

View of Things to Come in Technology

Do you hear it? The technology transfer explosion is coming right behind the communications explosion

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It is, of course, much easier to predict what the world will be like in 20 years, versus the near future; because there is the distinct possibility of being "over the hill and far away" before what has been forecast comes into focus as fact or fiction. The futurist has a magic cloak of invisibility, but I will decline invulnerability—I will describe an incredible scenario, and I will attend the 2000 A.D. LES Annual Meeting.

To comprehend a vibrant future technological world of galactic travel in which our great-grandchildren will of certainty travel with regularity in spaceships to and from orbiting artificial colonies where engineered environments create benevolent viroids, you must first turn your imagination backward in time and establish some basic relationships before you journey forward. Back to when isolated pockets of life survived in a primitive environment and examine the process of communication; or perhaps better described, as a time of no communication beyond the family or small tribal group.

The thesis that will be proposed in this paper is the congruency or the correlation between technology transfer and communication.

Now, going far far back—3.5 million years—in an early Pliocene dawn, imagine a small hominid tribal unit huddled protectively around a smoldering embered campfire in the presunrise quiet on the edge of Hadar Gully in what is now called the Afar Triangle in eastern Ethiopia where Lucy lived. A time of simple environmental forces, where resource utilization did not conflict with resource availability. A time of no "territorial imperative" where there was more space than human needs.

It was the time of no technology transfer, no exchange, no barter, and no quid pro quo. They were nonexistent. It was a time of *no communication*. That was Lucy's world.

Fossil evidence tells us that in all parts of our globe, different tribal groups evolved differently. Eating different foods as a matter of resource utilization was a cultural trait still apparent today in the food habits of different societies. Different tribes developed different tools and weapons in order to cope with the variety of flora and fauna. They had different shelter and

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clothing requirements to adapt to climatic variations. Imagine for a moment, the Eskima habitat and his clothes, versus the bushman of the remote Kalahari Desert who carries an ostrich shell of water in a sling and wears only a spear. They each have their environmental specific technology and it would serve no purpose for them to have the technology of the other even if they were able to communicate.

Necessities

Technology was created by the human mind responding to the necessities of survival. The digging stick replaced fingers for root gathering. Elementary containers were contrived to carry food. The sharp edges of cleft stones became scrapers, axeheads, then spear points. Even in that Pliocene dawn of "Lucy" an australopithecus afarensis technology existed, but was not being transferred because there was no communication between the isolated pockets of the first of our ancestors to walk erect. It would have served them well to be transferees or transferors of technology, but there was no communication.

Perhaps early one morning the tribal chief is practicing with his spears and discovers the principal of the spear-throwing stick. This immediately increases the range, power, and accuracy of his spear, and this chief needs more land for his growing tribe. And so, perhaps, the first minuscule nation was created.

The influence of one small group spreads. It dominates and communicates—and expands the arena of use for its technology.

Compound the effect of that early nationalization with Peruvian balsawood rafts crossing the Pacific, or Sumerian reed boats traversing the east African coast and Persian Gulf, or Phoenician entrepreneurs, those early masters of the quid pro quo sailing between continents. The first threads of a communication network are being woven; the first knots in an intellectual property tapestry are being tied.

Referring to the thesis, the essence of the transfer process is the process of communication.

One might question, can such a thesis be supported? Move forward through the millenium to the Greek and Roman periods. You regularly read about and see on television the discovery of sunken Greek and Roman ships, whose holds were filled with the amphorae of commerce—olive oil, wheat, wine, even coinage and statuary. The makers and users of marine transport technology were selling and communicating throughout their world, and their skill in the art was copied or borrowed wherever they went.

Also, it must be premised that they had to communicate with their markets and in turn their markets had to communicate to their suppliers. What merchant in his right mind would sail in those dangerous days

with his goods to markets of unknown needs and wants? Truly, communication propelled the oars and filled the sails with wind. The thesis appears valid.

Patent Law

In 1494, in Venice, the original patent law was written extolling the virtue of clever minds capable of devising many ingenious contrivances for the public benefit; yet insisting that the inventors be protected from other taking their honor; what we call today infringement. It might be said that infringement is a form of unrestrained and improper communication of technological knowledge, a form of technology transfer by communication from the other side of the coin.

Today, in the most remote mountain villages of India, Peru, or Upper Volta there are entrepreneurs who own a television set and charge the locals a small fee to enter their theaters to watch the magic tube.

Here is communication, coinage, and technology. But what incredible doors of desire are being opened! Ray Herzog in his keynote speech (at the 1981 LES U.S.A./Canada) said, "improved and expanded communications are going to make the poor . . . even more aware." For all these viewers to see the modern world, even the commercials which pretend to fulfill each and every human need and desire, to satisfy every secret fantasy, to be a Charlemagne, a Cassanova, or an Einstein; or equally, a Catherine the Great, Mother Teresa, or a Sandra O'Connor. Those humble viewers might never own or use a TV, a stereo set, or a home computer. But they will begin to want and need additional products. Without communication there is no demand for goods and services, ergo, no technology is needed or used, none is transferred. But *it is being* transferred in greater and greater amounts. It follows then that there is more and more communication. The thesis is reinforced.

In the year 2000 A.D. communications will be the incredible scenario. A brief recap of the progress of communication technology during the last seven years will help provide a perspective, however dim and ephemeral of that distant stage.

In 1974 Western Union launched the first domestic communications satellite "Westar I." Coincidentally, it was the same year that Lucy was discovered in Hadar Gully. Today there are nine communication satellites. Western Union has three; RCA Americon has two; Comsat has three, used by AT&T and GTE, and there is one data communications consortium of Comsat, IBM and Aetna Insurance Co. Their satellites generally have 24 transponders or mechanisms for receiving and transmitting information. They are in geostationary orbit about 22,000 miles above the earth's surface, and several other firms will soon have communications satellites. The going rate at auction for a transponder channel is now close to \$10 million. Roughly from zero to above \$2 billion in satellite communications channels have appeared during this initial period.

At this rate with a straight-line technology growth there would be 800 channels in operation by 2000 A.D. However, assuming an exponential rate of technology improvement, as is normal these days, the figure becomes tens of thousands.

Telecommunications is the name of the game. It is the elixir and magic carpet to a mind boggling environment with technology transfer rampant. Another for instance: the first Intelsat satellite over the Atlantic carried 240 telephone conversations or two television channels. The latest Intelsat V carries 12,000 communications channels—and television as well. By the end of the century the Intelsat system should be offering 700,000 international voice circuits.

So what else is new? Five years ago the next quantum leap ahead was in a new technology called waveguides. Except for a few special uses waveguides went down the tube with the development of optical fibers. Two strands of high-purity glass, smaller than a human hair are now able to carry 2,000 telephone calls.

Prophecy

A consultant at Arthur D. Little recently prophesied that optical fibers will make communication less expensive than satellites except for very long distances by 1995. This applies even to transoceanic communication where the first transatlantic fiber optic cable will be laid before 1990. To look in today's telecommunication status, as an individual, for a start you might consider buying a *satellite earth station*. About \$6,000 will get you a 10-foot dish that will impress your neighbors and pull down 40 or more television programs from the sky. If you wait, the dishes will drop in size to a yard across and the price to about \$100 and probably provide hundreds of channels.

What intelligence has these glimpses of the far past, the past, and the recent past produced as support to the thesis? It certainly has shown that whenever humans communicate, technology is transferred. It is not an overstatement to observe that communication nurtures and creates a ravenous hunger for technology.

What does this mean for the year 2000? A review of current forecasts for telecommunications suggest the following:

Communication systems will be operating and will be between persons, or interpersonal; person-to-business; business-to-business; business-to-government; person-to-government; and government-to-government.

Interpersonal will be laser optical with selective video transmission. If you just got out of the shower, you probably would forego the video or at least restrict the image to the more mundane. It will be more competitive and relatively less expensive than present-day telephone. Personal-to-business will be expanded to a computerized product availability, a superior and more effective "yellow pages" function. As an example, if you're looking for a piano, your videophone will tap a product data base providing an array of photos, models, and prices with a list of stores. Based on your economic restraints or lack thereof you might select additional detailed product information. Then, if a determinant selection is made you would be able to order from the geographically closest store or any other store of your choice, and pay for or arrange financing while still at home.

Personal-to-business will include a sole-source financial hookup. The company will provide all your credit,

banking brokerage, and insurance sources which will be considerably more convenient, competitive and less expensive by elimination of work duplication.

Personal-to-business will include an on-call system of artistic and recreational menus with prices and availabilities from a super hamburger to a kayak trip on the Upper Yangtze.

Between business-and-business there will be essentially a satellite optical laser system that will permit greatly expanded management audio-visual communication.

For example, an engineering draftsman in the piping and pumping section of a company could talk to a distant pump salesman to get the best and latest pump specifications or performance, pressure curves, and energy efficiency ratings, rather than fumbling through several catalogs, half of which are outdated. The opportunities for lawyers and LES are apparent.

Government

Business-to-government would provide simplified and improved instant proposal and feedback between key industrialists, senators, and congressmen regarding pending legislation and/or regulatory agencies regarding special rulings. Voice-sensitive recorders would document, printout and distribute agenda and minutes of conversations for review and approval.

Finally, government-to-government would provide greater personal contact and multi-conference opportunities in as much as with greater personal contact, there should be considerably fewer misunderstandings. This all seems almost too good to be true. What are the communication difficulties?

Most probably the major one is the administration of the use of these communicative devices and their control. Every communication activity is a two-edged sword. It can resolve differences, but it can because of personalities create them when they didn't exist before. There are many more opportunities for confusion and collusion. The only caveat is that administrators recognize the need for strong control procedures and policies, a system of communication recording and filing with supervisory access by parents, supervisors, and managers.

So, indeed, all factors are go. The quantity and variety of new products and services boggle the mind. In this review I have only touched the smallest fragment of what communication will be. I didn't even mention computers, robotics or genetic engineering.

In summary, the licensing profession will be hard-pressed for the next two decades. Herzog told us that the world population will be 6.6 billion. They are going to be more communicative and demanding.

If indeed the rate of technology transfer growth has congruency to communication as has been proposed in this paper, there will be a deluge of transfer activities.

There will be exponentially greater amounts of work for all licensing executives, but those efforts will surely expand the benefits universally, or perhaps with this future I should say galactically.

I also am a believer in the inevitability of world order and reject the apocalyptic scenario.

Finally, to prophesize: We are now hearing the first rumbling of the communication explosion—standing in the wings ready to come on stage is the technology transfer explosion. We better get ready.