

Yesterday's Deregulation For Tomorrow's Information

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This article will discuss why the present reform efforts to open the barriers in the telecommunications system, while useful, will not truly succeed. As they remove old bottlenecks, they also create new ones, of a type much harder to deal with through policy.

In the past, the three classic economic factors of production were land, labor, and capital, each associated with a social class. But now, they are being eclipsed by another factor of production, information, and by the people and regions associated with it. Information becomes the key to economic development. And the challenge to a nation, a state, and a community, is how to produce information, and how to transport, commercialize, and use it skillfully.

In this environment, communications networks are the shipping lanes. Capital travels as encrypted electronic bits, and the bit-economy is vastly outdistancing the physical economy. The weekly foreign-exchange trading volume in London exceeds the total British annual GNP. The CHIPS clearing network of New York banks moves each week about \$7 trillion, greater than the American annual GNP. The share of information workers in advanced economies has more than tripled in 50 years. In 1940, 17% of the American national workforce was employed in information industry, in 1990, it was over 60%. Firms were becoming virtual organizations, workers were becoming ad-hoc free lancers, and citizens were becoming members of tele-communities. In this environment, the glue that holds society and its sub-organizations together are communications networks, the nervous system of an information based economy and society.

These trends have swept into Washington, Brussels, Tokyo, and other capitals, with a message for reforming traditional arrangements in communications. In America, this is reflected in the efforts to change the antiquated Communications Act of '34, an effect that dominated 1995. But the problem is that policy makers are like generals fighting the last war. Now, even while deregulating, Congress has been adding hundreds of pages of old-style micro-regulation that will become rapidly outdated in this dynamic environment. The Bill extends local telephone competition to all of the states. It permits

the Bell companies to provide long distance service conditional upon their granting interconnection, number portability, unbundling, and several other obligations that would help their local competitors. It loosens limits on radio and television station ownership. It opens full telecom ownership to foreigners, subject to reciprocity. And it tries to restrict pornography on the Internet. The Bill tries to do something for everybody. Too much. It is a great example for what German Chancellor Bismarck had in mind when he said that one should look too closely at the making of two things: sausages, and laws.

Instead of fine-tuning the details of competition among local and long distance companies, of broadcasters and cable, Congress should have used the historical opportunity to craft enduring principles that would be applied in the tumultuous decades to come. Principles about competition, access, universal service, common carriage, interconnection, international asymmetry, inter-operability, privacy, and economic development. This would have also permitted some form of national debate. It would have permitted Congress and society to look at the interrelations. Congress should decide fundamental issues but leave the details that clutter the legislation to be fleshed out by the expert agency, reporting to it the Federal Communications Commission.

The second and more serious problem with the legislations pending in Washington, and similar efforts in other national capitals, is basically that they are a clean-up operation at the margin, almost irrelevant to a more fundamental problem. The reforms may eliminate bottlenecks in distribution, but this does not mean that other bottlenecks will not emerge.

We live in the information age, work in the information economy, and are surrounded by an information technology of astonishing performance and price. And yet, despite all these technological marvels we feel less than ever on top of information. The basic reason is that we have created a systemic imbalance in the information environment. A communications process, to simplify considerably, consists of three major stages: the production of information, its distribution, and its

processing. These three elements have to exist in some relation to each other.

We are near the point, historically speaking, when the cost of information distribution becomes both negligible and distance-insensitive. Similarly, the production of information has been spurred by the evolution of advanced economies to knowledge-based activities. The weak link in the chain is the processing of the produced and distributed information. These bottlenecks are both human and organizational -- the limited ability of individuals and their collectives to mentally process, evaluate, and use information. The real issue for the future therefore does not appear to be transmission -- the focus of telecommunications reform -- but rather processing.

Sometime following World War II, the parallel growth trends in information production, transmission, and processing diverged, and things have never been the same. The driving technologies were advanced by that war -- computers (from code-breaking efforts); microwave transmission (from radar technology); satellites (from missile development); and television (from superior electronics).

The production of information in the U.S. economy rose at rate of about 6%, and the growth rate is itself increasing. Distribution is growing even faster, by an estimated 10% and more.

The rate of increase in processing capacity needs to keep up with that. To reach a similar growth rate is very hard, and is not being achieved. It is hard, because of the limited capacity of processing channels of individuals and organizations, and the difficulty of increasing it.

Most branches of science show an exponential growth of about 4-8 percent annually, with a doubling period of 10-15 years. To get a sense of the trend: Chemical Abstracts took 32 years (1907 to 1938) to reach one million abstracts. The second million took 18 years; the third, 8; the fourth, 4 years 8 months; and the fifth, 3 years and 4 months. If we assume that before 1907 a full million of chemistry articles had not been produced, this means that in the past 2-3 years more articles on chemistry have been published than in humankind's entire history before the 20th century.

Some indicators (for the US, unless otherwise noted):

Number of e-mail messages, 1995:	~ 1 billion
Avg. annual household 1991 expenditures for entertainment (all forms);	\$1,447.
Number of color TV sets, 1992:	150 million
Number of VCR's, 1992:	67 million
Blinking 12:00 as current time:	51 million
Number of CD audio players, 1992:	34 million
Number of video camcorders, 1992:	16 million
Number of companies using mail order catalogs:	10,059
Telephone lines per 100 people - U.S.:	48.9
Japan:	42.2
Europe:	42.3
Percentage of all households with cable TV - U.S.:	55.4%
Japan:	13.3%
Europe:	14.5%
Personal computers per 100 people - U.S.:	28.1
Japan:	7.8
Europe:	9.6
Home PCS purchased in 1993:	5.85 million
Households with PCS: (1/3 of total households in 1993)	32 million
Expected households with PCS in 1998:	60 million
Year sales of computers surpassed those of color televisions:	1993

Year sales of encyclopedias in CD-ROM surpassed those on paper:	1993
Size of U.S. defense budget:	\$270 billion
Value of computer hardware and software sold in the U.S.:	\$500 billion
Number of Japanese per computer:	12
Number of Americans per computer:	4
Increase, since 1987, in number of fax machines in offices and homes:	10 million.
Reduction, since 1987, in number of secretaries:	521,000
Motion pictures produced in 1991 (not including TV productions) - (175 in 1979)	575

For all the talk about "paperless" offices due to electronics, the per capita paper consumption in the United States has increased from two hundred pounds in 1940 to six hundred pounds in 1980. Ten years later, per capita paper consumption had tripled again.

Thus the legislative efforts, well-meaning as they are, basically address only distribution and production of information, and are devoid of any strategy for the ensuing imbalance. What might these strategies be?

To deal with the problem of inadequate processing and the "noise" it generates, society has a variety of responses and coping strategies.

Response #1: fighting new information media

One classic response to an expansion of information is to restrict new information media.

When the telephone was invented, it was accused by a noted psychiatrist of driving people permanently insane. When the radio arrived, researchers noted that "Parents have become aware of a puzzling change in the behavior of their children"

When television emerged in the late '40s, it negatively affected the dominant media, film, and

print, which tried to suppress it. Hollywood went to war against TV.

Later, when cable TV emerged, it was the same story. The TV broadcasters, now the new media establishment, fought cable TV tooth and nail. The new arguments were the loss of national cohesion, and the absence of public interest standards.

Today, with computer communications in ascendance, the question is how they are treated. In the 1950s and 1960s, many believed that computers would surely create Orwell's 1984-like state, and computers had a negative image as a centralized huge piece of equipment. Data protection laws were passed, based on the "Big Brother" image of the technology, just as computers became "distributed." But when the real year 1984 arrived, the fear had become that 14-year-olds would use computers to start a nuclear war on their own.

Today, when computer usage is beginning to be democratic and when computers are becoming a communications device, the Cassandra industry is out in full force, and an avalanche of neo-luddite literature is rolling in. Today's fears are the usual suspects in new garb: Impressionable children. Sex. Violence. Crime. Games. Idleness. Alienation. Anti-authority. Extremist potential. Isolation. Information poverty. Commercialization. Poor countries. Bad grammar. Bad manners. Bad attitude. This is not to belittle these concerns, or to give credence to the similarly myopic Polyannas of the computer industry, but rather to observe that it seems that it is always the new media kid on the block that seems to be held responsible for the social sins of the elder media, and often in inconsistent ways.

Where once too much elite control was decried for television, now there seems to be too little of it to deal with the anti-social tendencies on the net. Where once lowest common denominator its programming was decried, we now mourn the loss of the national dialogue. Where once youngsters did not communicate enough, they now communicate excessively, obsessively, and sloppily. Where once the old series were ridiculed as chewing gum for the eye, the same programs are now romanticized as golden oldies, and bathed in nostalgia.

Response #2: Reorganization

Another way for society to deal with information is to reorganize its institutions. An organization's response to informational complexity is usually to increase organizational complexity -- management layers, procedures, and controls. But the result are organizational pathologies, such as tensions between the field and the center; depersonalized leadership; fragmented understanding; take-over of rigid procedures.

One way for organizations to increase information processing capacity is simply to grow. But this effort is doomed to failure. Many of the media mega-mergers of the past year, with their justification of "synergies", will end up as failures. Time-Warner/Turner, Disney/ABC -- these organizations grow beyond their ability to efficiently process information. The future lies in the opposite direction. In 1982, AT&T was split up by the American government. In Japan, the state is now considering a similar policy towards NTT. In both cases, the companies have strenuously resisted a massive government intervention pursued in the name of deregulation. But in fact, the divestiture of AT&T was probably the best thing that happened to AT&T. In the future, divestiture may not be state-imposed at all but rather company-initiated, and it may be in the telecommunications companies' own interest to split themselves up. AT&T did so in 1994 in a second and voluntary divestiture.

All this is part of the logic of transformation in telecommunications, in which service competition leads to infrastructure competition, which in turn leads to interconnection, unbundling, and eventually radical corporate restructuring.

This is not mere hypothesis. In the US, Pacific Telesis reorganized itself in 1994 in a major voluntary self-divestiture, spinning off its mobile subsidiary that receives no "fraternal" preferences. The Rochester Telephone Co. separated itself into a network company offering transmission to all, including service competitors, as well as a services operator offering the actual service to customers.

And now, AT&T, once split by government mandate into eight pieces, is separating itself voluntarily into several independent parts. Its chairman, Robert Allen, argues that "the complexity of trying to manage these different businesses began to overwhelm the advantages of our integration... Conflicts have arisen, and each of our businesses has to react more quickly." Traditional telecom monopolists may try to delude themselves that AT&T's second divestiture is about computers and equipment, not networks. But that is a distinction without a big difference. The economic point is that part of the company is harmed by another part competing against its best customers. The same dynamics will affect different network modules in a competitive environment.

Response # 3: Using technology as a screen.

The key technological challenge for the information sector is information screening. The super pipe requires the super screen. Typical tasks performed by intelligent agents could include filtering electronic mail, scheduling appointments, locating information, alerting to investment opportunities and making travel arrangements.

However, the technology available at this point is little more than a rudimentary mail filter. Humans can infer concepts. Technology can only do the most formalistic information selection. Expert systems and artificial intelligence cannot even yet suppress repetitive or unimportant information, and the technology which could provide contextual analysis is not even close at hand.

Response #4: Using economics as a screen

There are other important approaches to information expansion beyond technology and reorganization. One of them is economics. To an economist, the main problem is the limited presence of economic mechanisms in allocating information processing capacity. If our individual and organizational attention is a limited resource, why should it not be allocated as other scarce

commodities are? At least that is the question.

For example, we are being inundated by junk e-mail, each piece imposing some time cost on us, yet outside of a price mechanism. Why is our time a free good for anyone who wants to access our mailbox or telephone receiver? Let them pay for access. Prices are an excellent form of information about information. They provide relative values on time and information. In the upper reaches of power and prestige, access was always paid for indirectly. In advertising, marketers increasingly pay consumers rewards for attention. These payments can also be indirect, through a higher price for watching a program without further advertising interruptions.

When it comes to telephone calls, people should be able to select among incoming calls electronically only those calls they want, and to assess an access charge for those commercial telemarketing calls they do not normally want to accept. Such a service might be described as Personal-900 Service, analogous to 900-service in which the caller pays a fee to the called party.

Individual customers could set different price schedules for themselves based on their privacy value, and even the time of day. They would establish a "personal access charge" account with their phone, or a credit card company. The billing service provider would credit and debit the accounts in question. In such a way, markets in information access will develop.

Consumers will adjust the payment they demand in response to the number of telemarketer calls competing for their limited attention span. If a consumer charges more than telemarketers are willing to pay, they can either lower access or will not be called anymore. Because access is of value, exchange transactions would create rational markets instead of the present disruptive calls followed by hang-ups.

A similar principle could be applied to an E-mail, voice-mail, or fax system, with the sender assessing the content's value by attaching "urgent," "standard" or "junk" levels of "electronic postage" on an outgoing message. The postage would be charged against the sender's budget and credited by

the recipient. This will cut excessive group lists and junk mail.

These are a few suggestions to illustrate the general approach. There is no claim that an economic market mechanism will resolve all problems of the misadjustment in information processing. However, it is an approach that needs to be explored much more than in the past.

Conclusion:

All around the world, governments have been busy liberalizing telecommunications. This is the correct way to go, but the opening of old bottlenecks also creates new ones. The liberalization of information technology will not rectify the imbalance between information production and distribution, on the one hand, and processing on the other.

As we move from the traditional situation -- information scarcity -- to a new and unfamiliar era of information abundance, we must be willing to consider new approaches to information. All this will require leadership thinking and creativity. The legislation prepared in Washington, Brussels, Tokyo, and other capitals may be giant steps for legislative men, but they are only a tiny step for mankind.