of the claims made by gurus of the previous age such as Marshall McLuhan and Buckminster Fuller. As Nokia boss Marcus Weldon reminds us, E.A.T. was just too darned avant-garde for the 1960s, but finally the rest of us have caught up. Outlined in this way, the story of art and technology is one of the gradual synchronization of technological development and social reality after an awkward period when artists and technologists were too far ahead of the curve. This is presumably, after all, what avant-gardes are good at, but what has come before needs to hang around long enough so that it will eventually be recognized as timely.

What we have wanted to stress here, though, is the limitations of this Whig version of the history of art-and-technology projects, whereby the “failure” of the 1960s projects is merely a function of cultural lag that delays the full integration of creative tech collaboration into the processes of twenty-first-century corporate innovation. At the same time, as tempting as it is to partition off projects like E.A.T. and A&T as naive or opportunistic boomer adventures in the corporate financing of the arts, this would merely plug those projects back into their slots in twentieth-century US art history alongside the rest of the currently fashionable “hippie modernism” doing the international museum circuit.<sup>9</sup> The extent to which the potentially radical or utopian aspects of earlier art-and-tech collaborations have been made safe for viewing is not separate from the revival of some of the key projects by contemporary institutions and corporations. The techno-pastoral patina of old photos of long-haired students building geodesic domes on the grass at Black Mountain College is, after all, catnip for hipsters dreaming of seed funding or internships. The retrieval of the 1960s art-and-tech projects in the twenty-first century must itself also be historicized and understood, not merely as an opportunity to market prior achievements, though there is that, but as another indicator of art’s entanglement with advanced technology and its military-industrial backers. The point here is that the stuttering narrative of noble failures and bad timing does not do justice to the complex temporalities across, and through which, art, technology, and politics are woven.

The resistance to the narrative of failure we have noted in relation to Foster and Roberts’s account of the avant-garde calls for a different conception

of temporality than one that measures “success” as a progressive shoring up of “developments.” It is not surprising, though, that CEOs like Weldon have become adept themselves at retemporalizing the histories they wish to emulate. Nevertheless, the notion that “we” have caught up with the avant-garde itself falls back on a comforting synchronicity that cannot be allowed to stand, for while the apparatus of art-and-tech might currently be in alignment, what the retrieval of the 1960s projects must leave out if they are to function within the disruptively innovative environment of the neoliberal corporation are the elements of the precursor projects that were, in the 1960s, already anachronistic. In other words, what must be expunged are the traces of the radical collectivist avant-garde and their fusion with the socially emancipatory, democratically participatory elements the art-and-tech projects carried with them from their revolutionary, progressive, or pragmatist origins. In order to do justice to the notion of the art and technology project as a plausible model for collaborative interdisciplinary research that is more than R&D for the culture industry, we have to take account of the non-simultaneousness of the simultaneous.

Ernst Bloch developed the idea of the nonsimultaneous in his book *Heritage of Our Times*, first published in 1935.<sup>10</sup> A complex montage of Bloch’s Weimar period writings, *Heritage of Our Times* sought to understand the rise of fascism in Germany through, in part, a reading of the experience of time under modernity. Bloch derived his notion of the nonsimultaneous from art historian Wilhelm Pinder’s challenge to the convention of dating art works according to style.<sup>11</sup> For Pinder, such a practice did not take into account that at any given historical moment, an artist from one generation might be producing work at the same time as an artist from a much younger generation. The generational difference would, for Pinder, bring with it stylistic differences that historically dating the two works would not explain. The term the “nonsimultaneity of the simultaneous” was Pinder’s description of how one historical moment could contain elements that were not consonant with each other. While Pinder’s method led him to develop the suspect notion of a generational will or “entelechy,” it nevertheless allowed him to challenge notions of art history as unilinear and developmental. It is this notion of historical time as non-unified that Bloch develops in *Heritage of Our Times*.

According to Bloch, capitalist modernity might define the present as the most advanced economy, but it does not account for the entirety of contemporary experience. The present, for Bloch, still contains modes of life that belong to earlier times, such as the peasantry, who continue to exist alongside advanced industrial society yet experience the world in an entirely different way to the modern worker. Similarly, other groups, such as disgruntled white-collar

workers, are also nonsynchronous in that they are ideologically out of sympathy with the current state of affairs. To stay with Bloch's examples for a moment, the peasantry is "objectively" nonsynchronous since its mode of life is out of sync with modernity; the white-collar workers are "subjectively" nonsynchronous because their view of the world is not confirmed in the existing structure. It is precisely out of the nonsynchronous—out of the sections of the population that do not experience the present as synchronized with capitalist modernity—that Bloch claims the Nazi Party was able to draw cultural resources that should rightfully belong to the Left.<sup>12</sup>

In the context of our discussion of the history of the artistic avant-garde, the (bad) timing of 1960s art-and-technology projects, and their twenty-first-century reboots, Bloch's notion of the nonsimultaneity of the simultaneous is a useful means of grasping the complex cultural politics that we have described as the convergence of two avant-gardes, one artistic and one military-industrial. Understood according to Bloch's model, if we take the early 1960s as the moment of the most advanced economy, where technology and corporate liberalism are synchronous with US economic and geopolitical dominance, the historical avant-garde and Deweyan participatory democracy are patently nonsynchronous even though they continue to animate the art world and populate the progressive educational environments that nurture the neo-avant-garde.

While it is therefore easy, as critics like Kozloff and Burnham did in the case of A&T, to identify art and tech projects as "corporate art," since in many ways they can indeed be said to be leaning toward a synchronization with the contemporary moment, this criticism misses the fact that practitioners like Cage, Fuller, and Rauschenberg are never properly synchronized as their politics and their understanding of key terms of the debate such as collaboration, experiment, and creativity, are profoundly nonsimultaneous with the meaning of those terms as used by the corporate liberal institutions within which they are attempting to operate. Indeed, as we have seen, the public, participatory definition of terms like "scientific method" and "democracy" developed by progressives like Dewey in the early decades of the century, terms that resonated with European avant-garde practitioners like the Bauhaus, were already non-synchronized with the times by the end of World War II when the emigrant avant-garde is cultivating its relationship with American artists and institutions. Looked at this way, the inability of the art and technology projects to fully synchronize with the corporate liberalism of the military-industrial complex is not a failure but a measure of how temporally nonsynchronous the meaning of terms like "collaboration" and "creativity" has become.

Not only, then, as Foster and Roberts argue, does the avant-garde not fail if the temporal scale is expanded and the unidirectional “development” of art history rejected, but the art-and-technology projects do not fail either, since a successful synchronization of their mission with mid-1960s American capitalism would have constituted a disturbing fusion of radical aesthetics and corporate politics. As Bloch suggests, those elements that appear to be left behind by history instead contain the cultural materials through which a challenge to the normative synchronicity of the present might be properly staged. In the 1930s, in Bloch’s analysis, the catastrophe was that these nonsynchronous cultural resources had been stolen by the Right. As the escalation of the Vietnam War raised profound questions about the legitimacy of corporate government expertise and its deployment of technological solutions to social and political problems, a similar missed opportunity perhaps lies at the heart of the criticism leveled at art-and-technology projects. The nonsynchronous resources they carried through from the 1920s and 1930s, the emancipatory potentialities articulated by Dewey and at the Bauhaus and then at Black Mountain, had indeed already been appropriated by the other side. The stripped down, meritocratic, competitive, hierarchical model of democracy shaped in the postwar period by experts like James Conant and Vannevar Bush often used the same words as their more liberal counterparts, but the meaning was different. The kind of interdisciplinary collaboration undertaken at think tanks like RAND was among elites and not among a more generally distributed set of participants.

The notion of failure, then, is not adequate or accurate since it implies a one-time attempt to further the unidirectional narrative that has been thwarted. The capacity of the forces of reaction to identify and utilize the non-synchronous is, for Bloch, likewise not a one-off theft but must be countered and challenged. In other words, the resources of the past are not exhausted by their appropriation but remain, in their stubborn non-synchronicity, persistent potential excess and a disruption, a contradiction, and an alternative to the present. Nokia and the other institutions and corporations invested in promoting art-and-technology projects demand synchronization between the past and the present, yet a different reading ought to allow for and embrace the way that past projects, as Bloch puts it, “contradict the Now; very strangely, crookedly, from behind” (1991, 97).

What glares out of the pages of Tuchman’s A&T report and the archives of the other 1960s art-and-tech projects is not just the incommensurability of the utopias conceived by the artistic and the corporate avant-gardes of that time, but the flair of a corporate world gripped by its own potentiality. It is not surprising that artists wanted access to some of that—the resources, the confidence,

and the sense of mission, derived from the conquest of a brutal adversary, and, so it seemed, responsible (though self-appointed) for solving the problems of humanity. Despite the cold instrumentality of the bureaucratic approach to planning a world, and regardless of the devastating foreign policy failures that sprang from the slide rules and mainframes of the organization men, there is a capaciousness to the vision that, retrospectively, at least, can be breathtaking in its optimism, however catastrophic the consequences turned out to be. It is this chutzpah that wildcards like Buckminster Fuller and John Cage shared with institutions like RAND and outrageous projects like the Apollo program: a willingness to reach a beyond that, from any other angle, might seem ludicrous.

This is what LACMA, Nokia, MIT and other institutions want from that past, or at least the look of it—the cool, insouciant arrogance of ascendant power. What they do not want is the radical undertow that comes with picking Fuller or Cage or Rauschenberg for your team. The equivalent of a Jack Burnham or a John Chamberlain, with their awkward, contrary relation to the straight world, is unlikely to be welcomed, coming very strangely, crookedly, from behind, into the labs of SpaceX or Nvidia. If there is to be disruption, innovation, or creativity, it must speak and walk in the less strange, less crooked manner of the neoliberal adventurer. If there is to be collaboration, it must be via the frictionless transaction where all differences among art, technology, and business are massaged away by and through the synchronized movements of the market.

It is precisely this sense of synchronization claimed by late capitalism that led Fredric Jameson to draw on Bloch in his discussion of uneven development in his 1980s work on postmodernism. From the point of view of the postmodern present, writes Jameson, “Everything has reached the same hour on the great clock of development or rationalization”; we have reached “a situation in which the survival, the residue, the holdover, the archaic, has finally been swept away without a trace” (1991, 310). That which was incomplete, anachronistic, or anomalous has, finally, been brought into line, just as the “too avant-garde” work of E.A.T. has now found its correct time in the twenty-first century. This is the sense, as Jameson notes, “in which we can affirm, either that modernism is characterized by a situation of incomplete modernization, or that postmodernism is *more* modern than modernism itself” (310, original emphasis). A thoroughgoing synchronization of all elements would, indeed, register the end of history and the flattening of any challenge that might be posed by the concept of the new or innovative, which is now evacuated of context and serves merely to signify technical adjustment or improvement within the dehistoricized present.

When Jameson rightly located this postmodern move outside or beyond history as a function of late capitalism, whereby the “past” is synchronized as

a kaleidoscope of depthless and distracting styles, he follows Bloch in understanding that the contradictory nonsimultaneous elements of a “still living past” are most effectively deployed by capitalism “as a means of separation and combat against the future dialectically giving birth to itself in the capitalist antagonisms” (Bloch 1991, 109). In other words, the real contradictions of capitalism (what Bloch calls the objectively *simultaneous* contradictions) can be used to prevent the elements of an “unrefurbished past . . . not yet resolved in capitalist terms” (108) from posing a direct challenge to the maintenance of the status quo.

There is no straightforward way in which the art-and-technology projects of the 1960s can be revived or reclaimed unless the conflict over the meaning of the temporality of modernity is itself synchronized into the perpetual present of capital. Bloch’s assessment in the 1930s that the Right stole the nonsynchronous cultural resources of the Left, challenges to the narrative of the “failure” of the avant-garde, and Jameson’s account of the postmodern cancelation of history are attempts to claw back the force of the anachronistic and the anomalous from aspects of cultural production all too easily streamlined into affirmation. To borrow from Bloch, we might say that the terms of what once counted as aspects of an emancipatory collectivist model of inquiry—creativity, collaboration, inter-, post-, or non-disciplinary labor—have been stolen. They have not been stolen by neoliberalism in the first instance, though they have become part of the lexicon of this latest nonideological ideology, but were appropriated, and sometime gifted, from the avant-garde and put to use by corporate liberalism during the early postwar period as it sought to distance itself from the radical implications of the participatory democracy outlined in Dewey’s progressivism. As such, mediated through institutions and individuals (such as the Bauhaus, Albers, Kepes, and others) determined to situate themselves in meaningful opposition to the very real threat of totalitarianism, the radical modalities of terms like “creativity” and “collaboration” are already confiscated and redeployed by the time the 1960s art-and-technology projects seek to utilize them.

Despite the tragedy of belatedness that saturates his own diagnosis, Bloch’s assessment of how to move beyond the catastrophe of synchronization is not without purchase here. “The task,” writes Bloch, “is to release those elements even of the non-contemporaneous contradiction which are capable of aversion and transformation, namely those hostile to capitalism, homeless in it, and to remount them for functioning in a different connection” (1991, 113). The power of the nonsynchronous resources of the past lies, for Bloch, in the fact that they remain incomplete, unresolved, and “hence lastingly subversive and utopian”; they are the “gold-bearing rubble” (116) of a “prevented future” (110). Jameson, likewise, is not ready to concede capital’s victory over historical time. The problem



to be solved, he writes, is “how to jumpstart the sense of history so that it begins again to transmit feeble signals of time, of otherness, of change, of Utopia” (2003, 76). The expansive temporality proposed by Foster and Roberts, a temporality that suspends dismissive decisions surrounding purported failures and endings, and which allows for the conception of an avant-garde research program of undisclosed duration, might be one way to jumpstart history. A retrieval of the gold-bearing rubble from the prevented history of the historical avant-garde and its fusion with American pragmatism at its most socialistic moment in the 1930s is another. The force of the neo-avant-garde’s commitment to art and technology may well lie there, in advance of the alignment with Bell, MIT and other institutions of Cold War corporate liberalism, when it was still genetically linked to the emancipatory promise of the original Bauhaus and progressive anti-capitalism.

There may be other apertures through which to conceive of and act upon as yet prevented futures. The neoliberal institution’s attempt to synthesize its own nonsynchronous elements into the “great clock of development” is one of them. As we hope is now clear, the legacy of the 1960s art-and-technology projects is far from straightforwardly the prehistory of the present. Even before their fall from favor, projects like CAVS, E.A.T., and A&T already contained the archives of prevented futures, including the thwarted techno-utopias of postrevolutionary Russia, Weimar Germany, and America’s Progressive Era. As modes of deformed collectivist utopianism, the 1960s art-and-tech projects marked, not so much moments of compromise or collusion between the avant-garde and the state, but rather moments when the contradictions of capitalist democracy flared with a vividness that has not entirely burned out. It is the brightness of the art-and-tech projects, as well as their incompleteness, that has drawn the corporate sponsors, and the critics, back to stand in the afterglow. The reboots, though, mistake the hearth for the flame. It is, in the end, what is wrong with art-and-technology projects—their inability to square radical modes of inquiry and collaborative labor with the demands and expectations of corporate and military funding, institutional support, and instrumentalized science—that is precisely what is most important about them. What art-and-technology projects of the kind discussed here most powerfully demonstrate, both in their 1960s and twenty-first-century iterations, is the ongoing struggle between the idea of an avant-garde and the appetite capital exhibits in its willingness to feed upon it.