

HDTV:



Tuning in or Fading out?

By Susan M. Reiss

A surgeon in Bangkok, puzzled by a tumor on his patient's liver, beams a picture of the tumor to a team of experts in San Francisco via a high resolution transmission system and waits for their diagnosis. Because of the real-life clarity of the picture, the San Francisco team can prescribe the best course of action and transmit the information to Bangkok in a matter of minutes.

The high resolution, true rendition of color, and interactive capabilities of advanced video communications technologies promise to have profound implications for education, entertainment, medicine, telecommunications, and other fields.

Instead of having Rover fetch the morning paper, teach him to turn on a video terminal that transmits the latest news and pictures tailored to your needs. Forget about going to an art

gallery. Because of HDTV's potential to store, retrieve, and display high-quality images, art galleries can exhibit collections that otherwise would not be available to the public either because of space limitations or value.

The impacts of high resolution systems (HRS) may not be realized, however, if government and industry fail to outline a plan of action. From a policy standpoint, legislators, industrialists, and the Administration must decide whether to promote R&D activities related to HRS—a wide range of video and computer technologies—or to support a program that develops a specific subset of HRS, namely HDTV. Support for HRS means looking at the entire communication infrastructure. HDTV could advance the HRS case if successful in the marketplace.

But Charles Ferguson, a research associate at MIT's Cen-

ter for Technology, Policy, and Industrial Development, warns that if the U.S. fails to make HRS a national priority, the country will find itself in last place when everything from cameras to typewriters converge to "form a huge, unified information technology sector, based on common digital components and standard interfaces."

Focus in Europe and Japan

As in other technological areas, the U.S. finds itself competing with Europe and Japan on HRS to maintain leadership in the global marketplace. Some proponents of HRS in the U.S. suggest that we are not far behind. Sidney Topol, chairman of the Electronic Industries Association's Advanced Television Committee, relates that on a September trip to Europe, he found mass confusion and few clear ideas on what course the Europeans would take in the HDTV arena. Yet some \$500 million has been spent on Eureka 95, Europe's joint venture HDTV effort formed in June 1986. The project is charged with development of European production, transmission, display, recording standards, and equipment. Approximately 1,700 engineers, technicians, and support personnel are involved. A new HDTV consortium formed in September 1990 promotes high-definition television in Europe. European efforts, as well as the Japanese, have focused on direct broadcast satellite systems.

Japanese systems developed 10 years ago combine analog and digital technology. NHK, Japan's national radio and television broadcasting organization, has spent \$700 million over the past 20 years. Though Congressional Budget Office (CBO) analyst Philip Webre says that \$35 million a year is really not too impressive, NHK has been able to focus the Japanese effort on HDTV and HRS. The state-owned NHK provided funding and encouraged equipment suppliers to participate in the development of the system components. Companies were assigned specific research areas and sometimes even specific production tasks, the results of which were shared with NHK and the other participating companies for at most a nominal licensing fee. But in November, North American Phillips announced development of an all digital system, outstripping Japan's combined analog/digital endeavors.

U.S. research on-again, off-again

Although both the European and Japanese efforts have weaknesses, one of their main plusses is organization. The history of HRS in the U.S. has been a patchwork of stop and go research. After the 1950s, researchers achieved resolutions in experimental systems comparable to those now demonstrated by the Japanese. According to the Office of Technology Assessment,¹ these advanced capabilities were not pursued because:

- the cost would have been far too high for consumer use;
- the newness of the medium had not yet whetted consumer appetites for dramatic improvements in resolution; and
- practical transmission technologies such as bandwidth compression were not available.

The federal government has been aware of developments in the high definition arena for almost 20 years.² A Commerce Department official told the General Accounting Office that his office knew about Japanese HDTV efforts as early as 1975. Yet HDTV progress—including the potential impact of HDTV on the U.S. computer and semiconductor industry—was not monitored because the U.S. consumer electronics industry was in decline. Through 1988, the government spent only \$70 million on research in this area. Private industry has also spent about \$70 million during this period, with recent work being undertaken by David Sarnoff Laboratories, CBS, NA Philips, Thomson, Zenith, and the Massachusetts Institute of Technology, among others.

Big screen politics

The political debate surrounding high-definition television and high-resolution systems gives new meaning to the phrase, "the medium is the message." Congress is willing to appropriate money for HDTV research primarily for military applications, but the Bush Administration has yet to develop a concerted HRS plan of action. A Commerce Department spokesman told *OPN* that Secretary Robert Mosbacher came to work two years ago ready to push an HDTV plan, but the White House told him not to. Mosbacher's latest official line on the subject is that there is not enough interest in industry to promote HDTV.

The HDTV question causes problems for the Administration because it points to a larger problem in the U.S. today: lack of an industrial policy. To quell critics, the Administration's Office of Science and Technology Policy recently released a 13-page policy document⁴ that contends, "Competitive market forces determine, for the most part, an optimal allocation of U.S. technological resources." The government's role, OSTP says, is to create a helpful atmosphere for private enterprise, while filling in neglected spots.

Congress recently authorized \$36 million for the Commerce Department's Advanced Technology Program (ATP), which would be the likely agency to support HDTV. But Commerce is not doing anything specific in this area. Another \$75 million will go to DARPA for continued development of high definition panel displays. Beyond these two programs, the government has no policy to promote HDTV or HRS.

CBO's Webre maintains that the government divides responsibility for HDTV and HRS like this:

- Department of State—negotiating international standards;
- DARPA—possessing money and authority;
- Federal Communications Commission—developing testing standards;
- Department of Commerce—muddying the waters.

Programming at DARPA

When Craig Fields, former DARPA director, tried to push HDTV research, he was fired. He declined to talk to *OPN* about his efforts. OTA³ argues that, "Despite its technical savvy and fine record, DARPA is not the ideal agency to

support technologies of great importance to the civilian economy." The agency has traditionally developed technologies for military applications.

DARPA is pursuing component technologies for high definition displays (HDD). Within the next year, the program will expand to evaluate and integrate the components into complete systems, says program manager Marko Slusarczyk. Some of the technologies may have commercial applications, he notes, and if a technology happens to be picked up by the commercial sector, then it's a plus for the country. But Slusarczyk stresses that DoD is not in the entertainment business. "Our ultimate customers are soldiers in the field. We want to enhance their survival and help them get the job done."

The HDD program is structured around the importance of video and visually based information. "Wars are won and lost because of information and they're started and prevented because of information," Slusarczyk asserts. One high definition display technology already seeing action is straight console displays for airplane cockpits.

Although DARPA maintains its narrow military focus, officials acknowledge that a solid domestic base is a key ingredient in successful military production. A healthy U.S. production market enables the military to customize its requests. Foreign manufacturers and suppliers may not be willing to produce specialized configurations, because these manufacturers are geared toward a consumer market. Slusarczyk expresses optimism about the prospects for U.S. manufacturing. He notes that a strong market enables industry to leverage government funds, thereby reducing prices.

National security is also a consideration. Classified systems do not easily lend themselves to manufacture on foreign soil. "It's difficult to share information with foreign firms," Slusarczyk acknowledges. "Such an alliance can prevent the optimum technology from being created."

FCC defines standards

Historically, the Federal Communications Commission has dealt with communications issues and allocation of the radio frequency spectrum. In 1987, the FCC formed the Advisory Committee on Advanced Television Service to review proposed terrestrial broadcasting standards for the U.S. Several "tentative" decisions on HDTV have been issued:

- A simulcast system will be used, *i.e.*, one that broadcasts two signals—one using the current standard known as NTSC, in place since World War II, and a second using the high definition format;
- Only systems that work within the current 6 MHz channel will be accepted;
- No additional spectrum will be allocated to augment the existing 6 MHz channel used for broadcast television; and
- It is in the public interest not to retard the independent introduction of advanced television in other services or on non-broadcast media.

In addition to these policy initiatives, the FCC has developed a schedule to test proposed standards for HDTV. Testing will begin in April 1991 at the Advanced Television Test Center in Alexandria, Va. Each proposal will receive a

two-month test slot. Thomas Stanley, FCC's chief engineer for HDTV, says the schedule will be flexible enough to "keep the doors open" for late developing technologies. "Until the HDTV issue settles down, you can't get a good handle on it," he observes. "This is a very complicated thing."

Stanley describes the search for a standard as a "beauty contest." Contestants include David Sarnoff Research Center, NHK, Zenith, and MIT. By June 1993, the Commission expects to crown a winner.

In making a final decision on an HDTV standard, the FCC is carefully considering all modes of transmission. Of the options available—terrestrial broadcasting, direct broadcast satellites, coaxial cables, copper telephone lines, and optical fibers—fiber offers the most flexibility for HDTV use. "Optical fiber is ideally suited for transmission because it can accommodate a large bandwidth," says Tingye Li, head of Bell Laboratories' Lightwave Systems Research Department. Fiber can also be used over long distances without amplifiers to boost signals. Coaxial cable requires amplification even over short distances and suffers from signal degradation and noise buildup.

More research on fiber architectures is necessary before fiber-to-the-home can support HDTV transmission. "How to grow this industry is a difficult thing," observes Ted Darci, head of Lightwave Communications Research at Bell Laboratories. Whatever standards are chosen, Darci predicts the market will, by necessity, begin with high-end uses such as video conferencing for business. Before fiber technology becomes an economic means of transmission, the industry must discover a way to mass produce network components.

OTA's *HDTV: The Big Picture* stresses that government policies, particularly those of the FCC, could have a powerful influence on the way the HDTV market develops. The report suggests, and analysts agree, that if incompatibilities arise between FCC and marketplace standards, consumers may hesitate to purchase expensive HDTV systems. OTA also suggests that when presented with the option of simulcast broadcasts, consumers may decide that the added resolution is not worth the expense of a set costing at least \$5000. The report urges formation of clear and consistent government policies if potential investors are to enter the HDTV market.

Congress: a split-picture

The impact of high tech on their constituents has led many lawmakers to roll up their sleeves and plunge into the world of integrated circuits and network architectures. Telecommunications took top priority for several months during the last session of the 101st Congress as members debated regulation of the cable industry. Congress decided the broadcast industry would best be served by upholding current regulations that prohibit telephone companies from selling video and text services over phone lines.

Providing timely information on HDTV developments has been the charge of the Congressional High Technology Caucus, chaired by Mel Levine (D-Calif.) and Don Ritter (R-Pa.). But it has done nothing over the past six months. Before that,

the "watchdog" group sponsored technology bills and held press conferences and seminars on HDTV issues.

A senior congressional aide notes that, despite its recent silence, the caucus serves an important function. "We need some group to hammer away constantly at the idea that high tech decisions affect the U.S. standard of living." Asked if the government is doing all it can to promote efficacious action plans, the aide alleges that "not even close to enough is being done. It's pathetic. The situation now is a virtual stake through the heart of industry."

Congress is willing to throw money and verbal support behind HDTV because it "rattles the President's chain," say several congressional staffers. "It's a popular program on the Hill," notes Webre. The fact that Speaker of the House Thomas Foley mentioned HDTV in his rebuttal to the President's State of the Union message last January sent a strong message to the people that HDTV is an important technology, another congressional aide notes.

Future reception

Some analysts suggest that the hoopla surrounding HDTV in 1989 was a natural response of people getting excited about a new technology. Now that work to implement the technology has begun, little media attention is warranted. But critics argue that "people are making a lot of grandiose claims" concerning HDTV, which actually only represents a small portion of U.S. electronics. The market for HDTV receivers and VCRs is forecast to be less than \$30 billion (in 1988 dollars) by 2010.

"It seems counterintuitive to suggest that a small market that may exist in the future is a more important driver of economies of scale, technology, and competitive success than is the growth in the present market," a CBO report⁵ states. Webre notes that, except for consumer television and computer monitors, U.S. firms are very strong players at every level of advanced imaging. "Market after market—whether printers, workstations, or optical character recognition—all are dominated by the U.S.," the budget official maintains.

Because of the rapid changes occurring in design technology, many suggest the U.S. should leapfrog over existing HDTV models and begin readying all-digital systems for public consumption. If the U.S. gets locked into analog technologies, it could lose any potential lead researchers may have gained, analysts contend.

Webre believes that "HDTV is neither necessary nor sufficient to bring the U.S. electronics market back to life." Denise Michel of the American Electronics Association dis-

agrees. "High resolution technologies are critical to the electronics food chain," she asserts. Michel suggests that, although the government's role is to act as a catalyst, it could help industry by providing antitrust manufacturing relief, reducing the high cost of capital required to invest in high-end products, and remedying the lack of manufacturing infrastructure.

Russell Neuman, director of the Communications Research Group at the MIT Media Laboratory, argues that a national initiative is key to developing U.S. leadership in the HDTV area. His formula for success includes:

- Withdrawal of U.S. support for the NHK 1125/60 production standard;
- Continued DARPA sponsored research;
- Establishment of an industry-government enterprise along the lines of SEMATECH;
- A National Science Foundation initiative supporting fundamental HDTV research; and
- Special tax-credits for HDTV-related research.

One factor that few analysts can predict is how the consumer will react to high definition television. A CBO report⁵ criticizes HDTV market forecasts by the National Telecommunications and Information Administration (the Darby Report), the Electronics Industries Association, and the American Electronics Association. CBO states that the forecasts make two critical assumptions: HDTV will be a hit with consumers and the market will grow rapidly from the outset. In all but the Darby report, HDTV receivers are forecast "not only to be successes, but to be one of the most successful consumer electronic products of the last several decades."

An MIT study conducted by Russell Neuman found that in a side-by-side comparison of HDTV and conventional color televisions, consumers preferred HDTV. Viewer preference, however, was highly conditional and sensitive to factors such as program content and distance from the screen. The MIT study also questions claims that HDTV is as revolutionary as color TV was in the 1950s. The choice to buy HDTV or not to buy HDTV will, for the consumer, undoubtedly be a subjective one.

As Harvard's Lewis Branscomb puts it, "HDTV is an excellent illustration of a policy dilemma."

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