VII.A. Introduction

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If *homo ludens* is the man of the future, one would expect the computer to be his favorite instrument. We find, however, that in recent years it has become quite popular to deride the computer for its dehumanizing effect on various aspects of society: the automated billing and dunning procedures, the inability to correct computerized information, the feeling of being quantified, etc. While most of the applications the average citizen has encountered justifiably provide this impression of impersonalism and rigidity, there is some hope that this is a transition phase in the utilization of computers. In part, this is due to the lack of a "Model-T" product or service for "everyman." There is, however, considerable merit in the proposition that the use of the computer as an aid to human communication processes will correct this situation. The current generation of computers, associated hardware, software, and particularly terminals, now begins to provide on an economic basis the capabilities for considerable augmentation of human. communications. When this technical capability is coupled to the knowledge being gained in the area of Delphi design, all sorts of opportunities seem to present themselves. Underlying this view (or bias) is the assumption that Delphi is fundamentally the art of designing communication structures for human groups involved in attaining some objective.

The work taking place today in this area and involving computers often appears under the titles of computerized conferencing or teleconferencing The latter is a more general term including such things as TV conferencing:

In its simplest form, computerized conferencing is a system in which a group of people who wish to communicate about a topic may go to computer terminals at their respective locations and engage in a discussion by typing and reading, as opposed to speaking and listening. The computer keeps track of the discussion comments and the statistics of each contributor's involvement in' the discussion. In effect, one may view this process as a written version of a conference telephone call. However, the use of the computer provides a number of advantages in the communication process, compared to the use of telephones, teletype messages, letters, or face-to-face meetings.

In the use of telephones and face-to-face meetings, the flow of communication is controlled by the group as whole. In principle, only one person may speak at any time. With the .computer in the communication loop," each participant is free to choose when he wants to talk (type) or listen (read) and how fast or slowly he wants to engage in the process. Therefore, the process would be classified by psychologists as a self-activating form of communication. Also, since all the individuals are operating asynchronously, more information can be exchanged within the group in a given length of time, as opposed to the verbal process where everyone must listen at the rate one person speaks. Furthermore, because the computer stores the discussion, the participants do not have to be involved concurrently.

The discussion may take place over hours, days, weeks, or be continuous. Therefore, an individual can choose a time of convenience to him to go to the terminal, review the new material, and make his comments.

When compared to letters or teletype messages, the first item to note is the common discussion file available to the group as a whole. Having this file in a computer allows each individual to restructure or develop subsections of the discussion that are of interest to him. Normally the computer supplies each participant with whatever he has not yet seen anytime he gets on. In addition, the participant may choose to ask for certain sets of messages which contain key words or for the messages of certain specific individuals in the group. The computer also allows users to write specialized messages which may be conditional in character: (1) private messages to only one individual or to a subgroup of the conference; (2) messages which do not enter the discussion until a specified date and time in the future; (3) messages which do not enter unless someone else writes a message that contains a certain key word; (4) messages which enter as anonymous messages, etc.

The possible variations are open-ended once one incorporates directly into the communication process the flexibility provided by computerized logical processing.

The next dimension the computer can add to the communication process is that of special comments, which allow the participants to vote as a group. For example, a comment classed as a proposal would allow the group to vote on scales of desirability and feasibility. The computer would automatically keep track of the votes and present the distribution back to the group. Based upon discussion, the individuals can shift votes and reach a consensus or better understanding of the differences in views.

The computer also allows the incorporation of numeric data formats and the ability to couple the conference to various modeling, simulation, or gaming routines that might aid the discussion in progress.

In practice, one should view computerized conferencing as the ability to build an appropriate structure for a human communication process concerning a specific subject (problem). One can consider different conference structures for different applications- project management, technology assessment, coordinating of committees, community participation, parliamentary meetings, debates, multi-language translation, etc.

If the individuals enter such a discussion with fake names then we have de facto a "Delphi discussion." The computer allows us to go from this complete Delphi mode to various mixed modes such as that in which the conferee is able to decide whether an individual comment is signed with the person's real name. It is the view of the editors that the question of anonymity or its degree is less crucial to the definition of Delphi than the concept of designing the human communication structure to be used. The hundreds of meaningful paper-and-pencil Delphis that have been done represent a storehouse of knowledge on the design of human communication structures for implementation on modem computer communication systems. The area of computerized conferencing, in effect, provides an important option as an addition to the few available mechanisms people have to conduct communications: telephone, face-to-face, letter, teletype, video. In particular, the growing cost of travel has increased the concern for examining in greater depth the questions surrounding trans-portation/communication substitutability.

Studies by the Computer Science Department of the New Jersey Institute of Technology show that this type of service, computerized conferencing,; can ultimately be brought to the user at a computer cost of one to two dollars an hour, by utilizing dedicated mini-computers as the conferencing vehicle. This compares with 15 dollars an hour for the large general-purpose time-sharing: system. Also, the communication requirements are significantly less than those demanded by video or picture-phone-type systems. In addition, many applications demand the hard copy proceedings available through the use of the computer.

In general, computerized conferencing appears to be a more attractive' alternative than other, forms of communication when any of the following conditions are met: (1) the group is spread out geographically; (2) a written record is desirable; (3) the individuals are busy and frequent meetings are. difficult; (4) topics are complex and require reflection and contemplation from the conferees; (5) insufficient travel opportunity is available; (6) A large group

is involved (15 to 50); (7) disagreements exist which require anonymity promote the discussion (e.g., Delphi discussions) or free exchange of ideas.

As a result of the foregoing, one can call to mind an almost endless list of specific potential applications:

- ??Project management efforts among geographically dispersed groups
- ??Communications for the deaf
- ??Educational seminars for home -bound handicapped
- ??Preparing agendas for weekly or monthly committee meetings
- ??Salesmen in a company (spread out across the country) conducting a continuous sales conference on techniques and competitor information
- ??Joint seminar classes or discussions involving courses at different educational institutions
- ??Researchers in a given area staying in contact and presenting and reviewing current findings
- ??Coordination conferences among community groups
- ??Technology Assessment working groups spread out in different departments
- ??Sensitivity sessions and staff development training conferences
- ??Delphi forecasting and exploratory conferencing

The list could go on. All the foregoing examples would require different types of communication structure and different options available to the participants. One can, for example, create a conference that would follow *Roberts' Rules of Order;* another might be structured along debating lines with judge and jury, as well as the debaters.

In essence, computerized conferencing, being an alternative form of com-munication, can be applied to almost any area about which human beings desire to communicate.

We can forecast with some confidence that at some point in the 1980s an individual at home can in the evening decide to phone via his home computer terminal a list of ongoing conferences on specific topics. By joining one of these which deals

with a subject of interest to him he suddenly has a method of easily finding other people in the society of similar interests. In the long run this could have a dramatic effect on society itself.

The collection of articles gathered in this section represents only a small sample of many steps underway to improve human communications with the aid of computers. By design they are chosen to represent diverse directions and even differing underlying philosophies. We hope, via this mechanism, to expose for the reader the richness of this area and whet his appetite to investigate it in more depth. These articles deal not only with the utilization of computers as vehicles for improving the Delphi technique, but either explicitly or implicitly they impact on the more general issue of improving the human communication process.

The first article in this chapter, by Charlton Price, is an excellent review of some of the significant work in this area over the last five years. Mr. Price has, in the role of classical reviewer, delineated the strengths and weaknesses underlying these past efforts and raised for examination many of the questions

this new area of communications stimulates. He also contributes a number of concepts, both quantitative and qualitative, on measuring the effectiveness or efficiency of communications among human beings.

For any future evaluations of computerized conferencing systems it is vital to consider the whole gamut of group communications using electronic media. In fact, a great many classical group communication experiments should be replicated in the new media and the results compared to the earlier experiments using traditional media. The paper by Johansen, Miller, and Vallee considers this larger context of research. It introduces a descriptive theory leading to a clarification of the social effects and reviews the literature of group communication in the light of several major research projects in the field, both in the U.S. and abroad. The philosophy and history of each project is summarized and its relationship to the current trends in media development and assessment is described. Laboratory experiments, field trials, and survey research are three directions that social scientists have pursued and the overall relevance of each approach to specific problems is analyzed.

A new taxonomy of mediated group communication situations is proposed on the basis of these trends and an effort is made to relate it to ongoing work, pointing to the increasingly important need for systematic appraisal of existing communications media.

The third article, by Sheridan, introduces the concept of the "portable" Delphi and the use of Delphi as a vehicle for improving the local community meeting. While there is a great deal of writing on the need and possibility of using technology to enhance the democratic process, our choice of Sheridan's work is representative of the fact that he and his associates have carried out a great deal of careful experimentation in this area and are continuing to do so. The whole concept of "participatory democracy" and the decentralization of political power implies a need for effective two-way communication which cannot be met by current mass-communication media. This area is likely to see greatly increasing use of computer and communication technology over the next decade.

The fourth article by Johansen and Schuyler, represents a scenario for the use of real-time Delphi in a university of the future. It is, however, based upon real experiments carried out by them at Northwestern University. Implicitly the views of these two researchers and the work they have been doing are an attack on the concept of Computer-Assisted Instruction (CAI) as commonly held by most people in the CAI field. That is to say, neither CAI nor education should be viewed as a process of "programmed instruction" by the computer (or the teacher). Rather, education must be primarily viewed as a communication process.

It is not the objective of this book to take up issues surrounding the philosophy of the education process but merely to point out that a Delphi can serve an educational function for its participants and potentially, therefore, can be developed into a standard educational tool.

While many educators have utilized Delphi for planning and assessment purposes, very few other than Johansen and Schuyler have grasped the concept of Delphi as an educational tool. We foresee a potential here not only at the universities but also in high schools and elementary schools.

To this point, the view of the impact of the computer has been somewhat rosy. However, lest the reader become too comfortable and complacent, the final article in this chapter is guaranteed to raise a few doubts and some concerns. It is a scenario intended to convey an impression of what might happen if we do not attempt to improve human communications. It represents a society in the future which extrapolates to the logical extreme some of the dehumanizing trends brought about by some current organizational and technological developments.

There is, of course, more to the future of Delphi than its automation. Let us consider three -disciplinary advances and one sociological change which may have a striking impact on Delphi.

For the former, we may consider major achievements in (a) holistic communications, (b) fuzzy set theory, and (c) psychological measurement research.

(a) If Delphi is primarily a communication system among human beings, then we must admit that it misses the vital nonverbal, nonliterate components of interpersonal communications entirely. The work of Adelson et al. (Chapter VI, D) suggests one step beyond the familiar literate stage. But we must move much further in communicating images. Holistic gestalt or pattern recognition and transmission as well as induction of altered states of consciousness can vastly expand the ability to communicate. What will be the impact of either concept on Delphi?

(b) An area of mathematical research which is potentially of great significance to Delphi is the theory of fuzzy sets. It is an attempt, largely stimulated by L. A. Zadeh,[1] to deal quantitatively with the imprecise variables commonly used in social systems (e.g., big, happy, important, likely). In essence, the theory develops algorithms which enable us to operate more systematically in communicating complexity.

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[1] See, for example, L. A. Zadeh, "Outline of a New Approach to the Analysis of Complex Systems and Decision Processes," Electronics Research Lab., Memo, ERL-M342, July 24, 1972, College of Engineering, University of California, Berkeley.

(c) Psychological methods are undergoing an enormous revolution, made possible; in part, by the computer. Techniques such as multidimensional scaling offer hope of understanding the process of human judgment and utilizing such insight effectively.

Finally we turn to a sociological change which could have an enormous impact on our subject. There has been growing discussion of the possibility that Western society is in a period of transition from a uniformity-seeking type to one which emphasizes heterogeneity. Maruyama[2] has provided one concise description of what underlies these two concepts of society. They are briefly summarized by the following lists of characteristics contrasting the traditional uniformity type to the emerging heterogeneity type:

Traditional	Emerging
uniformistic	heterogenistic
unidirectional	mutualistic
hierarchical	interactionist
quantitative	qualitative
classificational	relational
competitive	symbiotic
atomistic	contextual
object-based	process-based
self-perpetuating	self-transcending

Delphi is exceptionally well adaptable to this emerging logic:

(a) It is interactionist rather than hierarchical. Anonymity hides the hierarchical status of the participants.

(b) The feedback can be positive as well as negative, thus amplifying differences as much as dampening them out. There is no a priori reason that convergence must and should result during the Delphi process. Differences can be crystallized and heterogeneity sharpened. Jones (Chapter III, B, 4) conducts his Delphi in a way to maintain the distinctiveness of the four participating groups and highlight differences in their attitudes on the same subject, while Schofer (Chapter IV, C) suggests means to measure the degree of polarization.

(c) The process is mutualistic rather than unidirectional. Ideas can originate with any participant and need not flow from a single source.

(d) The method is symbiotic rather than competitive. There is no grading of an individual's responses or comparison with others on some value scale. The feedback explains and clarifies, thus facilitating symbiosis.

(e) Good Delphis tend to seek relational and contextual representations of a problem and avoid preclassification or rigid atomistic considerations or structures.

(f) Qualitative input are normal in Delphis which involve personal judgment and subjective views.

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[2] M. Maruyama, "Commentaries on the `Quality of Life' Concept," unpublished.

In applying this societal shift to quality of life, a topic recently subjected to Delphi studies by Dalkey (Chapter VI, B) and others, Maruyama writes:

> The definition of the quality of life must come from specific cultures, specific communities, and specific individuals, i.e., from grass roots up. There still persists among the planners the erroneous notion that "experts" must do the planning Many of them, when talking about "community participation" still assume that the "experts" do the initial planning, to which the community reacts. There was a time when it was fashionable to think that Ph.D.'s in anthropology were experts on Eskimos. This type of thinking is obsolete. The real experts on Eskimos are Eskimos themselves. I have run a project in which San Quentin inmates functioned as researchers, not just data collectors but also as conceptualizers, methodology-developers, focus-selectors, hypothesis-makers, research-designers, and data analysts. Their average formal education level was sixth grade. Yet their products were superior to those produced by most of the criminologists and sociologists.... We can use the same method in creating criteria for quality of life in specific cultures and specific communities.[3]

Mitroff and Blankenship have expressed a similar view in their guidelines for holistic experimentation:

> The subjects (general populace) of any potential holistic experiment must be included within the class of experimenters; the professional experimenters must become part of the system on which they are experimenting—in effect the experimenters must become the subjects of their own experiments.

Corollary: The reactions of the subjects to the experiment and to the experimenters (and vice versa) are part of the experiment and as such must be swept into its design (i.e., conceptualization).

They add that "it is becoming increasingly clear that as much as the structural research situation contributes a great deal to our precise understanding of the responses and properties of human subjects, by its very nature, structured research also tends to inhibit and distort many of our subject's responses. "[4]

The key is to be found in the role played by the staff which prepares the Delphi, gathers the participants, analyzes the feedback, and synthesizes the output. The preceding observations point to the importance of having the "subjects" themselves take a major part in the staff activity. The Delphi process has the potential of becoming a basic tool of society, representing a new level of ability to use information from all segments of the society. This view reflects the Singerian inquiry philosophy, i.e., a need to sweep psychological aspects into most societal problem analyses. If we intend to take full advantage of Delphi for such mutualistic symbiosis we must resist one major impediment: subversion of the process by traditional modes of thought and staff procedures.

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[3] Maruyama, *op. cit.*

[4] I. I. Mitroff and L. V. Blankenship, "On the Methodology of the Holistic Experiment" *Technological Forecasting and Social Change*, 4, pp. 339-354 (1973).