INTRODUCTION

Good morning. This morning I'm going to talk to you about a dilemma -- a dilemma facing the U.S. electronics and its derivative industries. But lest what I say sounds discouraging, there is some comfort in knowing others have faced worse. I'm reminded, for example, of the watermelon farmer down in Hope, Arkansas.

(WATERMELON STORY)

THE DILEMMA

Electronics, and particularly microelectronics, represents a technological advance with ramifications which rival any technological change in human history -- the use of fire, domestication of plants and animals, the use of metals, the
printing press, and so on. Its journeys of discovery are as full of reward -- and pitfalls -- as those of Marco Polo, Columbus, or Lewis and Clark. And the growth and development of the U.S. electronics industry is very simply one of the most exciting stories in human history. As part of "high tech," our companies receive a lot of notoriety which sometimes borders on adulation. We are sought after, promoted, and pampered. And yet, in the midst of all the glory, the U.S. electronics industry as a whole and its individual participants face a great dilemma. This dilemma arises out of straightforward and easily understandable circumstances which I will briefly describe.

It is obvious to even the most casual observer that the rapid growth and vigor of the American electronics industry is due to the existence and individual innovation of many separate firms -- everybody doing their own thing so to speak -- which has resulted in rapid technological advance. It is also clear that basic technology has experienced extremely rapid diffusion through the industry. This has occurred primarily through the ad hoc process of people moving from one firm to another -- or to their own new start-up.

What isn't really grasped is that this set of circumstances is neither pre-ordained to continue indefinitely nor unique in history. In fact, it is quite normal in the early stages of any new industry when the technological base is small,
knowledgable people are in short supply, and marketplace distinctiveness is easy to come by -- that is, requires little value added above base technology. In short, in the early stages of any industry, including ours, it is easy to come up with a bit of proprietary technology which will yield a viable market position. As a result, there are many new entrants. This, in turn, results in an even greater rate of growth in technology and wealth.

However, as industries mature, the technological base becomes both broad and deep, and the effectivity of a business depends more and more on economies of scale in productivity and marketing strength. The price of entry for a new competitor (or staying in the game for existing competitors) goes up geometrically. Thus begins the vertical integration and reduction of competition to a handful of gigantic firms with which we are so familiar in older industries. More importantly, technological competition slows and the industry then becomes easy prey to some disaster or other -- economic decline, foreign competition, or whatever. There are obvious examples such as the U.S. automotive or steel industries for any anyone to study.

The dilemma arises in that industry-wide concentration on the secret of early success, namely that of single-minded pursuit of a totally proprietary technological position, future failure of the industry is practically assured.
There's much more that could be said on the nature of this dilemma but that's not my purpose here today. Rather it is to discuss a strategy for resolving the dilemma. There is a basic strategy for continued growth and health of our (or any) industry. That strategy will take the industry far beyond the limits which are otherwise imposed by succumbing to the historical approach found in maturing American industries.

THE SOLUTION - TECHNOLOGICAL COOPERATION

The foundation of the strategy rests on this observation: The single most crucial factor in the continuing health of any industry is the existence of a large number of competitors. And a corollary to that statement is that there must be relative ease of entry for many would-be competitors.

As costs of maintaining the scope and depth of the technological state-of-the-art escalates -- demanding ever larger economies of scale -- there is only one strategy which will allow the existence of a large number of competitors. That strategy is technological cooperation.

Said another way, the only way most of us will be able to remain competitive in the years ahead is by sharing basic resources and developing new technologies through cooperative
ventures. In our industry, the cost of trying to go it alone has long since become prohibitive. The unnecessary waste and duplication of effort in developing base technologies is costing us individually -- and the U.S. as a whole -- billions of dollars a year.

Moreover, every technical or capital dollar spent on redundant basic technology has a double whammy: Not only is it being wasted developing knowledge that already exists, but it's money that's not then available to use in producing value-added technology -- which is the actual secret to continued success.

Yet in the face of all this, people cling to the notion that everybody should compete from the ground up. As already noted, in the early stages that may be fine. But at some point the costs and inefficiencies get too large. IBM spends in excess of two billion dollars per year on R&D and I doubt they feel they're covering all the bases they would like. What, then, of the rest of us?

The general notion of cooperation is something every company is familiar with. Small firms, in particular, know what it is to be dependent -- whether it's on a key supplier or a prime customer. And those major relationships move relatively quickly from ordinary supplier/customer ones to something close to cooperative ventures.
But as companies gain economic power, instead of continuing to move in that direction, the tendency is to believe in the magic of vertical integration. All too often the magic turns out to be very expensive fixed costs, an oversupply of technologically obsolete goods and facilities and a business that seems to go dead in the water the day you write the check.

The principle of cooperation on the other hand is to capitalize on only those assets and resources of someone else's that have value to your operation and don't pay for the rest. This could be called "vertical cooperation" as contrasted with "vertical integration." And it is at the base technology level that this can be most effective.

Too much has been said about the "Japanese model" and clearly it is neither possible nor desirable for us to duplicate it. But that doesn't mean we can ignore the competitive facts either. Right now it takes U.S. companies roughly twice as long as Japanese companies to implement a new technology. The reason is a difference in attitude. They're willing to cooperate on base technologies. We're not. They're willing to let everyone start from the same plateau of basic knowledge and resources and concentrate on adding value from there. We're not.
I want to emphasize this point that to a large degree, companies in Japan share basic resources up to a certain level. Beyond that they compete intensely. This we can learn to do in our own way. We can achieve widespread technological cooperation while having widespread competition among a large number of industry participants.

BARRIERS TO COOPERATION

That is not to say, however, that it will come easily.

(1) For one thing, experience teaches that the management of most corporations is incapable of coping with major changes as they occur. Instead, they react to trouble after most of the damage has been done. And there is no reason to believe that the companies of our industry are basically any different.

In that regard, Business Week has noted that "there's a strong analogy -- with a 50-year time lag -- between what happened then in the auto industry and what's now happening in the computer industry." I doubt the consequences of what's happening will take as long to catch up with us as with the auto industry.
(2) Another reason for the difficulty in promoting technological cooperation is the continuing, seemingly unshakeable belief that cooperation is somehow anti-ethical to competition. This belief is in large part due to the fact that most people don't distinguish between technological cooperation and marketing cooperation, or said more dramatically, between cooperation and conspiracy.

(3) Furthermore, there is, as I've already noted, a misplaced concern for technology viz-a-viz a proprietary market position. Today, if you stop and think about it, companies in most industries, including the computer industry, are selling the same basic product. The differences are in production cost and marketing; in applications and customer services. So belief in basic technology as a basis for proprietary position is rooted more in tradition than logic. In the computer industry an enormous duplication of research and development has been going on for the past 25 years -- yet no exclusionary proprietary technological positions have resulted. Moreover, continued fragmentation and duplication of R&D have made it possible for the electronics industry in Japan to catch up technically.

(4) Still another problem in promoting a cooperative approach is the "not invented here" syndrome which precludes companies from looking at what might be available elsewhere. As a
consequence, most large corporations have no effective method for searching out and evaluating technology. The absence of adequate technology transfer mechanisms just further compounds the problem. Clearly we need more efficient ways to give access to technology that already exists. If we don't, we will continue to stumble along, bumping into each other in the dark.

(5) Finally, if cooperation is ever to take place on a truly meaningful scale, we must end the adversarial relationship which exists between government and industry. Businesses and public institutions should be cooperating in a variety of ways, but the government has a prime responsibility to improve the climate for cooperation. There's very little of value that can come of hanging the threat of anti-trust litigation over every company that explores a cooperative venture.

CONTROL DATA EXPERIENCE

Now, despite the barriers, cooperation as a strategy offers immense opportunities -- as Control Data's example will attest. As a small company, we were always looking for cooperative arrangements. It was some 18 years ago we started to establish a cooperative effort in peripheral equipment. It took eight years to get the first partner. The reason we finally got together was, very frankly, that we were both in enough trouble to see the light.
It has always taken a lot of effort to put a cooperative venture together and the tendency among some companies is still to wait until they're in trouble before even considering it. But companies can't afford to wait. The technology is moving too quickly, and the costs are going up too fast.

The engineering and start-up costs for each product generation continue to rise and if we want to stay in the business, we have to make the investment.

Over the next three years Control Data will have technical expenditures exceeding one billion dollars. Any part of that we can share through a cooperative effort frees up resources that go to other R&D needs. There's no question that to succeed in business you have to spend, but we spend on those things that make us unique, not on technology duplication.

Our experience shows that cooperation is most effective when we adhere to four basic principles:

1. Cooperation must, as I have already emphasized, be in regard to technology. Normal legal and ethical constraints apply to any aspect of marketing: pricing, market sharing, etc.

2. Cooperation must focus on advanced technology -- those technologies that are five to ten years out in front of those in today's products.
3. Each participant must have a clear value-added strategy which can provide them marketplace distinctiveness.

4. And cooperation must be open and with reasonable reward to the risk takers made generally available.

One of the cooperative projects we're most interested in currently, as you no doubt know, is MCC -- the Microelectronics and Computer Technology Corporation, which George Heenan mentioned. It will have within a few years a budget of $75 million.

Part of the MCC strategy is to counter the Japanese government-supported consortium working on the fifth generation computers. Another part is to make available to virtually every American company at a reasonable cost and within a reasonably short time frame all of the technologies developed.

The MCC approach is valid for every industry. It offers an immense source of vitality and growth. It helps to assure the viability of smaller companies -- in fact they stand to reap disproportionately high rewards through the rifle-shot use of new technology, faster adaptation and more market agility.
CONCLUSION

Rather than summarize, let me close with a final observation with regard to strategies for growth of which technological cooperation is but an example. Our world may be more complex than we would like it. And it's ironic that success itself breeds new barriers to continued growth. But the rewards for success go up proportionately as well. To reap those rewards, what is required is new and creative solutions. Looking back for answers just won't work. And for better or worse, the choice we make in that regard is up to us -- each of us.

Thank you.