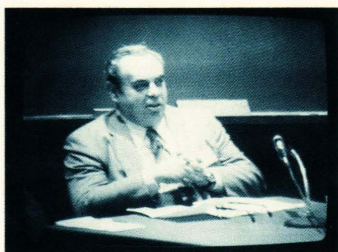SAMUEL KOSLOV
Panel Chairman

FROM CONCEPT TO CLIENT: GETTING THE PRODUCT TO THE USER

In our society, the developments of modern technology to assist the handicapped can help very few if commercial exploitation is not achieved. Availability through normal distribution channels, reliability, maintainability, and affordable cost is essential. A panel discussion, herewith freely excerpted and edited, provided valuable insights into this problem from different viewpoints.

Chairman:

Getting the concept to the client — getting the product out is the name of the game. It is a problem that has existed in other marketing fields for many years — namely, how to provide specialized products to a limited market that is distributed around the country, in fact, around the world. While the number of potential users is substantial and their need is very great, they are few compared to the users of common household products. It looks as if we need a new technique of marketing. To define marketing as merely the way to make money is inaccurate. Rather, it is to provide the understanding of how to get the product out. Whether or not you make money is a decision process for those who do the marketing.

I'd like to ask the panel members to express opinions on what problems and inhibitions there are between developing concepts and providing a finished product. What has to be done to get them into the hands of the people who need them? There is a general naiveté as to how to go about this. People talk about return on investment for research and development, but there is little investment for R&D needed here because the concept has already been developed. Others talk about producibility (can you make it into a product?), reliability, maintainability, the problem of the marketplace itself, the distribution, the price, who pays the cost, and how to let people know that the device is available.

Caldwell:

I'm with IBM, but I am not their expert on devices for the handicapped. I work in a plant where we make printed circuit boards. I've been working with computers for about 20 years, as a blind person. As far as how to get products to the market, we have an awfully broad market. We keep talking about "handicapped." I suspect there ain't no such animal; they are the people on the tail of a normal curve. We don't know yet what all the parameters are to being "handicapped."

I can tell you how I go about it when I want something to function for me. The first thing I do is see if I've already got something that will do it. If I don't, I look around in the marketplace, not one of 100,000 people, but the one that big companies work in, with millions of customers. I have brought a digital radio with me. This wasn't built for the blind, but it works perfectly. You type in what you want, and it scans, it does AM, FM, single sideband, CW — all this for $300. Another product that came out recently (and I don't think anybody thought of the handicapped or the blind in developing it) is the talking clock. It does everything from being a stopwatch to an alarm, with humor. It says, when it gives you your late-getting-up alarm, "Please hurry."

Clock: It's 11:14 a.m.

Caldwell: If it also gave the date, we'd know exactly when this is.

The next thing you can do is to see what high technology changes you can make to existing equipment to adapt it to yourself. I wanted a new little handy-talky two-meter ham radio. A friend of mine got one, and I said, "Oh great, the little dials where you dial in the frequencies don't have stops on them." He said, "Sure." Guess what? The dials just go round and round and a blind person isn't going to be able to tell what happens. High technology — take a little rat-tail file, put a couple notches in the dials, and you're in business.

If you can't raise the size of the market, make the product cheap. Build it cheaply, define the market very well, and disseminate it to that market. Of course, there are situations, particularly for children and for the profoundly disabled, where you just have to come up with money, build what is needed for a limited market, and use it there.

Lamprell:

I've spent the last 25 years trying to provide services to the disabled through the federal system of vocational rehabilitation. For the last ten years I've been involved in the Maryland Rehabilitation Center. My criteria for choosing disabled individuals to assist is that they have a 72 pulse and a wet tongue. It's been exciting to see what's taken place this last year in the one or two dozen workshops that we've held throughout the country, and where we brought the computer community together with some disabled communities. Those of us who are in the business of providing services to the disabled just do not know what's out there. It's imperative that we get together to communicate. We saw it work this past year, and we're convinced it will work.

There are many facilities with scientists and with people who are involved in computers as an avocation or hobby where we can look for help. There are many national and local societies — crippled children societies, paralyzed veterans, the veterans' facilities themselves, the Muscular Dystrophy Association, the Multiple Sclerosis Society. We solicit openly your involvement and participation.

There is a fabulous labor pool that can be trained at home. They can be responsible persons to an industry. More importantly, they can be independent and have a place in society.

I hope that in your respective communities, you'll touch base with comprehensive medical rehabilitation. There are two or three hundred of those, and there are many vocational resident facilities that will accept you with open arms.

Cunningham:

I'm involved with small firms that are looking at the development, merchandising, and marketing of items. The awareness of the utilization of these items for the handicapped has not crept into these studies. Many devices that are available now probably were not intended to meet the needs of the handicapped but are easily adapted to meeting them. Many things that are being readied for development and marketing could have an additional expansion into the handicapped market. Making some of these firms aware of this expansion of their potential market may help in getting some of these tools and devices into use for the handicapped.

I've been working with a small company that has developed a prototype for a modem operating on a small pocket computer that will communicate with other computers. They've been looking at this very seriously as a hand-held terminal for use by accountants visiting various offices and for entering data into large machines. You can start visualizing all the different things that can be done with such a device, the deaf using it to make home telephone calls to other deaf people, and perhaps to central computers.

Seamone:

I've been fortunate to have had, as a part-time activity at APL, research sponsored by the Veterans Administration, funded at between $100,000 and $200,000 a year for the last 10 years. One can be very successful in getting research money. But it's a harder row to hoe when you try to turn research ideas into manufacturing, to get the product made. Some of the projects that I've worked on included a powered upper-limb prosthesis, powered wheelchair controllers (including a chin-operated wheelchair), a robotic arm for the spinal cord injured person, and a complete worktable system, including a personal computer. More recently, I developed a Morse code interface for computers.
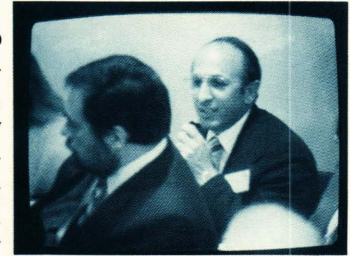
We have taken many of these projects all the way through the R&D phase. We've built our initial engineering model. We have carried out clinical tests. In our upper-limb powered prosthesis project, we conducted tests on at least 17 people for 2 to 4 years, until 1975. In fact, one person is still wearing it 10 years later. The doctors and the prosthetists we contacted thought it was a good idea. But when the manufacturers were contacted, they looked at the limited market problem. They said, "There are only five to ten thousand people who lose their arms or portions thereof during a year; there may be only 50,000 existing cases in the United States." And so they forecast a market of 1000 to 2000 units a year, if you could ever get started. They're not willing to take any gamble at all in starting it. If you could hand them the production drawings, if you could guarantee a purchase of the first 100 units by the VA or some organization, they'd invest some capital of their own.

Six months ago, one company in Baltimore that makes conventional prostheses decided that they would make the upper-limb powered system. To get them to make it, we got the Easter Seal Society to give us a small check by doing a telethon. We passed the funds directly to two manufacturers — one to make the mechanical parts, the other to make the electronic parts — to pay for their first three production prototypes. This is what it takes to get this type of job started. They're now making the first prototypes, and they hope to sell them. It's quite a chore to have industry make these low-volume items.

I'll point out one other problem that we've had with wheelchair controllers. We developed a chin-controlled wheelchair that, based on our clinical testing, appeared to be a very useful chair. We had a lot of support from the VA and found a manufacturer who makes wheelchair motor modules who said he'd like to make it. In the course of negotiations, he said it would take him 18 months to get into production and he signed a licensing arrangement with the Laboratory to produce it within 18 months. During that period he had other things to work on, including his own wheelchair motors for a different system. At the end he decided, "I don't think I want to make that." Presently another manufacturer said, "Yes, we're interested; please send us the sample parts, the drawings, and we'll tell you whether we'd like to produce it or not." It might take another 18 months for him really to get to the point of turning it on or turning it off. You've got to allow for a long time scale in this whole process. If you're persistent, you might make it.

One thing about the output from this contest is different from the previous rehabilitation work I've been involved in. Many of you are working with personal computers. They exist, they're high volume, and many of the things we've talked about here are basically programs or minor adaptations. I think you ought really to capitalize on the fact that you're dealing only with a small variant of an item that already exists.

Chairman: The other night someone talked about beginnings, middles, and ends. I would say, this panel is at the beginning of the middle, as we see the problem, because we've been able to show that by us-

ing existing technology, devices can be developed paralleling the vast marketplace for the personal computer that seems to be developing. However, that raises new questions. By virtue of getting over the initial investment problem, and by making something that can easily be paralleled to an existing distribution system, is there still enough incentive for somebody really to do it? In other words, if you say, "I've got a software package, it's a cassette, it's the same as 3500 other cassettes that three different marketing organizations are marketing," is it good enough to simply add number 3501 to the catalog; will that get it out?

Redden:
I direct the project on the handicapped in science at the American Association for the Advancement of Science. At AAAS, we began working on problems of disabled people in 1975. The reason we started was because Dr. John Gavin, a deaf biologist, wrote to AAAS and said, "Why does the AAAS have an office for women and minorities and not the handicapped?" From that beginning, we began to look into the problems of disabled people who were scientists, or who hoped to go into science. We asked disabled people who were in science to identify themselves to us and serve as our resource group. Those people shared with us many of the problems that they had faced and solved, and the ways that they solved the problems. One of the big problems identified by this

group was the problem of accessing technology that would make them able to function more efficiently in their jobs or in their educational setting.

For the last three years, we have been working with National Science Foundation funding to develop networks between the people who have something to do with technology development, production, and marketing and the disabled people who use the technology. Also, in this group of disabled people, many are themselves scientists, so they can interact on a scientific level with the people in the production of technology. We've had workshops regionally across the country and have asked the people who came to those workshops to identify problems and to tell us what they've done to solve the problems, to set a goal or action plan for themselves.

The first major problem is for disabled people, and the people who work on technology with them and for them, to know what's already been done and what's available. Another is to get the money to buy the technology if they find it. That's not as simple as it sounds. There are many problems ingrained in the rehabilitation system that prohibit disabled people from buying technology even if they have the money to do it because they have to go through a third party. Many disabled people get benefits from the government as long as they don't work. But when they begin working, those benefits stop, and then they have a really hard time buying the expensive technology that's available to them.

Another problem is to capture the imagination of the people in the scientific and engineering community who could quite easily solve the problems of disabled people. The next is to get disabled people involved productively in the design and evaluation of the technology that's being developed. Another problem is the production and marketing of technology that is already in the idea stage or in the model stage.

Fischell:

I'm in the APL Space Department where, until recently, I was Chief Engineer. Currently I'm in charge of technology transfer. I take the high technology developed by space and military work and apply it to civil programs such as medicine.

During the last 12 years, I have worked on four different products based on ideas generated and developed here that are now on their way to production by private American corporations. These are a rechargeable pacemaker; an implantable heart defibrillator; a programmable, implantable electrical stimulator of brain and nerve tissue; and an implantable, programmable infusion pump for the release of medication. In all four cases, I was successful in having a corporation proceed with my idea.

I believe there are certain keys to success in doing this. To begin with, you need a good idea. It's very difficult to define what a good idea is. You have to test it against other people who might know better what a good idea is. You need a market of reasonable size. You must get enough design and development work done to define your product clearly, whatever it is. You then have to try to obtain proprietary intellectual property rights to your product. That means a patent or a copyright, something that you have that could be of interest to a manufacturer. Then you must get a realistic estimate of what the actual market size is, the number of people who would want to buy and use your product. And finally, maybe the toughest job, is to sell your idea to a government agency, a private foundation, or a private corporation.

One of the keys to success is to get joint funding between a government agency or a foundation and a private company. It is amazing how much more private companies will be interested when you cut down on some of their risks and when they see that an agency independent of the inventor or the one who conceptualized it is also interested in putting funds behind it. All the products that I have worked on and gotten into manufacture have had some funding provided by an outside agency.

I think another very important aspect is that exclusive rights to your idea be given to the private company. I know there are those who say, ''Well, it was really developed with government technology, it really belongs to all the people; therefore, every corporation should be allowed to use it.'' That may sound on the surface very just. The truth of the matter is, when you say, ''If you put your money into it and you fail, tough; if you succeed, all the other companies will copy it and use it because we gave you no exclusive rights,'' the person making the decision whether or not to invest will decide against it. A policy that says ''If this has any government technology in it, it must be given to everybody'' is the kiss of death for any system as far as getting a private corporation to build it. If you do not get your device manufactured by a private company in large enough quantities to help many people, it is of no merit. Research for research's sake, when devices are desperately needed by many people, is a wasted effort. The only thing that matters is getting the device into production and to the many people who need it.

Campbell:

One of the jobs we have is the IBM project to train the disabled. As a member of that team, I went to various locations throughout the United States to assist developing a program to train the orthopedically severely disabled as programmers. That program was
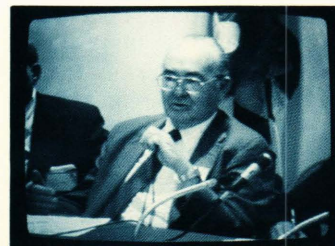
started in 1972, and today there are 18 programs in operation throughout the country.

Regarding the question of how to take a concept to a client: the process may be similar to the way the Sears catalog was viewed in the old days, it was a wish list, a "dream book." Who are the right people to read this dream book and select from it the particular items that will satisfy the needs of a particular customer? What we need is to bridge the gap between this piece of paper, this wish list, and a human being who needs something.

We're talking now about the vocational needs of a person, which is the emphasis of vocational rehabilitation. How do you make him a better employee? When you think about the National Rehabilitation Association, you also have to think about workman's compensation. The difference is that the compensation specialists are interested in how they can get an individual who is receiving workman's compensation rehabilitated to the point that he can go back to gainful employment, either in his original job or in a new one.

There are many foundations that have made grants in the field of rehabilitation. They are the organizations that can effect the translation from concept to the real world. An example would be a light pen to read the bar codes on food products so that a blind person can know what is in a can. But the typical blind individual has no way of knowing what capabilities might be available. The typical vocational counselor doesn't either. But with a catalog of capabilities, I think we can all find out.

Magee:

The Electronic Industries Foundation has been working with the National Institute for Handicapped Research for the past six years, looking at some of the problems of producing, distributing, and maintaining devices and systems for the handicapped. We also, for the past four years, have been running a program to promote employment of the disabled in the electronic industries and in other high technology industries.

One of the things we have recognized about products for the handicapped is that they have an unusual market. There are not only the end users of the product, there are a lot of other people who have to be sold, people who include the rehabilitation and medical professionals, those who have to provide funding in many cases for the purchase of the product, and, most of all, they include those who can undertake the manufacture, distribution, and maintenance of the products. The selling will come naturally if we have companies involved who have the strength to promote the products that can be made available.

What has been done in this context regarding devices and systems for the handicapped is unique. It is based on the premise that there are standard products already in production, distribution, and maintenance that can be adapted to specific applications for the handicapped. How do we approach the major companies who already can do what we need to have done but who have to be sold on the idea that there is not a fragmented market but a large market for standard equipment with minor adaptations?

Aller:

I've addressed this general question of how one surmounts the barrier of marketing, on a couple of occasions, without success. We ought to look at places that have solved it successfully. I'll ask you to visualize walking into distribution centers called department stores and asking them to furnish you with a garment. They will do it on an individual basis. They may have to adjust the hemline or cut the trouser cuffs. But you can look around this room and see the enormous variability that has been solved by mass production, in the various garments that we're all wearing and in their delivery in a somewhat individual way.

In the abstract, that's essentially the problem we're addressing here. What we have is the mass production of chips that are the central part of our modern electronics embodied in personal computers, among other things. Industry can deliver a nearly free computer in enormous quantities. How can society use free computers? One of the ways that I visualize is to provide products — whose costs are still going down on both real and inflation-adjusted bases in terms of their performances — to a group of people who have literally hundreds of ideas on how the products could be adapted and, like the analogy to the garment industry, be individualized. The next question is, how can some of the people who individualize things get a return on their own time? Borrowing money for a small business is not trivial, even for a fairly well-structured business. The market of delivering individualized computers to the handicapped is not highly structured. It depends on another group of professionals — the third party payers. The problem must be solved if we are going to deliver to the people who need them the fruits of the mass production industry of the United States and of that intellectual energy that many of you have demonstrated here.

If the handicapped are to be helped fundamentally, there needs to be some way for their employability to be improved. Of the 14 major types of industry in the United States, about six are considered high technology, where the dollar investment per employed worker is around $30,000. Now, if for a thousand or two thousand dollars, I can add tooling that makes a handicapped person employable, and I can save on the so-called support costs from another part

of the federal system, it's a real bargain. There's a foundation on the west coast that has shown that they can sum the total training dollar investment in the cost of putting in specialized tools for employment, and the entire amount is returned in less than one year through the withholding tax.

We develop, and I work with, a lot more than ever reaches the market. To get a product out is to have it reasonably well defined. This is a matter of standards; we need some kind of standards definition that defines some of the requirements. This is where the various agencies and organizations can create information so that we can better understand whether we have equipment that meets those standards.

The second thing is distribution. The handicapped community might have a unique advantage in this respect, because there are organizations that have a good knowledge of who can use what type of equipment; they could facilitate distribution. Once a company has some understanding of the standards and of the distribution problems, they're in a much better position to try to meet the needs with the right type of equipment and even to adapt it. We then know whether we can provide the necessary resources to get a return on what we're adapting because if we don't get a return on what we're doing, we will eventually have to withdraw from the total market area. So, having a knowledge of what we're getting into allows us to apply the resources and to produce the type of equipment that can then be adapted and tailored to the needs of the handicapped.

Kitchens:

An employee of Texas Instruments for 30 years, I am currently manager of manufacturing engineering for the personal computer. My own disability is short stature. I've been involved and active in the disability movement for a number of years and have been a director of Little People of America for 20 years and many other groups for less time than that. Many of you need to understand that the handicapped community is made up of several small cultures that are not obvious to the ablebodied. Until recently, each group of the handicapped did its own thing, in its own way. In the Little People's group, we did not concern ourselves with other disabilities. We tried to teach our own members our own thing, unsuccessfully. Many groups of the disabled have been grossly unsuccessful. There is a joke about the Little People marching on Washington — but nobody saw them.

However, the White House Conference on Handicapped Individuals was a learning experience for many of the disabled people. When 2500 disabled people got together, they discovered some interesting things in the process of having their toes run over, being poked by canes, and so forth. They discovered that the problems the different disabilities were facing were somewhat in common. And they also discovered that the solution to these in-common problems was identical. The best example I can give you is that if someone in a wheelchair needs a telephone lowered, or elevator buttons lowered, it works for me too. And that's just a small example.

As a result of the White House Conference, the awareness level among the handicapped community began to reach a new height and has generated an organization called the American Coalition of Citizens with Disabilities, which in turn has precipitated some 50 different state coalitions. The disabled community now is working together. The blind speak for the deaf and the deaf speak for the mobility impaired and the mobility impaired speak for the visually impaired. It has become an organized society where at least the handicapped communities are talking to one another.

The inventions and discoveries that have been shown here indicate that the inventors are familiar with the needs of the handicapped. However, you really don't understand the problem unless you have lived the disability. I heard several speakers indicate they had a solution and they had to go out and look for a problem to solve. They had to go out and find a handicapped individual.

We've talked about how to market, how to distribute, how to help the handicapped. People are looking for help, but they may be looking in the wrong places. The place to look is the handicapped community. Through the state coalitions, there's a very strong organizational structure and infrastructure that has developed considerable clout. The handicapped community can help pick up the ball and run with it. They can help find the funding. They can help find the manufacturer. Some of these handicapped people could conceivably manufacture some of the things that have been addressed in this meeting. Thus, the challenge is to find a better way to communicate with the very people that we're trying to help, and to let them know, in turn, what our needs are. Maybe this is the time for us to look at how the handicapped can help us.

It might be very useful if a traveling road show of these inventions in the form of slides and video tapes were circulated across the country to the various state coalitions and local organizations. If they could see what we've seen, you would find that you would no longer be pushing for help. You will find that people are pushing you.

Kuzmack:

I'm not here representing the Office of Management and Budget; I'm here representing myself and the Personal Computing Committee, the hobbyist, the ama-

teur. I want to look at delivery systems for the ideas, the devices, and the programs that are developed. I want to remind everyone to think about a fair rate of return. Don't try to get rich, don't overprice, because you will find that you are out. The delivery system includes such things as providing software through a data bank.

A way of getting your idea to the people who need to use it is through publication. There are publications for the personal computer market. There are publications that deal with the handicapped and their problems, and with vocational rehabilitation. Many publications that address mass audiences will also pick up on things, if they are properly put together. There are ways of getting ideas out, but they require a bit of effort and do not involve immediate pecuniary rewards.

I'd like to make a point concerning rewards. There is personal satisfaction, there is recognition, and there is monetary gain. If you go for immediate monetary rewards through a proprietary process, there are sales and there are royalties. A number of companies publish software, make it available, and give you a royalty. Even in the data bank sourcing approach, some of the companies that already are involved in the telecommunications field will provide royalties for programs each time they're run, each time they're loaded. Of course, if it's a device, something must be sold and arrangements made with companies to manufacture it. There is a long-term monetary reward for having participated and being recognized in a competition of this sort. A long-term reward is the increased lifetime earnings. The example that I might use is the value of a publication. Several years ago, a professional publication was worth $15,000 in lifetime income.

Chairman: I think that we can now ask for questions and comments from the audience.

Gaffney: I'm with the Veterans Administration. As I see it, the driving force in producing a product and getting it to market is money. It's not need, but rather money — cost-effectiveness in regard to the vocational aspects of producing a product — that will provide a job for a person. In order to produce a product for the rehabilitation community, you need a concerted effort of a number of different groups, including users and consumers, engineers, researchers, developers, medical personnel, and manufacturers, and you also need a source of funding. Without the joint effort of all these on a daily basis, a product for rehabilitation is doomed to failure. Unless you have these people's input before the product is produced, you cannot sell the product. You cannot say, "I've got the product for you, the disabled person, that I've produced in my basement. Here it is; use it." That's the wrong way to go. It has been proven over and over again that that way will not work. It's doomed to failure.

Chairman: A number of points have been made here. Some people have said, "Let's leave it to the normal marketplace, the normal industrial marketing relationship." Others have said, "The key factor here is the existing rehabilitation organizations throughout the country, the coalitions of various disabled groups." Some people have said, "Federal agencies have to put cash on the line because in the long run the taxpayer saves money by doing that." Are these points adequate? If we put these good ideas in a publication, make them available, tell everybody in the country they exist, will that do the job, or do we have to do something new and different to get a match between the idea and the consumer?

Attendee: I think that putting a "wish book" out in front of the public or sending out our traveling road show would prime the pump. We've seen some good ideas. I am not at all convinced that they are the optimum ideas. They might be excellent ideas in some applications and poor ideas in others, but I think they will prime the pump if the people in the rehabilitation community — the disabled people themselves — and various other individuals on the customers' side of the economic spectrum say, "There's a possibility that I can really get this problem solved." They might not buy the devices that have been designed and entered in this competition. But they'll go to a local computer club or to IBM or to Johns Hopkins and they'll say, "I need a device that does such and such," and that might be the device that has real economic feasibility.

Kuzmack: We are working with a general-purpose machine that is tailorable through software. The machine is in the marketplace already. What has been provided in many cases is the software or a small interface that enables the machine and the software that are available to be used by the handicapped. It doesn't require the same levels of engineering and development and big front investment on the part of the producer and on the part of the handicapped persons themselves.

Attendee: I came into rehab right after World War II. I can point to two items that are generally useful for the handicapped now, the wheelchair and the typewriter, and you're suggesting sophisticated improvements.

We were working with the old oak wheelchair with the big wheels in the front. We couldn't get people to the tables to eat, and the chairs had no brakes. It took almost 20 years before smaller wheelchairs with brakes came into being. But at least we had something to start with and we could prove the need and prove that some people could use the improved wheelchair.

Lots of our people were too weak to use a manual typewriter. However, they served some need for many people, and we were able to prove that they were useful to the disabled and to the people who

would buy them. They were not third-party payers in those days; they were Rotary Clubs, Elks Clubs, and anybody to whom the rehab people could make a pitch.

Attendee: I'd like to take exactly the opposite tack. It's clear that those of you who are in the rehab business have to address the mass market for rehab. Those of us who earn our living outside the rehab community can have the luxury, perhaps, of looking at the very small specialized markets. For instance, I've gone locally to insurance companies and to the handicapped organizations. They asked why we didn't develop an eye-tracking device that would get into the marketplace. There are very few people taking on the very specialized needs of children who have been put into mental institutions just because of physical handicaps. There is no mass market there, and the question is, am I wasting my time? How do I go about delivering the fruit of many years of work to that very limited community? I have a device that is cheaper than existing devices, and maybe can be made cheaper still. How do I go about getting kids to use it? I'd like many children nationally to use it.

For the clearly software developments for standard computers, you've addressed that issue very well. But you skipped over the issue of a piece of hardware using advanced computers. How do you go to the manufacturer? Do you go after patent rights first? They are very expensive to get. Do you go for protecting patent rights so that the manufacturer will pick it up, or do you go for a development prototype and get into the hands of users but possibly lose all your legal rights to the device? Where do you go for legal help on whether or not to incorporate?

Fischell: My comment as far as patent rights are concerned is that in the United States and Canada, if you get documented and witnessed what you're doing, even though you do not apply for a patent, you do not lose any patent rights. Therefore, you need not go to the expensive extent of hiring an attorney until you get to a manufacturer. Then, if they're interested, the couple of thousand dollars involved would not be significant to them. In the United States the law says the first to conceive and write it down and have it witnessed is the inventor, irrespective of the filing. You must pursue it, however; you can't write it all down, put it away, and five years later come back to it. If you do not pursue it, then you can lose your rights. But if you do pursue it, try to get funding, and try to build it, you lose no rights and you need not have an expenditure. After you have it in publication, you must apply for a patent within one year.

Kitchens: The question has been asked, "How can I get funding from one organization or another?" You never know until you ask.

Attendee: How do I ask? There are a lot of people out here who don't even know how to ask.

Kitchens: In every public library of any consequence there is a dictionary of foundations, there is a description of how you go about contacting them, the kinds of programs they offer and give grants to. The worst that can happen when you ask is that they say no.

Anderesk: I'm with the Education Department's Special Education Programs, Division of Immediate Services and Educational Technology. Our grant programs are applicable for any of the kinds of handicaps you're covering here. Specifically, we're interested in education for the handicapped, as opposed to vocational enhancement or personal life enhancement. This grant program, for the last five years, has given about $4 to $5 million a year in one- or two-year grants for application of technology for the handicapped and has done excellent things. We have been very interested in these last few years in the application of the new and high technologies to the education of the handicapped; the microcomputer is helping education.

Attendee: Is the National Science Foundation going to continue the advanced technology and small innovative grants?

Aller: During the past two years, we processed 153 applications and gave 17 awards, and that ought to be a clue.

Kitchens: If you want to know how to write a grant application, most state coalitions hold workshops on grant writing.

Ott:
There are actually three major areas where we can be competitive, and we have to be competitive to be successful. First, if you have patents, that's good. Second, if you get into the marketing and distribution channel first, you have a competitive edge that, in general, is even more powerful than the patent edge, unless you have a really fundamental, basic patent. Most of the patents can be gotten around, but the person who is successful in the marketing channel generally doesn't get displaced. If one person has a successful product, another person has to have something that's much superior in order to knock him out of the marketing channel.

The third area is being first in manufacturing. You build up a level of automation, and you have a learning curve. As you start getting into production, your learning curve drives costs down. Once you establish a certain amount of lead, then no matter what the competition does, unless they have a major breakthrough, they won't catch you competitively. So get-

ting you there early in your manufacturing, getting an established marketing channel, are just as important — if not much more important — than the patent edge. Don't worry if you don't have patentable material or if it has gotten into the public domain because of publication. You can still give a manufacturer a competitive edge that will make him want to use and make the product.

Attendee: I am involved in a research effort to develop a portable, laboratory data-acquisition system for the visually impaired. We are going about it pretty much systematically. Fairly soon we should be ready to search out a manufacturer to produce this device. Our philosophy is to develop it to the fullest extent possible with the assistance of the visually impaired to evaluate it. My concern is that when we finally find a manufacturer who is willing to produce it, is he going to be eager to redevelop and redesign the system and thus drive the cost up even more?

Fischell: It is not the first tendency of the manufacturer to increase the cost of their product. That's really counterproductive to them. They may make certain changes in it to make it manufacturable. You may have something that a team of devoted people — if you work on it with five Ph.D's, for example — can put together in three years. The manufacturer has to get it put together on an assembly line. That type of change, to make it producible, you would expect.

Every company differs, and you have to watch out for the NIH factor, i.e., Not Invented Here, in which they would like to say, we are going to do it our own way; but you have to live with a certain amount of that. You go to a skilled manufacturer that is also a good business company. They're going to try to make it into a useful and salable product.

Attendee: One of the allies that you may have in the future in this kind of marketing is the banking and financial institutions who are interested in creating home information systems and are not very aware of this market. If the demographics and the market characteristics could be better described to them and put in one place where people could get it, those institutions might be willing to support modifications to the computers that we use as home terminals to hook up to such information systems. The kinds of systems I am talking about are those where you do home banking, home shopping, home information access. I see this as a growing market in terms of making the handicapped consumer visible.

The related point is that some of the companies may be subsidizing homeowners in the purchase of small computer terminals. If there were some way of bringing the rehab agencies to share the cost of part of the modifications of the product, such as required for a handicapped person, that might complete the loop of making the person able to subscribe to the system and be visible as a consumer.

Chairman: If I might make some generalizations, we have talked about two classes of concepts: that there has to be a central place to get information; the other is the need for a fund of investment, venture capital. Does the fund have to be profit-making or could it be a nonprofit-making one that turns back whatever profit is made into taking care of those things that don't make a profit? Then there are the more peripheral things that have been talked about such as the state organizations of one sort or another that already exist, and the concept of the local tailor who fits a device to a client.

Redden: One thing we have available to make use of the tailor shop concept is the great store of knowledge about how to adapt technology available in departments of engineering in schools across the country, in colleges and universities. No matter how well we manufacture technology or on what level it gets to be manufactured, there is still going to be the need to adapt it. There is going to be a need to develop unique kinds of technology for individual people. That's something that's available to us that we need to harness, streamline, advertise, and train for.

Attendee: There might be some kind of a clearinghouse that could make proposals to independent, separate clients who showed an interest in this kind of thing but who need help in evaluating proposals; perhaps a central source that could provide evaluations.

Kitchens: If a newsletter existed that people could either send questions to or write to and say, "I've got this neat widget; is anybody interested?" If something of that sort were circulated among the disabled, the inventors, the funding sources, and the universities, it might be very useful.

Chairman: Computers can operate very well in *n*-dimensional spaces, which people sometimes find hard to visualize. One wonders whether one couldn't have some sort of central facility whereby you cross-match the consumers, the agencies, the devices, and the possible manufacturers, and give specialized printouts to each of those categories. You might, in fact, end up with a matchmaking system.

I wonder if you could comment on something that is analogous to the kind of situation we fear is here, namely, the orphan drug problem.

Redden: That phrase was coined several years ago. It simply means that a drug has been developed that can really help a person, but there not being enough of a market for it, it isn't further developed. That's very true of many pieces of technology that would help disabled people. They become orphans because there's not enough of a market. There are some people in the public media who are ready to write about it. Most of the disabled people I know

who are very successful in meeting life's opportunities are using tricky little things that people made for them in a shop somewhere, not the kind of thing that is going to be mass produced.

Attendee: Many items that are on the market now are things that were conceived in therapy settings all over the country. One woman in New York cataloged and compared them; periodically a handful of sheets would come to all the centers and people could subscribe to them. It contained ideas that were fairly crude. If you had a problem and an idea how you might solve it but didn't know quite how to go about it, you would flip through the pages and find a half dozen approaches to that problem.

Beatty: I do computer development for a hobby. But computers for a hobby are expensive, and I would like at least to regain my investment as I go along. We've been talking about two real problems. One is getting our ideas out into the hands of the handicapped. There is also a very keen interest on the part of each designer or inventor at least to recoup his investment, if not make a healthy profit. That's where we have to examine our own motives, individual by individual. Is our goal to make enough profit to live on or to form our own company, or is it just a hobby?

In my case, I've designed and marketed about five different products, primarily ham radio accessories. My approach over the past nine years to marketing my ideas was to publish them in the ham radio and computer magazines. That gives you an immediate return on your investment. You get $40 to $60 per printed page, with a fairly quick turnaround. If you want to get into the business of trying to mass-produce or at least market to some extent, you have various options. You can offer a printed circuit board; you can offer it already tested and ready to plug in. I have made enough from each project to do two more projects.

My real motive, as far as the handicapped are concerned, is to make it available. What do I do, as a person with no contacts at any universities or federal organizations? What do I have to go through during the design procedures, the marketing procedures?

Aller: One of the problems that has to be solved is that none of the large concerns wants product liability for the use of their articles on an individual. I haven't talked to the corporate management of large computer companies, but I think they would be very concerned about guaranteeing that their computers would do certain things for somebody who is severely disabled. They would be perfectly happy to sell a computer, but they make no claims that it can be used in the rehabilitation area. These constraints have to be taken into account in the marketing. When you begin to do things with the handicapped community, you begin to get into at least three federal regulatory agencies. One way to get around that is to ensure that your claims are primarily engineering claims and not claims of ability to perform a specific function.

There is one additional kind of marketing capability that is all important, "good will." There is a place between a mass-produced small computer and delivery to a small, tiny fragmented market, where little companies, each of whom has, as a way of protecting what they have, a commodity called good will, as well as accountability and responsibility.