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ABSTRACT

Four propositions and their policy consequences are advanced in this paper to identify pitfalls endemic to making policy in the rapidly changing area of telecommunications. The major point made in the discussion of these propositions and consequences is that any policy involving restrictive regulation of the rapidly changing field of telecommunications may retard rather than stimulate the complex process of innovation and implementation. On the other hand, it is argued that the failure to regulate could lead to the same adverse effect, thus, wise policy in this area cannot be reduced to a single dictum. (RL)

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INFORMATION PROCESSING AND COMMUNICATION TECHNOLOGY:

POLICY IMPLICATIONS FOR THE 1980s

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This discussion begins by assuming rather than establishing several familiar tenets of information processing and telecommunications theory:

(1) that our emerging post-industrial economy is increasingly service-oriented with a corresponding emphasis being placed upon information-intensive activities (Porat, 1978);

(2) that technical improvements in telecommunications systems are forthcoming at a nearly exponential rate of increase (Baer, 1978);

(3) that a wide array of developed or developing telecommunications systems (including computer-based word processing, cable/satellite TV, interactive video, videotext, etc.) are being considered for possible application in varied settings (ranging from the home to the office to the delivery of governmental services).

In the remaining years of this century we can expect as much focused attention on applied telecommunications policy questions as has been devoted in the entire previous eighty years. Unfortunately, the debate will occur when the optimistically termed "policy sciences" are themselves yet formative. Even if our ability to determine social policy were at a more scientific level, the complexity of establishing policy for a field in such rapid flux would present a separate (and most likely determinative) confounding problem.

These realizations should lead us to be skeptical about the soundness of policy formulation in this area; still they cannot lead us to doubt that policy will be formed and debated. Given the inevitability of the policy quest (wherein even a stance of "no policy" must be considered as a policy), we must at least try to identify policy analytic pitfalls endemic to this rapidly changing area. In the remainder of this paper, four propositions and

their policy consequences are advanced for consideration in this regard.

Proposition #1

Advances in telecommunications technology continually demand reformulation of distinctions between telecommunications media.

Policy Consequence #1

Regulations based on previously established distinctions may cause particular telecommunications implementations to lag behind technology capability.

An example of this proposition can be seen in recent advances with telephone technology. Originally, telephone systems were designed to transmit voice communications in analog form. This clearly distinguished voice communication from the digital transmission of data. Recent advances in microprocessors utilizing large-scale integrated circuits have made analog-to-digital conversion cheaper, thus encouraging technical developments wherein the U.S. switched telephone network is now a mixture of analog and digital facilities.

Prior to these developments, voice and data transmission could be conceptually separated. With voice and data transmission both more efficient in digital form, increasingly we should be unable to distinguish the type of communication by examination of the bits of information transmitted. In fact, voice communication in digital form can be conceptualized as merely another form of transmitted data.

When voice and data were more clearly distinct, one could see somewhat more justification for regulations preventing AT&T from developing data processing capabilities. However, to have maintained the AT&T-Justice Department Consent Decree of 1956 in the face of these technical developments would have

been tantamount to insisting upon retaining an arbitrary distinction as a subterfuge for legitimizing a separate policy goal aimed at restraining AT&T's growth (Holden, 1980). Should the latter be a policy goal, logically it should be justified on its own terms. That the distinction has broken down is overtly evidenced by recent agreements permitting AT&T actively to enter data processing and more subtlely cued by AT&T's advertising which has recently shifted from the theme "The System is the Solution" to the appellation "The Knowledge Business." Once again we are reminded that voice transmission is a form of knowledge, a point of conveyance between speech and data perhaps more fundamental than their mutual efficiency achieved in digital transmission.

Proposition #2

Studies of applied telecommunications systems which focus on technical potential may only establish a necessary (i.e., not sufficient) condition for implementation.

Policy Consequence #2

That telecommunications can be applied successfully in a social context may tempt analysts to overestimate implementation likelihood; a sufficient condition may also require (a) entrepreneurial initiative and (b) compatability of the technology with central values of important actors in the sector of application potential.

Scientific experimentation has established that videotape trials function as effectively as in person trials examined with regard to outcome measures such as outcome and juror information retention (Miller and Fontes, n.d.; Miller, Fontes, and Dahnke, 1978; Miller and Fontes, 1979). Still, most jurisdictions have been reluctant to introduce videotape into trial presentations except for the limited instances of depositions and occasional testimony

by expert witnesses unable to attend trials. In a related instance, a demonstration project has suggested that videophone arraignments could save time and money by avoiding unnecessary transportation of prisoners (Coleman, 1976; Eliot, Coleman, Pfefferkorn, Siegel, Stine, and Mitter, 1976; Eliot, 1978). Once again, the technology has not received widespread applications. Other examples could easily include computer conferencing where demonstrations have drawn enthusiastic endorsements (Turnoff and Hiltz, 1980; Lamont, 1980; Johnston, 1980). Yet, computer conferencing has only had limited sustained implementation.

In all these instances the technological potentials have been amply demonstrated. The videotape studies have even scientifically established the reasonableness of accepting null hypotheses concerning no difference between telecommunicated and live trials. The puzzling lag in implementation leads us to examine other unfulfilled conditions. Regarding the legal examples, strong presumptions have persisted that in person examination is required for due process, despite scientific evidence to the contrary. In the computer conferencing area, behavioral evidence has established a similarity between in person and voice-only communications both distinct from written communication in terms, for instance, of number of messages transmitted and the facility of problem-solving (Chapanis, 1978). This research would suggest that information is behaviorally transmitted verbally with much greater ease than written information. Thus, computer conferencing which may technically work well could easily encounter resistance of users to engage in the relatively laborious process of reading messages of others and entering messages of their own.

Finally, even where users are favorably disposed to the innovation, service

providers must be willing to aggressively and imaginatively market products. In comparing the rapid and successful growth of the telephone industry in America to the much different European pattern, one set of analysts commented: "The movement of the telephone system to rapidly become a universal low-cost service was more an entrepreneural decision than a foregone outcome of social processes." (de Sola Pool, Decker, Dizard, Israel, Rubin, and Weinstein, 1977, p. 132).

Proposition #3

The implementation of a telecommunications technology generally involves only a subset of the technically possible alternatives.

Policy Consequence #3

Initial attempts to regulate may be misdirected should ultimate system use differ importantly from the initially proposed use; in the extreme, initial regulatory constraints may artificially shape subsequent implementation.

Teletext and videotext systems are now being tested. Basically the innovation involves user access via video capability to text material. While this technology is yet in the developmental stage, several alternative implementation futures are imaginable (Plummer, Johansen, Nyhan, and Holmlöv, 1979). Transmission can be accomplished via air, cable, and/or telephone wire; information format can be fixed (e.g. news articles, books, journal articles), temporary (e.g. electronic mail), or interactive (e.g. medical diagnostic data base search and retrieval); price can be at a fixed rate, charged by use, or included within a package price for a variety of video services; records could be accessed widely (on a library principle) or narrowly (as is the case in the fixed and contained information format of a newspaper).

The particular future or set of futures actualized depends upon user acceptance and provider imagination. At present an experiment is underway combining the resources of New York University's Alternate Media Center and WETA-TV in Washington, D.C. (Carey and Elton, 1979).

Should regulation enter this field prior to extensive experimentation, entrepreneurial energy could well be restrained. An imaginable result of such a policy is the forced implementation of a subset of possibilities different from those which might emerge through a less structured and somewhat less predictable process of trial and error.

Proposition #4

The attempt to comprehend telecommunication innovations within existing systems of social interaction is contradictory given that the innovation itself may make existing systems obsolete.

Policy Consequence #4

Policy formed to maintain status quo interests may be antithetical to the environment in which telecommunication innovations and social systems can evolve together.

The telephone when first introduced was viewed as a toy: soon after the invention, Western Union turned down an offer to buy telephone patent rights and thus monopolize all electrical communications believing that the telephone would never replace the permanent record established by the telegraph (Aronson, 1977). Yet, the telephone in America made feasible skyscrapers (by facilitating message transmission between offices) and permitted decentralization of cities (Abler, 1977; Gottmann, 1977; Moyer, 1977). By analogy the automobile was first conceptualized as a replacement for the horse. Witness the term "horseless

carriage" and the placement of the engine in the front, a placement justified not by dynamic principles but by physical replacement of the previous pulling agent. Yet, the automobile made possible a wide range of interactions not before possible. Our present urban/suburban/metropolitan city and business structure is hard to imagine without both the telephone and the automobile.

Similarly, recent innovations such as home terminals linked to message and data transmission/reception computer-assisted capabilities may present an opportunity to further transform social and business interaction in an era when energy resources are more scarce and travel more expensive. Existing industrial patterns, social structures, and occupational definitions may once again undergo an important transformation. Those in status quo configurations who resist change merely to maintain present advantages may well attempt to retard social development in the face of technical opportunity to achieve newly conceived advantages.

Conclusion

Baer (1978, p. 114) in surveying the range of telecommunications technology likely to be available in the 1980s commented on a related technology as follows: "Had the mechanical calculator industry been regulated, we might still be waiting for delivery of electronic gate-to-electromechanical gear converters, rather than buying $9.95 electronic calculators at the supermarket."

Policy need not imply regulation; in fact, certain policy formulations may be inconsistent with regulations which in any way attempt to control product introduction. The ingrained values that bigness is bad and monopoly worse have undoubtedly contributed to public enthusiasm for legal contests which have attacked

telecommunications concentrations such as AT&T. Whether such policies lead to more or less competition is an empirical question beyond the scope of this paper. The major point to be made here is a warning. In a field in as rapid flux as this, any policy involving restrictive regulation may retard rather than stimulate the complex process of telecommunication innovation and implementation. Yet even this warning is issued with the realization that in this intricate field there may well be times when failure to regulate could lead to the same adverse effect. Unfortunately in this area wise policy cannot be reduced to a single dictum.

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