MATT WISNIOSKI

Centerbeam

Art of the Environment

How, then, is the much-yahooed copulation of artists, scientists, and engineers working at all?

—Otto Piene, 1979

The story of Centerbeam [Figure 1], the most successful collaborative project of the Center for Advanced Visual Studies (CAVS), opens on November 20, 1969 with a "Fuck You" and closes a decade later with a realignment of aesthetic virtue that amounted to the same thing. At the start, the Institute is on edge. It is the heat of what the Rosa Luxemburg chapter of Students for a Democratic society (SDS) has dubbed its November Action, and MIT's disorder

Note: I owe my thanks to Otto Piene for sharing his recollections with me and to Meg Rotzel and Alise Upitis for invaluable assistance in the CAVS Archives.

1   Bruce Schwartz, "If Two and Fifty Make a Million," The Tech (October 17, 1969): 12, 15.
2   Gyorgy Kepes, "Cen-ter for Advanced Visual Studies," in Massachusetts Institute of Technology Annual Bulletin. Vol. 106, no. 2 (September, 1971), 35.
3   Sid Lewis and CAVS correspondence (November 1969). Gyorgy Kepes papers, 1825-1989, Archives of American Art, Smithsonian Institution, Reel 5306 items 0801-0807.
4   The quote describes EAT's inaugural event 9 Evenings: Theater and Engineering. Jill Johnson, "Post Mordem," Village Voice, 15 December 1966: back cover.
5   Anne Collins Good-year, "From Technophilia to Technophobia: The Impact of the Vietnam War on the Reception of 'Art and Technology,'" Leonardo 41 (April 2008): 169-173; Jack Burnham, "Art and Technology: The Panacea That Failed," in Video Culture: A Critical Investigation, edited by John G. Hanhardt (Rochester, NY: Gibbs M. Smith, Inc., 1986): 232-248.
6   David Curt Morris, Tape 9; Otto Piene, Tape 11; Robert Preusser, Tape 12. Massachusetts Institute of Technology. Committee of the Visual Arts. AC 48, Box 1, Institute Archives and Special Collections, MIT Libraries, Cambridge, Massachusetts.
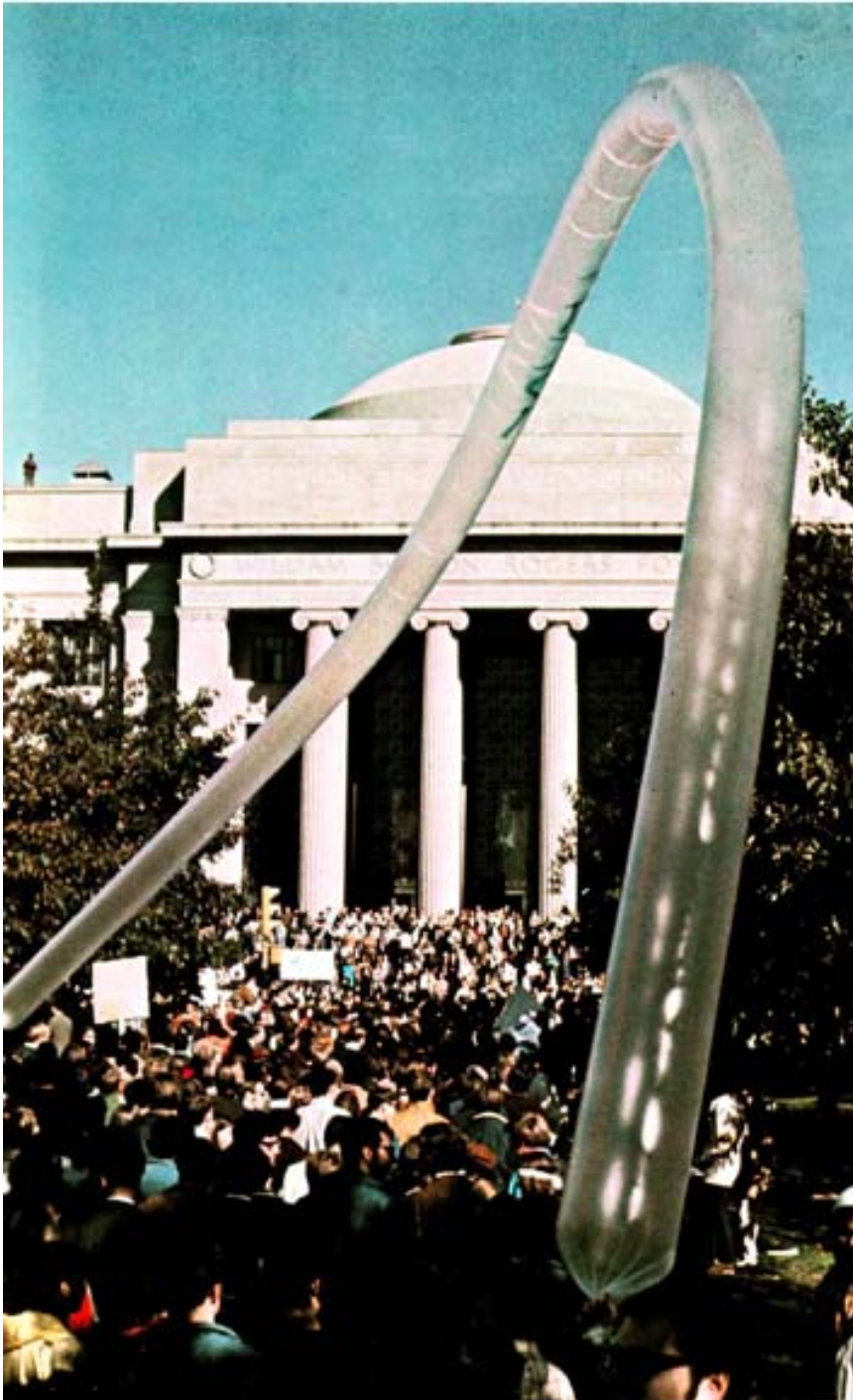7   William Thompson, "Art and Science: Shotgun Wedding," Thursday (May 1, 1969), 4.
8   Burnham, "Art and Technology," 239-241.
9   Jerome Wiesner, "Preface" in Centerbeam, Otto Piene and Elizabeth Goldring,

has become a national referendum on out-of-control technology.

CAVS is doing its part to restore harmony. Artists open their studios in participatory

events that convey the humane potential of the technological environment. Since his arrival in 1968, no one has contributed more in this regard than Otto Piene. His Sky Art—temporary helium sculptures reaching 1,000 feet in length—has brought students, faculty, and community volunteers together in collaborative celebrations. In October 1969, when 100,000 antiwar protesters formed the largest crowd to ever occupy Boston Common, MIT's contingent stood out for Provost Jerome Wiesner's solidarity and Piene's "insane balloons."[1] [Figure 2] During the CAVS open house, Piene again is at the forefront, organizing seminars that MIT's Annual Report of the President argues "were lively and received exceptionally positive response."[2]

Sid Lewis, representing an outfit called the Council for Conscious Existence, begs to differ. He leaves behind a pamphlet at Piene's workshop that declares CAVS' ambitions to be "nothing but the first step in transforming the spectators of empty culture into its organizers." [Figure 3] Depicted as a Strangelovian balloon vendor, Piene is castigated as "the advanced guard of the cybernetic welfare state, the reconsecration of order, no longer with God as ruler, but with technology raised to myth in the perfect order of zombies . . ."[3]

In a now familiar narrative, this missive from one of Central Square's innumerable cranks portends a historic reversal. On one side, enthusiasm for cybernetics, lasers, and strobes in collaborative works by artists, scientists, and engineers. According to participants and critics, these interdisciplinary projects are "essential in a crumbling democracy."[4] On the other side, gleefully reported calamities. The tribulations

eds. (Cambridge, MA: MIT, 1980), 9.

10   Gyorgy Kepes, "The Visual Arts and the Sciences: A Proposal for Collaboration," Daedalus 94, no. 1 (1965): 117-134.

11   Elizabeth Goldring, "'Centerbeam'—Description and Plan for documenta 6, 1977" in Centerbeam, Otto Piene and Elizabeth Goldring, eds. (Cam-

bridge, MA: MIT, 1980), 54.

12   Manfred Schneckenburger, "An Aqueduct to the 21st Century," in Centerbeam, Otto Piene and Elizabeth Goldring, eds. (Cambridge, MA: Massachusetts Institute of Technology, 1980), 27-29.

13   Lowry Burgess, "'Centerbeam,'" in Centerbeam, Otto Piene and Elizabeth Gold-

ring, eds. (Cambridge, MA: Massachusetts Institute of Technology, 1980), 26.

14   Otto Piene, "'Centerbeam,'" in Centerbeam, Otto Piene and Elizabeth Goldring, eds. (Cambridge, MA: Massachusetts Institute of Technology, 1980), 20-24; Otto Piene, "Recognition (in Praise of 'Centerbeam')," in Centerbeam, Otto Piene and Eliza-

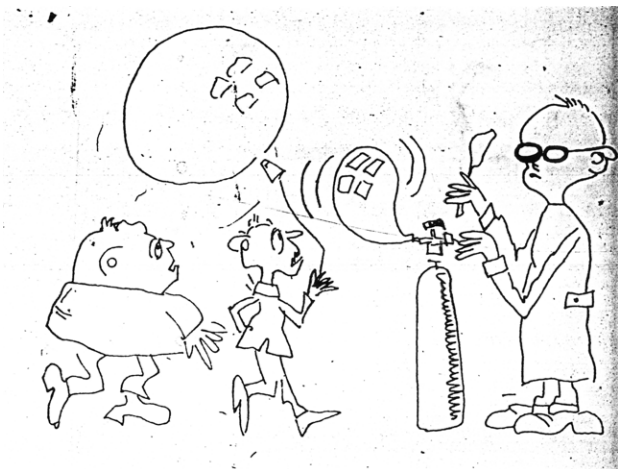beth Goldring, eds. (Cambridge, MA: Massachusetts Institute of Technology, 1980), 10.

15   The mapping in Chart 1 is informed by Adele E. Clarke, Situational Analysis: Grounded Theory after the Postmodern Turn (Thousand Oaks, CA: Sage, 2005), 262-289.

16   Lawrence Alloway, "Introduction," in Centerbeam,

Otto Piene and Elizabeth Goldring, eds. (Cambridge, MA: MIT Press, 1980), 5.

17   Gyorgy Kepes, Center for Advanced Visual Studies (Cambridge: MIT, 1967). For an analysis of Kepes' ideal of "wholeness" see Elizabeth Finch, Languages Of Vision: Gyorgy Kepes and the "New Landscape" of Art and Science (PhD

faced by artists and corporations alike in the Los Angeles County Museum's Art & Technology show. The rapid decline of Experiments in Art and Technology (EAT) sparked by a clash with Pepsi, Co. over authorial rights to its environment of fog and mirrors at the 1970 World Exhibition.[5] [Figure 4]

collaborate.[6] In MIT's alternative newspaper, Thursday, humanities lecturer William Thompson described CAVS as a "shotgun wedding" arranged to make artists "new apologists for the system."[7] Jack Burnham, one of CAVS' first Fellows, later infamously judged it a "panacea that failed."[8]

At MIT evidence for a shift from technophila to technophobia abounds. Throughout the Cold War era, MIT provided the technological arts with credibility and economic security, while the arts bestowed creative authority to the Cold War defense institute. Driven by Gyorgy Kepes' ideal of unity between visionary artists and scientists, the establishment of CAVS—dually christened in 1968 with the Center for Theoretical Physics—marked an apogee among efforts to bridge C.P. Snow's "two cultures" divide. But as soon as CAVS came to exist, it seemed compromised. Supported by short-term grants, funding was uncertain. The civic commission Kepes anticipated for the nation's Bicentennial never materialized. In the midst of preparation for one-man exhibitions, Fellows struggled to

And yet, travel forward to the summer of 1978, where five hundred thousand people experience an almost indescribable accretion of sensations generated from a 144-foot water prism on the National Mall in Washington, DC. [Figure 5] Those who brave solar-powered holographic forks, draw video images with their eyes. [Figure 6][Figure 7] Children trigger electronic sounds as they dance on illuminated squares. [Figure 8] Hand-rotated mirrors cast poems of light. [Figure 9] Steam plumes erupt 60 feet into the air, penetrated by a twelve-color laser. [Figure 1] In addition to patches of seasonal vegetation, the structure sprouts 250-foot polyethylene flowers. [Figure 10] As summer ends, the temporary sculpture becomes a Minotaur, clanging and booming

Dissertation, 2005).

18   See Anna Vallye "The Middleman" in this volume.

19   Massachusetts Institute of Technology Committee on Educational Survey, Report to the Faculty of the Massachusetts Institute of Technology (Cambridge: The Technology Press, 1949); Robert Preusser, "Visual Education for Science and Engineering

Students," in Education of Vision, Gyorgy Kepes, ed. (New York: George Braziller, 1965), 208-219. By the early 1960s, Field 10 had become a national selling point for MIT, with student work appeared in no less than 25 magazines ranging from Art in America to Fortune, between 1961 and 1969.

20   I am grateful to Meg

Rotzel for this delineation, used in similar fashion in her adept analysis of MIT's Wiesner Building. "The Media Lab that Wasn't" (2009). Unpublished manuscript cited with permission of the author.

21   Jamie Cohen-Cole, Thinking about Thinking in Cold War America, PhD Dissertation, Princeton University, 2003; Peter

Galison, "The Americanization of Unity," Daedalus 127 (1998): 45-71.

22   Los Alamos, "From Diversity Comes Unity," ME 83, no. 12 (December 1961): 155.

23   See e.g.: Company Climate and Creativity (New York: Industrial Relations News, 1959); Eugene K. Von Fange, Professional Creativity (Englewood Cliffs,

NJ: Prentice-Hall, 1959). J.H. McPherson, "How to Manage Creative Engineers," Mechanical Engineering (February, 1965): 32-36.

24   Cutler Hammer, "Art at A.I.L.," IEEE Spectrum 4, no. 5 (1967).: 5.

25   Matthew H. Wisnioski, "'Liberal Education Has Failed': Reading Like an Engineer
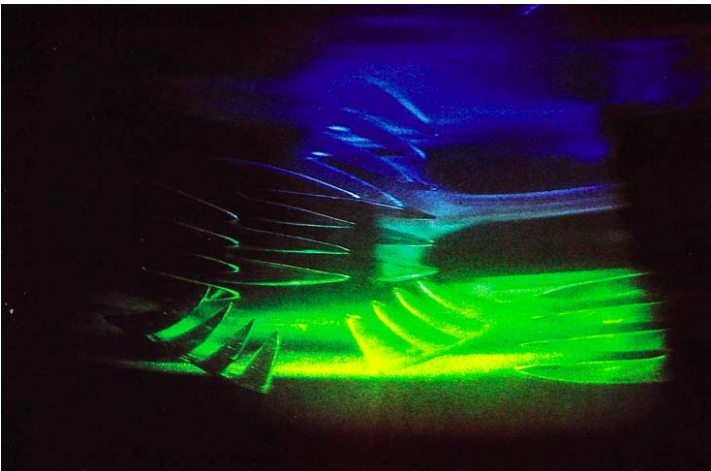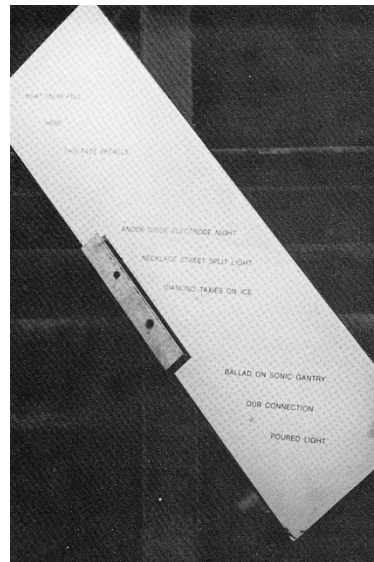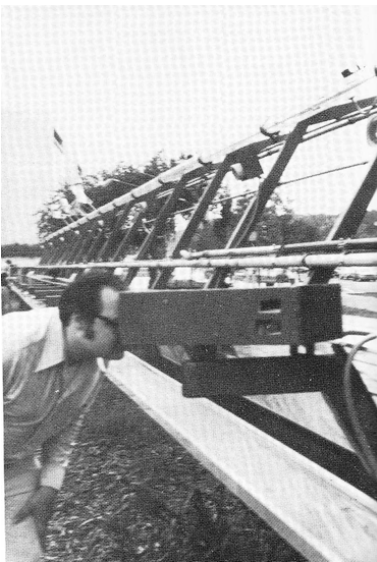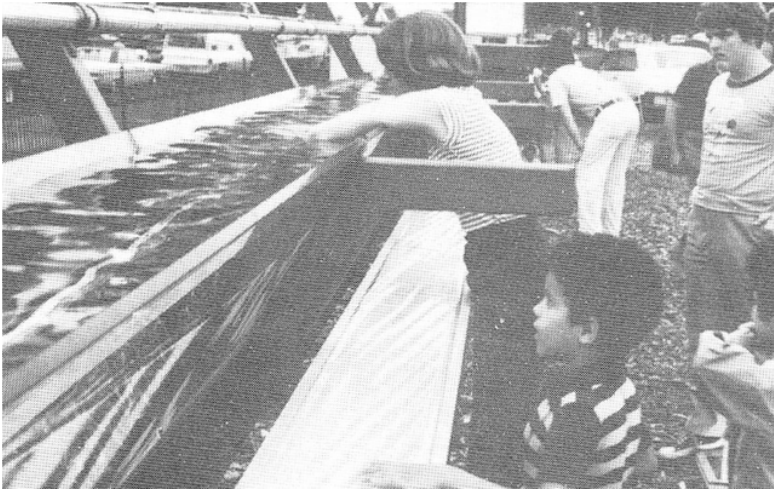
while a helium-filled Icarus floats in concert with a flying violinist. [Figure 11] Wiesner again enters the picture—now as Institute President—to declare Centerbeam's visitors "moved to understand that MIT is a place where new ideas meet new means, thus inspiring new art of an environmental scale."[9]

Originally built for the quadrennial arts festival documenta 6 in Kassel, Germany, Centerbeam was conceived as a 10th Anniversary celebration of CAVS—the first realization of its founding mission of "collaborative daring."[10] With funds and equipment from over twenty corporations, foundations, and government agencies, it was planned as a "participatory drama" that would represent society's collective need to "respond humanly, creatively, unexpectedly and with a shared sense of wit to the bundle of energy and communication lines that have become our network of existence."[11]

But even as they praised Centerbeam, its contributors had difficulty providing a unitary account of their achievement. To curator Manfred Schneckenburger, who invited CAVS to documenta 6, the device was "an aqueduct to the 21st century," an encyclopedia of human advancement from the industrial revolution to the present that settled tired polemics about the technological arts.[12] To CAVS Fellow Lowry Burgess, who proposed the core design, it was the outcome of scaling "human and environmental relationships not readily available in our individual work."[13] To Piene, who was then in his fourth year as Director of CAVS, it was a model of what could be achieved beyond the "the coterie of artists-for-art-for art-world associations" and "classroom intellectualism."
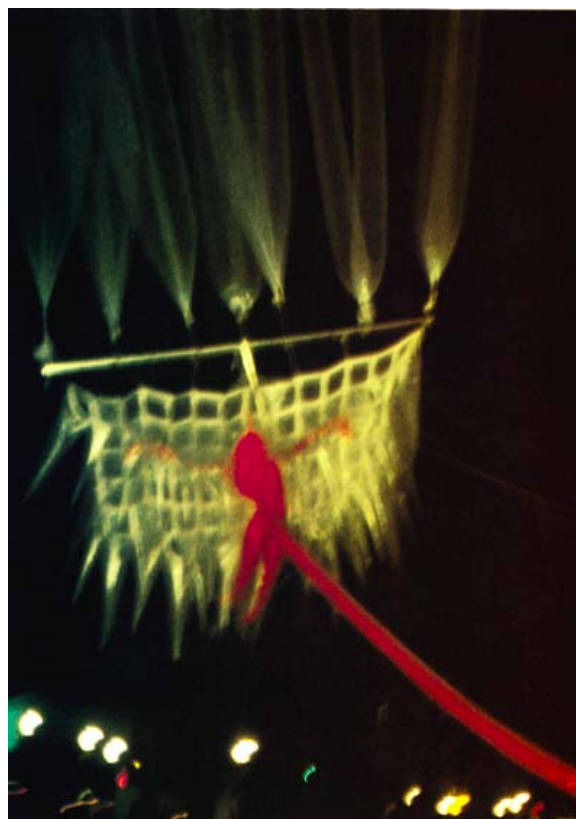
He varyingly described it as the "beast"; "the community of volunteers forming daily symbioses"; and "a house . . . a place to live, to rest, to entertain guests, to go through generations of human life."[14]

In this chapter, I investigate the making and unmaking of Centerbeam to map the entangled politics of artistic collaboration at MIT between the heyday of the 1960s and the sponsored media research of the 1980s. Both in its material instantiation and the networks that gave it life, Centerbeam encapsulates CAVS' ambivalent position in MIT's environment for the arts. Simply tallying its human and nonhuman elements, however, taxes narrative capacity. [Chart 1][15] The installation had distinct lives with differing audiences in two countries. In the process, it both shed and accumulated

in 1960s America" Technology and Culture 50.4 (2009): 753-782.
26   For contemporary explanations of the phenomena see: Jonathan Benthall, Science and Technology in Art Today (New York: Praeger, 1972); Douglas Davis, Art and the Future: A History-Prophecy of the Collaboration between Science, Technology and Art (London, 1973). For

historical analysis see: Caroline A. Jones, Machine in the Studio: Constructing the Postwar American Artist (Chicago: University of Chicago Press, 1996); Marga Bijvoet, Art as Inquiry: Toward New Collaborations Between, Art Science, and Technology (New York: Peter Lang, 1997); Oliver Grau, ed., MediaArtHistories (Cambridge, MA: MIT Press,

2007); Edward A. Shanken, Art and Electronic Media (London: Phaidon Press, 2009).

27   Henry Margenau, David Bergamini, and the Editors of LIFE, The Scientist (New York: Time Incorporated, 1964): 16-27. C.C. Furnas and Joe McCarthy, The Engineer (New York: Time Incorporated, 1966), 91.

28   I.S. Servi, "Dear Professor Kepes" August 21, 1969; Albert F. Wilson, "Dear Professor Kepes," October 8, 1968. Gyorgy Kepes papers, 1825-1989, Archives of American Art, Smithsonian Institution, Reel 5306 item 609 and Reel 5305 item 1124. Additional requests came from Bell Labs, Univac, AT&T, and the Lincoln Laboratory.

29   Finch, Languages Of Vision, 296-308.
30   Gyorgy Kepes, "Art and Ecological Consciousness" and "The Artist's Role in Environmental Self-Regulation," in Arts of the Environment, Gyorgy Kepes, ed. (New York: George Braziller, 1972), 1-12, 167-197.
31   Gyorgy Kepes to Dean William Porter (May 2,

Human Actors

Centerbeam Artists
Joan Brigham
Lowry Burgess
Harriet Casdin-Silver
Mark Chow
Betsy Connors
Alva L. Couch
Paul Earls
Derith Glover
Elizabeth Goldring
Michio Ihara
Christopher Janney
Kenneth Kantor
Harel Kedem

Gyorgy Kepes
Paul Matisse
Mark Mendel
Michael Moser
Muntadas
Carl Nesjar
Otto Piene
Alejandro Sina
Aldo Tambellini
Don Thornton

Centerbeam Technologists
Werner Ahrens
Edward Blair Allen

Jim Ballintine
Stephen Benton
Patricia Downey
William Cadogan
Harold Edgerton
Walter H.G. Lewin
Charles E. Miller
Michael Naimark
Marc A. Palumbo
Brian Raila

Administrators
Michael Collins
Paul Gray

John de Monchaux
William Porter
Walter Rosenblith
Jerome Wiesner

Other Actors
Lawrence Alloway
Jack Burnham
Muriel Cooper
Kathy Halbreich
Richard Leacock
Abe and Vera List
Donlyn Lyndon
Nick Negroponte

Starr Ockenga
Robert Preusser
Jon Rubin
M. Schneckenburger
Peter Spackman

Broader Publics
art critics
students
National Mall goers
documenta 6 attendees
MIT alumni

Institutions

Massachusetts Institute of Technology
Architecture Machine Group
CAVS
Committee on Visual Arts
Council for the Arts
Creative Photography Laboratory
Department of Architecture
Film and Video Section
Media Lab
Masters in Visual Arts Program
School of Architecture
Visible Language Workshop

Corporations
Alcoa Foundation
American Speaker Company
Aries Music Company
Carpenter Division of Gardner Cryogenics
Coherent Radiation
Comsat
The Computer Factory, Inc.

Corning Glass Works Foundation
Crown International
Electro-Voice
General Electric Company
Infodex, Inc.
International Telephone and Telegraph
Laser Creations, Inc.
Lubing Maschinenfabrik
Philips Petroleum Company
Pittsburgh Plate Glass
Spraying Systems, Inc.
Steam Rent, Inc.
Sylvania GTE
Tapco, Inc.
Thyssen Henschel

Museums and Art Agencies
Documenta GmbH
Federal Council on the Arts & Humanities
Fine Arts Commission
Hirshhorn Museum

Milwaukee Art Center
Museum of Art, Carnegie Institute
National Air and Space Museum
National Collection of Fine Arts
National Endowment for the Arts
National Gallery
Smithsonian Institution

Government Agencies
Bureau of Radiological Health, HEW
D.C. Architectural Commission
Federal Aviation Administration
Goddard Space Center
Government Service Administration
National Park Service
Secret Service
US Embassy, Bonn, Germany
United States Information Agency

Non-Human Elements

brine	helium	lasers	nozzles	steel	violins
computers	holograms	mirrors	polyethylene	strobes	water
electricity	hydroponics	neon-argon	speakers	synthesizer	weather
glass	kalliroscope	tubes	steam	video	

Significant Discourses

art
height of human creativity
source of pleasure and expression
visual inquiry equivalent to research
commodified window dressing
beyond common understanding
force for moral good

artists
society's heroic seers
participatory interpreters
experts equivalent to scientists
romantics
unnecessary expenses

technology
height of human creativity
out-of-control force
environment in which we live
source of pleasure and expression
militaristic and artificial

scientists and engineers
society's heroic seers
creative entrepreneurs
"doers" and "makers"
organization men
rationality incarnate

science
height of human creativity
source of human destruction
amoral rationality
beyond common understanding
beautiful, pleasurable act

architects
(see *artists, scientists and engineers*)

collaboration
source of societal wholeness
basis of new creative knowledge
cooptation/compromise of vision

1972) Gyorgy Kepes papers, 1825-1989, Archives of American Art, Smithsonian Institution, Real 5308 items 294-298.

32   "Wiesner Announces Formation of MIT Council for the Arts," Tech Talk, November 1971.

33   Jerome Wiesner, "Building a Shared Culture." Massachusetts Institute of Technology. Office of the Arts. AC

230, Box 2, Institute Archives and Special Collections, MIT Libraries, Cambridge, Massachusetts.

34   The best survey is Otto Piene, ed., Sky Art, 1968-1996 (Köln: Wienand, 1999).

35   Otto Piene, "Group Zero," Art Education 18.5 (May 1965): 20-23.

36   Piene's fascination with the sky as a medium was

rooted in his teenage experiences as a flak gunner during World War II. Conscripted at the age of 15, he remembers how gymnasium teachers gave lessons on Tacitus while children manned the guns. Robert F. Brown and Otto Piene, "Oral history interview with Otto Piene, 1988 Aug. 4-1990 Feb. 22) Archives of American Art, Smithsonian Insti-

tution. Tape 1, Side A.

37   Walter HG Lewin, "Three Decades with Otto Piene," in Sky Art, 1968-1996, Otto Piene, ed. (Köln: Wienand, 1999), 37-53.

38   Otto Piene, More Sky (Cambridge: MIT Press, 1973), 37, 108.

39   Otto Piene to Jerome Wiesner, October 3, 1974.

Folder 301. Center for Advanced Visual Studies Archive.

40   Otto Piene, "Center for Advanced Visual Studies," in Massachusetts Institute of Technology Annual Bulletin. Vol. 111, no. 4 (November, 1975), 76-79; Otto Piene, "Center for Advanced Visual Studies," in Massachusetts Institute of Technology Annual Bulletin. Vol. 112, no. 4 (Novem-

designers and capabilities. Centerbeam's contributors ranged in age from 21 to 75 years old. Some had collaborated for decades. Others joined the project when it arrived on the Mall. Working in no less than fifteen distinct media, team members consisted of artists from four continents, astronomers, industrial scientists, electrical engineers, graduate students in the School of Architecture, and a bevy of skilled undergraduates. To fully deploy Centerbeam's devices, required permission from the Federal Aviation Administration, the Bureau of Radiological Health, the National Park Service, and the Secret Service. All this is to say nothing of the rift set in motion by a bargain struck with President Wiesner while Centerbeam performed on the Mall.

In his introduction to Centerbeam's catalogue, Lawrence Alloway described the structure as a "path-node diagram—a graph of processes."[16] Reconstructing its history bears a similar quality. Beginning far afield of the event itself, I document the situational networks from which Centerbeam emerged, tracing its paths of energy as they merged and branched. In a shifting landscape of leadership changes, hybrid professional identities, evolving funding structures, and new technologies; artists, architects, administrators, engineers, and scientists pursued overlapping and often competing visions of "humane technology" through aesthetic acts. As such, Centerbeam forces an inter-textual reading of MIT's "second modernism" that puts into conversation its "clean" and "dirty" ideals. What follows is the biography of a transitory entanglement of virtues.

Aesthetic Virtue in the Defense Institute

Though Kepes served only as a consultant on the project, Centerbeam is inexplicable without appreciating how he made artist/scientist collaboration fundamental to the "wholeness" of postwar society by promising "epic tasks" of civic transformation; how he institutionalized that vision; and what was lost when it faltered.[17]

The resources Kepes tapped to create CAVS were more diverse even than his Vision and Value series let on. During Kepes tenure there where five distinct movements in support of the arts at MIT. The first and longest standing was the professional training of architects. The School of Architecture's desire to modernize it curricula by emulating changes in the sciences contributed to Kepes' appointment in 1945 and his subsequent replacement of "freehand drawing" with "visual design."[18] The second was the "integral plan" of general education— intended to prepare students for leadership in a nuclear age—which gave rise to Field 10 under Robert Preusser.[19] The third was a related desire among alumni and the wives of MIT administrators to "humanize" MIT by beautifying the campus and providing outlets for experiencing master works, manifest in the Hayden Gallery. The fourth was a complicated mix of ideologies and practices in which MIT scientists and engineers themselves laid claim to artistic vision, a position Kepes cultivated to great effect. The fifth, and by far the most tenuous, was the idea that MIT should aspire to professional art-making on par with its achievements in science and engineering.[20]

MIT, moreover, was not a universe unto itself. Its conceptions of the arts were

ber, 1976), 67-69.

41   USC, "The ultimate in environmental art . . ." The Tech (Friday, April 11, 1975), 5; Otto Piene, "To the Editor," The Tech (Tuesday, May 6, 1975), 4.

42   Jane H. Kay, "A Gallery of Visual Design," Technology Review (April 1967): 96-97. "Art and the Engineer," Mechanical Engineering (December 1967):

48-49.

43   Davis, Art and the Future, 100-102, 168; Benthall, Science and Technology in Art Today, 50, 75-78, 166-167.

44   Nicholas P. Negroponte, "The Return of the Sunday Painter," in The Computer Age: a Twenty-Year View, Michael L. Dertouzos and Joel Moses, eds. (Cambridge, MA: MIT Press,

1979), 21-37. Negroponte found ample support beyond MIT, as entrepreneurs and former counterculturalists fashioned themselves as socio-technical visionaries. Fred Turner, From Counterculture to Cyberculture: Stewart Brand, the Whole Earth Network, and the Rise of Digital Utopianism (Chicago, 2006).

45   He later established

Atari Research, earned an international reputation as a video artist, and now leads a similar academic unit at USC. http://www.naimark.net/

46   Harriet Casdin-Silver, "My First 10 Years as Artist/Holographer (1968-1977)" Leonardo Vol. 22, No. 3/4 (1989): 317-326. For an analysis of the hybrid artistic/technical character of ho-

lography see: Sean F. Johnston, Holographic Visions: A History of New Science (New York: Oxford University Press, 2006).

47   The event was prompted by an invitation from the University Film Study Center, whose director Peter Feinstein wanted to draw attention to art forms that fell between mass culture and the collector's mar-

coproduced with a range of activities in American science and industry. Informed by a highly theorized notion of "interdisciplinarity," psychologists, art historians, and sociologists identified the scientist and the artist as emblematic of the most innovative and least conformist individuals, the principal source of innovation and social cohesion in a modern age.[21] For government and industrial research laboratories, art was a marker of disinterested purity, the pursuit of truth by cultured employees dedicated to their task. Los Alamos, for example, ran a series of recruitment advertisements with abstract paintings inspired by scientific phenomena with the adage "From Diversity Comes Unity," that trumpeted collaboration while implying that researchers did not dirty their hands in weapons design.[22]

ket. Peter Feinstein, "Film," in Artransition (Cambridge, MA: MIT Press, 1975), 67.

48   Otto Piene, Artransition (Cambridge, MA: MIT Press, 1975), x-xi.

49   "Background: Arts and Media Technology Program." Folder 229, "Arts Building Facility." Center for Advanced Visual Studies Archive.

50   Arts Advisory Group and the Arts Environments Study Team, MIT Arts Environments Study (Cambridge, MA: MIT 1976).

51   Elizabeth Goldring, "Centerbeam—Kassel" in Centerbeam, Otto Piene and Elizabeth Goldring, eds. (Cambridge, MA: Massachusetts Institute of Technology, 1980), 37.

52   Harriet Casdin-Silver, "'Centerbeam' documenta 6—'Centerbeam' Washington, DC," in Centerbeam, Otto Piene and Elizabeth Goldring, eds. (Cambridge, MA: Massachusetts Institute of Technology, 1980), 77-78.

53   Walter H.G. Lewin, et al. "Solar Tracking of Holograms for 'Centerbeam'" in Centerbeam, Otto Piene and Elizabeth Goldring, eds. (Cambridge, MA: Massachusetts Institute of Technology, 1980), 79-81.

54   Otto Piene to Jerome Wiesner, May 26, 1977. Massachusetts Institute of Technology Office of the Provost. AC 7, Box 25, Folder "Centerbeam Documenta 6". Institute Archives and Special Collections, MIT Libraries, Cambridge, Massachusetts. Otto Piene to Walter Rosenblith, "Report part 1". October 17, 1977. Massachusetts Institute of Technology Office of the Provost. AC 7, Box 25, Folder "Centerbeam Documenta 6". Institute Archives and Special Collections, MIT Libraries, Cambridge, Massachusetts.

55   Harold F. Schneid-

[Figure 12] Inside America's corporations, there also was a veritable "creativity" boom among engineers, managers, and industrial scientists aimed at enhancing productivity and dispelling anxiety that postwar expansion had turned employees into organization men.[23] The Airborne Instruments Laboratory (AIL) of Cutler Hammer, for instance, showcased employee artwork that included paintings of a Siamese cat, a pastor, and covered bridges to demonstrate that its employees were a "broad-gauged group of humans" who were "civic-minded" and "artistic"—the sort "the world needs."[24] [Figure 13] Finally, in the late 1960s and early 1970s, nearly two hundred of the nation's engineering colleges revised their curricula, adding humanities, social sciences, and art courses to "humanize" technologists.[25]

A similar range of normative aims existed among artists drawn to new media and scientific themes. Between the mid-1960s and early 1970s, artists and critics debated the eroding meaning of the "art object" and the identity of the "artist" as its authorial maker. Video art, computer art, electronic art, light works, cybernetic environments, and holography proliferated as artists simultaneously praised, condemned, and appropriated the tools of the technological order.[26]

Throughout the Cold War era, in short, "the art of science" and "technological art" conjured contradictory values of hybridity and purity; elite expertise and participatory democracy; the neutrality of knowledge and its inherent politics. These visions nonetheless shared a set of common ideals. In a technological society, art always signified an intellectual, professional, and social good in which creativity and collaboration were means to repair societal divisions.

Kepes united these diverse energies at MIT by enrolling everyone else's worldview into his own. Externally, he embraced the persona of interdisciplinarity incarnate. Time Life Books used MIT's art programs to lionize scientists and engineers as fonts of "Poetic Vision."[27] His paintings lined the offices of Route 128 executives. He spoke at events ranging from a symposium on "hierarchical structure" at McDonnell Douglas's Advanced Research Laboratories to "Ladies Night" at the local chapter of the American Institute of Mining, Metallurgical, and Petroleum Engineers (AIME).[28] Internally, he cultivated a patronage relationship with Julius and Catherine Stratton familiar to any Renaissance courtier. To broaden support for the arts, he encouraged the work of Ida Rubin and other MIT matrons in developing a permanent collection. To assure that MIT collected and exhibited contemporary works, he welcomed a faculty-directed Committee on the Visual Arts (CVA). To appeal to the School of Architecture's desire to emulate the sciences, he adopted the "Center" rhetoric and cast artists as experimental researchers.

But in the upheaval of the late 1960s, Kepes struggled with the negative connotations of collaboration. The failed Boston Harbor project was followed by the similarly compromised Explorations exhibit.[29] As "The System" took on sinister meaning, Kepes did his best to adopt anti-technology tropes while maintaining optimism about the humanizing power of art. "What we face," he offered "are destructive forces of a completely new kind—man-generated, cumulative, and of almost cosmic proportion."[30] On the brink of retirement,

man to Otto Piene, April 25, 1978. Folder 6, "USIA". Center for Advanced Visual Studies Archive.

56   Sited across the street from the Bureau of Radio-logical Health, its laser was to shut down after opening night, sending Paul Earls back to MIT to redesign an aperture to meet federal standards and fix the laser's range of motion. Jo Anne

Lewis, "Pulling the Plug on Laser Art," Washington Post (Tuesday, June 27, 1978), C10.

57   Jo Ann Lewis, "The Mall's Multimedia Machine" (June 23, 1978) d1; "Light Show in the Sky" (June 23, 1978), wb 3.

58   Tom Zito, "Icarus on the Mall" Washington Post (Sept. 9 1978), B3. In 1966, New York

Times critic Clive Barnes wrote of EAT that: "If the American engineers and technologists participating in this performance were typical of their profession, the Russians are sure to be first on the moon." Clive Barnes, "Dance or Something at the Armory," New York Times (15 October 1966): 33.

59   Ross C. Anderson,

"'Beast' Designed by Center for Advanced Visual Studies Artists on the Mall in Washington, DC," Technology Review (August/September 1978): A12-A13.

60   Paula Ruth Korn, Tech Talk, "On the Mall in Washington DC: Its What Tom Wolfe Might Call Your Ordinary Kandy-Kolored Tangerine-Flake Streamline Baby" (June 28, 1978): 1,8.

61   Elizabeth Goldring, "Concluding Remarks," in Centerbeam, Otto Piene and Elizabeth Goldring, eds. (Cambridge, MA: Massachusetts Institute of Technology, 1980), 125.

62   Otto Piene's Draft Proposal, January 2, 1978. Folder 226, "Proposal Arts Facilities". Center for Advanced Visual Studies Archive.

Kepes had cause to question the viability of his dream.[31]

Art Transition

At this point, two of Centerbeam's principal agents—Piene and Wiesner—begin rearranging Kepes' network. As they assume new positions of leadership at MIT, they direct existing energies and spark new ones that will be vital to its construction. They also make choices that assure its singularity.

Shortly after Wiesner was appointed President in 1971, he declared his intention to "transform MIT into a large multi-purpose arts center."[32] In front of 900 alumni at the Metropolitan Museum of Art he announced a new Council for the Arts designed to raise funds and integrate the arts through centralized management. He explained to the Council's first chairman, real estate developer Paul Tishman, that the "humane arts" were "illuminators of human potential, genius and uniqueness" and thus should be at the core of a scientific

education designed to meet the inner needs of technologists and improve "the quality of the environment on the scale of the city or even the world ecosystem."[33]

In 1974, Otto Piene was chosen to inherit CAVS' directorship from its seemingly irreplaceable founder at a moment of skepticism about its mission. Like Kepes, his art had evolved from painting to light works to interactive environments. He had been incredibly prolific during his six years as a Fellow. Along with Nam June Paik and Aldo Tambellini, he participated in the first video art broadcast, WGBH's Medium is the Medium. He had his second solo exhibition at New York's Howard Wise Gallery. He published a collection of sky art lithographs and wrote a book outlining his tenets of environmental art. His sky events grew in scale and frequency, unfolding across the Charles River, on rooftops in Pittsburgh, beaches in Hawaii, city streets in Germany, and the National Mall in Washington, DC., culminating with the 1500-foot illuminated helium rainbow at the Munich Olympics.[34] [Figure 14]

Piene was an evangelist for technologically mediated collaboration. When he arrived at MIT, he already was an acclaimed organizer of Group Zero, formed in Düsseldorf when he was just twenty-nine. Celebrating scale and change, Group Zero defined collaboration as a balanced process of teamwork and individuality.[35] Of the Fellows chosen by Kepes, Piene actualized the artist/scientist partnership to greatest effect. He arrived at MIT with the intention of using the sky as an expansive medium. A call for volunteers attracted Walter Lewin, perhaps the one person alive best suited to help him.[36] A young Dutch astrophysicist, Lewin would became famous for

63   Lyndon Associates, Inc., Places for Art at MIT (Cambridge, MA: Lyndon Associates, Inc., 1978). The quote is a summation of Lyndon's plan from Deborah Hoover, Director of the Council for the Arts, from "Interview: Deborah Hoover," in Artists and Architects Collaborate: Designing the Wiesner Building, MIT Committee on the

Visual Arts, ed. (Cambridge, MA: MIT Committee on the Visual Arts, 1985), 29. For an extensive discussion of Lyndon's plan and its affinity with CAVS see Rotzel, "The Media Lab that Wasn't".
64   Nicholas Negroponte, "The Orgins of the Media Lab," in Jerry Wiesner: Scientist, Statesman, Humanist, Walter A. Rosenblith, ed. (MIT Press,

2003), 149-156.
65   Robert Campbell and Jeffrey Cruikshank, "Art in Architecture" in Artists and Architects Collaborate: Designing the Wiesner Building, MIT Committee on the Visual Arts, ed. (Cambridge, MA: MIT Committee on the Visual Arts, 1985), 11-24.
66   A&MT Minutes, (September 10 1979). Folder 228,

"Arts Building Facility." Center for Advanced Visual Studies Archive.
67   Campbell and Jeffrey Cruikshank, "Art in Architecture," 21-22.
68   Kathy Halbreich, "Acknowledgements" and "Interview: Kathy Halbreich," in Artists and Architects Collaborate: Designing the Wiesner Building, MIT Committee on the Visual

Arts, ed. (Cambridge, MA: MIT Committee on the Visual Arts, 1985), 6-7, 33-38.
69   Creative Photography was eliminated in 1983.
70   John de Monchaux, "Second Discussion Report of the Arts and Media Technology Task Force" (2/28/1983). Folder 236, "CAVS/AMT Politics 1983, etc." Center for Advanced Visual

discovering X-ray Burster stars. In the era before ubiquitous satellites, his detectors reached the outer atmosphere attached to the world's largest helium balloons.[37] [Figure 15]

Piene's understanding of collaboration, however, differed from Kepes' in important ways. Piene was a maker rather than a theorist. In More Sky, he called for the proliferation of "Integration Departments" in technical and artistic institutions, but criticized the academicism of "paper projects":

> Given the advanced age of technology, it is deeds that count, not babble . . . You hang a sculpture in the wind, and the wind becomes visible. You talk about the wind, and the wind becomes a word. You talk about art and technology, and they turn it into a phrase easily overcome or neutralized at least by words, a process also known as sloganeering. [38]

Though not a political radical, Piene's sensibilities leaned much more toward participatory democracy than Kepes. His most focused critical insights, moreover, were directed at artists rather than scientists or engineers. He railed against the commoditization and objectification of collectors and museums. On the other hand, he argued that the professional artist had a unique responsibility to interpret the technological world for broader publics that could not be achieved by amateurs. These tendencies would prove crucial in his interactions with other MIT stakeholders.

When he became director, Piene also faced a different institutional landscape than Kepes. The utopian sheen that had attracted scientists,

artists, and the press to Kepes' project had been severely reduced. Nonetheless, the 1970s were a period of growth for the arts at MIT. Wiesner and the Council for the Arts gave CAVS financial stability in exchange for a teaching mission that reconnected a thread Kepes had severed.[39] Simultaneous with Piene's appointment, Preusser was made CAVS director of educational programs. In 1973-1974, CAVS served 11 students in an informal capacity; the following year 133 enrolled in six new course offerings; in 1975-1976 there were 240 students.[40] To accommodate the surge, CAVS converted one of its five studios into a lecture/exhibition room, and Lobby 7, a short distance across Massachusetts Avenue, became its de facto exhibition space.

CAVS' education program created pockets of appreciation for environmental art among MIT's students and provided Fellows with access to a pool of skilled technical assistants. This was a relationship that Piene already had found productive. (Again a momentary look

Studies Archive.

71   Otto Piene, "Some Comments on CAVS and Environmental Art," Architext (March 16, 1983), 1-2; Otto Piene to Fellows and Grad Students (4/8/1983) Folder 238, "Cavs AMT". Center for Advanced Visual Studies Archive; Robert F. Brown and Otto Piene, "Oral history interview with Otto Piene, 1988

Aug. 4-1990 Feb. 22." Archives of American Art, Smithsonian Institution. Tape 7, Side A.

72   Rotzel, "The Media Lab that Wasn't," 12-13.

73   "Revised Draft: Proposal on New Space for Architecture Machine, CAVS, Synthesized Music, Film/TV". Folder 228, "Proposal for Arts Facility (O.P.) 1-2-78". Center for Advanced Visual

Studies Archive.

74   Otto Piene to Jerome Wiesner, November 17, 1978. Massachusetts Institute of Technology. Office of the Provost. AC 7, Box 25, Folder "CAVS-Correspondence," Institute Archives and Special Collections, MIT Libraries, Cambridge, Massachusetts.

75   Otto Piene to Wal-

ter Rosenblith, "The ABC (Arts Building Complex," Dec. 12, 1978. Massachusetts Institute of Technology. Office of the Provost. AC 7, Box 25, Folder "CAVS-Correspondence," Institute Archives and Special Collections, MIT Libraries, Cambridge, Massachusetts.

76   "Program for the Arts and Media Technology at

MIT," July 12, 1979. Massachusetts Institute of Technology Office of the Arts. AC 230, Box 15. Institute Archives and Special Collections, MIT Libraries, Cambridge, Massachusetts.

77   Goldring, "Concluding Remarks," 125.

78   Elizabeth Goldring "'Desert Sun/Desert Moon' and the SKY ART Manifesto," Leonar-

forward: Centerbeam's chief engineer William Cadogan was an MIT engineering alumnus who had worked with Piene since 1971.) Students discovered, however, that the audience that enthusiastically supported Field 10's scientific modernism in the 1960s responded less kindly

to environmental art. In 1975, CAVS held its Food exhibition in Lobby 7, which included a giant inflated apple with an internal slide, piles of rotting fruit, and a spaghetti-like net hanging above the atrium. [Figure 16] The show was conducted with understandable amateurism and committed the cardinal sin of obstructing the infinite corridor. In addition to a negative letters to the editor, MIT's student newspaper, The Tech, published a satirical review of a "Trash" show consisting of "three tons of garbage, litter, and sewage," anchored by a 200 foot inflatable plastic can.[41] Food, however, had a formative impact on at least four participants who later became part of the Centerbeam crew. Kenneth Kantor, a freshman contributor to Food, served Centerbeam's electronics engineer and went on to a distinguished career as an audio speaker inventor.

From CAVS' perspective, the Council for the Arts made judgments not far removed from Food's detractors. The Council, which had no practicing artists on its executive board, empowered alumni, who typically were much more conservative in their conception of "art" than CAVS. The Council's inaugural event, for example, was a national fundraising tour by the Institute's Symphony Orchestra intended to showcase the well-rounded talents of MIT students. Art/science/technology collaborations had ambiguous status among Council activities, a situation that Piene did not seek to improve through the sort of patron outreach that had earned Kepes respect among businessmen, engineers, and industrialists.

In addition to the Council, CAVS also had to negotiate with new programs in the School of Architecture that were staking

claims to art/science/technology collaboration as professional practice, namely: Richard Leacock's Film and Video Section, Muriel Cooper's Visible Language Workshop, Starr Ockenga's Creative Photography Laboratory, and Nicholas Negroponte's Architecture Machine Group (AMG). In general, these programs were mutually reinforcing, but were spread across the campus, competed for resources, and involved directors interested in fashioning MIT's arts in their own image. Negroponte emerged as Piene's chief sparring partner. As an undergraduate, his Field 10 coursework had been reprinted in Technology Review and Mechanical Engineering as prime examples of the art program's benefits.[42] Later, his mixed media contribution "SEEK" at the Jewish Museum's Software exhibit—which involved gerbils interacting within a computer-controlled landscape of aluminum blocks—was heralded by critics.[43] [Figure 17] But Negroponte's product-oriented computer graphics research was heavily funded by defense contracts. Moreover, though he shared Piene's desire to encourage art observers to become participants, he believed that technology itself would facilitate the transformation.[44]

Pooling their resources, these programs developed a new Masters in Visual Studies (SMVisS) within the Department of Architecture. Divided into five concentrations with different admission requirements and plans of study, the program was a fraught alliance in which students were expected to chart their own path. The mix, however, had impressive results. Michael Naimark, who would contribute to Centerbeam's holography line, for example, earned his degree from Piene's Environmental

Art concentration but worked as an assistant in Negroponte's AMG.[45] The SMVisS program, moreover, immediately became CAVS' lifeblood. Students worked in apprentice-like relationships with Fellows, and when they graduated they were given fellowships at the Center to further develop their work and professional reputation. [Figure 18]

Bolstered by its graduate and undergraduate programs, CAVS expanded its community of Fellows to over twenty a year. Many were supported by external foundations or had complimentary positions in Boston's art world. Burgess, for example, came to CAVS in 1972, but also was chairman of the MFA Program at the Massachusetts College of Art. Fellows

do Vol. 20, no 4 (1987): 339-348.

79 Smithsonian World, Elephant on the Hill (Washington, DC: Greater Washington Education Telecommunications Association, Inc., May 13, 1987).

80 John Russell, "Art Breathes Freely at M.I.T.'s New Center" New York Times (April 28, 1985), 31-31. See also: Joseph McLellan, "Science Meets the Muse in the Arts of the Future" Washington Post (Sunday, February 10, 1980) M 11.

81 Jerome Wiesner, "Interview: Jerome Wiesner," in Artists and Architects Collaborate: Designing the Wiesner Building, MIT Committee on the Visual Arts, ed. (Cambridge, MA: MIT Committee on the Visual Arts, 1985), 25-28.

82 Stewart Brand, The Media Lab: Inventing the Future at MIT (New York: Penguin, 1983), 83.

83 Frank Popper, Art of the Electronic Age (London: Thames and Hudson, 1993), 147-148; Bijvoet, Art as Inquiry, 49.

84 Piene, "Centerbeam," 23. Interview in this Volume.

85 Bruno Latour, Aramis or Love of Technology. (Cambridge, MA: Harvard, 1996).

86 Interview in this volume.

87 "Revised Draft: Proposal on New Space for Architecture Machine, CAVS, Synthesized Music, Film/TV". Folder 228, "Proposal for Arts Facility (O.P.) 1-2-78". Center for Advanced Visual Studies Archive; Otto Piene, "A Five-Year Plan for the Center for Advanced Visual studies, (1985-1990)"

88 Sally S. Vanerian, "Search Underway for Head of Visual Studies," The Tech Vol. 108, no. 8 (March 1, 1988): 1, 18.

invited by Piene typically had worked with scientists and engineers prior to their arrival at MIT. Some were technical adepts in their own right. Harriet Casdin-Silver, who became a Fellow in 1976, evolved from an environmental artist into a holographer. She first began working with industrial physicists in 1968, gaining her own laboratory space at American Optical Research. This led to further collaborations with Stephen Benton, inventor of white light holography. She then became a visiting researcher in the physics department at Brown University, simultaneously performing technical and aesthetic research.[46]

In sum, during his first years as director, Piene cultivated a diverse community of undergraduates, SMVisS graduate students, emerging talent, and established artists that virtually defined what it meant to be a "technological" artist in the 1970s. In October 1975, he publicly announced CAVS' expanded mission [Chart 2] by co-organizing the international ArtTransition conference.[47] For Piene, ArtTransition was an effort to stake CAVS' position as a leader in the environmental and new media arts. It also set the tone for future events under his tenure. He appointed Wiesner to be the conference Chairman with collaboration as the central theme. [Figure 19] Instead of a delicate balance of artists, scientists, and essayists, however, the emphasis was decidedly on artists. According to Piene, it was artists who were responsible for fostering human uses of technology and guiding the "'archaic' stages of the information industry." This was a democratic task that would preserve the "artist's identity" as he or she engaged technologists and politicians. The result, he argued, would not be "ultimate solutions to perennial problems," but rather "momentary psychic energy."[48]

CAVS' expression of purpose at ArtTransition

Center For Advanced Visual Studies

1. Environmental Art & Design	"enhance the physical environment's psychological economy by means of beauty which is both expressive and practical"
2. Developmental Media	"find the expressive artistic language which can reach a large audience with human dignity and *without commercial stimulation*"
3. Art/Science/Technology	"use every chance for interaction between artists, scientists, engineers and scholars to master the increased scale of communication"
4. Celebrations	"an oft-neglected art form presumably earlier than painting, which is obviously communal and most inviting to people of all ages, denominations and professional commitments"
5. Education	"toward the new arts and general education towards a broader understanding of our 'modern' world"

Chart 2. A Revised Mission for CAVS, 1975. (Piene, *Artransition*, xi. Italics added for emphasis.)

offers a convenient place to regain our bearings. Throughout the 1970s, CAVS, Wiesner, the Council for the Arts, the School of Architecture, and others all had been debating what counted as "art" and how those diverse energies could be brought together at MIT. A persistent hope was that there would be an architectural solution to integration, and, as early as 1973, the Council began planning for new facilities.[49] Discussion accelerated with the formation of the SMVisS degree. In 1976, Architecture Professor Donlyn Lyndon conducted an Arts Environments Study at the request of the Council that emphasized the need for facilities along MIT's main corridor in order to maximize informal interaction.[50] Late in 1977, the discussion ceased to be academic when Abe and Vera List announced their intention to make a major donation for the construction of an arts complex. At the same time that Wiesner's vision was becoming reality, Piene also was on the brink of actualizing the civic art that had eluded Kepes.

Assembling Centerbeam

Having completed the institutional and discursive groundwork and introduced the main players, we can finally approach Centerbeam

with an eye toward its proximate aesthetic and organizational meanings. Late in 1976, Schneckenburger, who had been a panelist at the ArtTransition conference, invited CAVS to present a group project at documenta 6. The result was an accumulation of agents and resources dating to Piene's arrival in 1968. [Chart 3]

Centerbeam's organizing form was established by democratic vote. Among three ideas—one from Piene, one from Burgess, and one from Harel Kadem (an SMVisS graduate student)—the group chose Burgess' concept of: "bundled energy and communications lines from the well springs of an urban environment

to extend into the natural landscape, where they would become visible interactive transmissions."[51] [Figure 20] Burgess, Piene, and Micho Ihara (a sculptor of modernist architectural spaces invited by Kepes in 1970) then worked out the structural base, which was intended to convey infinite length, but was paired down to 128 feet to accommodate the

	Name	Contribution	CAVS Affiliation and Other Relevant Connections	Age
Artists/ Organizers	Otto Piene	project director, 23 sky events	Director	50
	Lowry Burgess	artistic director	Fellow 1972 –	38
			MFA Program Chair, Massachusetts College of Art	
	Elizabeth Goldring	project coordinator	Fellow 1975-	33
Artists	Paul Earls	laser line, computer tapes music and sound lines	Fellow 1970 –	44
			Lecturer, Department of Architecture, MIT	
	Micho Ihara	structural design	Fellow 1970-1977	50
	Alejandro Sina	neon-argon line	Fellow 1973 –	33
	Joan Brigham	steam line and water line	Fellow 1974 –	43
			Assistant Professor of Fine Arts, Emerson	
	Carl Nesjar	brine line (Germany)	Fellow 1975 –	58
	Harriet Casdin-Silver	holography line	Fellow 1976 –	43
			Assistant Professor of Physics, Brown University	
	Mark Mendel	poetry line	Fellow 1976 –	31
	Aldo Tambellini	video	Fellow 1976 –	48
	Mark Chow	video	Fellow 1977 –	25
			SB, Electrical Engineering, MIT 1974	
			SB, Architecture, MIT 1975	
	Paul Matisse	Kalliroscope	Fellow 1977 –	45
	Muntadas	video	Fellow 1977 –	36
	Betsy Connors	video	Research Affiliate	28
			WGBH New Television Workshop Artist	
	Alva L. Couch	laser imagery	computer programmer, Harvard Medical School	22
			SB, Architecture, MIT, 1978	
SMVisS Students	Derith Glover	"drawing with your eyes"	Fellow 1977 – 78	26
			SMVisS, CAVS, MIT, 1977	
	Michael Moser	video	Fellow 1977 –	26
			SMVisS, CAVS, MIT, 1977	
	Harel Kedem	grow line	Fellow 1978 –	31
			SMVisS, CAVS, MIT, 1977	
	Christopher Janney	"soundshuffle"	Fellow 1978 –	28
			SMVisS, CAVS, MIT, 1978	
	Michael Naimark	solar tracking participant film assistant	SMVisS student	26
			works in Architecture Machine Group	
	Don Thornton	holograms	SMVisS student	32
Scientists/ Engineers/ Assistants	Walter HG Lewin	solar tracking design	Professor of Physics, MIT	42
			Piene collaborator since 1967	
	William Cadogan	project engineer	Fellow 1978	31
			SB, Electrical Engineering, MIT 1969	
			Piene's technical assistant since 1971	
	Kenneth L. Kantor	electronics	MIT electrical engineering undergraduate	22
			participant in CAVS 1975 *Food* show as freshman	
	Brian Raila	hologram system	SB, Art and Design, MIT, 1977	24
	Werner Ahrens	*documenta 6* assistant	Research Affiliate 1977	30
	Charles E. Miller	strobe line (not installed)	Lecturer, Electrical Engineering, MIT	46
	Marc A. Palumbo	Washington, DC assistant	Fellow 1978	25
Consultants	Gyorgy Kepes	artistic advisor	Institute Professor Emeritus, MIT	72
	Harold Edgerton	technical advisor	Institute Professor Emeritus, MIT	75
	Edward Blair Allen	structural design	Associate Professor of Architecture, MIT	40
	Stephen Benton	holography	Senior Scientist, Polaroid	37
			former Doc Edgerton student at MIT	
			future founding faculty of Media Lab	
			future director of CAVS	

15

Baroque courtyard at Kassel. The water prism—its dimensions calibrated to maximum visual effect by Lewin—was the first component to stabilize. It was to be raised four feet from the ground on stanchions carrying fifteen distinct media "lines." [Figure 21]

After the senior group established the modernist steel scaffolding, the CAVS community adopted a fluid process for integrating elements of individual expression. In December 1976, they met in the alley of building W-11 with an "impromptu changing collage" consisting of a three-foot prism, a steam generator, a hologram, a laser, and neon rods. Biweekly meetings addressed problems of integration and aesthetic sensibility.

The most complicated element of Centerbeam was Casdin-Silver's white-light transmitted solar holograms. From 12" x 16" plates, they projected images at a frontal distance of roughly three feet.[52] To assure a consistent light source for her forks, she worked with a team composed of Lewin, his graduate students, Kantor, Naimark, Brian Raila (an Art and Design undergraduate), and Benton. When completed, the solar tracking mirrors automatically determined the position of the sun from "anywhere on Earth."[53] [Figure 22]

All the while, Piene and Elizabeth Goldring worked the phones and travelled to companies
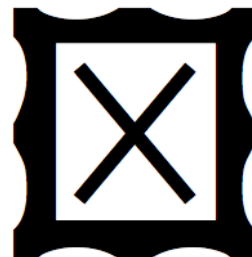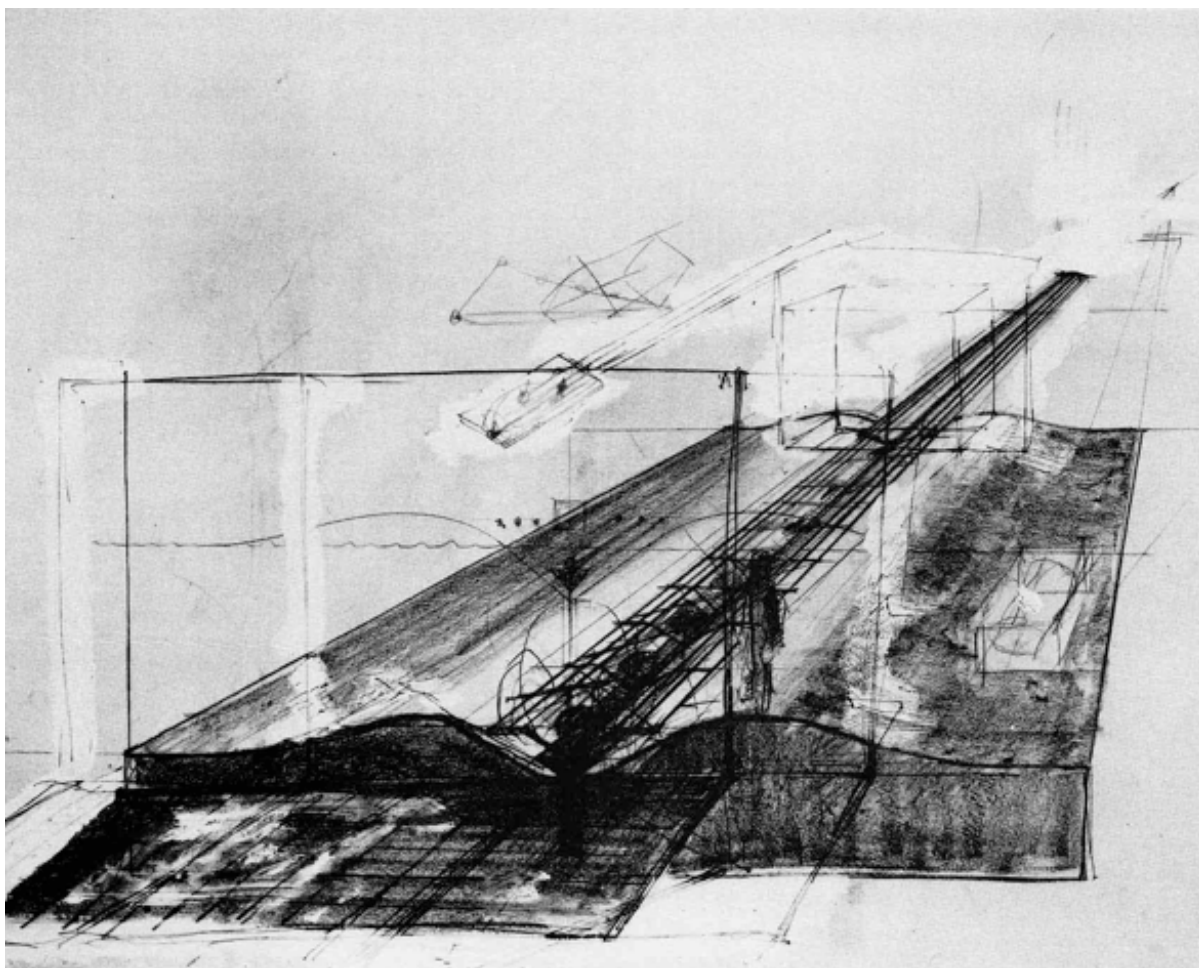
and government agencies in Washington, New York, and Pittsburgh. President Wiesner assisted as a critical fundraiser and ideas man. Corporate and government sponsors
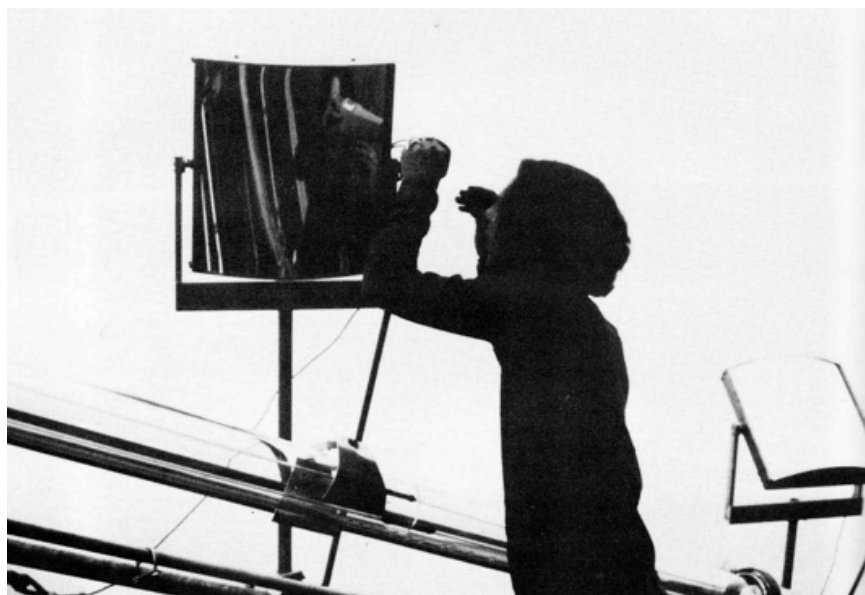
were enthusiastic, but unwilling to support a one-off event in Germany. To enroll American foundations and government agencies, CAVS promised a travelling sculpture. The majority of funding for documenta 6 came from the United States Information Agency (USIA), which at first imagined Centerbeam would be reconstructed in Eastern Europe and Moscow as a symbol of political reconciliation. Vice President Walter Mondale's office, however, wanted it shown in Washington to represent Carter's energy policies and willingness to work together with industry.[54]

The team arrived in Kassel a month prior and began assembly. Following the release of one of Piene's 50 foot flowers, Centerbeam was turned on for a duration of roughly 100 days. With additional funding from the USIA, Piene invited Leacock and Jon Rubin of Architecture's

Film/Video Section to document the "developing art and technology relationship."[55]

While documenta 6 deserves further attention, Centerbeam's incarnation in Washington, DC best highlights its tangled aesthetic, discursive, political, and technical elements. Centerbeam encapsulated in a single form the meeting of two visions of collaboration. Its spine was Kepes', and its pulsating energies were Piene's. It uneasily balanced the democratic with the technocratic. Its overriding goal of participation shaped design choices and the implementation of as many hands-on elements as possible. Participation, however, conflicted with the fragility, cost, and hazards of its high tech components, necessitating constant surveillance. It was designed to highlight student work (SMVisS graduates were given their own "lines" and titled components); while at the same time it was a representation of MIT's advanced research. Centerbeam was reliant on the improvisation of the crowds that helped construct and launch its sky events, but it operated in a highly regulated bureaucracy of permits, approvals, and forced design changes.[56] It was a collective project, but with twenty-five sky events on its Washington schedule, it also was a signature display of Piene's work. It was a recognition of CAVS by national art organizations, but its closest ally was the National Air and Space Museum. It was the culmination of at least two decades of work in kinetic sculpture, laser, and other technological art forms that bore a strong resemblance to EAT's Pepsi Pavilion; but Casdin-Silver's wildly popular holograms—developed with the assistance of Benton who would soon join MIT as a founding faculty member of the Media

Lab—suggested new hybrid directions in the art/science/technology relationship.

Faced with this complex of history, politics, and technology, the press was at a loss for words. Journals such as Science, Machine Design, and IEEE Spectrum that once championed similar projects were not re-convinced. Art journals were nonplused. The Washington Post described it as a "sophisticated multimedia Tinkertoy," advertising the event with the affirmation that: "You don't have to know art, or science, to know what's pretty, or strange."[57] More acerbic criticisms accompanied the Icarus finale. Repeating a trope from the late 1960s almost verbatim, Washington Post critic Tom Zito declared

that: "If this is the best that MIT can do, the technological future of America is in serious trouble"[58]

Most illuminating was the response to Centerbeam in MIT's institutional press. The Tech, made no mention of either the Kassel or Washington events. Technology Review attempted to describe Centerbeam in its alumni insert but expressed befuddlement.[59] MIT's internal news service, Tech Talk bordered on hostility, stating that visitors "came to see something they did not understand. But they knew the experience was something they must take in . . . or watch . . . or whatever it was they were supposed to do with the avant garde sculpture just installed on the Washington

Mall"[60]

Artists and Architects Collaborate

Despite the mixed reception, Piene and Fellows returned to MIT jubilant. There were commitments to show works from Centerbeam's contributors in a dedicated exhibition in Grand Rapids, Michigan and at the 1979 Vienna Biennale. Plans also were underway for a Sky Art Conference, made possible by a grant from the National Endowment for the Arts (NEA).[61] In between Kassel and Washington, Piene was euphoric about MIT's anticipated arts complex, imagining it as a "Louvre/Deutsches Museum" dedicated to the production, exhibition, and historical documentation of art/science/technology collaboration. He called for a fluid, open-space that avoided "geometric design imagery."[62] Plans for Phase I of the project, distributed in June 1978, seemed to confirm his ambition. Designed by Lyndon, Places for the Arts presented "a long corridor going through MIT, somewhat like a mall, with arcades on the side—each having a different type of art form, but all connected."[63] [Figure 23]

But just as Kepes' vision deteriorated at its apparent apotheosis, so did Piene's. In late August 1978, Negroponte met with Wiesner and Provost Walter Rosenblith to pitch his ideal of entrepreneurial new media research as the creative force of society's future.[64] Negroponte cultivated Wiesner as patron and partner— not only would the building be named after Wiesner, but he would be its first professor of communication. [Figure 24] Within a year, I.M. Pei was selected as architect, and Lyndon's

"village" became Pei's "box."[65] CAVS was not on the client team, which consisted of Negroponte, Dean William Porter, and CVA exhibition director Kathy Halbreich.[66] Events came to a head when Halbreich invited artists to produce "environmental" works for Pei's building with support from the Council for the Arts and a landmark grant from the NEA. [Figure 25] She neither considered nor consulted CAVS artists.[67] In the volume that documented Halbriech's self-described "experiment"—Artists and Architects Collaborate—she criticized "plug-in" art and temporary installations, lamenting that: "When 'collaboration' become the buzz word, objects became sinful."[68]
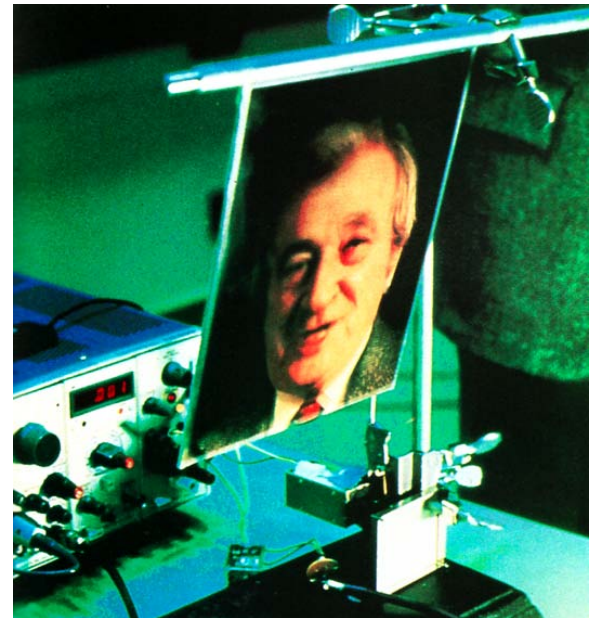
Dragged out over more than five years, the evolution from arts complex to Arts and Media Technology building realigned MIT's aesthetic commitments as substantially as Kepes had done so when bringing CAVS to life. The transformation left CAVS diminished and resulted in a reorientation in the meanings

of "humane" technology. The Wiesner Building emerged as an alliance between MIT's traditionalist art interests and the sponsored research of the Media Laboratory that encompassed most of the stakeholders in Architecture's SMVisS program.[69] CAVS, on the other hand, remained in Building W-11. Changes in leadership again proved crucial. In the early 1980s, when Paul Gray replaced Wiesner as President and Francis Low replaced Rosenblith as Provost, MIT faced multi-million dollar budget cuts and a proliferation of research centers. As part of broader restructuring, administration of CAVS shifted from the Provost to the School of Architecture. At the same time, John de Monchaux replaced Porter as Dean of Architecture. Monchaux was a powerful

advocate of sponsored research, and citing a lack of "reflective and analytic thinking" in the MSVisS program, he sought to remake it under the Media Lab's aegis and turn CAVS

into a service arm of a revised visual studies program.[70] Only through a vigorous defense did CAVS maintain its mission of experimental art making and professional training.[71]

The tensions of this reorientation embodied different ideals about art and technology that drew on shared rhetoric for alternative ends. In the early planning of the arts complex, the differences were framed in terms of "clean" and "dirty" space.[72] Whereas Piene argued for "neighborhoods" of diverse media equipment

in an open "barn," Negroponte requested a hundred eight-foot square "acoustically isolated" boxes—one for each researcher—"so clean" that dust could not flow into them. "I see my own office," he wrote, "as something closer to the cockpit of an F14 than a barn."[73] In the fall of 1978, when Piene learned of the Arts and Media Technology plan, he sought to convince Wiesner and Rosenblith to preserve the arts complex model by contrasting the "gimmickry" of a "celluloid house" with "developmental media work" oriented toward "human messages made available to a large, multi-faced, deserving public."[74] Sending extensive documentation from Centerbeam to make his case, he reiterated the humanist contribution of environmental art. He insisted that a collaborative team of "environmental artists, architects and engineers" design the complex in an "integrated group work . . . leading to a functional, sculptural edifice whose very shape is vital, organic and represents major human concerns."[75] But Wiesner and the Council shifted from the expressive humanism of the Kepes/Piene mode toward a technologist-directed vision of creativity. Peter Spackman, the Council's Executive Director, argued that art/technology collaboration thus far had been "superficial . . . a liaison rather than a marriage of means and interests." However, a new kind of entrepreneurial technologist was becoming an artist through the innovation of "ubiquitous computers" and other "expressive technologies." This development was the result of MIT's "process-centered and project-oriented" culture based on "sponsored research," "professionalism," "high standards," and the "linking of work at the graduate and

undergraduate levels."[76]

As divisions grew between CAVS and other stakeholders, it increasingly took its dirty art on the road. With the exception of the first Sky Art Conference in 1981, most of its projects embraced the "movable theatre/circus" attitude of Centerbeam.[77] The 1986 event Desert Sun/ Desert Moon captured the sense of separation. Over the span of two weeks, some thirty artists, technologists, and students met in Lone Pine, California in the foothills of the Sierra Nevada to stage CAVS' first large-scale installation since Centerbeam. Spread over three miles of barren terrain, it consisted of loosely integrated individual projects that included Goldring's twenty-minute reading of poetry by megaphone, Fellow Joe Davis' rover constructed of recycled electronics, and Fellow Tom Van Sant's satellite-linked mirror sculpture.[78] [Figure 26] In addition to a small crowd of locals, Desert Sun/Desert Moon was filmed by a documentary crew from Smithsonian World. Reduced to a few minutes in an hour long broadcast, narrator David

McCullough described the scene as "strange art in a strange land."[79]

Back at MIT, the Wiesner Building opened in 1985 to great fanfare. In a glowing review, the New York Times argued that the List Visual Arts Center "Revives some of the ancient awe in which MIT was once held." The Times attributed its success to its traditional modernism: "We are not obliged, in other words, to stand and stare at a lot of goofy machines and wait for something significant to come of it."[80] In an interview with Jeffrey Cruikshank of the Harvard Business School, Wiesner contextualized the Building from the point of view of its other tenants, arguing that: "if you look carefully, an awful lot of the media technology is art, and the art is technology."[81] The following year, the School of Architecture stopped using the phrase "Arts and Media Technology" in MIT's Bulletin. In Stewart Brand's 1988 homage to the Media Lab, Negroponte simply stated: "This is not an advanced art school."[82]

Conclusion

Centerbeam is an unlikely representative of MIT's "second modernism." It was never a stable authorial object or architectural space like Pei's Box, Saarinen's chapel, or even Haacke's Weather Box. Though innovative in many respects, it lacked the world changing promises and million dollar contracts to generate publicity about "Inventing the Future." Nor was it a conceptual manifesto with broad professional ramifications. Even among historians of new media art, Centerbeam garnered scant recognition.[83] If not for another anniversary and another reconfiguration of the arts at MIT, it may have remained forever disassembled in Piene's barn. Seen in context, however, Centerbeam is a powerful node for investigating the meanings and practices of art in a technological culture.

That said; no amount of historical detective work can affix a singular reading to Centerbeam. In the multiple interpretations actors to understand collaboration, metaphors of romance were omnipresent. To cynics of CAVS' ambitions, Centerbeam was the compromised outcome of a "shotgun wedding." To its committed partners, it was the beautiful offspring of "a shotgun love over time," a shared moment of "rare harmony" made possible by years of commitment.[84] Similar metaphors are equally compelling with historical distance. Assuming a perspective of the political geographer, Centerbeam presents a case of too many lovers whose shifting alliances generated passions, recriminations, and persistent instabilities. From a Latourian vantage, Centerbeam offers yet another rendition of the Frankenstein myth. It is the estranged

assemblage of an estranged assemblage, created in a moment of boundless optimism but unloved when it did not bring institutional wholeness.[85]

Of all potential narratives, failure is the least convincing. Just as CAVS overcame the unrest of the late 1960s, it survived the restructuring in Centerbeam's wake. Piene remained director until 1994, zealously organizing Sky Art Conferences. Prominent artists who initially arrived as temporary Fellows remained at MIT for decades. After Piene's retirement, CAVS was again re-imagined under the leadership of Krzysztof Wodiczko, who pushed artists to be MIT's loyal opposition. CAVS' long-term success comes into clearest focus outside of MIT, where its energies have been extended and appropriated internationally in far too many developments to chronicle here. Fundamental to the success of these current projects remains the desire among scientists, engineers, and their employers to collaborate; whether motivated by curiosity, pedagogical theory, public relations, or any one of various ideologies.

An explanation of protracted conflict between CAVS and the Media Lab is little better. Though Piene clearly had bad days with Negroponte, we should take him at his word that the "spirit of collaboration" between their organizations was sympathetic.[86] In the arguments of the late 1970s, both parties expressed a desire to "cohabitate" in a "dialectical relationship."[87] Indeed, since the Media Lab's creation, graduate students in the programs have crossed organizational boundaries to forge hybrid careers. From 1996 to his untimely death in 2003, moreover, Benton moved from the Media Lab to replace Wodiczko
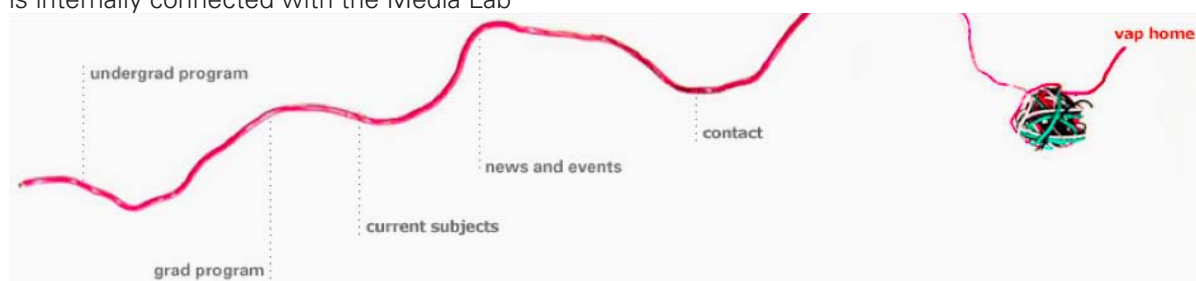
as CAVS director.

To be sure, this longevity has its uncomfortable truths. The Fellows program did not maintain the scale achieved in the late-1970s. For a time the SMVisS program went fallow. The Media Lab operates with a budget orders of magnitude larger than CAVS'. There also have been changes among stakeholders in the arts at MIT that have impacted the character of CAVS. In 1988, another Institute-wide arts survey concluded that there had been a "drastic decline" in visual studies options for undergraduates, leading to a new Visual Arts Program (VAP) and the establishment of an Associate Provost for the Arts.[88] Finally, within the present new media universe, which continues to expand internationally, the meaning of "humane technology" remains deeply contested.

Thirty years after Centerbeam, MIT's art communities seem to be achieving the integration hoped for in the 1970s. In 2009, the Media Lab expanded into a highly publicized addition, designed by Maki & Associates, amid yet another economic recession. At the same time, CAVS merged with VAP to form a new Program in Art, Culture and Technology (ACT). Housed in the Wiesner Building, ACT is internally connected with the Media Lab

by passages that overlook an expansive glass atrium. On the other hand, the ACT Program's website—which deploys the familiar visual metaphor of transitory entanglement—leaves the continuation of the "CAVS" namesake and future mission unsettled. [Fig 27] At the moment of this writing, CAVS exists principally as a site of archival documentation. Nonetheless, in October 2011, a section of Centerbeam will be powered back to life at the List Visual Arts Center, now an elevator's ride away, curated by Seth Riskin, SMVisS graduate and former CAVS Fellow.

Early in the planning stages of Centerbeam, its makers ran into a technical and aesthetic challenge that they instantly recognized as inherent to their work. They aspired to capture the endless quality of modernity's technological energies, but encountered constraints that compromised their vision. They subsequently debated the "beginnings and endings" of Centerbeam. Should it "crescendo" or should it "remain repetitive and constant all along the way"? Backing away from a "denouement," Centerbeam's bundled energies emerged unceremoniously at one end. Neither panacea nor crescendo, this was the art of MIT's environent.

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