SOME CHANGES IN INFORMATION TECHNOLOGY
AFFECTING MARKETING IN THE YEAR 2000

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Although the topic of this session is that of market segmentation, our concept of this issue is highly dependent upon information flow structures. Change the information flow mechanism by providing instantaneous feedback to the manufacturer and the entire market segmentation process must change.

First we shall consider how far the year 2000 is from today, then some of the changes in the information technology we might expect, and lastly how these changes might affect marketing and its segmentation.

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In 32 years we enter the year 2000. This may seem like a long time away. But 32 years ago, in 1936, the Queen Mary was launched. Today, in 1967, it completed its last ocean journey. In the same year, 1936, the Hindenberg went up in a flaming pyre, ending the era of commercial zeppelin travel. In 1936 George Murphy was playing in "Woman Trap." One year later Ronald Reagan appeared in "Love in The Air."

Let us flip our 32-year reference period forward to the year 2000. We have a rough idea of our wealth and population (see Fig. 1). Figure 2 shows our probability of being around in the future. Three curves are shown for a male 20, 30, and 60 years old today. For example, if you are about 40 your chance of being alive in the year 2000 is better than 50/50. For those who won't, the probability is high that their progeny will. The obituaries of our friends may erode our innate belief in our own immortality, but let us not undercut our responsibility to our future.

This morbid topic is raised only to pinpoint the year 2000 and to describe the nature of long-range technological prediction. It is, of course, impossible to predict
Fig. 1—Change of GNP and population in the U.S.
Fig. 2 — Your probability of being around (and alive) in the future
precisely who will be around, but we are free to talk with reasonable certainty about the gross framework. The fine-grained structure remains to the gods, uncertain and indefinable.

Technological advances are proposed in the scenario to follow. What is said will only define the ballpark; the specifics are solely for illustration. It's the game, not the players, that is important.

Early prototypes of the basic hardware components needed for the illustration exist to some degree in the laboratory today. We should not forget that things tend to be in laboratories and not "off-the-shelf" because they are not yet practical or economical. However, we are much further along in developing the equipment I shall describe than we were toward the economically feasible development of TV in 1936. Further, these proposed developments are more generously funded and more actively pursued in 1967 than TV was in 1936. The evolving electronic technology is
moving along as rapidly as ever. Many orders of magnitude improvement are clearly visible before exploitation of today's technology. Accomplishing our goal requires neither the revision of the laws of physics nor the circumvention of market place economics. Hopes cannot be based on unforeseen technical breakthroughs. While useful and convenient, they occur with regularity only in new laxative advertisements.

Well before the year 2000 we can realistically expect widespread large-screen, color, person-to-person TV communications over cables using a switching network similar to the telephone system (see Fig. 3). This development will attempt to create the illusion that those in TV communications with one another are in effect within the same room. They must, and will, contain mechanisms to assure privacy. Much of the nation's business will be transacted through these screens. Images may be "conferenced." Any size group will be able to get together. Conferences, such as the one we are attending today, in which people are transported across a continent to sit in the same room to hear a speaker, will have gone the way of the town crier and the Western Union delivery boy.

The TV screen may be the primary means of communication—even partially supplanting face-to-face communications. Our access to the world at large will be through the screen
Fig. 3c—Large conference

Fig. 3d—Person to computer (to computer)
to a huge automated information storage and processing base. Push buttons will provide painless individual interaction with a powerful, remote computer capability. To be precise, we should choose a more appropriate term; the word "computer" is too narrow. It derives from the earlier use of digital processing equipment. We are considering something more fundamental. Specifically, an interactive, automated, information processing system which allows rapid and friendly coupling between an individual and a huge information base.

Development of improved interaction between the human and the computer is already well underway. We seek to obtain the maximum benefits of each; to achieve a whole greater than its parts. Some even call this development "augmented intelligence." The screen will probably become the primary channel of education, partially or wholly displacing those educational institutions based upon the brick-and-mortar technology called schoolhouses. Entertainment, even for the smallest select audience, will come via the screen. We no longer will be constrained by the paucity of channels which restricts present television to sponsors fighting for the largest slice of the audience, and in the process catering to the tastes of the lowest common denominator. But possibly of most interest to us today is that the screen and
the computer promise an entire restructuring of today's merchandising concepts.

Before getting into specifics, keep in mind that we are discussing a one-slice projection of a single sector of a multi-dimensional world. Mass TV, new contraceptives, and atomic energy (more familiarly known as the tube, the pill, and the bang) are irreversibly changing our social attitudes and our institutions. The mixed blessing of reduced infant mortality is creating a population explosion in those portions of the world least able to feed their population. This limits these remarks to the richer nations of the world. Too many things are happening simultaneously to paint a complete picture. The transitional role of the city, the new role of government, the potential loss of privacy, the modification of the traditional standards of sexual morality and the value of work for work's sake--the sacred things we take for granted--are in a state of flux. The following words are only one frame of a changing picture--nothing more.

For the last several decades, distributive costs were almost as high as the cost of manufacturing. For example, in 1964 the cumulative income in salaries in the distributive industries was about 75 percent of that in manufacturing industries. Continuing technological innovation in
manufacturing is well documented. These innovations make continuing reductions in the cost of manufacturing possible. Not nearly as well appreciated is the automation of the distributive industries also taking place. For example, during the period 1945 to 1964 the salary income from the distributive industry tripled; yet the ratio of income in manufacturing to distributive industries remained remarkably constant (see Fig. 4). However, during this same period the total number of workers in manufacturing increased by only 10 percent, while the number of workers in wholesale and retail trades increased by 57 percent.

What does this mean? It seems to suggest that we have already experienced much innovation in the distributive process. But the increase in efficiency or the ability to enforce salary increases for the workers in the distributive industries is not nearly as high as in the manufacturing industries. This is of prime interest to the computer system designer, as one of the characteristics of the distributive industry is that it is primarily an information processing activity.

The advent of computer-based technology, including communications, suggests that the next 32 years may produce major technological innovations in distribution even greater
Fig. 4—Number of workers and the ratio of personal income from the manufacturing industry relative to the distributing industry
than conventional automation has produced in manufacturing. It may not be unreasonable to look forward to a reduction in the relative cost of distribution to manufacturing in the future. In absolute terms, manufacturing itself will, of course, continue to undergo innovation, but a huge untapped domain exists for development in distribution. Here is where the real action may occur.

To give some insight into the changes that they may imply to marketing, let us consider a "limiting case example"; that is, where the cost of the goods has dropped near zero and the overriding cost is distribution.

As an example, consider distributing technical information. This is a commodity that is for the most part almost given away by the manufacturer—the author. The printing and distribution costs of technical articles in technical journals are generally subsidized by professional societies' dues. Technical books can be sold for profit only because most authors are satisfied with a non-compensatory token honorarium. The rest of the quid pro quo is derived in the implied form of intangible prestige. The cost of distribution of technical articles published in trade throw-aways is covered only by the advertising sold.
To appreciate the negative worth of a technical manuscript in the market place, think of those technical journals that charge the author a page charge even to give his article away. Technical articles, therefore, must be something like today's effluent society's trash—you have to pay to have it hauled away.

Let's examine this case where the cost of manufacturing (writing) is sufficiently low so that the distribution cost is overriding. Within bounds, this strained example could be indicative of the marketing situation in which we might find ourselves in the far future. Consider this process and the messages it might hold for us.

In viewing the burgeoning and chaotic profusion of technical literature, Walter M. Carlson* expounds a novel concept. Carlson describes our present publication distribution procedure as "pushing." He defines pushing as the process in which a written product is widely disseminated in the hope that someone will stumble across it and pay to read it. Carlson calls most professional publications which bundle up masses of partially related topics

prime examples of the "push" mechanism at work. He suggests that, as the volume of the material being pushed becomes overwhelming, and our methods of access to it more difficult, we would be well advised to convert to a distribution system where the individual requests specifically what he wants from the primary source. This process is defined by Carlson as having the user "pull" the information of value to him (see Fig. 5). Carlson takes the interesting view that:

... the greatest single contribution our engineering and scientific societies can make to technical communication would be to suspend the issuance of technical journals altogether.

This piling of push mechanisms, one on the other, has nearly brought the abstracting and indexing services of our country into a state of chaos that seems merely a prelude to collapse. As these abstracting and indexing organizations try to keep up with the flood of primary literature being pushed their way, they initiate new and clever schemes for pushing out more and more packages for alerting their subscribers to the appearance of new materials. Only a very few of these services pay their own way from subscription fees willingly paid by recipients of the service. The deficits are made up with large amounts of the taxpayer's money through government subsidy. The prospect at the moment is for even greater subsidy as a matter of national policy.

This idea of information overload in our increasingly complex society is not completely new. For example, a different but perceptive statement of the coming problem of information saturation is described by R. L. Meier.*

Fig.5—Information overload: Push versus pull

- The Narrow End of the Funnel
- Tons of Copies
- The Researcher
- Help!
- I Want...
The consumer in tomorrow's marketplace will probably be overwhelmed by the variety of choice similar to that facing the researcher in the library of today. The development of "pull" mechanisms to cope with this flood of consumer options will be just as necessary as those to handle the uncontrollable profusion of technical papers.

To be more specific, let us consider the "hardware" needed to support a "pulling" concept for the distribution of both goods and paper.

The customer has never faced such a diversity of product choice as in America today—and this trend is on the upswing. There's the old saying about Henry Ford's immovable restriction on marketing his Model T: you could order it in any color, provided it was black. Our early mass production lines did not encourage diversity. Exceptions were a pain in the neck. "Everything the same" was the name of the game. One of the characteristics of automating information flow in the factory is the reduction of the optimum size production run. Watch a trail of different color cars, each with totally different "custom" accessories, roll off today's production line. The computer tape-controlled, general purpose machine tool is coming into rapid use in manufacturing, which will reduce
the size of the minimum economic production run even further.

To the consumer this promises a large increase in the possibilities of product choice; to the warehouseman, a nuisance; to the seller, a curse. But now the consumer will find rational choice of products a near impossibility. We can choke in a profusion of alternative choices. So much for the problem. How do we harness the new technology to get us out of the dilemma?

U.S. consumer advertising is regarded by much of the world as one of American society's worst features. It is expensive to the producer, wasteful and often discourteous to the audience. It is designed for mass media, selling a few mass produced products. The profusion of products is so great that usually only the selling of brand names is attempted. Advertising often ceases being a public information service and becomes a borish nuisance. It is basically the "push" mechanism that is at fault. The "push" mechanism floods the recipient with a sea of mostly unwanted distractions. Yet it is so expensive that it often does not allow conveying specific information useful to those actually interested in buying a product.

Now let's think in terms of our infinite-channel TV
set allowing a very large number of separate audiences. To reach all by "pushing" would be even more wasteful than today's procedure. Consider the large number of separate programs that will be transmitted concurrently with the continued explosive growth in the number of products offered for sale. Conventional "push" advertising will subject the audience to interminable commercials of which very few will be of any interest. Stacking the huge variety of products possible is expensive; selecting the objects to be purchased is time consuming and wasteful.

Returning to the problem of distributing technical material, let's examine the proposed use of "pull" in lieu of "push" mechanisms, at the same time avoiding the social disutility present in much of today's advertising based upon the emotional and irrational behavior of man. New "pull" mechanisms can be developed that avoid the uncouth pandering to the irrational characteristic of today's advertising.

Imagine consumers in the year 2000. Much of the shopping will be done from home via TV display. Think of this screen as a general purpose genie. Pressing a few buttons on a keyboard allows interaction with a powerful information processing network. The information net-
work sends back a modified image to the TV display in response to selections. In the following example, it will help to imagine ourselves being electronically conveyed through a huge general purpose store carrying almost every imaginable product. All information relating to each item in the store will be kept in a huge memory. Anything we may wish to know about a product can be displayed on our TV screen.

Consider one way we might have access to this almost infinite data bank rapidly and painlessly.

When you turn on the screen a list of questions is displayed (as seen in Fig. 6). We are rapidly carried down the branches of a tree until we come to the specific product or information about the product we desire. For example, suppose we want to buy a saber saw. In Fig. 6, we push button 7 which says, "We wish to buy a new product." Immediately, the image on the screen changes and a set of boxes or selection categories (Fig. 7) is displayed. We press button 5, "Hardware." This takes us to Figure 8a, and we would press the button "Power Tools." This takes us to Figure 8b. We press button 2 corresponding to "Saber Saws." Further lower levels permit consideration of individual brands and specific information relating to price, performance, delivery, etc.
0  TURN OFF SET?
1  DO YOU WISH ENTERTAINMENT?
2  DO YOU WISH EDUCATIONAL OR LIBRARY MATERIAL?
3  DO YOU WISH TO TALK AND SEE A PERSON?
4  DO YOU WISH INFORMATION FROM THE LIBRARY?
5  DO YOU WISH TO INTERCONNECT TO YOUR OWN PERSONAL INFORMATION BANK?
6  DO YOU WISH TO CONDUCT BUSINESS REQUIRING TEXT TRANSMISSION?
7  DO YOU WISH TO BUY A NEW PRODUCT?
8  DO YOU WISH TO BUY SOMETHING ON YOUR OWN OLD SHOPPING LIST?
9  NONE OF THESE

Fig. 6—Initial selection table
Fig. 8b — Power tools

- Lathes
  - 4
  - 5
  - 6

- Electric Drills
  - 1

- Electric Saber Saws
  - 2
  - 3
Fig. 9a—Electric saber saws
Fig. 9b—Electric saber saw ordering information
This may seem like a complex process. But, where repetitive selections are to be made within a single category, one would record the indexing number, just as we do for telephone numbers today. If we wanted the latest price of each of three different saber saws, we might quickly punch in 7542, 32, 52, 72. This would tell us that we wanted the price ( ) ( ) ( ) ( ) 2 of brands 3, 5, and 7 (see Figs. 9a and 9b). It is not necessary to back out of the tree all the way; we could stay and shop in one department for many separate items.

The consumer in the year 2000 could make a more rational selection from many more items than available today. It is unfortunate that today's marketing forces the development of "push" mechanisms. But it is the nature of present mass media which causes this blanket approach. "Pushing mechanisms" must by their nature seek to exploit the irrational weaknesses of the population if any message is to be heard in a background of cacophony. Hopefully, one day the consumer will be able to select goods as some researchers today are able to extract a technical paper using experimental retrieval systems of the type previously discussed. If the variety of choice necessary appears difficult to achieve with a few branching decisions,
consider the game "Twenty Questions." Here, with a little practice, it is possible to describe almost everything in the universe by "yes" or "no" answers to a sequential set of questions selected as a function of answers to previous questions.

When the consumer reaches the lower end of the selection tree and has narrowed his choice to a small number of contending products, it becomes plausible and appropriate to call up specific advertising for each. **This is the socially beneficial use of advertising.** Here the recipient wants to read, to see, and to hear advertising. Now he is attuned to respond to advertising which contains claims of superior features or performance. The consumer can be encouraged to use valid comparative testing information to help decide which product is "best." The sale of information from competing testing bureaus could be allowed and encouraged. Since the sale of information is on a product-by-product basis, entry to the field is cheap. Advertisers can be assured that their advertising will be seen almost simultaneously with all other advertising. Sheer boasting could give way to more rational, comparison-type advertising.

Consumers can be provided more factual information
for more rational decisions in a world of almost infinite options. One of the most wonderful mechanisms in the free enterprise system is the process of survival of the fittest product where the consumer's vote-by-purchase drives out inferior merchandise. This concept was workable when the number of competing products was few and the markets were small. But in a world of too many different, rapidly changing products, its effectiveness needs bolstering. Even more dangerously, it is capable of falling apart by overloading the information channel with too many alternative products. We prefer to see a better product sold than a shabby one wrapped in a fatuous sales campaign. The arena of competition should be shifted from repetitious, boastful claims by a large manufacturer to one where products are individually compared.

We have anti-trust laws to cope with the problem of the restraint of trade by collusion. But we lack mechanisms to handle the equally destructive threat of irrationality when flooded with too many products.

The customer wants to know prices and delivery before reaching a final decision. The information storage system can tell him whether the pink shirts with tab collars are available, from whom, and when, and at what price. Price
comparisons are instantaneous and again reinforce the free enterprise price mechanism.

The introduction of a fast-acting two-way information flow channel has further profound effects on the concept of retailing. Add a more effective transportation system and a distributed warehousing scheme and the role of the conventional retailer will diminish markedly. Direct dealing with the manufacturer will increase, as the goods will be dispensed from the most economic storage point. The function of the retail clerk will have been subsumed by the question and answer machine. It may be a minor loss. Today too few retain store clerks are capable of providing an intelligent and honest answer to a request for information needed to make a wise shopping decision. It is not entirely the clerk's fault; he has too many rapidly changing products to keep track of. Thus, bid this profession goodbye.

Consider another class of goods whose purchase is totally a repetitive nuisance to the consumer--shopping for staple groceries. Once finding a brand of pickled string beans that suit your fancy you wish to reorder the exact product without having to play Sherlock Holmes. You would like to be able to reorder many such items painlessly. Again, the computer can come to our aid by providing us
with a stored list for rapid recall ordering. The better information available about alternative prices for the same goods will eliminate the undignified loss-leader game to trick the consumer into the store.

Richard L. Meier in 1962,* and Simon Ramo in greater detail in 1965** suggest that a feedback system be connected to TV sets to allow "instant" market research for proposed new products. The suggestion is made that a product trial be described with a special discount one-time only offer if the person agrees to place an order by a certain date. No obligation is assumed by the manufacturer to go ahead with production unless and until enough orders are on hand to justify its manufacture. This instant, hard-market-survey could speed new product development by eliminating the large risk investment, as the manufacturer faces a guaranteed sale.

As the information feedback loop is continuously shortened with these proposed techniques, manufacturers' inventory declines. The inventory buildup and depletion

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*Meier, p. 129.
oscillation, a destabilizing factor to the economy, can be reduced. Even today smaller inventories are possible using linear programming for decision of production-line runs and warehousing. Even today some automobile salesrooms send their orders into headquarters by teletype-writer in computer coded form to order custom automobiles. This was infeasible in the earlier day of low information-system-effectiveness mass-production lines. Tomorrow's manufacturer will have to respond to the infinite "custom" demands of each individual consumer or else he may go the way of the dinosaur.

Only one aspect of the improved information flow possible in the year 2000 and how it might affect one narrow sector of life has been described. Its influence on the design and location of cities, educational institutions, and government are profound. Although limited, this discussion indicated what the year 2000 might hold for you. All that has been said is applicable to a lesser degree within the next two decades. To wait passively and to restrict thinking to terms of a static technology in a static world will be to invite economic disaster well before the year 2000.

Conversely, the opportunities for the innovator in marketing have never been greater than in the new world coming.
Serendipity

Dr. Leonard M. Guss of the Weyerhauser Corporation and several other marketing specialists raised an important complaint. The proposed scheme did not acknowledge the impulse-buying phenomenon, important in marketing and fun to the store buyer. We walk into a store thinking of buying one item and purchase another product out of the blue, merely because we happened to stumble upon it. Often we may never have imagined ourselves being interested in the product before seeing it. This seemingly irrational behavior is part of the joy of physically shopping in a store and is one service played by conventional advertising.

This serendipity effect is real. But it is easy to add an extra "serendipity selector." This would allow any degree of randomness in our selection process that we might wish. Product selection was performed by transversing the down branches of a tree, reaching finer and finer levels of separation. At any level of presentation the serendipity selector allows a random choice of an item on the next lower level. This provides us with the best of both possible worlds. She who is in a hurry, or unimaginative, is able to purchase precisely what she wishes. She who is uncertain as to what she really wants has any degree of random choice at any level of her
search--complete window shopping of miscellany. At the first level, the decision of whether to watch entertainment or shop can be left to chance.

I would like to state a first law of serendipity: "Any system capable of operating in a hierarchical manner to select any single item may be modified by use of a random number generator to produce any degree of randomness of choice of display desired in shopping equal to or better than the randomness of choice of a buyer in conventional shopping."

Postscript

After delivery of this talk I was fortunate in seeing a demonstration of the Bell System Picturephone connected to a computer. One was able to call up recent weather forecasts and retrieve simple information organized in tree fashion much like that I described. Perhaps I am being too cautious. We may not have to wait until the year 2000.