Integrative Thinking at MIT:

Vannevar Bush, Jack Burnham, Ithiel Pool & György Kepes

by Robert Horvitz

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Martin Orosz's new film, "György Kepes: Interthinking Art + Science,"[1] gives a good overview of the MIT environment and Kepes' impact on it. But the film does not go into detail about the role of the arts at MIT and how it evolved. For a deep understanding of the Kepes/MIT relationship, one needs more context.

I lived in Boston from 1971 to 1975 and then in Providence, Rhode Island, from 1980 to 1984. Cambridge (where MIT is located) is adjacent to Boston, and Providence is less than an hour away by bus or train, so I was around MIT quite often in those years. I met György Kepes in 1972, just after the last volume of his *Vision + Value* series of books was published, and we spent about an hour talking in his office at the Center for Advanced Visual Studies (CAVS). I was never a CAVS Fellow, but I had friends who were, and I often visited them at CAVS. In 1982 MIT hired me to teach a seminar in post-World War 2 American art for students in the School of Architecture and Planning. So my knowledge of the place is centered on the 1970s and 80s. Fortunately, we have other speakers this afternoon with more recent involvements with MIT and they may able to indicate which things I'm telling you are no longer true.

It is important to keep in mind that MIT is not a university. It is a research institute. The difference is that, even though MIT has students and offers courses and academic degrees, not all faculty members are required to teach. That has implications we will encounter later. In any case, research is the main objective, and if a faculty member teaches, the students often work in the professor's research projects because the Institute's educational philosophy is learning by doing, which has been true since its founding in 1861.

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[1] A 4-minute preview is free online at https://filmfreeway.com/GyorgyKepesInterthinkingArtPlusScience

Another fact to keep in mind is that the research conducted by the MIT faculty gets limited financial support from the Institute's central budget. If you are a director of a research project, you might get free rooms for your office and lab and many hours of help from your students. You might have your salary paid by the Institute's tuition and endowment. You can certainly use the "brand name" of MIT in fund-raising, since it has credibility and is attractive to potential sponsors. But you have to raise the rest of the money for research from outside sources. That means governments and corporate sponsorships. Thus, MIT is an entrepreneurial environment more than an ivory tower, and researchers have incentives to work on tasks with social or economic value.

When a laboratory comes up with an insight, process or invention that could have commercial value, it is typically spun off for development by a company outside the Institute. Such spin-offs often have their headquarters close to the campus, so MIT is surrounded by high-tech businesses created by faculty members and graduates. Employment in these firms enables many people to remain in Cambridge after graduation, expanding and stabilizing the MIT community beyond those who are currently enrolled. That community is an important social setting and intellectual influence.

Founder William Barton Rogers proposed the Massachusetts Institute of Technology as a triple organization: "A society of arts, a museum or conservatory of arts, and a school of industrial science and art."[2] So the aim of integrating science and art was there from the start. Of course, back in those days the prevailing concept of art was closer to the ancient Greek notion: i.e., skilled craftsmanship and "how-to" knowledge, in contrast to philosophical knowledge, which came from introspection and debate.

But despite the stated aim of integrating art with "industrial science," MIT actually developed as a center for training professional engineers. Throughout its history, the arts were a secondary activity at best.

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[2] ROGERS, William Barton: Objects and Plan of an Institute of Technology, Boston Committee of Associated Institutions of Science and Arts, 1860, 4. See also MASLANKA, John Stanley, William Barton Rogers' Conception of an Institute of Technology, senior thesis, MIT, 1961.

In 1865, MIT began developing a course in architectural design—apparently the first in the US—and students started signing up for it in 1868.[3] The architecture program became the wellspring of art activities at MIT.

The style of architecture which prevailed in the 19th century meant the architecture program's curriculum was classically oriented. Students were taught how to design buildings which copied historically validated forms, especially the style associated with France's École des Beaux-Arts, with Greek-inspired ornaments and statues on the facades. It was not an innovative or a modern architectural school as we know them today. The curriculum had two components: students were taught structural engineering, so their buildings would not fall down, and they got rigorous training in mechanical and free-hand drawing, because that was how architects conveyed their intentions for a building's design.

György Kepes was hired in 1947 to teach drawing in MIT's School of Architecture. That's how he came to the Institute. It wasn't that MIT had the idea of implanting Bauhaus ideas and looked for someone to do that. They were looking for a good drawing instructor. But as soon as Kepes arrived, he realized that, in fact, the architecture curriculum, which was still classically oriented, was an anomaly in MIT: it was about perpetuating old norms while the rest of the Institute was trying to "invent the future." So Kepes scrapped the drawing curriculum he inherited from the previous drawing teacher and proposed instead to adapt the curriculum that he and László Moholo-Nagy used at the new Bauhaus, which was reborn after one year as the Chicago School of Design. Their curriculum was based on the original Bauhaus in Germany.

[3] KHOURY, Philip S. – KINNEY, Leila W.: White Paper – the Arts at MIT, Office of the Associate Provost and Creative Arts Council, 2011, 14.
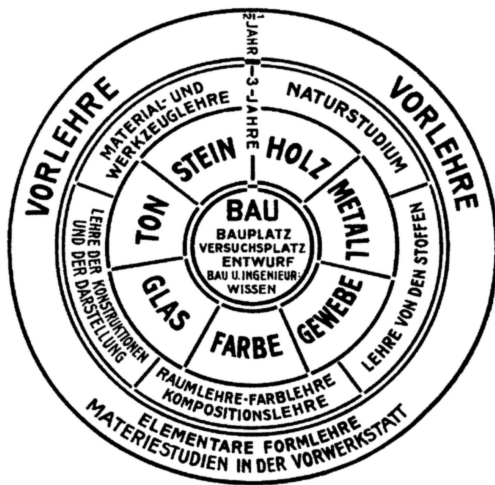
Bauhaus Curriculum 1922
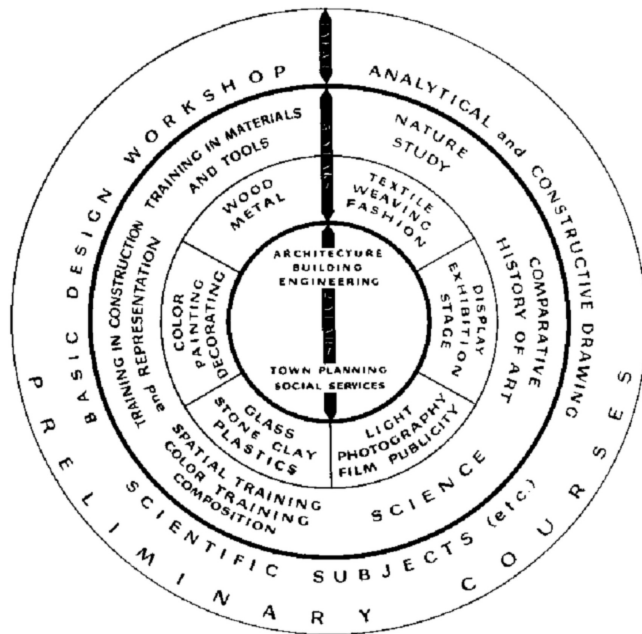
Bauhaus Curriculum 1937

The new Bauhaus' educational plan is summarized in the diagram above on the right.[4] Architectural building and engineering were its core. Nineteenth century architecture had stressed symbolism and the preservation of tradition, while the Bauhaus sought functionality and innovative uses of material properties. Nothing could have been better suited to MIT's needs than what Kepes and Moholy-Nagy had already put into practice in Chicago. So MIT got much more from this new drawing instructor than they expected: Kepes' proposals led to a broader rethink of MIT's architecture curriculum, finally bringing it into the modern era. Beyond even that, "Kepes helped overhaul MIT's curriculum shift toward general education and basic science with a set of courses structured around vision, techniques, and their social implications."[5]

In addition to teaching, Kepes curated a ground-breaking exhibition at MIT in 1951 called "The New Landscape in Art and Science." As described by Charles Morris,

"Works of art and science stood side by side, and matched. Here were the extremes of an imaginative person-controlled non-representational molding of a medium, and the

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[4] Both diagrams are from WINGLER, Hans Maria – STEIN, Joseph: The Bauhaus: Weimar, Dessau, Berlin, Chicago, MIT Press, 1969.

[5] BECK, John – BISHOP, Ryan: Technocrats of the Imagination – Art, Technology, and the Military-Industrial Avante-Garde, Duke University Press, 2020, 54.

most objectively-intended literal accurate mirroring of non-human processes. And yet the textures and structures came out alike… The result was a collapse of the sense of opposition between organic and inorganic processes, and between the human and the other-than-human phases of nature. There was no hint of loss in this experience, but of immense gain. Man was once more in the world and the world was in man."[6]

So, almost from the beginning, Kepes had strong backing at the highest levels of the Institute for the implementation of Bauhaus ideas at MIT and he soon demonstrated his value to the Institute in other ways. Perhaps most relevant to our discussion today, he seems to have catalyzed the formation of a committee to study the potential role of the visual arts at MIT. Even before the committee finished writing its report, MIT's president declared that what the Institute needed was not "'conventional courses in painting or sculpture,' nor 'to produce amateur artists,' but to contribute 'something much more profound… related to the experiences in the Bauhaus, the work of Moholy-Nagy in Chicago and more recently that of Professors György Kepes and Richard Filipowski in our own School of Architecture'"[7]

Despite that strong endorsement, MIT was slow to decide how best to use Kepes' talents, contacts and energy—until Kepes himself offered a suggestion. In an article published in 1965—"The Visual Arts and the Sciences: A Proposal for Collaboration"—he outlined his idea for a "work community" of visiting artists who would team with MIT scientists and engineers on innovative projects:

> "I propose the formation of a closely knit work community of eight to ten promising young artists and designers, each committed to some specific goals. The group, located in an academic institution with a strong scientific tradition, would include painters, sculptors, film-makers, photographers, stage designers, illumination engineers, and graphic designers… It is assumed that close and continuous work contact with one another and with the academic community of architects, city planners, scientists, and engineers would lead to a climate more conducive to the development of new ideas than could be achieved by individuals working

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[6] MORRIS, Charles W.: Writings on the General Theory of Signs, Mouton & Co., 1971, 464.

[7] The 1954 President's Report, quoted in LACEY, Sharon: Integrating the arts and humanities at MIT, then and now. https://arts.mit.edu/integrating-the-arts-and-humanities-at-mit-then-and-now/ (last download: 21/03/2024)

alone."[8]

Before publishing that article, Kepes had already submitted a written proposal and draft budget for such a community to MIT's administration, which subsequently approved it and made Kepes the director.

But the approval came with a significant change: instead of "promising young artists and designers," Fellows of the Center for Advanced Visual Studies were to be "mature artists, sculptors and film-makers."[9] Apparently the administration thought it less risky to choose artists with established reputations rather than the "promising young." Nevertheless, most of the 200+ Fellows appointed by CAVS during its 42-year life could reasonably be described as "young and promising," as Kepes had wished.

CAVS was allocated the building which had been the MIT bookstore. The large window on the right let sunlight into Kepes' original office, although by the time I met him he had moved to a smaller office in the middle of the building. Like his corner office, his second office was austere, featuring polyhedral models, microphotographs, and no paintings, not even his own.

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[8] KEPES, György: "The Visual Arts and the Sciences—A Proposal for Collaboration" = Daedalus, No. 1 (winter, 1965), 122.

[9] Announcement to the MIT faculty accompanying CAVS' Certificate of Incorporation, 1 June 1967. Reproduced in HINTERWALDNER, Inge: György Kepes und das Center for Advanced Visual Studies am MIT, Karlsruhe Institute of Technology 2019, 13. https://kg.ikb.kit.edu/hinterwaldner/downloads/hinterwaldner_ws_18_19/09_art_n_tech_cavs_mit_02_online.pdf (last download: 21/03/2024)

MIT Building W11 (40 Massachusetts Avenue) where CAVS was located.

Kepes' office in 1967.

The launch announcement for CAVS revealed another significant detail: visiting Fellows would not teach any classes. "There will be seminars, lectures, colloquia and exhibitions but no course work is planned."[10] This was consistent with Kepes' contention in his *Daedalus* article that the "visualization of new opportunities cannot be taught."[11] It was also intended to

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[10] ibid.

[11] op. cit., 132.

free the Fellows to pursue investigations that might not interest students. However, the question of teaching gained importance after Kepes retired and support for CAVS waned.

Having professors develop research projects with students serving as lab assistants was effective in inculcating specialized knowledge. But not all students were content with such narrow foci. So even before Kepes arrived, the Institute knew they had to address the "tunnel vision" problem which seemed an inevitable consequence of both the explosive growth in research subjects and the Institute's approach to education. Their solution was to spice the curriculum with what they called "soft culture." This included courses in the humanities, history, literature, music and the visual arts.

In 1944, a humanities program was introduced with a four-year sequence of courses planned for MIT's undergraduates. In 1949, the Committee on General Education recommended upgrading this program to a School of Humanities and Social Sciences, equal in status to the existing Schools of Architecture and Planning, Engineering and Science. An option offered to students by the new School was a set of courses in the histories of art and architecture.[12] Then, around the time CAVS was created, "the science core requirements were cut in half, which gave students a great deal more flexibility in their schedules to pursue arts-focused or interdisciplinary subjects."[13] But because CAVS did not offer courses back then, it did not benefit from this increase in demand. Thus began its marginalization.

> "By the mid-1970s, the scope of the arts at MIT had broadened considerably to include the visual arts and explorations in music, media, and performance. The Studio for Experimental Music… and the Visible Language Workshop… joined with Negroponte's Architecture Machine Group and other units to form the Media Lab in 1985… in 2009, the Visual Arts Program (VAP), created in the Department of Architecture in 1989, merged with the Center for Advanced Visual Studies (CAVS). These united academic and research units were renamed the program in Art, Culture and Technology (ACT)… Not an art school in the traditional sense, the program's mission is to promote the interplay between science, technology, art, and design and to

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[12] LEWIS, Warren K., et al.: Report of the Committee on Educational Survey, Technology Press, 1949, 121-2.

[13] LACEY.

deploy artistic practice as a research methodology. Undergraduate students can major or minor in ACT, and the program also awards graduate degrees."[14]

What that long quote does not say is that CAVS was one of the "other units" that Nicholas Negroponte wanted to absorb into the Media Lab. However, according to Michael Naimark, Otto Piene, who succeeded György Kepes as CAVS' director in 1974, found out that "non-MIT artists" would be commissioned to provide visual elements for the Media Lab's new building. "He was livid. It opened an old wound that when MIT needed 'real artists,' it went to New York. Everyone at the Fellows' meeting was livid. The result was that CAVS abruptly pulled out… CAVS remained its own independent entity on the other side of campus, for an astounding thirty years."[15]

Otto Piene came to MIT in 1967 with the first batch of CAVS Fellows. When his fellowship ended, he joined the teaching faculty in 1972 as a professor of "environmental art." Two years later, when Kepes retired, Piene became CAVS' director and

> "the Center took on additional educational responsibilities in conjunction with the Department of Architecture. These educational responsibilities include courses for graduate and undergraduate students… [CAVS] has 5-20 resident Fellows (who take on teaching responsibilities for little or no pay)… The Director of the Center seemed quite interested in taking on the responsibility for undergraduate visual studies education, which we have identified as a serious problem. The Director himself, however, does not appear to enjoy the support of the Dean of the [School of Architecture and Planning, SA&P] or broad support within the Department of Architecture. The Center is not well integrated into related programs in the SA&P or elsewhere at MIT and, at present, appears to be tolerated, rather than supported with any enthusiasm."[16]

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[14] LACEY.

[15] NAIMARK, Michael: "How the 62 Year Story of Art at MIT Shaped the Media Lab Ethos" = Medium, 2019. https://michaelnaimark.medium.com/how-the-62-year-story-of-art-at-mit-shaped-the-media-lab-ethos-65f3fd43efb6 (last download 24/03/2014).

[16] Ad Hoc Committee to Review the Creative Arts at MIT: Report to the Provost, 1987, 45-47.

In Marton Orosz's film, one of the original CAVS Fellows, Wen-Ying Tsai, commented that the imposition of teaching requirements totally changed the atmosphere at CAVS as well as the incentives for the kinds of creative activities undertaken by the Fellows. The just-quoted committee report also suggests why the Visual Arts Program was created, despite the CAVS director's desire to take that responsibility for his organization.

Otto Piene retired in 1994, a few years after CAVS lost its building to MIT's Office of Religious, Spiritual & Ethical Life.

György Kepes tirelessly promoted the integration of art and science into something like creative design through what he called "the education of vision." Or, as he put it, "To develop a vision which brings the inner and outer worlds together, we need common roots…"[17] A cynic might say that Kepes' real aim was to capture some of the excitement surrounding new technologies to revive the aging context of art, and that would not be inaccurate. But Kepes saw his mission differently—as similar to Rudolf Carnap and Otto Neurath's "Unity of Science" movement. That catchy label suggests a quest for a common narrative to unify the diverse specializations and subject areas of scientific research. But the contemporary documentation available in English belies that understanding: instead the movement's aim was said to be uncovering "the functional relationship between formal reasoning (pure logic) and sense experience."[18] Such differences in defining the basis of unity remind us that it can be sought on different levels or in different ways—which perversely suggests that efforts to unify can instead sharpen differences of opinion and strategy. We see this playing out at MIT, where conflicts between art-related programs have persisted for decades, partly due to rivalries between strong personalities and partly due to disagreements concerning the social role of art and the purpose of art education in a tech-dominated environment.

The announcement of CAVS' founding described the aim of this new working community of visiting artists as being to "explore new directions in creative & civic uses of technology." That implies an embrace of technology but indifference to commercialization. Media Lab also embraced technology but with an interest in the potential for marketable products. Offering an

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[17] KEPES, György: The New Landscape in Art and Science, Paul Theobold & Co., 1956, 20.

[18] MILLER, David L.: "The Unity of Science Movement" = Southwestern Social Science Quarterly, No. 3, 1945, 252.

array of courses to MIT students was the Visual Arts Program's aim, because that was not a priority either at CAVS or the Media Lab. Meanwhile, the program in Art, Culture & Technology positioned itself as an academic hub of "critical art practice & discourse." ACT's relationship to technology was thus critical, or at least skeptical, even though it had absorbed CAVS. Given this wide spectrum of stances and agendas, it is not surprising that ACT student Jeff Wheelock wrote in his senior year,

> "MIT, as I experienced it, was not a place for the unification of positions, as [William Barton] Rogers may have envisioned, but rather a space of negotiation between attitudes and disciplines that are often incommensurate. Roger's ideal of unity could instead be replaced with an ideal of collision; individuals and disciplines that push on and react to one another."[19]

Nevertheless, Kepes' years at MIT were a time when it was widely recognized that science and engineering had become excessively specialized. So there was a hunger for integration and synthesis, for big new ideas. Particularly in the 1950s and 60s, a rash of new "interdisciplinary disciplines" emerged: systems theory, information theory, game theory, ecology, cybernetics, operations research, general semantics, Buckminster Fuller's World Design Science (geo-engineering), etc. It is important to keep that context in mind, because Kepes' efforts to bring science and art together were part of a much larger movement. He was as successful as he was because he did not try to move the mountain all by himself. Many others living in Cambridge and further afield inspired and aided his work. The most helpful contributed essays to his exhibition catalogs and the many books he edited. He was an avid networker whose persistence, personal charm and eloquence helped garner support for his ideas.

Others nearby with comparable ambitions included the Research Society for Creative Altruism, founded in 1956 by Pitirim Sorokin and Abraham Maslow.[20] Institute Professor Cyril Stanley Smith's group of Boston-area intellectuals, the Philomorphs,[21] were, like Kepes,

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[19] WHEELOCK, Jess: "N52 - On Art + Research at MIT," MIT Program in Art, Culture and Technology, 2011, 7.

[20] See the Pitirim Sorokin Collection at the University of Saskatchewan Library = http://sorokin.library.usask.ca/islandora/object/sorokin%3A9677#page/1/mode/1up (last downloaded 25/03/2024).

[21] See WEAIRE, Denis: "A Philomorph Looks at Foam" = Proceedings of the American Philosophical Society, Vol. 145, No. 4, 2001, 564.

fascinated by patterns in nature which produced similar forms in different materials and situations. Even MIT's Model Railroad Club can be considered a force for integration because its interests extended far beyond toy trains: it became the source of what was initially called "hacker culture," and then later, "maker culture."[22]

Vannevar Bush

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[22] "The beginnings of the hacker culture as we know it today can be conveniently dated to 1961, the year MIT acquired the first PDP-1. The Signals and Power committee of MIT's Tech Model Railroad Club adopted the machine as their favorite tech-toy and invented programming tools, slang, and an entire surrounding culture that is still recognizably with us today." RAYMOND, Eric S.: "A Brief History of Hackerdom; Chapter 3 – The Early Hackers," 2000: http://catb.org/~esr/writings/hacker-history/hacker-history-3.html (last downloaded 27/03/2024).

But the godfather of integrative thinking at MIT was Vannevar Bush (1890-1974).
Bush joined MIT's faculty in 1919 and was promoted to Vice President of the Institute
and Dean of the School of Engineering in 1932. During World War 2, he headed the
US Office of Scientific Research and Development and initiated the Manhattan
Project, which developed the atomic bomb. His essay "As We May Think"[23]
introduced an implementable vision of a desk containing a vast microfilm library with
view-screens, a tablet for graphic input and "associative indexing." He called it the
Memex but it clearly foreshadowed the personal computer and inspired generations of
hardware & software designers, including Douglas Engelbart, Ted Nelson, Steve Jobs
and Tim Berners-Lee.
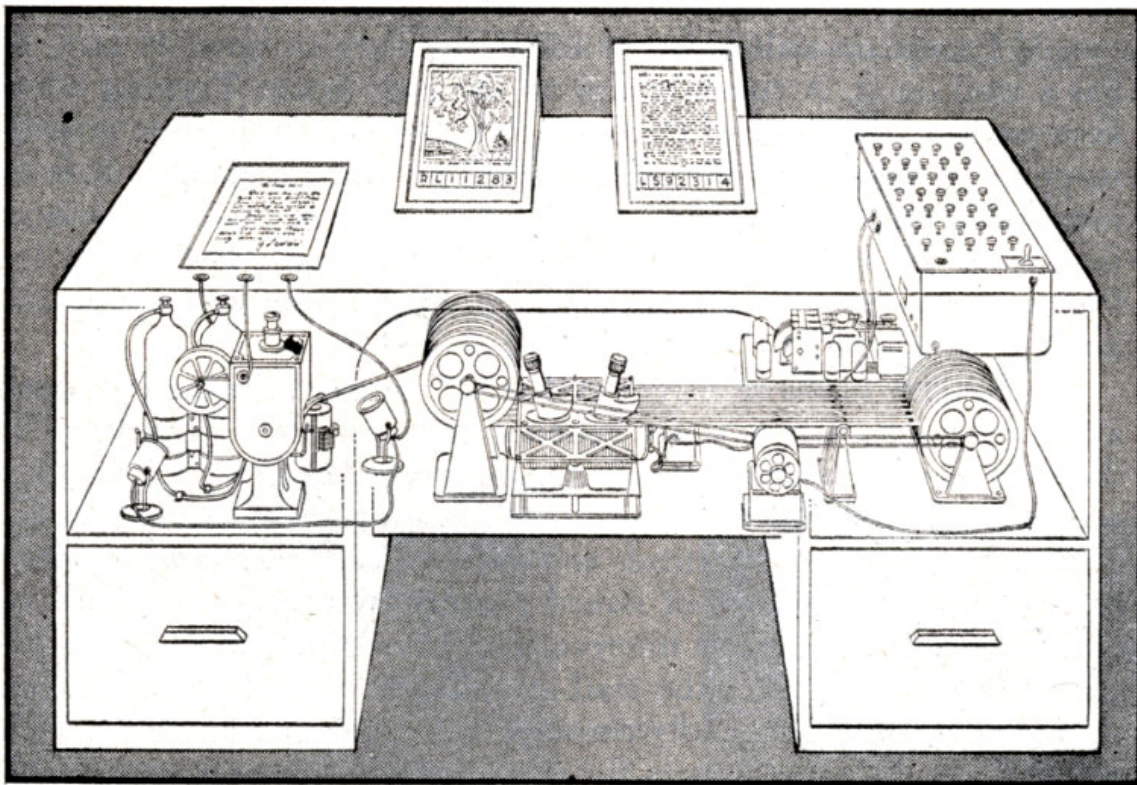
MEMEX in the form of a desk would instantly bring files and material on any subject to the operator's fingertips. Slanting translucent viewing screens magnify supermicrofilm filed by code numbers. At left is a mechanism which automatically photographs longhand notes, pictures and letters, then files them in the desk for future reference.

Illustration by Alfred D. Crimi from *Life Magazine*, 10 September 1945, 112.

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[23] BUSH, Vannevar: "As We May Think" = Atlantic Monthly, 1945, 101-108.
https://www.theatlantic.com/magazine/archive/1945/07/as-we-may-think/303881/ (last downloaded 26/03/2024).

I mentioned that I spent a lot of time at MIT in the 1970s and 80s. It was not mainly because of CAVS. I was attending the seminars of the MIT Research Program in Communication Policy, initiated by Ithiel de Sola Pool in 1972.

Ithiel Pool.

Pool (1917-1984) helped develop content analysis techniques during World War 2 and applied these to both Nazi and democratic propaganda. In 1959 he became a full professor at MIT and director of MIT's Program in Communications Policy. Prior to his death in 1984, he made many predictions about the impact of electronic communication technologies that proved remarkably prescient.

A wide range of subjects was covered in the RPCP's biweekly seminars, which often included presentations of prototypes and newly developed technologies like the laser disk, the interactive ebook and the (pre-WWW) XWindow browser. More importantly, Pool was among the first to realize that the commercial availability of low-cost analog/digital

converters would precipitate the development of all-digital networks carrying all sorts of content: in other words, an internet. And that would mean the convergence of broadcasting, publishing and telephony. (Nicholas Negroponte popularized Pool's insights and used them to fund-raise for the Media Lab, so he was often mistakenly credited with originating them.) However, since these information industries each developed under different paradigms, to serve different purposes, and different countries had different rules for regulating content and access, which policy model should prevail when they converge? The broadcasting model of free public access for receivers, licensed access and strict limits on content for senders? The publishing model of paid public access and regulation by copyrights? or the telephone model based on individual addresses, freedom of expression and expectations of privacy? These and related questions were debated in depth in the seminars, whose impact on my life was transformative.[24]

The final integrative thinker I want to mention here, even though his time at MIT was short, was Jack Burnham (1931-2019).[25] Otto Piene met him just before CAVS was created and he encouraged Jack to apply for a Fellowship, which he got in 1968. Below is a picture of the young Jack with some of his light sculptures. (Before he became an influential writer, curator, teacher and theoretician, he was a sculptor—and before that a sign painter.)

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[24] These seminars continue today as the MIT Communications Forum. Just before he died, Pool summarized his thoughts on how converged media should be treated in law and policy in Technologies of Freedom – On Free Speech in an Electronic Age, Harvard University Press, 1984.

[25] See https://horvitz.multiplace.org/burnham/homepage.html.

Jack Burnham in his sculpture studio. Photo credit: Northwestern University archive.

The relationship between Burnham and Kepes deserves a book all by itself, but I can't give you the details because I met Jack after he left CAVS. I did not see his personal interactions with Kepes. Jack told Joan Brigham in 2004, "Generally I got along with Kepes until the spring of 1969."[26] What changed then was Kepes' insistence that CAVS should exhibit in Brazil, which had a brutal military dictatorship. Jack and some of the other Fellows refused to participate.

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[26] Quoted in "Joan Brigham Interviews Jack Burnham," CAVS Collection, MIT Library, 2004, reprinted in RAGAIN, Melissa: Jack Burnham – Dissolve into Comprehension (Writings and Interviews, 1964-2004), MIT Press, 2015, 242.

Jack wrote his most famous book, *Beyond Modern Sculpture,* mostly at CAVS, but Kepes hated it. He said "my examination of art and technology 'had no heart'."[27] Nevertheless, Jack remained cordial with Kepes and hid his growing disenchantment:

> "I was in full revolt against Kepes' 'New Bauhaus' philosophy… If Kepes thought I was a soulless technician, too often I found that his panegyrics on purely scientific photographs were sloppily sentimental and misleading… To many, the Center's formal name seemed academically pretentious: Center for Advanced Visual Studies, yet essentially we were artists playing with our computers, light environments, and holographic 'realities.' Nothing resembling an academic paper came out of it, although one suspects that MIT would have dearly loved it… Is it possible that the Center reveled and romped in the hardware obsessions of individuals but forgot that art is conceptual software in its origin?"[28]

> "Kepes had a strange aversion to direct involvement with sophisticated technology, particularly anything to do with the computer sciences. Due to the fact that the Center had been publicized, by virtue of its relation to MIT, as a technological nirvana for the artist, I found the situation mystifying. Slowly it began to dawn on me that the Center's underlying purpose was not primarily to do visual research or to make art, but to produce lavishly illustrated catalogues and anthologies that would impress foundations."[29]

Jack did not like the art produced by the other CAVS Fellows and he thought Kepes' best work was in publications. The exhibition catalogues Kepes edited were often better than the exhibitions because he was able to convince prominent intellectuals to contribute stimulating essays.

Even though integrating art with science was a challenging and perhaps even utopian notion, Kepes' arguments for why it was possible and desirable were attractive. However, there is more than one way to approach that task, which opens the door for small differences in

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[27] ibid.

[28] op. cit., 244-245.

[29] BURNHAM, Jack: "Art and Technology - The Panacea that Failed" = WOODWARD, Kathleen (ed.): Myths of Information: Technology and Postindustrial Culture, Coda Press, 1980.

emphasis and strategy to grow into fierce disagreements among people who should be close allies. It is not so different from the problems MIT had—and still has—integrating its many organizational units engaged in art teaching, research and production.

So perhaps this talk should have been titled "Integrative and Disintegrative Thinking at MIT"—to recognize the benefits of what Jess Wheelock described as "an ideal of collision; individuals and disciplines that push on and react to one another."

Thanks for listening.