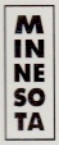
The Interface

The Interface
IBM and the Transformation of Corporate Design 1945–1976

John Harwood

A Quadrant Book



University of Minnesota Press Minneapolis London

The IBM Design Program

In February 1956, the president of the International Business Machines (IBM) Corporation, Thomas Watson Jr. (1914–93), hired the industrial designer and architect Eliot F. Noyes (1910–77). Given the title "consultant director of design," Noyes was charged with entirely reinventing IBM's corporate image, in parallel with Watson's decision to reorganize IBM's pyramidal managerial hierarchy into a more "horizontal," efficient structure. Noyes thus coordinated the redesign of the entire environment of IBM on a telescoping scale: from stationery and curtains, to products such as typewriters and computers, to laboratory and administration buildings, IBM was literally to become "simply the best in modern design."[1]

That a corporation would bring in a consultant designer or even multiple designers to reform its products, facilities, and even the behavior of its employees was not then a new phenomenon. Perhaps Noyes's most significant predecessor in this regard was Peter Behrens (1868–1940), whose work with the German industrial concern Allgemeine Elektrizitäts Gesellschaft (AEG) in the early twentieth century remains a central episode in the history of modernist design.[2] The parallels between Noyes and Behrens are striking and cannot be ignored. Behrens, like Noyes, worked primarily as an architect and designed buildings, industrial products, and graphics for AEG; Noyes, while he was content to commission graphics from his fellow consultant, Paul Rand, did much the same at IBM.

The Werkbund slogan that "Good Design Is Good Business" meant primarily, according to Noyes's architectural mentor at Harvard University, Walter Gropius (1883–1969), that "goods have become a means of carrying tastefulness and quality among large numbers of people. Not only have they earned themselves a reputation for promoting culture but, which is equally important in business, have considerably increased their pecuniary gain."[3] Good design was also meant to have a certain reformative impact on the functioning of a corporation.

> A worker will find that a room well thought out by an artist, which responds to the innate sense of beauty we all possess, will relieve the monotony of the daily task and he will be more willing to join in the common enterprise. If the worker is happy, he will take more pleasure in his duties, and the productivity of the firm will increase.[4]

This corporate design ideology remained more or less intact in the post–World War II era—similar statements can be found in the decrees of Camillo and Adriano Olivetti, in the industrial and graphic design reforms of the Container Corporation of America under Walter Paepke and his consultant designer Herbert Bayer, and in many more instances besides.[5]

However, the design program at IBM introduced an additional and unique claim under the same aegis. Receiving an achievement award in design excellence from Tiffany in

1965, IBM's president and chairman Thomas J. Watson Jr. delivered a lecture—titled, in a conspicuous echo of the Werkbund, "Good Design Is Good Business"[6]—in which he stressed that corporate design was not simply a matter of establishing good taste among the consumer public, nor of simply keeping workers happily productive. It was a matter of management. Unlike AEG, with its industrial and consumer products, IBM's business was the administration of business itself. Whether its products—which were ways of thinking as much as they were office machines—were to be used for military, scientific, administrative, or business purposes, IBM's products and employees concerned themselves primarily with reforming the actual operation of other corporations and organizations ranging in scale from small business enterprises to universities to states. At IBM, the design program was to serve a control function; in harmony with the demand of the computer that all its data be processed in mathematical terms, the design program would seek to establish a material regime by, for, and of the logic of organization.

For this very reason Noyes, as *consultant* director of design, did not go it alone. Rather, he and his colleagues developed an entirely new approach to the problem of designing for the corporation in the post–World War II era. Assembling and directing a team of fellow consultants—including himself, Charles Eames, the graphic designer Paul Rand, the designer and critic George Nelson, and the architecture and design critic and patron Edgar Kaufmann Jr.—and hiring a host of high-profile architects such as Marcel Breuer, Egon Eiermann, Wallace Harrison and Max Abramovitz, Ludwig Mies van der Rohe, Paul Rudolph, and Eero Saarinen for individual commissions, and coordinating these efforts with engineers and designers in IBM's own design department, Noyes *managed,* perhaps more than he *designed,* the "new look" of IBM.

But what was management?[7] What was new about IBM that required such drastic changes in its material organization and appearance, and what was at stake in this transformation? Perhaps surprisingly given his infrequent, sober, taciturn statements on his work, Noyes provides ample insight into these questions. In 1976, reflecting back on his first days working for the corporation, Noyes noted that IBM's appearance was wholly out of step with its rigorous corporate organization.

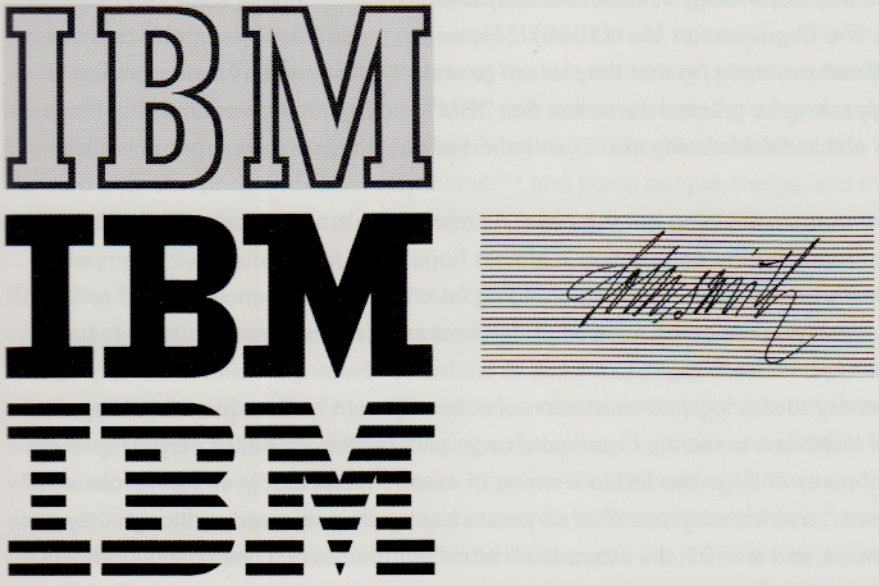
> When I first met IBM the large main company showroom in New York was a sepulchral place, with oak-panelled walls and columns, a deeply coffered painted ceiling, a complex pattern of many types of marble on the floor, oriental rugs on the marble and various models of back IBM accounting machines sitting uneasily on the oriental rugs. These accounting machines, I might add, often had cast iron cabriole legs in the manner, I believe, of Queen Anne furniture. . . . It said IBM about twelve times on the façade. . . . It also said, "World Peace through World Trade" and many other slogans.[8]

The layers of patterns—classical orders, coffering, marble inlays, oriental carpets, and historicist "furniture" of the business machines—all contrasted with one another, producing an incoherent image. Moreover, the vaunted slogans—many of them the products of a

cult of personality previously centered around IBM's president Thomas Watson Sr.—seemed to contradict one another, crowding each other out. As Noyes put it, in devastating terms, "It was design schizophrenia of the worst sort."[9]

But what was the unified subject that Noyes sought to articulate, in order to cure his patient of its fragmented self-image? IBM was not simply a maker of business machines, Noyes reasoned in an interview in 1966; rather, it was in the business of controlling, organizing, and redistributing information in space. This Noyes recognized as a matter of environmental control: "if you get to the very heart of the matter, *what IBM really does is to help man extend his control over his environment*. . . . I think that's the meaning of the company."[10] This was what Noyes called IBM's "corporate character," a quality that unified its various endeavors, from producing business machines to consulting with other companies about how to manage their facilities. As Noyes would emphasize again and again throughout his career, this process of management was one of controlling space.

Here Noyes was on firm ground. The word "management" originally connoted "the working or cultivation of land," and, later, "the maintenance and control of a forest, environment, nature reserve, etc."[11] But with the wholesale transformation of the nature and structure of business interests in the United States at the turn of the twentieth century, management took on yet another spatial dimension. In what has frequently been named by economic historians as the "management revolution," the "invisible hand" of Smith's "market mechanism" had been replaced by a "visible hand," where a well-organized entity termed the "modern business enterprise" increasingly played a central role in "coordinating the activities of the economy and allocating its resources."[12]



Figures I.2, I.3, I.4 *(top)* Anonymous, IBM logo, 1947; *(middle)* Paul Rand, IBM logo, 1956; *(bottom)* Paul Rand, IBM logo, second design, 1962. Courtesy of IBM Corporate Archives, Somers, New York.

The traditional business firm was a single-unit business enterprise, with a small number of employees engaged in a single economic function from a single office, dealing often with a single product line, in a single geographic area, and owned by an individual or family. In stark contrast, the modern business enterprise was engaged in multiple economic functions over vast distances and controlled by salaried executives presiding over a highly articulated and specialized hierarchy of employees. As Adolf A. Berle and Gardiner C. Means emphasized in their landmark study *The Modern Corporation and Private Property* (1932), the modern business enterprise parsed ownership of the corporation (by individuals and/or shareholders) from managerial control.[13] It is a truism of economic history that by 1917 this new type of firm "had become the dominant business institution in many sectors of the American economy," and that by 1950 it had become the dominant institution in nearly every sector.[14]

Largely missing from such accounts, however, is the specific role that nascent mathematical theories of information and communication, and the machines that were their material and practical embodiment, played in the further development of the interwar corporation from modern business enterprise to multinational corporation. The most admired current histories of corporations in this crucial period tend to deemphasize the role of mathematical and organizational theory in the reformation of the corporation, instead favoring fashionable—and pseudo-scientific or scientistic—theories of corporate "evolution." The best of these histories place heavy emphasis on close attention to corporate routinization, arguing that the most effective way to describe the way that corporations change is to pay close attention to the quotidian practices and procedures that animate a corporation's daily activity.[15] There is much merit in such accounts, given their attention to the specific functions of a corporate body while avoiding the oversimplifications and pop psychology of influential early sociological accounts, such as William H. Whyte's *The Organization Man* (1956).[16] However, these histories introduce or reproduce difficult problems, in that they refuse to state explicitly what the corporation is, seemingly taking for granted the notion that "IBM"—or any other corporation, for that matter—is a stable, fixable entity akin to an individual subject or coherent group subject.

This is, of course, anything but the case. As many scholars have pointed out, the legal theory surrounding the corporation is almost hopelessly fragmented, with competing and mutually contradictory theories—ranging from the storied "concessionist" or "grant" theories identifying the corporation as an "artificial person," to organicist theories based in German historicist thought, to "nexus of contracts" theories[17]—simultaneously operative in the day-to-day legal administration of economic activity. Even more troubling, the efforts of historians to narrate historical change either within individual corporations or in the economy at large has led to a series of mixed metaphors, in which "evolutions," "revolutions," and "developments" in corporate history are presented as though they were equivalencies, and in which the ostensible "natural" and "artificial" components or essences of corporate organizations are in competition with questions of "rights and duties." In this morass, it is difficult to parse out the significance of each theoretical approach and

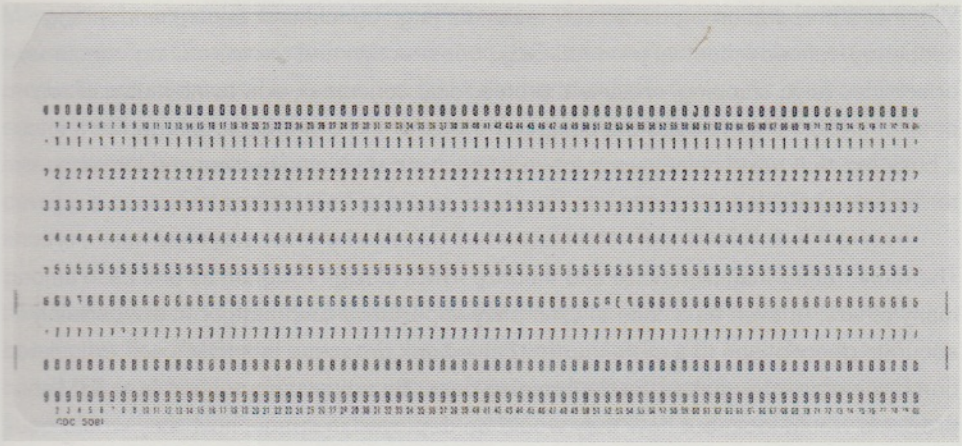


Figure I.5 IBM punch card. Collection of the author, with thanks to Kevin Stumpf.

even more difficult to select a single theory to which one as a historian ought to commit oneself.

There can therefore be little question of producing a single theory of the corporation through which to analyze the history of a corporation such as IBM. As the philosopher, aesthetician, and pedagogue John Dewey argued in his attempt to address definitively these unsettling questions regarding the ontology of the corporation, one may regard each of these competing theories as an "extensive abstraction" possessing meaning insofar as they describe aspects of the corporation in relation to other phenomena.[18] That is to say, although the multitudinous efforts to pinpoint the modern corporation's essence may be of little value, it is possible to focus one's attention upon the consequences of an organizational form and the theoretical assumptions that are operative within that organization. This is what I pursue here, describing the role that design plays in reformulating many of the basic aspects of the corporation, with consequences for other organizations. Even if the corporation is irreducible to any one thing, to borrow from Marx, it is "a relationship between people mediated by things,"[19] and these people, things, and mediated relations can be described.

IBM, as a developer, manufacturer, and technical liaison for the use of teletechnological equipment—initially time systems, punch-card tabulators, scales, and the like, but later computers, real-time management systems, and Tele-Processing—was a corporation that managed the development of management as a central concept and set of techniques sustaining and renovating the modern business enterprise (i.e., the corporation). In its own words, repeated throughout much of its own promotional literature, IBM was a "business whose business was how other businesses do business." Moreover, its utter dominance of the computer market from the mid-1950s to the late 1970s—which, along with Paul Rand's logotype and color designs, earned it its nickname Big Blue—ensured that whatever IBM produced was installed at the very heart of most modern corporations.

Whether a corporation produced raw materials (e.g., agricultural, mining, and milling concerns), refined industrial products (e.g., construction and manufacturing concerns), or services (e.g., shipping, retail, and professional concerns), or a combination of any or all of these, IBM provided the computer systems and expertise to reorganize it into a business that relied heavily upon the most sophisticated management and logistics techniques available.

Therefore, rather than historicize and theorize IBM's Design Program as one case among many others, or even as a case of exemplary importance (although both are certainly accurate descriptions to a certain extent), this book proposes that IBM's self-articulated corporate character makes it a determining case. By articulating not just how IBM's products would look, but how they would be deployed in space, how they would be designed through coordinated teamwork by literally tens or hundreds of architects, designers, and engineers using both drawing boards and advanced teletechnological equipment, and how end users would interact with this equipment, the design program at IBM elaborated theoretical positions and set standards of practice that quite literally changed the technics of corporate and architectural culture alike. The design program was, in its own right, a work of corporate theory and practice. By understanding it, we may come to understand more about its contemporary corporations that so reshaped the global economy, whether they adopted IBM's specific approaches to corporate practice or not.

The following chapters will treat the specific structure of the landmark program at IBM as articulated by Noyes and his clients in close detail; however, before turning to a brief overview of these questions, it is essential to note one last aspect of the relationship between design and management, in order to understand what the design program's stated aim of achieving something called "design management" might be.

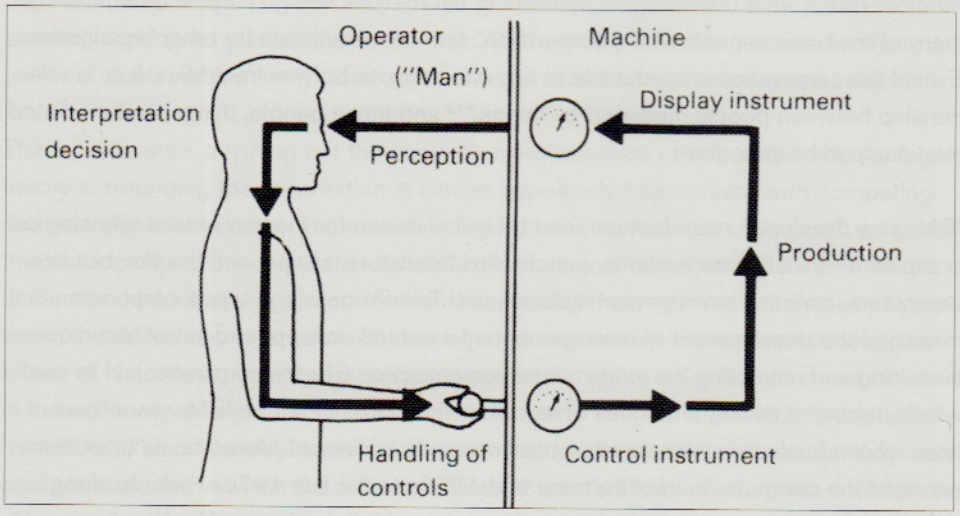


Figure I.6 Etienne Grandjean, diagram of the "man–machine system," from *Fitting the Task to the Man: An Ergonomic Approach*, trans. Harold Oldroyd, 3rd ed. (London: Taylor and Francis, 1980).

Management, although it is a coordinated practice of controlling behavior in space and possesses firm diagrammatic forms and strategies, does not articulate how objects and products are distributed in space in any detailed or descriptive way. As is clear from a cursory examination of any number of textbooks, primers, or handbooks on the subject, management deals with generalities—or at best, it can cope with the situation. In order to develop a consistent and detailed approach to objects and products, management requires another, finer-grained level of articulation that can situate. This discipline is logistics.

Like management, logistics is primarily a spatial discipline; the word is derived not, as one might expect, from the protean *logos,* but rather from the French *loger,* to lodge or house.[20] It is the art of placing each thing (persons/troops, facilities/emplacements, supplies/materiel) in its proper place at its proper time. What is surprising about both management and logistics is that even though they are so directly concerned with spatial organization, their main representational tools are only rarely spatial in any conventional sense. Rather than moving models of weapons/products/people across a model territory, practitioners of management and logistics deploy diagrams—flowcharts, homonculi, regressions, etc.—to model the space and time of the territory under their control. These models are topological, describing only those aspects of the objects represented that are relevant to the logistical process.

Sophisticated logistical systems operate by reducing all objects to be manipulated to numbers. Objects, processes, and even people are literally evaluated, so as to be manipulable through specific algorithms. Whether this remediation is accomplished through ledgers, punch-card machines, or digital computers (or, indeed, all of the above) is only an index to the specific qualities of a logistical system; all logistical systems essentially perform this single, albeit complex, function. Although many such systems predate the 1940s (such as military, transportation, and product-distribution networks[21]), the invention, distribution, and use of the digital computer in the decades immediately following World War II brought logistics into full maturity. For this translation from object to number to take place, there must be a site and apparatus that performs this evaluation, a hinge between the world of things and the world of numbers. This hinge is what I identify throughout this book as the *interface.*

The Interface

Originally coined in the 1880s as a scientific term for the surface along which two adjacent bodies meet, the term "interface" was taken up by the nascent discipline of ergonomics in the late 1940s to describe the site at which the human body interacts with a complex mechanical apparatus.[22] The interface is the crucial but often overlooked element in what ergonomics identifies as the "man–machine system." It is the hyphen between "man" and "machine" that articulates the system as a whole. Whether it is a screen, a keyboard, a sitting surface, a proscenium, or a curtain wall (and it is often all of

these and more), an interface is a complex apparatus that appears as a simple surface. Although it seems to be unitary, it is always fragmentary and complex; although it seems to be two-dimensional, it is always at least three-dimensional and rendered in depth; although it seems to be solid and impermeable, it is always carefully perforated to allow strategically mediated interactions between man and machine.

Describing the design program at IBM in terms of its multiple media or interfaces has several advantages. First of all, it helps to avoid the potential problem of attributing systematic integrity to the program itself—that is, describing all efforts at system-building as systems in a rigorous sense, which is a constant threat to the historian of the information age.[23] The interface is by definition a coordination between two or more agents in a putative system, and by refusing to represent it as a simple relationship between a single subject and a stable set of objects, one avoids the tendency to fix the history of its developments into a single perspective. As Hubert Damisch has argued, "an image constructed in perspective—figurative or other—can be made perfectly coincident, optically speaking, with its object, such that it could be precisely superimposed over it or screen it out perfectly, *but only if it is seen from the fixed point of view of an observer who could take in both of them in one glance.*"[24] Identifying the existence of multiple interfaces, made visible only by considering the situation from multiple points of view, allows me instead to call attention to the very real difficulties that Noyes and his colleagues encountered in developing the design program at IBM systematically, and the program's eventual failure to outlast the lives of its main protagonists, Noyes, Eames, and Rand.

More importantly, though, the interface draws our attention away from (long-lived and insidious) superficialities such as style, and instead toward the way in which these multiple media were intended to relate to one another. For example, rather than trust that asking what a particular building looks like is a self-evident proposition central to architectural history, this book asks how that building was meant to function topologically, as part of a larger technological and economic apparatus. As Jean Baudrillard hypothesizes in his landmark critique of postindustrial society, it is a matter not of objects but of a system of objects. This system eschews means–ends rationality even as it is produced by it:

> *"functional" in no way qualifies what is adapted to a goal, merely what is adapted to an order or system:* functionality is the ability to become integrated into an overall scheme. An object's functionality is the very thing that enables it to transcend its main "function" in the direction of a secondary one, to play a part, to become a combining element, an adjustable item, within a universal system of signs.[25]

To be sure, the object's appearance is of significance—and no corporate design and propaganda machine was as efficient as IBM's in exploiting the visual elegance of its buildings and products—but only insofar as that appearance did not impinge on, and indeed answered directly to, the very real functional and economic demands placed upon architecture by the corporation's various departments.

Analyzing the interface also allows an architectural history to extend its scope beyond the building to the other, related, media that were so crucial to the overall conception of the IBM Design Program: graphics, industrial design, multinational production networks, and exhibition and spectacle design. As I have already suggested, all of these, alongside architecture, were understood by the managers and design consultants at IBM as media not only in an artistic or material sense, but also as means of communication: ways to integrate and organize a vast, far-flung corporate enterprise into a coherent, organic whole.[26] Furthermore, rather than simply mobilize—as many recent histories of corporate design culture have done[27]—archival afflatus such as advertising, corporate ephemera, corporate documents and memoranda, designers' biographies, and so on in the service of explaining buildings or industrial products, treating each of these media as interfaces through which material objects and actions are translated into information and vice versa allows the architectural historian the ability to explain how architecture in turn serves to organize institutions through means well beyond standard approaches to spatial form.[28] As I have already noted, corporations are hardly unitary subjects, and thus it is crucial not to essentialize corporate behavior, interpreting advertising campaigns or product research and development as the product of a single imperative rather than of a fragmentary and incomplete process. As Noyes repeatedly emphasized throughout his corporate consulting career, "a typewriter sits in a room in a building. There *must* be a sense of their relationships in each of these."[29] However, these relationships are anything but secure.

Finally, the recent imperatives to digitize architecture in widely varying areas of architectural culture can only be poorly understood without understanding the history of that digitization itself. Although this book does not treat many of the landmark efforts to create "architecture machines,"[30] it does provide a detailed account of how architects became involved with computation in the very first instance. The genesis of the school of design theory known as "design methods"[31] that sought to reduce design to an internally consistent algorithm for making design decisions based upon a systematic aggregation of numerical data—an ideology strongest at the Hochschule für Gestaltung at Ulm, at several schools in the UK, and at MIT, but with adherents throughout the world from the early 1950s to the present day—can be better understood through paying careful historical attention to the mediatization of architecture and industrial design.

The structure of this book follows the imperative to pay attention to the emergence of this interface-based approach to design and its theoretical reformulation. It moves, as it were, upward and outward in scale, from the articulation of theoretical positions to graphics, industrial design, architecture, planning of multinational installations, and exhibition and spectacle design aimed at an international public.

The first chapter, "Eliot Noyes, Paul Rand, and the Beginnings of the IBM Design Program," begins with a brief genealogy, tracing the theoretical influences that contributed more or less directly to Eliot Noyes's outlook on design. Beginning with Peter Behrens, the leading design consultant to the German industrial concern AEG, and then moving

to Walter Gropius (the Bauhaus director, Harvard professor, and Noyes's teacher and employer), and ending with the theory of industrial design current when Noyes graduated from architecture school, this chapter establishes (1) that Noyes may be seen as a direct descendant of the main currents of German architectural theory of the turn of the twentieth century and of the interwar period; and (2) that Noyes decisively departed from certain aspects of that theory by aggressively asserting the need to extend the designer's purview beyond the industrial product.

The next two sections of the chapter follow Noyes's early career, from his education, to work as the first curator of Industrial Design at the Museum of Modern Art (MoMA) in New York, to his first projects for IBM (done before any formal consultancy was established). This biographical approach is accompanied by critical readings of Noyes's writings and designs, which serves to establish the intellectual and practical background that Noyes brought to the IBM Design Program. Here I explore Noyes's assertions that all design must be organic and that designed objects must be continually and actively redesigned in order to perform effectively.

Finally, this chapter describes the beginnings of the formal design consultancy—its articulated theoretical assumptions, managerial structure, and goals—with particular emphasis on the graphics program under Paul Rand. It provides a detailed analysis of Rand's decisive retheorization of the trademark as the crucial functional element for ensuring corporate cohesion and explains how Rand's approach to systematizing the graphics program for IBM became a paradigmatic approach in other areas of the design program, such as industrial design and architecture.

Chapter 2 offers what is, to my knowledge, the first critical history of architects' and industrial designers' unusual, crucial, and wholly ignored role in the design of computers, from IBM's early digital computers up through the landmark design of the System/360, announced in 1964. It begins with a fundamental rereading of the early history and theory of computers, placing emphasis on the spatial and temporal aspects of the basic concepts and technologies that contributed to the invention of the digital computer. In short, I argue that the computer was and remains a technology that is conceived of in architectural terms, even before John von Neumann articulated what was to become known as the computer's architecture. Building on the rich trove of information in Eliot Noyes's archive, this chapter demonstrates that Noyes and his collaborators at IBM set ground rules for articulating the physical and psychological relationship between people and computers that prevails today. This is the provocative theory—first stated by an unlikely contributor, the critic and curator Edgar Kaufmann Jr.—that the space of computing is to be divided in architectural terms into a "parlor" (i.e., the space that the computer operator inhabits, or interface) and a "coal cellar" (the concealed, distant space in which the machine itself operates). The final section of the chapter describes the architectural and spatial implications of this parlor through an analysis of a curious building designed by Eliot Noyes as the archetypal space for computers—a shed known as the "white room,"

which has become a universal architectural metaphor for computational teletechnologies. The uncanny spatiality of this building became paradigmatic for IBM's architectural program, and my description of it here serves as the basis for the following account of IBM's architecture under the auspices of the design program.

Chapter 3 historicizes and theorizes how Noyes and IBM reconceived the fundamental approach to corporate architecture as a "counterenvironment," an enclosure organized over and against the surrounding, disorganized environment. The corporate counterenvironment, rather than simply being a container for the management systems and computers that became IBM's main business, were instead understood by their designers and users alike as technical. Just as were its graphics and products, IBM architecture was a medium of communication, designed to facilitate connections between installations across the globe. Although IBM, on the advice of Noyes, commissioned buildings from leading architects in the United States and elsewhere, these were most emphatically *not* buildings and campuses meant to be seen as the signature of work of those architects. As the designs of these early buildings strongly suggest, and as IBM's development of a Real Estate and Construction Division (RECD) to oversee the growth of its physical plant through a coherent system of building production and management decisively proves, "simply the best in modern design" meant not glamour but the redesign of architecture itself into a data-processing machine that operated at representational and technical levels.

The next chapter treats IBM's efforts to manage the persistent crises its activities provoked in political and cultural debates. It begins with an account of IBM's failed first attempts at allaying the public's suspicion that the computer and automation in general were sinister forces that threatened Enlightenment values such as individuality and freedom (not to mention labor). Through the intervention of the Eames Office, IBM began a vast, two-decadelong campaign in the late 1950s to naturalize the computer. This campaign was conducted in multimedia barrage, beginning with exhibitions and films, and concluding with the production of overwhelming spectacles meant to convince the public of two seemingly contradictory ideas, each a contradiction in its own right: first, that the computer was a wholly natural tool, capable only of what human beings could command it to do; and second, that the computer was a force that would radically and even magically change the world.

The Eames Office succeeded beyond IBM's wildest expectations through the use of two main strategies. First, it aimed not to explain away such contradictions, but rather to multiply them. In writing and design alike, the designers in the office who worked on the IBM projects—foremost among them Charles Eames, Glen Fleck, and Parke Meeke—collaborated closely with IBM's own researchers, scientists and engineers from the Rand Corporation (located only a few blocks away from the Eames Office in Santa Monica), and leading academics to demonstrate to IBM's managers and the public alike that the computer's purported natural and magical qualities were complementary. Second, the

Eames Office pursued a heuristic design strategy, of placing the exhibition or spectacle viewer in a space that appeared to be free of any formal or overriding regulation, when in fact providing that freedom guaranteed the invisibility of a rigorously conceived and executed pedagogical program. This two-pronged project culminated in a largely forgotten, decadelong project to build an IBM Museum, which would place its visitors inside an invisible computer built at architectural scale with multiple interfaces.

IBM's Design Program gave birth to similar consultancies (although none would be quite so elaborate or enduring) at corporations at several points in the supply chain of industrial production and services. Noyes presided over three of the most significant: Westinghouse Electric (1960–77), Mobil Oil (1964–77), and Pan American Airlines (1969–77). Noyes also began shorter-lived consulting programs at Cummins Engine and Xerox, among others, all the while employing his trademark mixture of in-house design teams and high-profile designers toward the ultimate goal of creating an autonomous and automatic system of design. These simulacra are briefly treated in the conclusion, along with some closing remarks on the degree of success that Noyes and his collaborators achieved in pursuing a redesign of design through the development of the interface and its subsequent impact on architecture and teletechnology alike.

Virtual Paradoxes

The age of media (not just since Turing's game of imitation) renders indistinguishable what is human and what is machine, who is mad and who is faking it.

Friedrich Kittler

The End of the IBM Design Consultancy and Its Simulacra

Now, with an overview, if not of the entirety, then at least of a reasonable cross-section of the IBM Design Program, several questions arise. First, and most generally: to what extent was Noyes's and IBM's attempt to redesign design—to reformulate design, previously conceived as an authorial act in one or another medium, into a systematic and anonymous logical process carried out simultaneously in various media—successful? In a televised interview with Noyes in 1966, just as RECD was gaining momentum and taking over the reins from Noyes in governing IBM's architectural endeavors, the architecture critic and historian Reyner Banham asked him, "how will you hand on your power? Is there enough momentum inside the company or have you got to find and train another person?" In an obvious bid at continuing his quest to find the source of what he called an "Other Architecture,"[1] Banham grinned and answered his own question before Noyes could respond: "You see the sneaky conclusion I'm working 'round to. This man might not be a designer." Noyes, for his part, answered tellingly,

> It could happen of course. Adriano Olivetti was such a man. I haven't seen it happen much. One of the things that I've been able to do, and really needed to do, I think, was direct the programme also by example setting. [Pointing to a slide of the IBM Development Laboratory.] You see the first modern building that IBM built, I built for them. I said, you see, that you can do it this way, and I got in there and started designing typewriters, and I then had to fight for my foothold in those areas. But I've insisted with all the companies that I work for that I'm really an architect and industrial designer, and that as a third profession or activity I'm willing to consult rather intensively, but I'm not willing to consult *only;* and if they're not going to give me these jobs to do, I'm not going to accept the assignment; so my mix as a guy who performs, as well as talks, is very important to me, and I don't know if I could run the programme without both.[2]

At this critical juncture in the design program, in the wake of the release of System/360, Noyes ultimately felt that he had, despite his collaboration and leadership in creating a collective and autogenerative mode of design—whether through the *Design Guidelines* or through RECD—preserved his autonomy as an author, but only by retaining control over individual architectural projects. The role of the traditional architectural author remained, to be sure, but only (in the best scenario) as an exemplar, to set a standard to which the automated and autonomous production of corporate architecture could then aspire. The architect of the corporation had already become a diffuse set of relations.

Eames acknowledged this state of affairs in a response to a questionnaire circulated to various designers by the curators of a 1969 exhibition at the Louvre, provocatively titled *Qu'est-ce que le design?* (What Is Design?). The exhibition put this provocative question, among others, to the participating designers, in response to a perceived crisis in the identity of design. No longer associated with the humanist tradition of *disegno,* or with the modernist discipline of the Industrial Revolution and its aftermath, the definition of design was undergoing rapid change. As the Belgian art historian Henri Van Lier wrote in the

introduction to the catalog for the exhibition, what had changed was the introduction of an "information explosion":

> In the aftermath of the Second World War, and concurrently with the information explosion, design reformulated its problems in the terms of communication theory. It is at this moment that the industrial object, just as all other objects, appeared as a bundle of messages, according to its forms, its handling, its functions. These different messages, denoted (direct) and connoted (indirect), evidently assume codes, i.e. conventions . . . and consist of redundancies, in other words repetitions and insistence, the better to understand them.[3]

In the face of this new status for the industrial object, all aspects of the ontology of design were, in the minds of the curators, called into question.

Eames responded to the questionnaire not only with pithy and coy answers (e.g., "Q: What are the boundaries of design? A: What are the boundaries of problems?") but also by drawing a pair of diagrams. The second, more famous diagram, which eventually appeared as the Eameses' manifesto-like statement in the exhibition, was abstracted from the first. In the earlier sketch (Figure C.1), "R & C" (Ray and Charles) appear at the center of a sprawling web of individuals, corporations, institutions, and events, in what is at once a topological analysis and a historical description of their practice. ("EERO," appearing in one of the circles nearest their own, had been dead for eight years, and "Moscow," referring to their multiscreen projection *Glimpses of the U.S.A.* for USIA in 1958, was

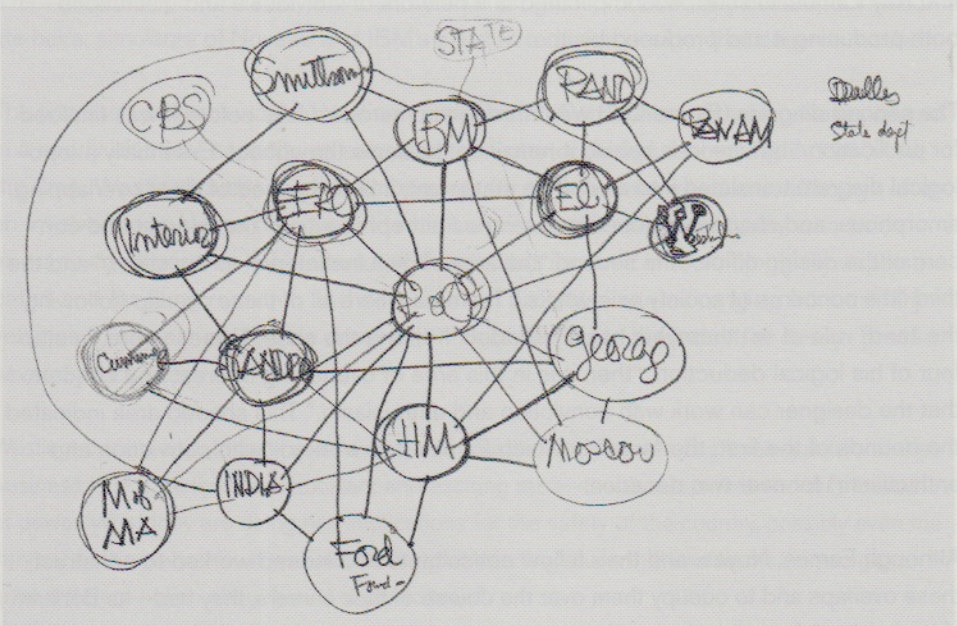


Figure C.1 Charles Eames, diagrammatic sketch showing relationships between the Eames Office and other designers, corporations, and projects, from the exhibition *Qu'est-ce que le design?* Musée du Louvre, Paris, 1969. Copyright 2011 Eames Office, LLC (eamesoffice.com).

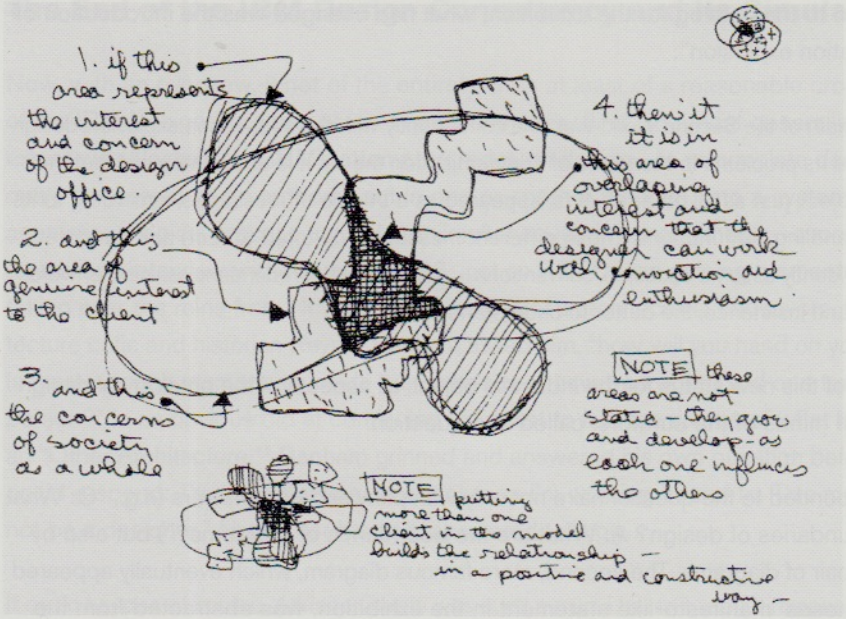


Figure C.2 Charles Eames, diagrammatic sketch showing overlapping "areas of interest," from the exhibition *Qu'est-ce que le design?* Musée du Louvre, Paris, 1969. Copyright 2011 Eames Office, LLC (eamesoffice.com).

then a decade gone.) "El"—Eliot Noyes—is depicted as a nearby element in the flowchart, in turn connected to IBM, Westinghouse (depicted by a sketch of Rand's "W" logo), and many of the other corporations for which he consulted. The work of the Office of Charles and Ray Eames, in short, was implicated in a network of individuals and institutions—both producing it and produced by it.

The second diagram (Figure C.2) went through numerous drafts before it was finalized for publication,[4] but the idea behind it remained the same throughout. Essentially a topological diagram translated into an if–then statement, it is composed of three overlapping, amorphous, and shaded enclosed areas—the first representing "the interest and concern of the design office," the second "the area of genuine interest to the client," and the third "the concerns of society as a whole." The area where all of these overlap (following the "and" rule of set theory) is heavily shaded. If this is the case, Eames wrote, in step four of his logical deduction, "then it is in this area of overlaping interest and concern that the designer can work with conviction and enthusiasm." This shaded area indicated the bounds of the first, the "area" in which Eames had worked "with conviction and enthusiasm" for over two decades.

Although Eames, Noyes, and their fellow consultants had indeed worked to construct these overlaps and to occupy them over the course of their careers, they had—as Banham hinted—also labored to design themselves out of corporate design. When Noyes died unexpectedly of a heart attack in 1977, and when Eames passed away the following year, IBM did not deign to replace either of its leading consultants. A design system was

in place, and it only required consultants in minor areas. Rand stayed on, eventually designing a playful new logotype—the "Eye Bee M" pictogram (Plate 8)[5]—in 1981, although he soon moved on to other corporate clients (including Steve Jobs, who commissioned Rand to design the logo for his line of NeXT computers). Richard Sapper was given responsibility for overseeing graphic and industrial design in the European laboratories, but the rest of Noyes's and Eames's responsibilities were distributed to a cadre of thirteen design managers.[6] The Noyes office's last building for IBM, fittingly a management training campus in Armonk, was finished four years after his death—in the same year that the IBM 5150 personal computer was announced. The consultancy was over, its goal of rendering itself obsolete achieved.

This achievement noted, however, the coherence of the postconsultancy design program at IBM was greatly weakened in Noyes's absence. The IBM PC, with its greyish boxy exterior, was hardly a great achievement of industrial design, despite its excellent sales; and Rand's pictogram logo was a violation of every rule he had established in the preceding years regarding the sanctity of IBM graphics.[7]

Second, if the rather brash claim at the outset of this book that the IBM Design Program constitutes a determining case in the mutual imbrication of architecture, corporations, and information technology, what impact did it have upon these fields as wholes? This is a question that lies well beyond the scope of this book to answer, the argument here being to establish both the rough outline and fine points of the design program itself, in the hopes that other scholars of this period may find in it resonances, parallels, and even direct relationships. That said, however, the IBM program produced any number of immediate heirs, simulacra of Noyes's and IBM's effort to redesign design, that deserve mention.

The first such program was at Westinghouse Electric Corporation, for which Noyes served in a nearly identical capacity as consultant director of design, beginning in 1960.[8] At the time, Westinghouse was known primarily for its consumer products, although after an involved tour, Noyes discovered to his surprise that it was a company with twice as many employees as IBM (albeit half the profits), involved in technologically sophisticated and far-flung research and development projects in areas ranging from military vehicles to nuclear power. He described this revelation to the industrial design press several years later:

> Westinghouse is easy to think of as a maker of household appliances. But three-quarters of their business is in a vastly more important and exciting area—the development and distribution of power. What they are doing has implications for the safety of the country, possibly even the survival of the planet. So if you start looking at Westinghouse in those terms . . . you get a quite different notion about how it ought to look.[9]

Despite these important differences, just as he had at IBM, Noyes immediately turned to Rand, who redesigned their corporate logo (Figure C.3), and Eames—who, among

many other projects, created the film *Westinghouse from A to Z,* which created a taxonomy for the individual consumer of Westinghouse's activities, showing that Westinghouse's production methods for household appliances and nuclear reactors alike were intimately related activities. For his part, Noyes designed several buildings for Westinghouse, including the Tele-Computer Center near Pittsburgh, of 1964.[10] This building was designed for the real-time management of Westinghouse's global resources, and the reader will hardly find it surprising that it resembles in almost every particular the courtyard/fortress buildings that Noyes and others had designed for IBM. While the Westinghouse building used UNIVAC computers (the effective real-time management software for the IBM System/360 was still a year or two off), it was a courtyard building much akin to the buildings he had designed for IBM.

In some respects, Noyes's approach to the Westinghouse consultancy benefited from his earlier and current experiences at IBM. As he had at IBM, he preserved his professional and authorial autonomy to a certain extent, directing numerous projects for Westinghouse in his own office; these ranged from product redesign to an ambitious scheme for a new public transit system for Pittsburgh, and the office also produced prototype designs for an electric car.[11] In 1964 Noyes designed the Westinghouse pavilion for the New York World's Fair, a strange, flying-saucer-like affair. However, Noyes also changed his approach to better systematize Westinghouse's entire design process. Although he commissioned special architectural projects from numerous architects (such as a molecular electronics plant designed by Vincent Kling in Baltimore, of 1966–68), he also created a generic prototype for Westinghouse's WESCO distribution warehouse buildings; at least thirty of these were built across the country in collaboration with local architectural firms throughout the 1960s. The company commissioned Knoll Associates (now the Knoll Design Company) to design office interiors across the country as well, creating a streamlined building-production scheme and standardizing the appearances of the corporation's offices. And unlike IBM's Design Program, in 1966 Westinghouse eventually built a centralized Design Center, with interiors by Noyes, in the company's research campus in Pittsburgh, housing thirty-one designers and managers, organized into three

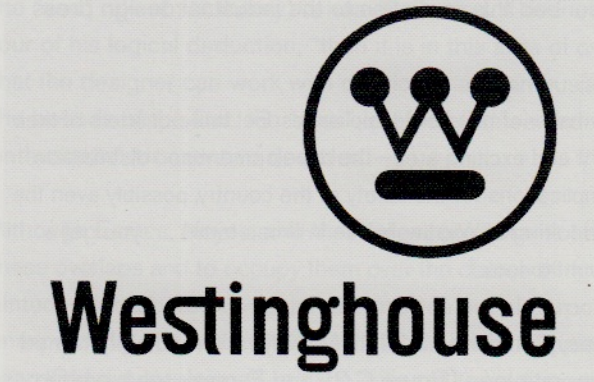


Figure C.3 Paul Rand, Westinghouse logo, 1960.

departments, tasked with overseeing "every visible manifestation of Westinghouse."[12] To help supervise this center, Westinghouse hired away the IBM industrial designer C. F. Graser (who had played a crucial role in the design of System/360) in 1964. Thus, in many aspects, the systematization of the Westinghouse program, though younger than IBM's, advanced quickly, achieving the sophistication of IBM RECD's apparatus within less than a decade.

Several other Noyes consultancies followed, of which the most thorough-going was for Mobil Oil, begun in 1964.[13] Here, with a corporation less far-flung in its activities than either IBM or Westinghouse, Noyes was able to move quickly. Rather than look to the overstretched Rand, Noyes turned to the graphic designers Ivan Chermayeff and Tom Geismar to redesign the logo and signage for the corporation's vehicles and buildings, famously separating the company's Pegasus mascot from the logotype and changing the color of the "o" in the company's name to red. Noyes pursued the redesign of Mobil's vast network of filling stations within his own office. The result, the ubiquitous, flexible yet iconic circular gas pumps under circular canopies, tied together the company's publicly accessible architectural presence with its logo through the shared circular motif.

Noyes repeated his successes with multiple other corporations, as either a consultant or designer, and often as both: Pan American Airlines, redesigning plane interiors and commissioning a new graphic design regime; Xerox, redesigning the company's New York showroom in 1963 (although a conflict of interest with IBM forced him to stop work for Xerox soon after); Cummins Engine, for whom the Noyes office redesigned engines and the interior of CEO Irwin Miller's private jet; and North American Rockwell, for whom the Noyes office produced (alongside other firms, such as Loewy/Snaith and Teague Associates) habitability studies for NASA's first space station, Skylab.[14]

Although the designs that Noyes and his fellow consultants produced for all of these varying corporations were markedly different in character and appearance than the IBM projects and products discussed in the preceding chapters, this is wholly consonant both with the core of Noyes's theoretical approach and with the thesis pursued in this book. On the one hand, Noyes, as "curator of corporate character," took care to express in his and his collaborators' designs a unified and systematic set of statements regarding both the look and the organizational structure of the corporation in question. On the other hand, the nature of Noyes's approach to corporate design—as communication, as logistical, as managerial—teaches us to look at the designs not for any repetitive stylistic quality, but for each object's status as a component of a larger communicative and functional apparatus.

When it comes to assessing the impact of the IBM Design Program on architectural culture beyond the immediate design consultancy, the matter is slightly more difficult. Although it eventually became a corporate exemplar of the school of thought known as design methods, the design program itself did not always contribute directly to the integration of computational techniques—ranging from software for determining building

programs to computer-aided drafting suites—into the everyday practice of architecture. These, as was argued in chapter 2, were primarily the province of engineers and computer scientists (although the efforts of architects such as Christopher Alexander, Nicholas Negroponte, and Yona Friedman also resulted in significant contributions). The effects we may detect are more subtle and indirect. Only part of the legacy of the IBM Design Program is in such technical feats and the program's reproducibility in formal terms at other corporations; its significance extends rather to determining essential aspects of the technical and aesthetic integration of computers into everyday life, from professional ambits to the most basic elements of our personal lives. The IBM Design Program shaped, through various media, the contemporary image of computation for a vast public well outside of the computer lab.

Information Art?

This point is important, since emphasis on the aesthetic outcomes of the design program can all too easily be misunderstood as an emphasis on the beauty of its products, as a matter of imagism. I have argued throughout that the outward appearance of objects is only of secondary importance when considering how these objects (and indeed systems of objects, processes, and concepts) came to be. Even considered as a surface, the interface is anything but superficial. As we have seen, the graphics, machine casings and I/O devices, curtain and cellular walls, and exhibition techniques that related the human being to the computer and corporation alike all played a determining role in the way these machines interact. However, art and architectural history all too often remain mired in the institutional imperatives toward aestheticization, fixing machines as objects rather than as apparatuses, as images rather than as interfaces.

A clear, if perhaps unfair, example of this stagnating trend may be seen in the trajectory of MoMA's three explicit efforts to come to terms with the machine. Alfred H. Barr and Philip Johnson's *Machine Art* exhibit, of 1934, famously posed the question—subject to heated contemporary debate[15]—of whether or not a machine may be considered "beautiful" and in so doing achieve the status of "art." How could a design be "the unconscious result of the efficiency compelled by mass production"?[16]

More than two decades later, Arthur Drexler concluded his review of the museum's design collection with a description of "The New Machine Art," illustrated with a color photograph of an IBM RAMAC control panel (Figure C.4). Drexler begins promisingly:

> Most often the design of machines is not consciously guided by aesthetic considerations. But in technology as a science, the more limited aesthetic decisions may be, the more significant are their effects. For this reason Machine Art still offers important clues to emerging concepts of design, the word design being understood not only in its conventional sense but also as a broad approach to the making and organizing of objects.

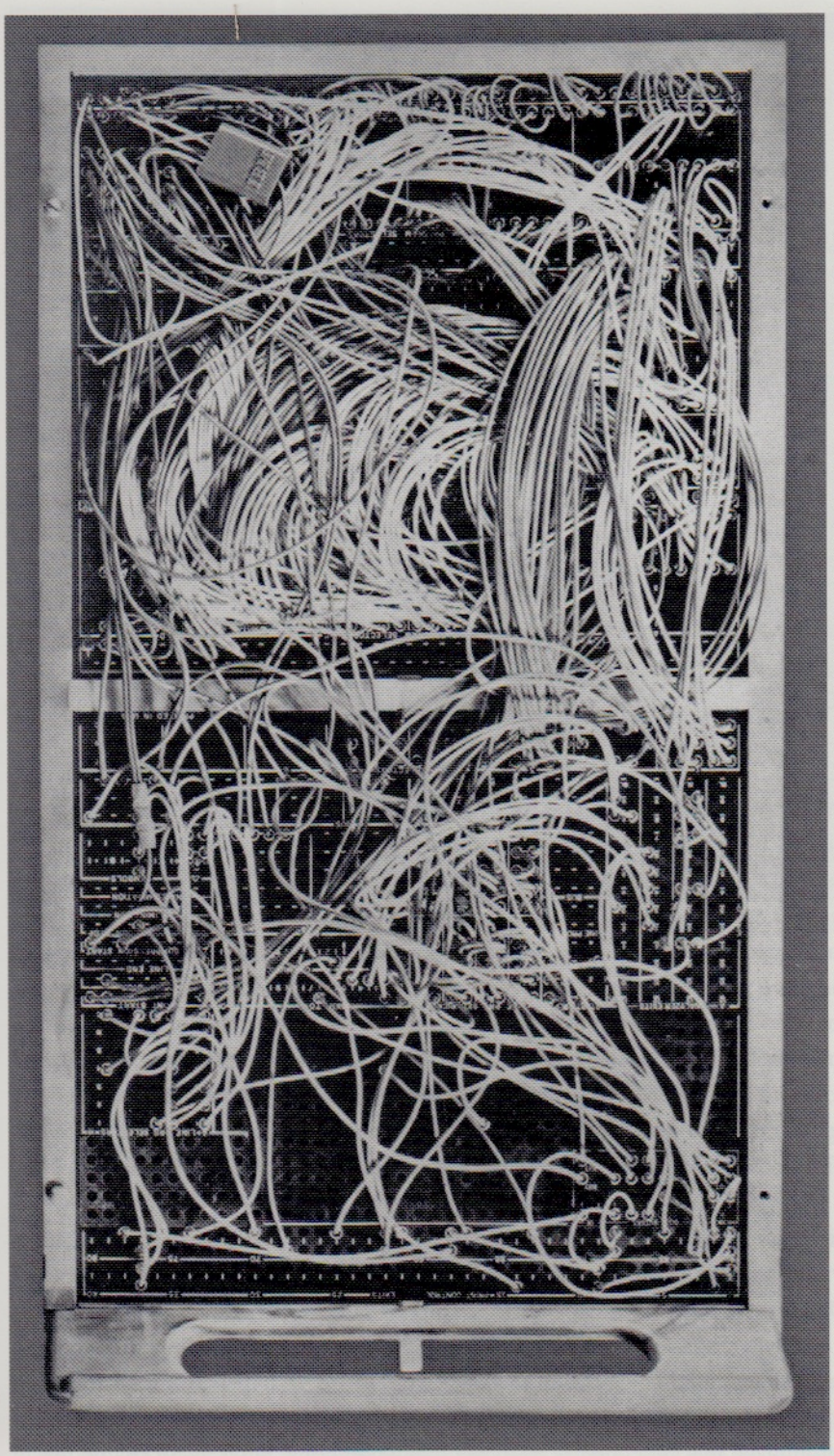


Figure C.4 IBM RAMAC control panel, 1958. From Arthur Drexler and Greta Daniel, *Introduction to Twentieth Century Design from the Collection of the Museum of Modern Art* (Garden City, N.Y.: Doubleday, 1959). Courtesy of the Museum of Modern Art, New York.

Since the end of World War II electronics has altered our conception of how things need to be shaped in order to work, and of how they may be related to each other. . . . The new machines are incomprehensible unless one knows about the existence of invisible forces.

So far, so good; however, addressing the circuit board as an image, he quickly loses his way.

Perhaps the most striking characteristic of the new machine aesthetic is its dematerialization of finite shapes into diagrammatic relationships. Examples are the printed electrical circuits, which replace separate three-dimensional objects with groups of patterns printed on a flat surface. Such patterns can hardly be said to have precise boundaries, or to be complete in themselves. This is also evident in a three-dimensional design such as the control panel from a RAMAC computer, with its clusters of colored wires arranged on a panel according to the requirements of computer operations. . . .

Dematerialization and pattern relationships recall similar ideas in painting, most notably in the work of Jackson Pollock.[17]

Now the significance of the "invisible forces" that animate the RAMAC, that relate it to other objects, is lost, and Drexler is left with a vague, embarrassing formal comparison to a painting. Drexler leaves us with no real sense of what is "new" about "New Machine Art."

Cara McCarty's *Information Art* exhibition, of 1990, was another self-conscious attempt at returning to the provocation of *Machine Art* with a more technologically sophisticated set of objects, hoping to gain new insight into spectral images of information technology and their significance for modern culture. Yet the exhibit consisted solely of photographs of logic circuits, framed and mounted on the walls as pictures. As McCarty admitted, unwittingly anticipating a point that the media theorist Friedrich Kittler would make several years later, there was no making sense of these images from a technical point of view. All that could be done by the art historian in the face of the sheer complexity and opacity of these images was to appreciate them as images. McCarty suggests as much by making use of an early draft of Drexler's confounding description of the RAMAC as an epigraph, but then goes on to make the point much more explicit: "But even if we never understand them, we can delight in their marvelously complex and variegated designs."[18]

The diagrams are indeed delightful as patterns; however, one in particular, a particular kind of "neural net" called a "foveated retina-like sensor" (Figure C.5) developed by IMEC and the University of Pennsylvania in order to give robots "active vision," interrupts our pleasure. Surely a diagram that is capable of staring right back at us demands a more critical art historical method.

It is plain from even this very cursory overview that when considered as an image, the problem is not the consideration of the computer or any other technology as art. Instead it is the fact that the interface produces the virtual; that is, it produces a misleading

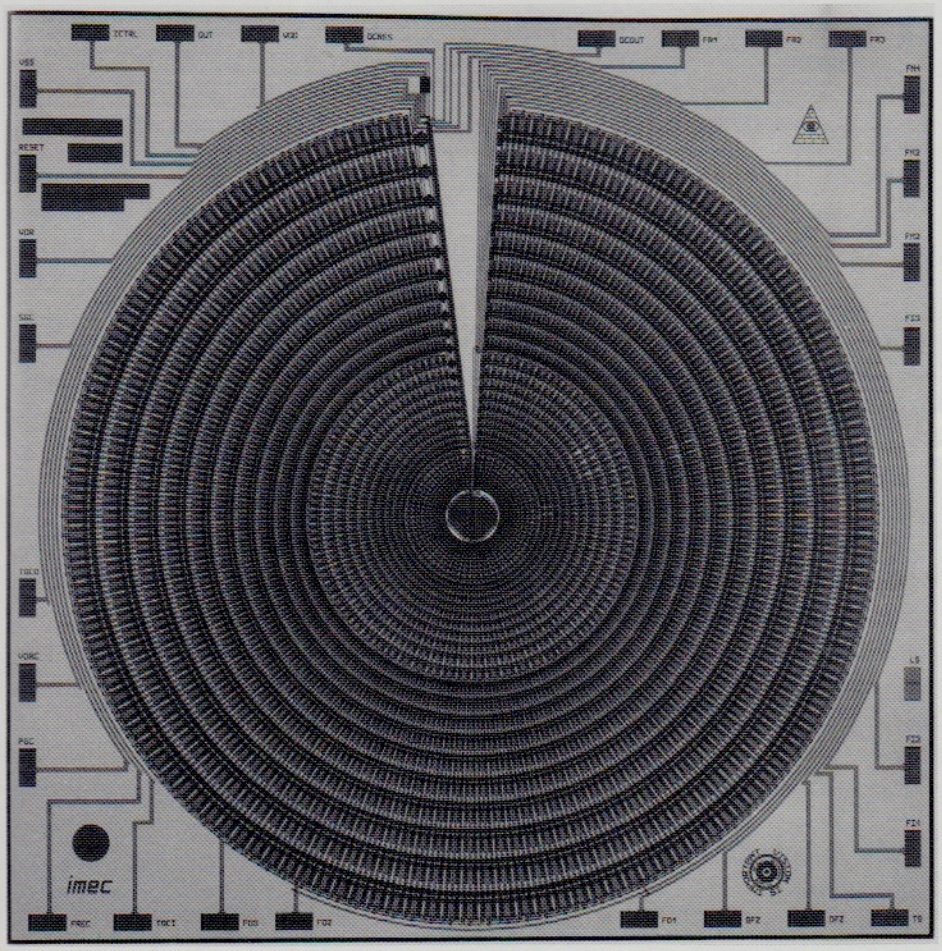


Figure C.5 IMEC and the University of Pennsylvania, "Foveated retina-like sensor," ca. 1989. Courtesy of the Museum of Modern Art, New York.

and seductive surface that is "almost or nearly [the apparatus] as described, but not completely or according to strict definition."[19] The most successful interfaces present images of connection and interrelatedness, power, and ubiquity, even as they interpellate individuals, producing what we might call a paranoid sense of well-being. That the interface performs this work does not herald the emergence of a radically new kind of image—after all, the *ikon* and other forms of religious imagery have been doing the same for centuries—but rather of yet another technical reconfiguration and remediation of the image with vast political implications.[20]

It is my hope that an expanding critical art history of the computerization of art, design, and architecture—one that is the product of multiple historians and theorists in dialogue, one that sheds light on the ideologies inherent to the vague metaphorics of systems, networks, and interfaces even as it seeks to describe these phenomena—may help to avoid our being held hostage in the whimsical oxymoron and epistemological trap of "virtual reality."