Design in the Information Environment

How computing is changing the problems, processes and theories of design

Editor: Patrick Whitney
Institute of Design
Illinois Institute of Technology,
with
Cheryl Kent

Southern Illinois University Press
Carbondale and Edwardsville
Information and Design: The Essential Relation

Jay Doblin

With the digitizing of information, human beings are endowed with the powers once ascribed to gods. Jay Doblin reflects on the nature of information and the impact of its digitization.

I am going to theorize about information - something as perilous as dancing on quicksand.

Information in Design

Every product is composed of information, materials, and energy. The form given to the materials is the result of applied information, and the materials are formed by an expenditure of energy. For example, the materials in an automobile are some dirt and oil. By successive applications of information and energy, a car is produced. At the end of the assembly line that car reaches its peak of integration.

The process by which products are made can be described by a flow chart with five components: control, operation, product, consumer, and evaluation. (Figures one and two.) The process begins in control with the definition of the project's purpose. Information generated in control is sent to operation where it is combined with materials. The result is the product.

That product is evaluated twice, objectively and subjectively. In the objective evaluation, direct measurements are taken from the product: its size, weight, durability, and capacity. Subjective evaluations are indirect; they are based on consumers' opinions and preferences. Eventually, both the subjective and objective data is sent back to control. This flow model is a cybernetics loop. Information from evaluation is the feedback used by control to make corrections and refinements in succeeding cycles.

What flows throughout this system is information. The arrows are information transmission, the cells are information transformation. To understand this model properly requires an accurate definition of information.

Information in Products

Of the thousands of cases where information is used for
The Process of Making a Product is outlined in Jay Dobkin’s five step flow chart. (1) In control, what the product will do, and how it will work is determined. (2) From control the plans go to operation. Here, the product is made in accordance with the information from control, and in combination with the appropriate materials, and necessary energy. (3) When the product is complete, it can be objectively measured for size, dimension, strength, and so on. (4) The consumer who has bought the product is also evaluating it, perhaps using different criteria. The product may work, but perhaps it is too difficult to make work, or it is unattractive. These subjective judgments are combined with the objective feedback in the evaluation step. (5) The evaluation is sent back to control where modifications to improve the product can be made.

Information in Inorganic and Organic Objects

The information that controls the form of products comes third in a long chain of events. The first event, non-informational, occurred when materials and energy interacted to produce natural objects. Examples at the cosmic scale are the formation of suns and planets; at earth's scale, the formation of clouds and mountains; at atomic scale, the formation of atoms and molecules. Science tells us that no information controlled the formation of these objects; they happened. (But such objects can be deciphered into information; this is the major activity of physical sciences.) Page one of the Bible describes God supplying the information to form earth and its objects.

The second event, the spontaneous beginning of natural information, happened billions of years ago when life first appeared on this planet. Science tells us that the first organism was the chance result of some primordial event. Since then, the evolution of species is the result of the natural accumulation of control, the ones that interest designers are those where information is used to give performance and appearance to products. A product is concentrated information. A Polaroid SX-70 has a massive amount of accumulated mechanical, optical, electronic, and chemical information packed into it. This is what makes it possible for an amateur to produce color photographs. (Consider the skill and equipment it took fifty years ago to produce color photographs.) What happens is that as products evolve (accumulate information) they get smarter, and this smartness reduces the need for smartness and experience on the part of the user.

The process can be reversed, so that information can be taken from the object. Looking backward, an archaeologist can "read" an artifact because a product is "frozen" information, the totality of everything its maker knew about that product at the time it was produced.
Volkswagen with a male Volkswagen.

Like organisms, products as they evolve accumulate information and become more complex. But where organic species evolve slowly, products evolve rapidly. The reason is that the information in products can be externalized; designers can get it, extract it, and change it to fit their objectives (bio-engineers now claim that this can be done with organisms too). The information extracted from a product is the de-materialized product. There is one big change in this process — it has shifted from analogical to digital.

Analog to Digitized Information

For millennia, information has been analogical, communicated as words, numbers, and drawings. In this form, information is perceptible to the eyes or ears, and so is easy to use. But it is also cumbersome. In the 1950s, main-frame computers made it possible to use digital information, and suddenly an entirely new capacity was available.

Digitizing makes some extraordinary things possible. Because of digitizing we can collect and store a vast amount of information in a small space, (eventually you will be able to go to the drug store, buy the Library of Congress and carry it home under your arm). With digitizing, we have the possibility of instant access to any piece of stored information. With the right software, that information can be processed in any way we like, instantly. Digitizing also allows the transmission of information to, or from, any part of the world instantly. And, digitizing permits us to display information as copy, lists, charts, or any other desired form. With this power available, all of us become omniscient.

During the last decade, the development of the micro-processor has allowed this power to become compact, economical, and available. We are only at the beginning; how this technology
will be used for design is still evolving. At present, these methods are often as frustrating as they are useful. But knowing something about this technology will prove to be critical. We are in a transition period where the haves - who can use this power - will be separated from the have-nots who can’t.

Information in Offices
The term office is as vague as information. Because there are millions of offices, and because they vary enormously in size and purpose, it is difficult to generalize about them. But whether an office has a staff of one or thousands, whether it is a bank or a newspaper, one thing can be said about all of them - they are information processing operations.

The product model shown earlier can be adapted to demonstrate how offices process information. Control and operation can be combined here in a triangle that represents the three levels of office operations: planning, design, and production. (Figure three.) Planners, at the top, decide what the company will make. In design, those concerned with human factors, engineering, industrial design, and graphic design, turn the plans into precise specifications that detail everything from color and material, to the last bolt. In production, the instructions from design are followed to create the final product. In office parlance, these three levels are called executive, professional, and clerical.

The Office as Exobrain
The shift from analogical to digital information is causing enormous changes to occur in offices. In the evolution from the traditional office to the modern office, the equipment has changed from that based on analogical message communication, to machinery that will translate the analogical to digital. We have moved from the quill pen, to typewriters, to telephones, to the copier; and into word processors, terminals, micro-computers, electronic typewriters, and laser printers.
What this means is that many workers can simultaneously work on a single problem because they are tied together through a computer and computer terminals. (Figure four.) The office becomes an "exobrain" in which workers are contributors to an ongoing cumulative process of combined thinking. The result will be a competition in which Mobil's exobrain is pitted against the exobrains of Shell, Texaco, and Standard. May the best exobrain win (that is, after all, the ultimate purpose of an office).

Inexorable Trends

There are some inexorable trends that cannot be ignored. The first is the massive shift to office work. At the turn of the century, over eighty per cent of all workers were in agriculture; by the end of this century, two per cent will be. The number of industrial workers grew from a small percentage to over fifty per cent by mid-century; now this number is declining. It is said that it will take 15 per cent of the work force to produce all the food and products we can use. Information workers are increasing rapidly, to over 65 per cent. The major shift is from material-energy workers to information workers.

The second inexorable trend is to digital information. By the turn of this century, most people will be using more digital than analog information. This will not only change our social interaction, but will change how we think. People born into a digitized world will think very differently from the way we do.

To be digitized requires equipment that couples the workers and the system. To be effective, or just employed, every worker will need to be attached. This explains the exponential growth of office equipment - said to be thirty per cent each year.

But I urge you to ignore, if you can, the equipment. The important thing is to understand that these individuals will be combining their skills in a cooperative system. For designers,
this means a new way of working that makes obsolete the old board artist concept.

The New Designer
A few decades ago, designers were the visionary stars of business. But now, consulting offices are giving way to corporate design departments where designers are “matrized” into teams with engineering, marketing, production, and the rest. In the process, as designers homogenize and “professionalize”, they may give up their prime purpose: to be corporate visionaries. Designers should be wary of becoming digitized participants who make their specialized contribution. They must keep their most valuable asset - their vision - and use that vision on behalf of the end user, not the intermediate market, or the immediate corporation. This may sound idealistic, but it’s not; it’s hard-headed good business.