In Ten Years

Mr. Gates' 1994 speech is an interesting slice of history. It predates *Windows 95* by about nine months, and widespread use of the Internet by a year (there was almost no mention of the Internet during the *Windows 95* beta, and the first release did not include *Internet Explorer*). Most of today's computer users began using computers after 1995.

In 1994, most computers were still 80386-class; the 80486, running at 66-100MHz, was quickly gaining popularity. Modems ran at 14.4 k.b.p.s., but unless you frequented bulletin boards, you probably settled for 2400-baud (2.4 k.b.p.s.). Consumer hard disk drives were smaller than 540MB. RAM had just dropped from about $40 to $6 per megabyte (it's 4MB for a dollar now). While Mr. Gates mentioned CBS, he was at that time negotiating with NBC. President Clinton, a Democrat, had been in office for less than two years, and the Republicans had just won a majority in Congress.

This is an unedited copy. I have shortened several paragraphs, formatted the text, and highlighted a few words, but it is otherwise as it was written. There is no copyright notice to be found.

Bill Gates' Keynote Speech Fall/COMDEX
Alladin Hotel, Las Vegas, Nevada Nov. 14, 1994
Transcript

It's great to be here at *Comdex.* It's a chance for us every year to get together and see all the change that's been taking place. With this fast moving industry the pace of change has never been greater. In fact, we can find change everywhere today. With last Tuesday's election, even Bill Clinton and the democrats are facing some change. The changes now are being discussed not simply in the context of data processing or the computer industry but in a much broader context. In the context of how we communicate, how we organize, how we educate, how we run business. The changes that would be brought by this will go well beyond the group we find here. However, this industry will be at the center of all of it. With software innovation and competitive hardware, we'll be shaping this so-called information highway.

Now, this next era that we're moving into is quite different than the original PC era. That one was done simply by having a few companies that believed--spring it on the world--and it was a complete surprise. Here we have thousands of companies and it's talked about all the time. You can hardly pick up a magazine without reading about what's going on here. It's often cast in the light of who's doing a deal with who. What companies are getting together. Who's getting ahead. Who's winning and who's losing. I don't think that's really the context that helps us understand where we ought to go.

I think the best approach is to really look at what will it be like once technology is pervasive. What will the benefits be? Then step back from there to see how we can get out to that. I decided to take this year's speech and dedicate it to that vision, to showing those scenarios. That means I'm going to go this full hour without mentioning a single Microsoft product--if I can control myself, that is. Really just look out ahead. I did do this one other time in 1990 when I introduced the original "Information at Your Fingertips" concept. There I included some fun scenarios where people were doing a lot of things. Most of what I showed in that presentation has already come true today: object orientation, document centricity, fax/ mail integration, improved ease of use. One notable thing I had in there that has not taken place is **pen computing,** the **tablet computer** where signatures and handwritten notes were being recognized. I still believe very much that that will happen, and will be important, but that's one case where the time frame wasn't exactly right.

The last four years have seen very substantial growth in this business. Every year the increase is fantastic because we're at a selling rate worldwide of over 40 million PCs a year. Many people have predicted that we had reached saturation. That there wasn't the opportunity to keep going. Yet, whether it's in business or home or in education, the growth has been there and I expect it to continue. It is a very healthy situation. Lots of winners and losers, but an industry that's not only growing from a revenue point of view, which we see here, but also from a capability perspective. As prices are coming down, computers and software are

having a broader and broader impact, empowering people with very rich information tools. Key to this growth is the pace of innovation. One way that we can see that, that's most dramatic, is by looking at what's happened to the microprocessor.

Going back to the original PC we see that the *8088* had **.33 MIPS** of capability. It only let us do a very limited number of things. With the *286* we got enough power to move up and do applications that had never been done on 8 bit PCs. The *386* that came in 1986 for the first time allowed us to do graphical interface and that's when Microsoft and many companies put out graphical-type products which have now moved into the mainstream.

After the 386, we moved up to the *486,* taking us to **20 MIPS.** Here we started to see collaborative applications, sharing of rich information between applications. Machines that could really run those applications together and give you substantial benefits. Now this year we've seen the emergence of the latest generation, the *Pentium,* that takes us over **100 MIPS.** That pace of improvement is exponential improvement. It's not just a linear increase, it's exponential. It's very hard for us to appreciate what that means. In fact, this pace is going to continue. So as we look out ahead it's hard to say specifically what the performance will be, but there will be incredible performance that applications will be able to take advantage of. We'll use that to the benefit of the user. To search out the important information. To provide new interface techniques.

There is no slowing as we look at the next decade in terms of the processor speed or memory size or storage capabilities of these systems. It's really up to us to think, how do we want to take advantage of that. Of course, at the center of this will be the idea of digital convergence. That is, taking all the information--books, catalogs, shopping approaches, professional advice, art, movies, and taking those things in their digital form, ones and zeroes, and being able to provide them on demand on a device looking like a TV, a small device you carry around or what the PC will evolve into. All of these form factors will count. But we'll need to have a common architecture so we can take all the authoring, the work done to prepare this media and make it easily available to people using these different devices. So this is what we're reading about all the time, with all the different stories.

The communications companies have to think about this because it is their future. Media companies, from TV to cable, to Hollywood studios, need to get involved because it is their future. The consumer electronics industry is coming into this and will need to be one of the ones building these devices. Certainly, for the PC industry, this is what it's all about. Lots of advances, lots of things that we can draw on to have growth in years ahead. So even at 40 million units a year we still have lots of frontiers to conquer and lots of impact.

This video I put together relates to the title of today's speech which is Information At Your Fingertips 2005. I picked that year not because that's when you'll finally start to see these things happening. I picked it because I think that's a time frame where these devices will be pervasive. That people will expect them. There will be everyone using them. Small businesses, consumers of all types will have them. The critical mass of information will be there to make them very straightforward to work with and get a lot of power out of them. This 2005 is a decade away.

I think there's a lot of people who are going to say that I've been too conservative here because, in fact, I'm not showing any technologies that need to be invented anew. Everything here you can find in some limited form already. Some people will criticize this as being too far out, too futuristic. As long as I get a balance of people criticizing it equally on both counts I'll feel like I've hit the right point.

If we look to our past, our belief in graphical interface, which we announced in 1983, it took seven years to happen. Our belief in CD-ROM technology, where we held our first conference talking about that in 1986, it's only this year that you can say that's taken place. So we're often optimistic. But I think the key here is not so much the specific year but having the scenarios in mind and having an agreement as an industry on what the opportunities look like. Let's go ahead and start the little story that I've prepared.

[video]

One thing we can see that hasn't changed between the Twin Peaks scenario I did four years ago and this one is that lots of people are still drinking coffee up in Seattle. First we saw Becca, the policewoman, using her little **wallet PC** in order to buy the latte there. This small business person who's got the coffee stand has a display and she was simply able to push a few buttons and transfer currency over to them. We call it the wallet PC because it's capable of really replacing everything that you carry with you and more. So that getting messages, seeing the latest news, seeing a different location, keeping track of your schedule, keeping hundreds of pictures of your children stored there, all of those things are easily possible with this kind of technology. Now, here, she used just the **infra-red** to transfer the currency across using a secure protocol. It's easy to think of this as simply a grownup pager that will cost only a few hundred dollars, but using the latest chip and display technology, and will have the kind of power that she's showing here.

The next thing we saw was the **flat panel display in the vehicle.** This means that mobile workers of all types will be able to collaborate together, call on expertise throughout the world, bring them up. Not just see their face but look at information, like the video we play here and data banks that will be at their disposal. The advance in display technology is a big part of this because in order to carry them around and use them in the way that we use paper today they'll have to be small and light and very high resolution.

One of the things we called up on this display was a map that let us see exactly where we were. You could see on this map the different police cars around the city, the traffic conditions. A map will be pervasive in all these applications, where you're seeking out a store or hotel or restaurant, you'll be able to get guided along the way in a very straightforward fashion. It's just one data type that people will be familiar with and they'll come to expect in all the interactions they have. Let's go back and see how this story unfolds.

[video]

Here in the home we see a couple of different devices that have been incorporated. A little **wall panel display** which based on the icons down at the

bottom can be used to manage security, temperature, different lighting scenarios. Here it's being done for lighting and you can pick the particular activity you're going to engage in and have all the lights the way that you want them. Over at the TV set we saw that whenever you stop watching a show you have a choice that you can come back and watch the rest of it later. You're no longer tied down to the particular schedule of where that show comes out on.

It's not just movies, it's also music, any type of show, educational video, anything you want to do, you're in control. We saw the last minute of the *Letterman Late Night* show. Then we moved over and saw the personalized menu that has been set up for this user. What she's done is indicated the shows she likes and the things she does very often and put those onto her home page. You can see that these different icons light up when a new show comes in. In fact, if you get behind multiple episodes you can even have a count of the number of episodes that you haven't seen there. We had a special Oprah show there.

There was a little icon where you had a chance to send in a message and tell your story about meeting people in **cyberspace.** Here we're showing the kind of control that an individual will have over this system. Of setting it up so they only have to pay attention to what they're interested in.

Next, as we got into the *CBS This Morning* news show we saw how a producer of a show could use this flexibility. We worked with CBS to come up with some examples of how they would use buttons that you might click to go into depth on a particular story. Here we have things like the weather. Some people are really nuts hearing about the weather. Personally, I find it somewhat repetitious and I'd rather skip over it. But there it is, it's an option. Take an area like sports. You might want to hear a lot more about your favorite sport or just skip over the sports that you don't really care about. It's the creators of the news information who have a lot of control in terms of giving you those buttons as well.

Then, over in the kitchen we had Jackson browsing around out on the net trying to get his homework done at the last minute. When he started out he went up to a library to find out about pre-Columbian art and in fact he traversed a lot of links in his exploration here. He went up to the local university, University of Washington. He went out to *Library of Congress.* Then he linked over and got down to a museum in Mexico, *the Museum National,* that specializes in pre-Columbian art. We see here an ancestor of one of today's popular politicians, **Ross Perot,** that's why it's called the Peru family. He's going to be interested in finding out where he can get a reproduction that's something like this.

Out on the **network** there will be all sorts of third party services to help you find what you want. You'll be able to get referrals from your friends. You'll have people that are the equivalent of *Consumer Reports* writing things up. You can hear from buyers of the similar product, what they thought about it. All sorts of ways to be directed to what goes on. In a sense we're taking the very mechanism of the marketplace, the matching of buyers and sellers, and making it far more efficient. In this case Jackson was choosing the proximity, how far was he willing to go, how much was he willing to pay, how similar did it have to be before he'd be interested in a particular choice. It found for him a gallery in downtown Seattle that he's

going to be interested in going down to and buying a reproduction. So let's go see what happens when he goes down there.

[video]

We saw in the wall of the gallery there a very nice display of art. What this means is that art will be far more approachable than it is today. The ability to have this kind of passive display, have it in your home, and call up art of all types, learn about it, learn about the story behind it, I believe, is going to make art more interesting to a broad range of people than it ever has been before. You'll be able to download the bits. All of these creative works will be stored as objects. With the object will be stored the information about what you have to pay to license it, to use it in different ways, or who you would contact if you want to get a broader set of rights. This kind of object approach is going to mean that creative people have a much broader market than they have today because the marginal cost of sending it across the network will be very low and the opportunity there is quite dramatic.

As we moved into the office we saw on this rather cluttered desktop all the business information that this gallery owner deals with. He's got his employees, he's got his suppliers, he's got his sales plan. Actually, down at the bottom he's got a little graph that shows how he's doing in sales. He's got a little icon that has his printer in his phone so he can control those things. He's got a little diagram which is the layout of the gallery. Here we don't have any more running applications, whatsoever. Instead of thinking of running applications you just think of the data and the applications are brought in. We also have here a very advanced feature - **long file names.** I think in 10 years that will probably be commonplace.

We also saw that from this device we could do video conferencing with somebody at a public phone booth. These terminals will be everywhere. So wherever you find a pay phone today, wherever you find an automatic teller machine, on the seat back in the plane, in your hotel room; many, many places you'll have a general purpose terminal to get directions, buy tickets, look at schedules, look at maps, perform banking transactions or do the kind of video conference that we're showing here. It'll be out there accessible wherever you go. Let's see how Jackson is going to do on this little homework assignment.

[video]

What Jackson put together in the classroom is the kind of animation that today we'd only associate with a high budget film. In a similar way that what used to require typesetting and very expensive tools to make a professional document that we brought down into the hands of the average user with advanced word processing tools now will be bringing these animation capabilities down to individual authors. What this means is not only students but teachers and anyone will be able to put together rich things. Inside Jackson's presentation we saw lots of images that he pulled together off the network. That's another key point about this digital world--taking someone else's work and adding to it, picking the subset you want, blending it with another one is very, very easy in this environment. For the first time we'll see teachers sharing their ideas, reviewing to say which is the best and then tuning it for the particular thing they're trying to do and making it

compelling in a way that will allow them to compete with the production values of TV that kids are exposed to so much of the time.

Moving to the ambulance we had a collaboration going on here. In a sense you can say that this is the most mission critical application, dealing with a health emergency. We had three different people, the nurse in the emergency room, the doctor who was on call and the gentleman in the ambulance, all trying to decide what to do. It wasn't just a video image that was being exchanged there. There was an immense amount of data being made available. For example, the nurse was getting advice on this type of problem, what steps should she go through. In fact, we drew that material from a CD-ROM title that's been published about the human body. We called up Jackson's phone number. We called up his medical records. These people could have been anywhere. That doctor, for example, could have still been at home, providing the advice and yet able to help out in this way. All kinds of business activity, whether it's designing a product, dealing with a customer problem, presenting a product opportunity, all of these can be handled very well with this kind of large screen display and the user interface that we're demonstrating here. Now, let's go back and find out how Jackson's doing.

[video]

Several times here we've seen voice recognition play a role. When we're filling out the assignments for the officer, when we're taking transcription here. I do think this will become a really central way of interacting with the computer. The advances in performance that we've talked about. The advances in software that certainly 100 companies or more are working on as well as the kind of context we get by understanding natural language. By having applications explain their state and what's likely to be coming in and feed that back into the input system so it can pick the right words in this kind of environment, all of that will come together.

We'll see **speech command** capabilities. We'll see **speech dictation** capabilities as well as, of course, the ability to store speech and play it back which is very, very straightforward. Here we can actually see the words being recognized as they're being put together there. Speech won't totally replace the keyboard. We'll still have the keyboard. And we'll have different forms of pointing including even handwriting that will be used to work with these devices in a seamless way. We also saw an advanced use of the business desktop. Here we have a database but it wasn't like today's databases, it was an **object oriented database.** It has pictures of the suppliers. You could just point at the icon there and make contact with that supplier or see your status of orders from them.

Everything's kind of integrated together which, by putting the object capability into the file system itself and the operating system we'll have the ability to pull things together in this fashion. We clicked on a pop-up menu on this and we chose the common ways we want to filter it, in this case choosing pre-Columbian. The ability to navigate through doesn't require thinking about different forms of storage because all the things have links that span from one to the other. Now, we're about to see the end. Let's see how this turns out.

[video]

Now, wait a second, what kind of ending was that. I think in the future with something like this you ought to be able to choose the ending. I ought to be able to take my little wallet PC here and say that I'd really like to see the alternate ending.

[video]

So we got our happy ending there. What we've seen here requires a number of things to come together, a number of building blocks to make it all happen. The first is we need **very high speed networks** and it's going to take lots of competition that has to be unleashed through deregulation to get people building these at full speed. We have the wired network that goes at very high speed but we also have the wireless network that's being formed through things like the auction that's coming up for the PCS Spectrum. We also need a wide variety of hardware, people who could make that little inexpensive, small device. Some of those will have voice capability, some won't. The screen displays will come in every size you can image: wall size, notebook size, desktop size. Many companies will participate in that. These include classic consumer companies as well as all the PC companies. We'll also need a lot of new software. At the operating system level, at the authoring tool level.

We've got to really empower people who are not technologists to reach in and do their work here with a lot of new ideas and simplicity being brought to that authoring environment. Most importantly, we need great applications and services. This means hospitals thinking about how they can be involved. Or any company that sells their products, thinking about how they work together with their customers. I say that we are seeing excellent progress in every one of these areas. That's what makes me confident that a decade from now that it will have been brought together. On the software side the excitement and innovation around both CD and on-line services is a big part of where the new ideas are coming out.

We have a number of new start-up companies doing CD titles and bringing them to all sorts of subject areas. For example, we have a *"3D Landscape"* title from *Books That Work,* where you can not only design what your garden looks like you can see what it's going to look like as it grows years into the future. For kids, we have a title *"Freddy the Fish"* that comes from *Humongous Entertainment.* It takes the animation and graphics capabilities of the PC to a new level by sitting on top of some of the elements in the graphical system. Another great new title from *Seventh Level,* who's done very state-of-the-art animation is a *Monty Python* title. Of course, that draws on the TV series and the movies that were done there.

Besides start-up companies we have classic media operations also saying, how can they take the work that they do in different mediums and use interactive as part of that. From Turner, working together with Swifte, we have their Gettysburg title where they put out an interactive CD that goes along with the movie and TV show. Another example of this is *the Discovery Channel,* which when they did their Normandy series put out a CD that'll let you interact, get into a lot of depth that simply wouldn't fit into the length of the TV show. The CD gives us a way of having lots of information in audio and video together.

Another platform for innovation certainly is network and dial-up. On the **Internet** we're seeing an explosion of **web-type pages.** Even though… the *White House* has recently come up and did some excellent work. They let you listen to Bill Clinton. Go out and see different government agencies, fill out forms. Everybody's getting involved. Even small companies. One of my favorites out there is a little company called *Virginia Diner,* let's you click and see pictures of their famous peanut brittle. You can even *fill in a form* and order that and they'll send it to you right away. It's this kind of experimentation of what's popular, how should it be presented, getting the tools out there, that's going to get us to the critical mass of information that makes people want to have electronic access everywhere they go everyday. The impact of this is quite substantial. It's not just movies on demand. People think of it that way and they mislead themselves. Because that alone would not be enough to justify this investment. People think of it as computing but I think that also misleads us because it's not really about computing. If it's about any one thing it's about communications.

Taking today's phone system to a new level where we not only have video but we have the intelligence in the system to help us locate things, to follow links, to store the information so we can get at it when we want to. The kind of electronic commerce that will go on here of picking real estate, finding a professional that you want to work with, allowing people with expertise even if they want to stay at home most of the time to offer that expertise and work through the screen, it's really very, very different than anything that's happened before.

Even entertainment is quite broad. TV shows, music selections, gaming. We'll have TV game shows that you can bet along with the contestants. We'll have multiplayered games for bridge and chess and role playing games. We'll even have gambling. So if you want to lose money very efficiently without coming down to *Las Vegas,* you'll be able to do that right there on your screen device.

The government's role besides opening up the regulatory environment will be to participate as an application provider. Going in and filling out forms, renewing your driver's license, that will be very straightforward here. No more lines involved in that. Having transparency to the political process, seeing the bills that are being debated, seeing who's saying what, very straightforward here. Finding people who have a common point of view and organizing politically will be straightforward.

Medicine is also a big part of this. Just those electronic records moving around so that experts can quickly see what your case is, that will make health care not only less expensive but far more effective than it is today.

The most important opportunity, I think, is in this area of education. Education is what we use as a society to provide equal opportunity, to help every individual realize their full potential. I think for the first time these tools will eliminate some of the labor intensive and individual aspects of that and allow for a sharing that's never gone on before.

I've been out many times talking about my excitement about this information highway era. Every time I speak there are a number of concerns that come up. This is not without its areas that we have to watch out for. First of all, ease of use. A lot of people think that maybe they'll be the only one that won't be able to use the

system because they've seen things like `config.sys` and VCRs that they find very difficult today. That's a challenge to the industry. I happen to believe that as we move and take graphical interface and go to the next level, which I'll call the social interface, where you interact with a personality that you've chosen and it remembers what you've done that we'll be able to solve that problem.

Privacy is a major concern, about the system knowing all these things that you're doing. We need to use both technology and policies to control, to make sure that people are confident that they can use it for all of their activities.

Universal access is a serious concern. What about people who live in rural areas. What about people who aren't rich enough to buy these devices. What about people who have never been exposed to the PC. Some of those questions are political questions of how will it be subsidized for various users as it reaches out into the mainstream.

A lot of the worries that people have really come down to a fear of change. Will their job be displaced. Is there something they ought to be learning about. I think that's why, even though all of these articles are kind of like a mania, a feeding frenzy, I think the focus on this debate and getting people thinking in advance, how we want to shape this thing and what they ought to do individually is a very worthwhile thing. The opportunities here are incredible. This is where the PC industry will find its growth. We can be at the center of this and we will be as we take our architecture and expand it out to those new form factors and move into new applications.

It's not just about productivity tools--communication of all types. Whether it's within a particular application like Design Work or whether it's creating new kinds of markets, those things require lots of companies to step back and take a new look. Dozens of killer applications. Every company is going to have to avoid business as usual here. There'll be lots of new companies that grow up to do very well here. The only big companies that do well are ones that are going to be entrepreneurial, break out of the boundaries and make sure that they obsolete their own products instead of having other people come along.

This is not something that's just happening in the United States. There are great ideas about how this should be used everywhere in the world. The awareness, the discussion of it, is at a high pitch, even in countries that are newly converted to be market economies. In some cases they'll invest in the infrastructure because they're starting really from scratch and want to make sure they're not left out. All of us should reach out and find partners not only in this country but in every country in the world.

The opportunity here is unbelievable. Looking back I think we can all say that the PC industry has come a long ways. But it's really nothing compared to what's going to happen here. I am more excited about this and these possibilities than I ever had been since the beginning of the PC. It's going to take thousands of companies from several industries to make this happen. Everyone here is going to have lots of opportunities arising out of this. Thank you.