

Introduction

This is the story of two avant-gardes and their brief moment of asymmetric convergence. Each emerges out of the American experience of World War II and each is international in scope, including a contingent of Germans, and responsive to the altered economic, political, and technological circumstances of the world after 1945. Each has its roots in an earlier encounter with modernity and each, in different ways, seeks a purchase on the future. The first is the post-war American artistic avant-garde, infused with the legacy of radical experimentation brought from Europe by those able to extract themselves from the conflagration. The second is the so-called military-industrial complex, the network of private and government institutions held together with Federal dollars and fortified, again, with European brains in flight from, or smuggled out of, tyrannous regimes and their defeated remnants.

The point of convergence is the late 1960s, when a loose confederacy of artists now referred to as the neo-avant-garde (a term we will have cause to return to toward the end of this book), including, most prominently and influentially, John Cage and Robert Rauschenberg, participated in a number of collaborative, interdisciplinary projects aimed at plugging American art into the power grid driving US scientific, technological, and industrial innovation. At leading universities, corporations, and museums, finding ways of bringing advanced art and cutting-edge technology together was conceived of as a way of unleashing the creative capacities of artists, scientists, and engineers, of sparking as-yet unimagined inventions of form and function, and of initiating new modes of inquiry unfettered by conventional distinctions based on professional loyalties, prejudices, or habits of mind. For the artists, informed by an ongoing investigation of the unfinished projects of Dada, Surrealism, Constructivism and other aspects of early twentieth-century avant-garde, the fusion of art and technology was not only an intrinsic aspect of contemporary practice but was bound up with the avant-garde's broader utopian challenge to the compartmentalized



and administered lifeworld of modernity. For Cage and Rauschenberg, designers and educators like R. Buckminster Fuller and the Eames Office, and artists working closely with emerging computational and audiovisual technologies such as György Kepes, Jack Burnham, and Stan VanDerBeek, experiments in art, technology, and science presaged not merely a new aesthetic but a new social order based on collective experimentation within the richest and most advanced science and tech infrastructure the world had ever seen. Imagine Marcel Duchamp, Vladimir Tatlin, or El Lissitzky supported by IBM and MIT. What happens when the possibility of such improbable pairings is taken seriously is the subject of this book.

The collectivist dimension of art-and-technology collaborations is a vital part of their utopian promise since it represents an attempt by many artists and organizers to instantiate radical democratic practices, or at least to start to imagine what such practices might be, within the ostensibly hierarchical and corporate environment of the mid-twentieth-century university or business. The dilation of the coterie to include the spectator and passers-by, so central to the performative happenings, processes, and interventions of artists like George Maciunas, Claes Oldenburg, and Otto Piene, and enlarged further in the multimedia broadcast experiments of Cage, VanDerBeek, James Lee Byars, and many others, posits the redistribution of artistic agency and a redefinition of what the aesthetic might be and do. The pursuit of common ground and a sense of the public good are key aspects of 1960s art-and-technology projects that are easily overlooked amid the (sometimes literal) smoke-and-mirrors spectacle of much of the activity. Without the prospect of social, as well as artistic, transformation, an ambition shared, though manifest in different forms, by the historical avant-garde and aspects of progressive pedagogy reintroduced to the US through Bauhaus émigré artists and educators, the art-and-technology projects are largely just experiments in doing things with lasers. Taking the avant-garde credentials of the project leaders seriously means that these otherwise ephemeral enterprises ought to be situated within a longer temporality that includes both the politics of the early twentieth-century avant-garde and the early twenty-first century reclamation of some of the key 1960s projects. Furthermore, if there are political considerations at play in the art-and-technology projects, which we believe there are, an understanding of how the avant-garde aspirations of American artists might be situated within the broader cultural climate of mid-century corporate liberalism is necessary, for it is this climate that spawns and then destroys them.

World War II drew the United States into international affairs, and postwar global geopolitics was redefined largely according to US interests. With much of Europe and the Soviet Union devastated by war and economically depleted, the Pax Americana was predicated on the superiority of democracy as a system of government capable of restoring ruined nations and maintaining peace. This notion of the US as the modernizing guardian of freedom was especially compelling given the extended Soviet influence across Eastern Europe.

The new global responsibilities facing the US were inevitably colored by anxieties produced by evidence of the extent to which political extremism in Europe had gripped entire populations. The massive mobilization of US resources during the war had radically extended the role of government in American life far beyond anything imagined by the architects of the New Deal. The scale of the challenges facing the postwar world left little room for a rollback of government intervention; indeed, the Federal management of domestic affairs, not to mention foreign policy, came to be seen as entirely commensurate with the successful organization of a complex modern society. The effectiveness of wartime mobilization, not least through the coordination of scientific, technological and military institutions and personnel, suggested that the continuation of support for research across the human and physical sciences should be maintained and developed during peacetime, not only for the purposes of national security but also to enhance the health and prosperity of the American people. To the extent that American democracy was normalized as the natural order of things, structured according to the value-neutral terms of a scientific rationality free from theological or ideological influence, then the application of reason, in its managerial and organizational modes, could be understood as entirely in keeping with the democratic spirit.

Certainly, the prosperity enjoyed by many Americans during the 1950s and early 1960s appeared to confirm the sense that science and technology were delivering unprecedented rewards in the form of the new consumer goods and improved infrastructure that transformed cities, created suburbs, provided jobs, and delivered mobility, opportunity, security, comfort, and, indeed, pleasure. Organizational efficiency and design innovation elevated the status of scientists, engineers, and planners, despite growing concerns regarding the increasing conformism of American life. To an extent, the collective labor of corporate America and its potentially flattening social effects could be offset by a celebration of cultural ingenuity and novelty. The multiplication of consumer goods and services, along with the emergence and promotion of a distinctive American culture able to embrace popular forms yet serious enough to supplant European predecessors, suggested that fears of bland uniformity could

be outweighed by the energy and inventiveness of a people unfettered by old-world ideological limitations.

The American postwar embrace of the modern, then, meant holding in abeyance a number of contradictions. Even as contemporary science became too difficult for the uninitiated to understand, science and the scientific method were conceived of as foundational to modern democracy, guarantors of impartiality and objectivity. At the same time, it was the scientists who continued to invent the ever more destructive means by which the world might be destroyed. The same ambivalence marks the extension of new technologies into every aspect of life. Technology was self-evidently an engine of social change and emancipatory potential, yet technology also injected into everyday life a nonhuman world of efficiency and alienation. Similarly, while individual freedom remained the bedrock of democratic virtue, the complexity of modern society increasingly required expert organization and management according to rational principles. This reliance on expertise extended into the arts which, despite their purported achievements, had become, like much modern science, increasingly abstruse and incomprehensible to the untutored.

The percolating anxieties during the 1950s surrounding unwelcome levels of conformity and social control, not to mention the existential dread fostered by an awareness of the atomic bomb, sat alongside the widespread celebration of mastery and expertise that also characterizes the era. The response to this unease was, in many areas of life, a commitment to more integration and more effective management, wider collaboration, and deeper investigation of the psychosocial dimensions of the modern world. The wartime emergence of cybernetics and systems thinking found new converts far beyond their military applications and converged with other approaches to conceptualizing totality, such as Gestalt theory.¹ The sense that the complexity of any given situation required the combined understanding of numerous perspectives had become established during wartime but, by the 1960s, was a commonplace of American institutional life, from government to university, corporation to think tank. This embrace of interdisciplinarity was, at once, a recognition of the necessary fluidity required to solve complex problems but also, in keeping with the confused rhetoric of American mid-century democracy, an acceptance of the role of the expert and of the necessity of collaboration. As such, the rise of interdisciplinarity as a virtue combined a commitment to collective enterprise among equals with acknowledgement of the distinctiveness of some individuals by dint of their expert knowledge. Interdisciplinary networks provided a context within which individual capacities might be recognized while rejecting the idea that any one individual might be enough. Interdisciplinarity allowed

for expertise but rejected the notion of individual genius. Part of the attractiveness of interdisciplinarity during the Cold War across a wide spectrum of fields was that it appeared to capture something of the spirit of what a properly functioning democracy might look like. It is within this context that the transfer of avant-garde artistic energies from Europe to the US was able to find a plausible place within the burgeoning military-industrial organization of Cold War America.

The postwar emphasis on interdisciplinary collaboration and creativity in the human and physical sciences chimed with the broad contours of the historical avant-garde's challenge to bourgeois art, namely through a rejection of individual genius and a stress on collective practice; a commitment to experimentation and process over outcome; a dismissal of medium specificity and a dismantling of the distinction between art and non-art, or, in other words, between art and life. While it is clearly a stretch to draw analogies between Dada or the Bauhaus and the RAND Corporation or the Macy conferences, a general sympathy toward the collaborative and the innovative increasingly attracted, during the 1960s, the seemingly incommensurable worlds of advanced Cold War technoscience and advanced art. It is a convergence that is made possible by the heightened status of scientists and engineers during the early Cold War, who came to serve as models of a new creative class, and the expanded ambitions of artists seeking access to new materials and methods of fabrication made possible by technical advances as well as a revived sense of art's social remit as the high formalist moment of American abstraction came under increasing pressure from the neo-avant-garde.

The purpose here is not to smooth out the profound differences in mission and function among technologists, scientists, and artists, nor to suggest that these constituencies necessarily shared the same broad vision and subscribed to the same values. In many ways the converging paths of technology and art during the 1960s was as much a clash as it was a meeting, and the often fractious and slender common ground between them will be the subject of a good deal of what follows. What scientists, engineers, defense intellectuals, and artists did share, nevertheless, was a common sense, distributed widely in the culture not only in the US but strongly registered overseas as well, of the remarkably propulsive power of American modernity and its capacity to actualize new modes of experience and social organization on a grand scale. To no small degree this sense was a consequence of unprecedented and unrivaled access to financial and technological resources and the organizational structures with which to deploy them. Yet beyond the simple fact of wealth and power, the compelling narrative the US was able to establish for itself, as the sole legatee of

a European tradition of enlightenment only the US was capable of protecting, lent a powerful moral charge to the stewardship of a world yet to attain the state of immanent utopia America already enjoyed. This sense of mission is there in the dream of a post-ideological liberal democracy run by a benign bureaucracy of experts, and it is there also in the post-disciplinary aspirations of art and technology collaborations that grew, in weird technocratic countercultural formations, out of Black Mountain College in North Carolina, Bell Laboratories in New Jersey, the Massachusetts Institute of Technology in Cambridge, Massachusetts, the Los Angeles County Museum of Art (LACMA), and elsewhere.

While Black Mountain was not explicitly geared to art-and-technology collaboration, the college was an important meeting point where the cross-disciplinary, thinking-by-doing ethos shared by the Bauhaus and American progressive education were synthesized. Many of the key participants in art-and-technology projects of the 1960s passed through Black Mountain either as visiting staff (John Cage, Buckminster Fuller) or as students (Robert Rauschenberg, Stan VanDerBeek). The Bauhaus influence also permeated MIT's Center for Advanced Visual Studies (CAVS), founded in 1967 by György Kepes, who had previously worked with László Moholy-Nagy at the New Bauhaus in Chicago. Unlike Black Mountain, which was a resolutely New Deal-era liberal arts college, MIT was at the heart of Cold War R&D, and the well-funded labs provided CAVS fellows like VanDerBeek and Jack Burnham with access to the most advanced technology.

If MIT was the paradigmatic Cold War university, Bell Labs, where scientist Billy Klüver launched Experiments in Art and Technology (E.A.T.) with Rauschenberg in late 1966, represents the other side of Cold War research. A private company whose labs were designed to replicate the flow of ideas and personnel more characteristic of a campus than a business, Klüver and others at Bell had, since the 1950s, facilitated an easy movement of artists, musicians, and composers from New York City and nearby Rutgers University and Douglass College through the Murray Hill complex. Envisaged as a clearing-house for art-and-technology collaboration, E.A.T. was at once an agency, lobbying organization, and think tank. More limited in scope but still capable of drawing on major resources, LACMA's Art & Technology Program (A&T), launched in 1967 by curator Maurice Tuchman, sought to hook up artists with organizations and businesses in Southern California's booming industrial and technology sectors. More focused on producing art than E.A.T., and culminating in an exhibition at the museum in 1971, A&T provided access to resources and expertise for a number of prominent artists, including Andy Warhol, Claes Oldenburg, R. B. Kitaj, and E.A.T. members Rauschenberg and Robert Whitman.

Some of these initiatives have become legendary, such as Black Mountain and E.A.T., even when, and sometimes because, their achievements were short-lived. In recent years, there has been revived interest in many of the 1960s projects as new technologies and new conceptions of art practice have sharpened a desire to locate, evaluate, and emulate predecessors' experiments. Yet the projects discussed here were all relative failures, if success is measured according to the pronouncements of the project leaders, and they often sustained heavy critical fire during their brief life spans. The demise of these experiments in collaborative, interdisciplinary exploration can be easily summarized in local terms—lack of funds, lack of shared agenda, inability to engage or persuade relevant constituencies, withdrawal of institutional support—but the larger failure lies in the breathtaking collapse of confidence, during the latter half of the 1960s, in the US as a legitimate world power and the rapid reversal of fortunes, and withdrawal of trust, experienced by the institutions that authorized that power. The complexity of modern society was, by 1968, no longer a marvel to behold for many Americans; indeed, complexity came to be seen as a function of power, and expertise its instrument. In retrospect, it is hard to imagine a worse time to launch an art-and-technology initiative than 1967, the moment at which technology was no longer seen as an open invitation to build the future but increasingly perceived simply as a weapon.

One measure of the shifting political assessment of technology was the publication in the *New York Review of Books* in 1969 of sociologist John McDermott's withering response to the techno-optimism promoted by Emmanuel Mesthene, director of the IBM-sponsored Harvard Program on Technology and Society, which had just released its fourth annual report. By the time sculptor Richard Serra wrote, two years later, in response to the Los Angeles A&T exhibit, that technology is neither art nor invention but "what we do to the Black Panthers and the Vietnamese under the guise of advancement in a materialistic theology" (Serra and Serra 1980, 40), McDermott's association of technology with a managerial elite blind or indifferent to its catastrophic effects had become a widespread concern.² Perhaps the worst critical battering among the prominent art-and-technology projects of the later 1960s was meted out to A&T, but it was merely the most visible casualty of the renunciation of the utopian promise of a marriage of art and technology. Ambitious projects in the early 1970s saw E.A.T. developing satellite broadcasting and communications technology in developing countries, but these were hampered by lack of funds. Kepes retired in 1974.

The restructuring and realignment of defense R&D funding according to a more entrepreneurial and commercial model after the legitimation crisis of

the late 1960s is part of the broader neoliberal deployment of marketization as a means of redistributing responsibility and accountability from the late 1970s onward. In the arts, by the early 1980s the institutional critique posed by post-minimalist, often politically radical, forms of practice (the kind of critique targeted at the 1960s art-and-technology projects discussed here) was supplanted by a revival of interest in painting (including such US artists as Keith Haring, Jean-Michel Basquiat, and Ross Bleckner, along with influential German painters like Anselm Kiefer, Georg Baselitz, and Gerhard Richter) and the ironic distance of the so-called Pictures Generation (including Barbara Kruger, Cindy Sherman, and Richard Prince), both tendencies capable of delivering gallery- and market-ready product relieved of the broader conceptual and political burdens posed by the neo-avant-garde. As the art world became increasingly financialized and globalized as a luxury dry-goods market, and as New York became merely a node in the global supply chain rather than the pacesetter, the kind of artists engaged in the explorative interdisciplinary work characteristic of the art-and-technology projects of the 1960s were more likely to find a welcome home in Silicon Valley, where the Stewart Brand mode of techno-futurist pioneer-consultancy, of the kind prototyped by Buckminster Fuller, had become the orthodox workplace model. Brand's celebration of MIT's Media Lab in a 1987 book that claimed, in its subtitle, that MIT was "inventing the future" there, is emblematic of the shift away from art as such and toward a more fluid conception of innovation as world-building. To an extent, this had been the ambition of art-and-tech projects from the outset, from the Bauhaus and Black Mountain through to E.A.T. and CAVS, and had undergirded the utopianism of the avant-garde project since the early twentieth century. Yet the integration of art and life achieved at Media Lab and in Silicon Valley, as much as it appeared to realize the erasure of distinctions between art and technology, work and leisure, that had been central to the historical avant-garde's political ambitions, speaks more directly to the restructuring of capitalist relations of production after the 1970s than it does the eradication of bourgeois values.

The early twenty-first century has seen a surge of interest in art-and-technology collaborations that is at once future oriented and backward looking.³ The reputations of the main 1960s projects considered here, summarily dismissed at the end of that decade as the worst kind of complicit corporate art, have all recently found themselves positioned as illustrious predecessors. In 2013, LACMA launched the Art + Technology Lab (A + T), explicitly inspired by the museum's 1960s project and designed to support artists seeking to develop work with emerging technology. In 2015, MIT's Center for Art, Science, and Technology (CAST), the descendent of Kepes's CAVS, 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 2016, marking the fiftieth anniversary of Klüver's celebrated *9 Evenings: Theatre and Engineering*, the project that kick-started E.A.T., Nokia Bell Labs launched the E.A.T. Salon, another self-consciously retro-futurist collaborative venture intended to foster innovation across the arts and technology sectors. All at once, it seems, the present has caught up with, or at least caught on to, the lost futures canceled by the most egregious excesses of Cold War militarism.

The revival of interest in art-and-technology collaboration in the early twenty-first century, not least in the retrieval of the earlier projects as proudly displayed precursors, is, we argue here, not only a consequence of the massive transformations brought about by ubiquitous computation, but also due to the permeation of contemporary life by the time-limited, project-based, collaborative-labor model that has restructured society according to the demands of the neoliberal market. The buzzwords of the entrepreneurial ethos are in many cases the same terms circulating in the jargon of Cold War corporate liberalism, yet what has been evacuated from notions of creativity, collaboration, and interdisciplinarity in their contemporary iterations is the sense that they were of value to the extent that they served a public good. It is true enough that the conception of what constituted the public, as understood through the scientism of the Cold War corporate state, might have been severely delimited and exclusionary, yet the *realpolitik* driving the need to improve creative and productive capacity in science and industry, and in society more broadly, nevertheless carried a utopian charge largely missing from the atomized, Hobbesian revanchism typical of twenty-first-century enterprise. The contemporary art-and-technology lab is reliant on the precarity of the contemporary labor market in the culture industries as much as it is the beneficiary of tech largesse. In this regard, as in others, the history of art-and-technology collaborations since the postwar period is part of the narrative outlined by Philip Mirowski in his series of books that track the mutually supportive energies among neoclassical economics, physics, and the military as they produce neoliberal thought out of Cold War computation (Mirowski 1989, 2002, 2011, 2013; Mirowski and Plehwe 2015).

Recent scholarly and curatorial interest in the 1960s art-and-tech projects has identified them as influential in facilitating the use of computation and other new technologies in contemporary art (see, e.g., Blakinger 2016; Blauvelt 2015; Lee 2004; Wisnioski 2012). To a significant degree, what was once seen as somewhat marginal to art history has acquired a prominent place.⁴ The political ramifications of these projects, however, and their relation to the wider

military-industrial agenda of the Cold War US, remains under-examined and is often positioned as a background concern in the context of a predominantly art-historical narrative. On the other hand, recent work in the history of the social sciences, science and technology studies, and related fields, has explored the extent to which Cold War thinking, especially in relation to systems analysis and rational choice theory, came to permeate American social organization and embedded itself into the deep structure of economic, political and social life (see, e.g., Amadae 2003, 2015; Cohen-Cole 2014; Erickson et al 2013; Isaac 2007, 2011; Oreskes 2014; Rohde 2013; Solovey and Cravens 2012). Our aim, here, in part, is to draw together the strands of these two histories in order to contextualize art-and-technology projects within a broader narrative about the changing fortunes of American liberalism, and to understand how the progressive ethos realized, fleetingly, at institutions like Black Mountain and, less expectedly, commercial concerns like Bell Labs, was metabolized by the military-industrial state into neoliberal orthodoxy.

In his book on artistic labor, *Dark Matter*, artist and activist Gregory Sholette wonders whether it is not “the alleged radicalism of art, but its demonstrated capacity to mobilize excess, even redundant productivity, that makes it an attractive model to the priests and priestesses of the new networked economy” (Sholette 2011, 43). Perhaps, he goes on, it is “not the artist’s seemingly transgressive, risk-taking nonconformity, but exactly a mode of distributed risk and social cooperation denied by neoliberalism that leads certain CEOs and business thinkers to see artistic methods as near-miraculous models of ‘just-in-time creativity’” (43). The impetus for art-and-technology collaborations during the 1960s largely came from those with an interest in realizing the potential of art, whether it was curators like Maurice Tuchman and Jane Livingston at LACMA or committed art-loving engineers like Billy Klüver. The traffic was mostly in one direction, with Tuchman, Klüver, and Kepes, among others, working to persuade an indifferent or openly hostile science and tech establishment to accommodate the unusual interests and demands of artists. To a significant degree, as James Conant’s Cold War model of general education, discussed below, suggests, the predominant notion of the arts through the Cold War period was that of civilizing influence, necessary for social cohesion and the inculcation of values but distinct from the serious, albeit creative work of research, design, and manufacture. When collaboration between arts and engineers did happen, the resulting work retained the imprimatur of the artist’s signature, despite the efforts of some, like Klüver, to credit participating engineers.

To a considerable extent, then, the notional two-cultures model that dominated the debate in the early 1960s remained largely untroubled by the

incursion of artists into laboratories, workshops, and factories. The situation outlined by Sholette, however, suggests a significant shift in the perceived value of art and artists among corporate and business leaders, thanks in no small part to the successes of the tech sector and the restructuring of the economy since the 1970s, to which the rise of Silicon Valley substantially contributed. From a twenty-first-century vantage point, the claims made for creativity, innovation, and interdisciplinary collaboration during the 1950s and 1960s by scientists and artists seem unremarkable indeed, given the extent to which these virtues have become normative. Yet the mainstreaming of the idea of the creative economy enabled by the absorption of countercultural rhetoric into tech business strategy has not resulted in the kind of revolution of everyday life envisaged by the historical avant-garde or its mid-century descendants. Instead, a deregulated and dematerialized economy no longer beholden to any national interest or labor force has found it extremely easy to accommodate the revolutionary ambitions of the avant-garde. A successful enterprise is now one that is nimble, creative, innovative, and disruptive, its workers contributing as outsourced entrepreneurs on temporary or time- or project-based contracts. The ability and willingness to collaborate is a given.

As university research has also become increasingly marketized, not only in the commercialization of military-related R&D, but also through the competition for funding, faculty, and students, the distinction Cold War technocrats defended between so-called basic (or non-instrumentalized) and applied research has become less relevant. In such a climate, the arts and humanities have repositioned themselves as players in the new creative economy, the virtues associated with these fields, such as critical and analytical inventiveness and the production of conceptual and formal novelty, now valued as a necessary component of an interdisciplinary business environment. The reconfiguration of art practice as research under these conditions, though it is often explained as a means of securing equal status across disciplines and as a recognition of practice as a mode of rigorous inquiry, nonetheless normalizes and regulates the antinomian energies still associated with the arts as another branch of the knowledge economy.

It is, then, artists (and the folk history of their creatively disruptive force), if not art itself, that have been celebrated, and vilified, as the primary agents of urban gentrification and the source of creative juice powering all manner of start-ups and entrepreneurial adventures. Sholette's point that it is not their radicalism but their capacity for adaptation and cooperation that makes artists valuable for business is an argument Klüver or Kepes would have been unlikely to contest. What they would have challenged, however, is the degraded status,

if not the complete erasure, of the notion of a public good that counted for more than economic gain. Despite the nonideological ideology of much US Cold War thinking, where American democracy operated unproblematically as code for human nature, and despite the strategic value placed on celebrations of individual creative freedom within the context of a set of tacitly accepted, shared normative values, the grand talk of “civilization” or “Western man” did presuppose a model of human community and the collective good.⁵ The extent to which this model also contributed to the deployment of science and technology in the engineering of consent and the suppression of dissent cannot be denied, but the atomized, economistic regime that emerged out of and supplanted Cold War-era consensus culture has left little of the utopian capacities of that era uncontaminated.

The revival of CAVS as CAST, of A&T as A + T, and E.A.T. as the E.A.T. Salon is part of a broader reassessment of midcentury art-and-technology collaborations that identifies, correctly, the germ of many present preoccupations in those initiatives. Yet the conditions under which these projects are revived or reimagined must be attended to, just as the military-industrial context of the original projects must be understood as integral to their formation and, significantly, to their demise. The new art-and-tech projects are often sponsored by the tech sector and encourage work in areas such as machine learning, augmented reality, and robotics that are already the mainstays of contemporary technological R&D. The artists participating in these ventures are less likely than in the 1960s to be art “stars” and less likely to produce works for exhibition. Instead, they are the art professionals contracted in or winners of funding or residency competitions tasked with realizing projects that fall within the purview of the host institution. In a society where art’s emancipatory capacity has been codified as its contribution to a culture of competition-driven entrepreneurial dynamism and precarious labor, computationally mediated information flows and privatized spatiotemporal capacities, it is unsurprising that it is these elements latent in the 1960s projects that have been pulled out for use while the radical potential embedded therein—the incubated though often dormant revolutionary energies of the historical avant-garde—lay undisturbed.

The aim of this book is to disturb these energies and to address the 1960s art-and-tech ventures within a context that extends backward and forward. We return to the early twentieth century in order to understand how the complex coupling of American progressive liberalism and the European and Russian avant-garde produced a distinctive mid-century US art-technology utopianism even as it was invariably nested within the growing military-industrial infrastructure of the corporate state. Chapter 1 seeks to position the 1960s art-

and-technology projects as the product of a particular way of thinking about the relation between science and democracy that has its roots in John Dewey's pragmatism. It is Dewey's conception of the scientific method as a generalized mode of active engagement with the world that enables him to conceive of science, technology, education, and art as aspects of a dynamic and transformative collective project capable of actualizing a democracy commensurate with American modernity. The influence of Dewey's ideas in Germany contributed to the design philosophy of prominent schools like the Bauhaus, many of whose leading figures emigrated to the US during the 1930s. Bauhaus émigrés like Josef Albers and György Kepes, among others, brought an understanding of the European modernist avant-garde synthesized with a Deweyan model of scientific democracy that provided a compelling model for collaborative, interdisciplinary art-and-technology research for US artists and designers during the 1950s and 1960s.

World War II and the early years of the Cold War, however, also saw a realignment of priorities in education and the conception of the democratic citizen toward specialization and expertise and away from Dewey's participatory collectivism. The massive surge in federal funding of scientific research and the exalted position of the scientist provided a plausible context for art-and-technology collaboration, but the social ambitions driving the Bauhaus-Dewey model were increasingly downplayed, challenged, or distorted by the corporate liberalism that developed to fight the Cold War. The following three chapters consider key 1960s art-and-technology initiatives—CAVS, E.A.T. and LACMA'S A&T—as they attempt to work through the implications of what is essentially a progressive conception of participatory democracy within distinctive but related institutional contexts. We read the main 1960s art-and-tech projects as engaged, in various and challenging ways, with the prevailing ethos of the postwar institutions that supported them; that is, the research university, the military-funded corporation, and the modern art gallery based in a region booming on defense-industry growth. It is here that the radical legacies of the artistic avant-garde collide with the normalized corporate liberalism of the Cold War.

In chapter 2, we focus on MIT as the site of Kepes's attempts to redeem the Cold War university through the arts. Chapter 3 considers E.A.T.'s collaborative model as an extrapolation of Bell Labs' innovative and longstanding support of interdisciplinary working within the private sector, though Billy Klüver's stress on practical problem-solving remained loyal to the notion of the artist as the center of gravity underpinning any art and science collaboration. The strategy of LACMA'S Art & Technology program, explored in chapter 4,

was perhaps less ambitious than those of either Klüver or Kepes in terms of broader social outlook, but the attempt to link Los Angeles's new museum into the Southern California business environment nonetheless grasped the sense that art constituted a field of expertise on a par with technology and science. By focusing on collaborations LACMA established between individual artists and two of the most influential think tanks of the era, the RAND Corporation and the Hudson Institute, we consider how notions of expertise and specialist knowledge proved more resistant to collaborative enterprise than Klüver and Kepes might have hoped.

The art-and-tech programs were never reductively complicit with military-industrial interests, however much their contemporary critics labored to make the charge stick. Instead, they operated within a broader cultural climate where the imbrication of technological innovation and social progress were largely unchallenged and where the perceived nonideological virtues of creativity and collaboration could do real work toward the preservation and protection of the public good. Chapter 5 takes a wider view of the ways in which art-and-technology projects of the 1960s attempted to erase distinctions across media, disciplines, and subject specialization in order to grasp the totality of American modernity. In a variety of ways, E.A.T., CAVS, and LACMA were all involved in international expositions aimed at promoting American technology and American values. Through examination of some of the ambitious work undertaken by, among others, Charles and Ray Eames and Buckminster Fuller, we address the cybernetically influenced desire to capture, and to an extent account for, the dynamic, fluid capacities of the modern world. Bolstered by the post-ideological imaginary fostered by US corporate liberalism, the "everything is connected" ethos allowed designers like the Eameses and Fuller to imagine a benevolent generalized technology fully commensurate with the natural order and capable of awakening untapped human capacities. Though there remains more than a trace of Dewey's anti-dualistic thinking in projects like Fuller's, and their techno-utopianism found a ready audience among a counterculture suspicious of Cold War politics, the post-ideological notion of a value-free technology deployed by the unprecedented creative capacities of an affluent and benevolent democracy failed to account for the Vietnam War.

Finally, in chapter 6 we look forward from the 1960s to consider the complex legacy of the era's projects as it is manifest in twenty-first-century iterations. The limits of the 1960s art-and-technology projects were largely set by the realities, rather than the rhetorical claims, of Cold War corporate liberalism, and the escalation of the war in Vietnam rapidly undermined the utopianism that promised the solution to social problems through the application of

scientific rationality. The projects discussed here did not survive the erosion of confidence in the American government of the late 1960s and early 1970s. Chapter 6 reflects on the reasons for the turn away from art-and-technology projects. It also explores how the funding of defense research and development after Vietnam served to reshape the relation among universities, the private sector, and the defense establishment, contributing to the growth of new technologies such as computing and biotechnology. The twenty-first-century tech sector, in its turn, has prepared the ground for the reemergence of art-and-technology initiatives, and this chapter examines the revival of our three core projects from the 1960s.

Part of the story here, as will hopefully become clear, is the way in which the Cold War generated the conditions and the modes of thinking that enabled neoliberalism to take root as the latest nonideological ideology. The work on probability that made possible the innovations of the Manhattan Project and migrated, postwar, to think tanks like the RAND Corporation, where game theory underpinned nuclear strategy before finding widespread applications in economics and the social sciences, is a narrative that runs alongside, and periodically intersects with, the history of the artistic avant-garde. This dual track, crisscrossing series of knots and loops binds the history of art and the history of science and technology in the US during the twentieth century. Together, these entwined strands reveal much about the assumptions and legacy of the American Century, its cultural, economic, and military reach, and the ways in which those assumptions continue to shape our sense of the limits of the possible.⁶