

The Economic Club of New York

365th Meeting
93rd Year

Stephen Case
Founder, Chairman, and CEO, America Online

Dr. William A. Haseltine
Chairman, Human Genome Sciences

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Questioners: Susie Gharib, Co-anchor
Nightly Business Report, PBS

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Introduction

Chairman William J. McDonough

Good evening ladies and gentlemen, and welcome to the 365th meeting of the Economic Club of New York in this, our 93rd year. People looking at the world economy are especially perplexed by two questions. Why is the economy of the United States doing so extraordinarily well and especially why is it doing so much better than all of the other industrialized countries of the world. Tenth year of an economic expansion, longest in our history. Very low unemployment rate, very low inflation rate. I would suggest that it isn't just because those of us in the public sector have done the right thing – excellent fiscal policy, some modesty aside, very good monetary policy. But rather that, the reason that the U.S. economy is doing so very well, and especially why we are doing so much better than other countries is a result of two characteristics of American culture – both involved in our attraction to change. We have the most flexible labor force in the world. But perhaps even more important, we believe in rewarding highly creative risk-taking people. And in exploring that theme, the Economic Club thought that we would try to attract two of the leading figures in information technology and in biotechnology. And we have certainly succeeded.

Only in America could a young man begin as a product manager at Procter & Gamble and very soon be the Founder, Chairman, and CEO of America Online. Were I not a public servant, I would point out to you that very soon he may be involved in an even bigger company with my

good friend, Jerry Levin.

In the biotechnology field, only in America would an accomplished PhD in biology get interested in medicine and then continue that interest in creating and being Chairman and CEO of Human Genome Sciences.

Of these two outstanding entrepreneurs, we are going to do the logical thing and follow alphabetical order and we have the great good fortune of beginning with Steve Case.
Steve...(Applause)

Stephen Case

Founder, Chairman, and Chief Executive Officer

America Online

Thank you. It's certainly quite an honor to be here. I've heard about this organization for many years, and it's a pleasure to speak here. And when I was invited to, I certainly wanted to be here; although that's only one of the reasons I'm here. The other reason I'm here is I thought if I agreed to speak here and it was a black tie event, finally I'd get to see Jerry Levin wearing a tie. (Laughter) Jerry has this "no tie" going and it's a little unnerving for me as we aspire to be the most valuable and most respected company in the world. But I'm pleased to see that he's here with a tie.

In a moment, Bill will talk about the increasingly exciting world of biotechnology, and I have to say that the mysteries he and his colleagues are now decoding in human genetics are truly mind-boggling, even for people in my world, and we like to throw around big terms like teraflops and gigabytes and things like that.

But I think there is a logic to having us both here because in many ways our fields are quite related. Indeed, highly intertwined if you look at it in the context of the history of human development. That history is very much about the parallel development of science and medicine, of philosophy and religion, and of art and communications. But the greatest advances we have made as a world community have come when we have built bridges between these critical lines of human growth, connecting ideas and practices, and ultimately improving people's lives.

So I'm very glad to have this chance tonight to discuss some of the ways our respective industries – high-tech and biotech – both together and separately are changing the shape of the future. Not only by changing what we know or what we do, but also by transforming the nature of the questions we ask and the ways we go about answering those questions.

Now I say this all with a big dose of humility because, as some of you may recall, the American movie mogul Samuel Goldwyn once warned, "Never make forecasts, especially about the future." (Laughter) But I feel I am in pretty good company here because for now nearly 100 years the New York Economic Club has been a world-class forum for talking about the future. Indeed, I wonder about some of those original members back in 1907 of the New York

Economic Club. When they first held this meeting before there was radio, before there were telephones, before there was television, before there were computers, before those had taken hold, what would they think if they were here tonight? What would they make of the past century of technological advances, the way these developments have changed our lives and will continue to change the world in ways we still can't even imagine today?

Let's take the internet. Ten years ago, only scientists, researchers, and a handful of enthusiasts had even heard of it. Just five years ago, the worldwide web barely existed. There was no talk about a new economy. And the letter "e" was just the fifth letter in the alphabet. Today, we all know that "e" has become a prefix for a mass of social and economic transformation – not only here, but all around the world.

Some of you may have seen the recent *New Yorker* magazine. The cover shows a group of commuters on their way to work – one typing on a laptop, one chatting on a cell phone, one speaking into a handheld recorder, one listening to a portable CD player, and one preparing breakfast in what appears to be some kind of wireless toaster. (Laughter) Now perhaps in New York, this isn't so far-fetched. And in truth, it's really not all that far off. Now I must admit that AOL does not yet extend to these toaster things, but we do enable people to access the internet whenever they need it, wherever they want. And it's not just a cartoon; it's really part of everyday life.

These days these trends connecting PCs and TVs and stereos and telephones are what's increasingly called convergence. And it's already changing people's expectations of what technology can and should do to improve their lives. These expectations extend well beyond how people want to use their televisions or their PCs or their phones. At heart, they're about how people want to live their lives and what they want this new world to look like.

Let me cite just two examples. Think about the explosion in online giving which some call e-philanthropy which is giving people a more informative, more convenient way to give back to their communities. In just six months, a website we created for online giving has channeled a million dollars to individual gifts to charities in average donations of more than \$150. And even more importantly, has channeled tens of thousands of people to volunteer their time to organizations that need their help. Or think about the e-government trend, using the internet to connect people to their elected officials and to help governments at every level provide citizens with more accessible, more convenient services, like online voter and driver's license registration.

And the internet is changing the very nature of governance all around the world. It is blurring old boundaries between the public and the private sectors. It is challenging business and government to interact and learn from each other in new ways. It is even transforming the notion of national sovereignty by changing the nature of commerce from a system governed by local rules to one increasingly guided by global principles. All of this is happening at lightning speed. Sometimes

faster than public policy and private sector practice can keep pace with them and certainly faster than some countries and communities around the world can keep up with them.

Because I know we'll have some professional questioners here tonight, I'll just throw out three questions that are on my mind, especially because they are questions that don't yet really have clear answers. But they're all questions we're going to have to face, not only in the internet industry but also in government, the private sector, and in society at large, to build a truly global medium and extend its vast economic and social benefits to every country and every community.

The first question I would like to pose is economic, and I'm sure it's one many of you ask yourselves, and that's whether the increasing productivity we are seeing in our economy as a result of these technological developments is systemic and sustainable, or whether it's a short-term phenomenon. In the United States, information technology is now driving a third of our economic growth and it's helped fuel the greatest surge in productivity in a generation. In developed and developing nations, the internet has given companies unprecedented access to the global marketplace, reducing barriers to entry, cutting costs, and extending brands well beyond traditional regional boundaries.

Alan Greenspan recently observed, perhaps here, that new internet technologies appear to be producing these productivity gains by driving risk and uncertainty and, hence, waste out of business processes. How? In his view, because businesses have better and more timely

information about their customers. And I think he's exactly right. We know more about consumers and their needs than ever before. We're in more direct contact with our customers than ever before. So we are more efficient in manufacturing, inventorying, and distributing products than ever before. The consumer has actually brought about this dramatic restructuring of businesses and increasingly our economy. But are the productivity gains we see today going to continue? In my view, we've still just begun and businesses are only just beginning to transform themselves in very fundamental ways to take advantage of the internet.

Let's take the automobile industry. It's long been a leading edge user of computers in the design and manufacturing processes, but today we're on the verge of a truly revolutionary transformation driven by e-procurement, e-marketing, and e-distribution. When consumers can connect to the assembly floor to demand vehicles customized to their personal transportation needs, I can only imagine the proliferation of vehicle sizes, shapes, and performance characteristics that will result. Transforming an industry shaped by mass market techniques revolutionized by Henry Ford to a world where they are a much more personalized industry. In short, I believe that the current productivity surge driven by better knowledge about consumer tastes and preferences will continue and potentially grow as more industries fundamentally rethink the premises of their businesses and convert from this world of mass marketing to more personalized marketing.

If the first question is economic, the second has to be societal. And that is how can we ensure

that the internet knits us together as a people and as a world and does not divide us along class, racial, or cultural lines. Here in the United States and around the world, there is a genuine concern that the rapid pace of globalization and technological development is driving greater global inequalities, making some countries and communities super-connected while others struggle for even basic access benefitting high-tech urban workers and college-educated people while leaving rural areas and unskilled workers and their families behind, and this is a well-founded fear. At home, 75% of households with incomes over \$75,000 have computers, but only 10% of our poorest families do.

And the United Nations recently reported a massively unequal distribution of internet access and use around the world. Let me give you just two examples. The United States has 100 times more internet users per capita than the Arab states. And Europe has 70 times more users per capita than Sub-Saharan Africa. This digital divide is an international crisis in the making on an economic level, on a social level, and on a very human level. We cannot afford to let the internet be a tool only for the privileged few, not the many, or we will all inevitably lose. And it will take an international crusade to truly bridge this digital divide.

Now, I must say there's some good news. There's some hope and there's some progress. Next month, for example, the leaders of the G8 nations will meet in Okinawa at a summit dedicated to developing a strategy to extend the benefits of the internet age to all nations and all people. The leaders of these countries know that the internet itself is a tool to connect buyers and sellers, rural

and urban communities, families and friends around the world. And through tele-medicine, distance education, and other internet-based techniques, the internet can help address traditional disparities in healthcare delivery, and in education.

As I see it, our challenge is to take the great complexity of our world's government structure divided by national boundaries and disparate public and private sectors and adapt it to a shared vision of improving the lives of people everywhere. This is a problem of policy, not of technology or resource, and the sooner we get to it, the better.

So this leads me to the third question of the evening, and it's about governance. In a world where the internet is boundary-free and global, how do rule setters who are national and local ensure that matters of global concern are being adequately addressed? As much as the internet has challenged industries to adapt and change, it's rocking the way governments, and we in the private sector, need to think about our roles and also about our responsibilities. We need a sea change in our thinking, in our policies, and in our practices in every segment of society. We need to develop a framework for policymaking across the traditional boundary between public and private sectors. We need a framework that inspires trust and confidence among governments, business, and citizenry. And we need a framework that is suited to the fast pace and global character of the internet itself.

This is an opportunity to develop a new model of governance that is not based on confrontation

but rather on collaboration. I can suggest three ways we can get there. First, we need to ensure that the new technology gives individuals more voice and say about products, about politics, and about policy. We, as business leaders, should put consumer choice and consumer protection at the very top of our agendas. Online, consumers have more power than ever before. And you can see that looking at the way the financial industry has changed, as individual investors can now access the latest research reports, chat online with leading analysts and transact with the click of a mouse. Or look at the way parents can now use advanced parental control technologies to decide what their kids should or shouldn't do when they're online. We ought to be applying the same principles of individual choice and empowerment throughout the private and public sectors – in healthcare, in education, and in many other fields.

Second, we should not take a business as usual approach to these thorny policy issues. The internet is transforming our daily lives and our businesses. It should also be transforming our approach to public policy issues. We need to rethink public policy goals through the fresh lens of an internet-centric world. Let me give you two examples that really highlight this challenge – intellectual property protection and taxation.

Since our Constitution was framed, every generation has had to strike the same kind of balance between the property rights of innovators and the interest of consumers in sharing the fruits of that innovation by having access to the best and most affordable range of new products and services. Today, the explosion of the online medium and expansion of broadband technologies

increase the challenge considerably. Faster computing speeds and the growth of broadband technology now make it possible to zap copyrighted material, whether it be movies or music to millions of people all around the world in just seconds. So we, in the industry, have to work together with public officials all around the world to formulate intellectual property policies that strike the right balance in this new internet century. The stakes are high and the need to strike that balance is great.

And with respect to taxation, governments are rightly concerned that businesses without boundaries put at risk the revenues of governments limited by boundaries. But the zeal of governments seeking to tax those outside their boundaries must be matched by an equal passion for uniformity and simplification. So tax collection costs resulting from thousands of tax-collecting jurisdictions don't chill the very energy that is driving our new economy. We favor a neutral taxation system that neither favors nor disfavors internet-based commerce. And in a world where businesses need to shoulder more responsibility for policy decisions, we think more companies should step forward to assist governments in these reform efforts.

As these examples demonstrate, we need to work cooperatively with governments to establish policies and practices that balance sometimes conflicting laws and regulatory structures around the world – from creating national communication infrastructures that are open, accessible, and competitive, to lower tariff and non-tariff trade barriers, to promoting modern financial payment systems and more efficient distribution channels. If we're going to build a truly global medium,

we must tackle these challenges together with a renewed commitment to cooperation between countries and corporations and communities.

Last year, CEOs from around the world, including Jerry Levin, came together to form GBDE, the Global Business Dialogue on E-Commerce. We hope this ongoing discussion will help set international standards from security to privacy to taxation and those will help the internet continue to thrive.

Finally, policies should be designed so that every community in every country have access to the power of technology and can participate fully in the economic and social changes that it will help bring about. All of us need to work together to find new ways to teach young people the high-tech skills they'll need to succeed in this new workplace and to give people of all ages access to the tools they'll need to keep on learning throughout their lifetime.

Only in an environment where there are common goals and a shared sense of purpose will we be able to lessen the growing anxiety over the pace of change and globalization and maximize the benefits of the internet age. Now that's a beginning, and I know it's a lot to reach for, but it is within our grasp. Building a medium that really benefits people's lives and really brings us together as a world community is a matter of public policy and a matter of will. It is not an impossible dream. As the inventor Charles Kettering once said, "My interest is in the future because I am going to spend the rest of my life there." I, for one, am looking forward to this

exciting journey. Thank you very much. (Applause)

Chairman William J. McDonough: Thank you, Steve, for an extraordinarily thoughtful speech. It is now my pleasure to present to you Dr. William Haseltine, the Chairman of Human Genome Sciences. (Applause)

Dr. William A. Haseltine

Chairman, Human Genome Sciences

Well, it's certainly a great pleasure to be here this evening. And I'd like to begin by thanking the man I think is responsible for my invitation, Bob Hormats, a loyal friend, a board member, and a great human being. And it's a special pleasure to be here because in the past I've been in the audience listening....(INAUDIBLE). It's also a great pleasure to share this podium with Steve Case who, as you have just seen, has laid forth a vision of the future and a challenge for all of us to reach for to make this world a better place through communication – not just better for the wealthy, but a better world for all of us who inhabit this planet together.

Our talks have, or our work and our talks in our lives, have many parallels. Steve mentioned a few. One of the ones he didn't mention is that we're both from Washington, D.C. We are pleased that Washington, D.C. is bringing you tonight something other than taxation (Laughter) and some other grievances of which we're well aware. It is not by chance that both of us, who

represent this new, new economy, come from Washington. There are now more workers in high-tech and biotech in our community than there are federal workers. It's a sea change for that part of the country. And it's a change that we feel, in the outskirts of Washington, in a very vibrant way.

I could not do the work that I'll describe to you today if it had not been for the revolution in computation, the revolution in communication. And I couldn't do the work we do on a daily basis without very substantial improvements in what we call an internet, which is what you call the intranet, made internally. When we talk about productivity, and I was listening to Steve talk about productivity, what the story, part of the story I'll tell you tonight is about, is dramatic increases in productivity that come from three confluent technologies – information technology, and computers and the way we handle it, instrumentation technology, and the technology of the life sciences. We have combined those three to spark a truly revolutionary change in medicine.

Now, as we're all aware, this is an historic moment for biology and a milestone in human understanding of ourselves. We are about to have revealed, through either the work of the Human Genome Project or by other efforts, the complete book of life in terms of the text of our inherited genetic information. That is a truly revolutionary milestone. It is a marvelous technical achievement. And we will be able to read into the human makeup far deeper than we ever could before.

The Human Genome Project has as its origins one of the oldest observations that man has made, that like begets like, that difference begets difference. We understand it in terms of our personal traits – our eye color, our skin color, our height. We have come to understand it not in terms of only our physical characteristics, and the physical characteristics of other living organisms that share this planet with us, but also in terms of our health. That in a very real sense our health is written in our genes – whether we get colon cancer, whether we have psychiatric disorders. A whole range of diseases that determine the shape of our lives and the shape of those who are most close to us, our children and our parents, is written to some extent in our genes. And we are beginning to learn that far more than we may even be comfortable with is written in our genes. Very minute details about how we perceive the world, how we think, how we act, a range of things we thought might be peculiar to us and our upbringing may, in fact, be determined by our genes.

And so, as we think of the implications of being able to read this information we should be excited about the possibilities that come from this very deep question of why we are the way we are, one of our most fundamental human questions, why we have differences, one human being from the other. But we must also take this opportunity to pause and think what that information means. How much of that information do we want shared – with our doctors, with our employers, with our insurers, with our government, and even with other members of our family. And, in fact, how much of that information do we even want to know ourselves?

It was an ancient curse to know your fate, especially since the ancients realized there was little you could do about your fate. And so that aspect of the Human Genome Project is marvelous, it answers some of the deepest questions we asked, but it poses a host of questions which are ones we are reading about every day. What do you do with knowledge of disease, say of breast cancer, colon cancer, prostate cancer, or pending schizophrenia, that you can't do anything about yet? That is a question that won't be a casual question for most of us in the next five to ten years because we will be faced in very real terms with those answers.

Now, it is all of our fervent hope that over the next 5, 10, 20 years we will begin to be able to change that fate. At present, we cannot do that. We cannot even give you a reliable time line for that. I am personally an optimist. My fellow scientists are optimists by nature. And we believe that eventually, eventually we will be able to change fate – individual fate, perhaps collective fate. And that too will pose a series of very difficult questions because whose fate gets changed and in what direction and how extensively? These will not be idle questions. These will be pressing, practical questions for all of us to think about, to deal with. One word of advice, find a friend who is a doctor, find a friend who is a molecular biologist, and start learning now. You have a lot to learn but, fortunately, you have a long time to learn it.

Now that is one vision of what happens with this new genetic knowledge. It doesn't happen to be the business that we're in. It doesn't happen to be the form of understanding of human genes that I practice, or that indeed I would guess 85 to 90% of the practically-minded world practices.

Because we think of genes, not as determinants of inheritance, we think of genes as instructions to build a small working part of your body. To us, a gene and the protein it makes is as real an anatomical part of your body as is your hand or your heart. We have learned to see these with the eyes of our electron microscopes, with the abstract pictures that our computers draw. And so when we think of a human body, we have now the ability to redefine what it is that we're made of.

And this comes from a second and very deep impulse, a question. When faced with a marvelous machine or a flower or a tree or a plant or an animal or the human body, you can ask a different question which is how does it work? What are its working parts? You take it apart and you find there are organs. You take the organs apart and find there are tissues. You take the tissues apart and find there are cells. You take the cells apart and find there are organelles. And at the bottom of that pyramid, you find our proteins – the irreducible element of life – one gene making one protein. And for the first time, we now have a comprehensive, high resolution anatomy of a human being.

We have now in our possession those pieces, those information, those pieces of DNA which individually code for those proteins and now can make all of those pieces separately for study. That is a basis of a revolution in understanding what a human is and what we can be, as profound as understanding our inheritance. And it can be used to ask a different question. Not why we are the way we are, but what we can do to change it. And when you look at genes and proteins in

that light, you come to realize that there is a new and better source of medicine.

Consider for a moment where the medicines we take come from. Almost – not all – but almost all those medicines are either extracted from plants or are synthesized in the test tube. They are chemicals. They are not our own body substance. But once you begin to have the power to isolate and to use and to study these individual human components, you realize that you can create a new and, I think, a better form of medicine. I've called this medicine "regenerative" medicine because it uses the power of the body, that same power that brings our bodies from a single fertilized cell to our complex system of organs, tissues, and cells, and allows that system to be maintained in good health and repaired when injured.

All of that we do ourselves, and each and every one of those processes is controlled by our genes and our proteins that act to carry out these functions. And the notion that we have is that that is the new pharmacopeia. And it won't just replace one type of medicine with another; it will replace an older medicine with a better medicine.

Let me just give you a few examples from the work that we're doing. We start always with an unsolved medical problem. We are all familiar with the notion that coronary artery disease is serious, life-threatening, and a major problem. None of us is without friends who haven't suffered from coronary artery disease. We know the remedies are either coronary bypass or angioplasty. Our view is that if we can find, if you can find that substance which the body uses to

build new blood vessels, perhaps we could use it to build new blood vessels without surgery. We looked for, using powerful systematic methods, testing the effects of thousands of proteins on cells instead of one at a time, collecting over 160 million bits of biological data per experiment, constructing systems that could search through that mass of data and find the one protein that could stimulate the body to build new blood vessels.

We found it and we are now introducing that into the heart muscles of terminally ill patients. And I'm happy to say our first study, it appears to have worked. Many of the patients experienced profound improvement in their overall well-being, their performance on treadmills, their ability. (Applause) It's still in tests and you can't get it yet. But that's the concept. You trigger the body to do what it wants to do.

Let me give you a second example. The second example has to do with our immune system. We all know that we would like to stimulate our immune systems to function better under certain circumstances – when we're infected with an organism that either is a virus and you can't treat with a drug or an antibiotic-resistant organism. Many of you may know that as we get older, our immune systems get weaker and need support. Many elderly people get gammaglobulin injections. There are some people who are born without good immune systems. And many people, through medical treatment, for cancer treatment, organ transplant, have weakened immune systems. And we all know that AIDS patients have weakened immune systems.

We looked for and found, using these new, rapid systematic methods an on switch for the part of the immune system that makes antibodies. Scientists had known that switch must exist and had looked for it for many, many years but were unable to find it. We found it in a few short months, demonstrated that it worked in a variety of experimental systems, and in less than a year from the time we got our first indication that we had it, we will be beginning clinical trials – first, for patients with inherited immune deficiencies and later for elderly patients and AIDS patients.

But that turns out not to be the end of the story because as you find in biology the knee bone is connected to the hip bone. In this case, we found that that same switch which was deficient, and when supplied in abundance could help the immune system, when present in overabundance leads to autoimmune diseases. A very recent finding, and this was an inspired guess by some of our scientists, was that the same switch might be present in high concentrations in people with rheumatoid arthritis, in people with lupus, and possibly other immune diseases. So we went out and got these blood samples and found that in many of these cases, the levels are astronomically high.

We have a remedy, we hope, for that because a whole new branch of biotechnology has arisen in the last five years. And that is to be able to mimic part of what our bodies do when they make antibodies outside the body in the test tube. So we can now very quickly, and in less than six months, have been able to make antibodies that bind and specifically inactivate that immune on switch. And so those are two very interesting new drugs that come from this type of

discovery. That's the kind of productivity which simply would not have been possible without a fusion of these multiple technologies.

Now, let me take an opportunity to look forward at some of the opportunity and problems that this new technology will bring. In the first place, we will have many new medicines that will allow most of us to lead longer, healthier lives. We can look forward to an active, healthy aging which was previously the privilege of the very few. That is very good news for us as individuals and yet it is a problem for society. I am part of a global forum on aging and the problems that an aging, even an aging healthy population, faces when a whole demographic shift occurs is a serious consideration. Many, many things change, and we have to evaluate most of our social institutions.

There is a second problem that we all have to consider, and this is one that Steve Case mentioned, and it's access. We will have a much better medicine. We will be able, if we have access, to live longer and healthier lives. Most of our organs and tissues will be able to be rebuilt and restored to normal function and maintained for much longer if we have access. But we know in this country, we don't have uniform access. And if we don't find ways to give uniform access to our citizens, we will have obstacles and barriers that will prevent this medicine from reaching even the privileged.

Those problems are magnified considerably when we look around the world because the

problems of access to medicine that we're not even able to solve in this country become even more formidable when we look abroad. Certainly we should be familiar with the problems of access to AIDS medications in most developing countries. The one that comes to mind now is South Africa. But do not think that the problems of South Africa, that the problems of the developing world are not your problems because the way we cope with those problems as an industrialized world will affect the kind of medicines we can develop for ourselves. Decisions on medicines, as in so many other areas, are becoming multilateral decisions. We will not be fortress America because the rules of the game that are going to be played in the next 20, 30, and 40 years will be rules that are largely determined by a world in which America is a minority. And if we don't take our responsibility seriously now to make sure that this marvelous technology gets distributed, which we should do as moral human beings, we should also do because we are practical human beings as well.

So indeed this is a marvelous time for science. It's a marvelous time for medicine. And as you've heard from Steve Case, it's a marvelous time for information technologies. But because it is a marvelous time, it means each of us has increased responsibilities to understand what these changes are, what they mean for us, what they mean for our society, and what they mean for the world. And if we reach that appropriate understanding, we can all live healthier, happier lives. Thank you. (Applause)

QUESTION AND ANSWER SESSION

CHAIRMAN WILLIAM J. MCDONOUGH: ...(audio goes off and on)...another very thoughtful presentation, and you see that there is another characteristic of American society. In many countries around the world, major public policy issues are deemed to be the problems of politicians and bureaucrats. In the United States, it is the leaders of the private sector, as you have just heard, who are very much involved and extraordinarily thoughtful about these major public policy issues. We will now have our question period. Our questioners this evening are Susie Gharib, who is the co-anchor of the evening Business Report on PBS, and Robert Stovall, who is the Senior Market Strategist of Prudential Securities. And we will begin with Susie who will address her question to which of the speakers she may wish. Susie, you're on.

SUSIE GHARIB: Thank you very much, Bill. I'd like to start with you, Dr. Haseltine. Thank you very much for your very thoughtful comments. It's a very exciting vision that you laid out for all of us here about this powerful new technology. And it just raises the eagerness; I'm sure, of everybody here in the audience of when we will see this technology move from the lab to the marketplace. Is there any way you can give us some kind of best case scenario of when your company, for example, will launch its first drug? What has the most potential? How far off are you from all that?

DR. WILLIAM A. HASELTINE: Well, that's a very practical question and one that's certainly

of interest. In terms of, I'll answer it in two ways. First, I'll be specific to what we're doing, then I'll be more general in a time line, a rollout of when I think society will benefit. In terms of our specific drugs, we have been first to take this technology and bring it to the clinic. We now have three drugs in clinical trials. We hope by the end of this year we'll have five drugs in human clinical trials. Those are the first drugs to come from genomics. I don't think it's an accident that it's been our company that's done that because we have focused on a very specific application – not genes as inheritance, but genes as part of the human body. And we focused even there on what those genes and proteins themselves can do as drugs. The specific answer to your question if things go ideally for us is within two and a half years we should have our first drug on the market. There are many things, and if my lawyer was here he'd probably turn pale, and probably many of you are lawyers so you know what I mean, but if possible within two and a half, certainly I'd say within three and a half years. In terms of a wave of new drugs, I can see that by five years there will be beginning a systematic flow of new drugs from genomics into the marketplace. By ten years, I think that up to half of the new drugs that we see will come from genomics. And within twenty years, almost all. Now, these will be a mixture of different types of drugs, but what this field allows us to do for the first time is link the desire to treat and cure a disease with a starting point. As marvelous as all medicine has been, and as great as my fellow professors were, we were not systematic, we were more like...(INAUDIBLE)...in terms of where we want it and we're very proud to dig where we wanted, as deeply as we wanted, and we did not have a system. And therefore, discovery in medicine was haphazard. It is no longer haphazard, thanks to the genomics revolution. You can now almost always, whether you're a big

company or a biotech company, link a desire to treat and cure a disease with a starting point. And that is truly transformation and truly a magnificent increase in potential productivity.

ROBERT STOVALL: My first question is for Steve Case...(INAUDIBLE)...cohorts have done at your company. And I wonder why you chose not to keep going it alone because of the great successes you've had. And merging with the giant Time-Warner allows us to infer that maybe your futurist thoughts can see you moving into still other forms of media. Can you give us a long-term future idea of what this giant company-to be means for the present and the future?

STEPHEN CASE: Sure. First of all, we have been doing our internet work for now 15 years. When we got started, not many people had PCs. Almost nobody had modems and I said nobody really heard of the internet. And we've spent 15 years building it up and we've had great success, particularly in the last five years. To give you some sense of that, five years ago we had about 1 million people as members of AOL. Now it's about almost 25 million people. And five years ago, which I think is even more startling, our members used AOL about an hour a week and now they use it over an hour a day. So we've seen dramatic expansion in the number of people connected as well as the amount of time they're connected and that's having a transformative impact on how they think about getting information and communicating and buying products and so forth. I'm sure many of you have experienced that firsthand and probably came to the internet in the last five years and hopefully some of you, my guess, about half of you through AOL. But even though we've had that success, even though people are now using the service an hour a day,

we recognize that there are 24 hours in a day. And if you look at what people are doing the other 23 hours, they're watching a lot of television. They're listening to a lot of music. They're going to movies. They're reading books and magazines. This is the reality of people's lives. So we said we really want to reinvent the way people get information and communicate or entertain and so forth. And if we're going to do that, let's play on the biggest possible canvas, and by joining with Time-Warner we have an enormous canvas and can really start building bridges between the personal computer and the television and the telephone and the stereo and build all kinds of, we think, very innovative services that really will improve people's lives. And if we do that effectively, and we think we will, we believe someday we could be the most valuable and the most respected company in the world. So we had a lot of momentum and we could have stuck to our knitting, but we said this is a unique point in history. We are seeing the convergence of some things that had otherwise been apart. It's no longer financial services and media and television and radio and the internet and so forth in separate little boxes. They're starting to come together. And by merging AOL and Time-Warner, we, Jerry and I, thought that we really would have an unusual opportunity to change the world.

SUSIE GHARIB: Steve, I have a question for you as well so you might as well just stay there. You brought up the subject of the enormous canvas. And seeing as today was a historic day in Washington with the way that the judge had ruled on the Microsoft case, it brings into question the words enormous and big and the government's views on things like that. Given the scrutiny that Washington has given to a number of big mergers recently, like the AT&T and MediaOne or

the pressure for WorldCom and Sprint to unite, and given that your merger with Time-Warner is probably going to have to undergo a lot of scrutiny with all your cable franchises and what have you, where do you stand on all of this with the FTC and the FCC and the regulators? And can you really stick to your timetable to get this wrapped up before the end of the year?

STEPHEN CASE: Yes, we announced the merger on January 10 and at the time said we expected to close the merger in the fall, and we're still on track to do that. We actually have joint shareholder meetings at the end of this month so we expect to have that done this summer and then we expect to get all the regulatory approvals in this country and around the world in the fall. And we do recognize that it's a large merger and we also recognize that the kind of things AOL and Time-Warner do really resonates with hundreds of millions of people. So it gets more attention. People have sort of visceral kind of reaction because they subscribe to *Time* magazine or watch HBO or use AOL or things like that. But what we believed then and we certainly have found since in the discussions we've had with people, even though it's big in scope, it's very unique in character. And by that I mean, all the mergers you mentioned, whether it be Exxon and Mobil or WorldCom and Sprint, you can kind of go down the list, are really mergers of concentration where companies are really joining forces to expand their market share and achieve some cost efficiencies. AOL and Time-Warner are completely complementary. AOL does not publish magazines or make movies or music or run cable systems or things like that. And Time-Warner doesn't have internet service subscribers and things like ICQ, a messaging service, and so forth. So they really are extremely complementary businesses. So we're not

gaining market share in any market through this merger. What we are gaining is an opportunity to paint on this bigger canvas. So we're on track to close this in the fall.

ROBERT STOVALL: For Dr. Haseltine, yours is a fascinating subject and a great presentation. But you mentioned that the aging problems include, of course, the danger of living too long and the non-uniformity of access. Just a few weeks ago, Prime Minister Tony Blair and our own Bill Clinton were talking on general subjects of this sort, public domain perhaps for intellectual property, and it had a negative effect on biotech stocks in general. What is your point of view on regulation of this sort of thing? Either domestic, global, or some other combination?

DR. WILLIAM A. HASELTINE: Thank you for the question. The first thing I'll do is answer part of Steve Case's question. What is he going to do next after Time-Warner-AOL? Certainly it's going to be health services. (Laughter) Maybe not pharmaceuticals, but health services, because that's also a natural. Neither company does it yet. It's probably a very good information-rich services. So watch for the next shoe to fall. I'm happy to help, Steve. But in terms of the question, intellectual property writ large is another common theme that unites both Steve Case and me and our interests. And it should unite all of our interests because we're moving into an economy which is a knowledge economy. We are actually, at least for the moment, in what I would call a post-capitalist economy. It doesn't mean that structures of capitalism are gone. But it means the limitations of capital are, for the moment, lifted. And what limits us is not capital today, it's imagination and imagination put into the form of intellectual property. And that is a

transforming event which we could discuss its implications for probably most of the evening. But because we are a knowledge economy, protection of intellectual property, in its multiple forms, is critical to the health of that economy. Not just for the pharmaceutical industry but, as you've heard, for publishing – how many books would be published without copyrights – for films, for music, for all sort of ideas. And so the limitation and the key to the future is the intellect. Now the specific issue which was raised was intellectual property when it comes to our own human genes. And I have to admit that it is counterintuitive that we should have intellectual property for such a fundamental part of our human bodies. But let me give you a couple of perspectives and then close with the words of a Jesuit on the topic. What is a gene? A gene is a complex chemical in our bodies. And indeed, the patent law treats it as a complex chemical. No different, for example, than a complex chemical extracted from a plant. The law says, patent law around the world says that it must be new. You must be first to describe it, as you are first to describe the chemical composition of a new potential drug. In this case, it's the text, the sequence of a gene, gives you its chemical composition. It must be useful. You can't just say I found it and, therefore, have any rights to it. You have to demonstrate a potential use. And then a patent does something else. A patent is a teaching document. Most people, I don't think, understand that patents are a contract between society and inventors that works for mutual benefit. For society at large, the contract reads something like this: You teach me everything you know about your secret invention that has some use and I will protect you, but you must teach me everything you know. So somebody else can invent around it, somebody else can take the next logical step. A patent is the antithesis of secrecy. And for the inventor, it's if you've made a

truly inventive contribution, something that no one else could have thought up, no one else did think up, that you are protected and rewarded for that. When it comes to our genes, no one has a right to any of your genes. That's a form of slavery and it's outlawed. But if you extract it from a human body, if you make it useful, then for 20 years, the law has held, you can patent that because it is an abstracted substance which has been worked on by the hand of man and made useful. It is those kinds of patents that now make clotting factors safe. People have isolated the gene for clotting factor. They manufacture clotting factor in factories so they don't have to take blood from people and the danger of AIDS and other infections for the hemophiliac population are no longer. When it comes to our products, what we bottle and sell are human products. Most people don't think about it but if you look at a bottle of insulin, you're looking at a bottled piece of a human being. Because it doesn't look like your finger doesn't mean it's not an important part of your body. It's a key part of your body, and it is a human substance. But that is the substance we describe as the product of our genes. Now, in fact, the market widely misinterpreted the President's statements and the Prime Minister's, because if you read that statement, they actually said we support intellectual property on gene-based inventions and believe they will be important for the future of medicine. What they said also is this information about the genome, which has no immediate practical use, should be made publicly available. So it actually was a balanced and nuanced statement. I think what shocked people is they said saying about patents and genes at all, and it surprised us. Let me finish with the words of a Jesuit. The first time this issue came up in a serious format that I was involved in was when one of our gadflies, Jeremy Rifkin – and every industry has its gadflies and he's a pretty effective one – got

a group of ministers and priests and rabbis together to sign an anti-gene patent document and about 150 did so. It turned out they hadn't quite understood what they had signed and working with one of our Washington think tanks – good reason to be in Washington, a lot of think tanks there – we put together a group of religious leaders. The end of the discussion came from a Jesuit who said we have pondered the problem of ensoulment for many centuries and we have concluded the soul is not in a finger, and it's not in a piece of DNA that comes from the finger, that if we can use DNA for bettering human life and if it requires a patent for that purpose, then it's moral to patent DNA.

SUSIE GHARIB: Allow me, Dr. Haseltine, to follow up a little bit on this point. Aside from the patent aspect of it, do you see any need for any government oversight as this technology progresses? You raised, in the early part of your talk, about some of the philosophical and ethical questions that may arise and maybe this technology right now is in the very early stages, but I gather from what you were saying that ultimately it will be possible through this technology to engineer a whole human body – ultimately, somewhere down the way. And while we look at all the positive uses of this and the noble causes that could come out of this, such as what you were talking about in your company, there will be others that may have, you know, another agenda, let's put it that way. What is the risk of this technology getting in the wrong hands? And is there a role for government to oversee this? What is your view?

DR. WILLIAM A. HASELTINE: I think that there certainly is a role for government to oversee

many aspects of technology, but it's a role that has to be arrived at with great caution. When it comes to the introduction of new drugs, we deal in a highly regulated environment, perhaps the most detailed and extensive regulatory environment that exists. I, for one, am a big supporter of those regulations, of that process. And I believe that the integrity of the FDA and of those regulations is the reason we can operate to create new medicines. And so, although they may be onerous, I believe they are necessary, and I think they're doing a great job and they are modernizing themselves in an effective way. There are a broad range of questions that extend beyond the approval of specific substances for medicine. They have to do with how we reimburse people for genetic tests, how we handle that information, who we tell. I don't think we, as a society, are ready for those regulations because I don't think we've had an informed debate. As a professor at Harvard, one of the things I enjoyed doing was teaching Harvard non-scientist undergraduates about science and society. I taught a course for 20 years on that topic. The point of that course was to help an educated non-scientist grapple with political decisions they would be inevitably called upon to make that had scientific content. The issues that we are all going to have to grapple with, not only through government regulation but in our individual lives, are multiplying, and not only in biology. And so I don't think we should move in any precipitous way toward government rules and regulations because the rules and regulations we are likely to make now as knee-jerk reactions to what are perceived to be crises are likely to be the wrong ones. But I do think we have to rethink the whole education process, both of our young people and I'm afraid to say, all of us, because we need to know more about technology. Now we are very well-served by the media. We were talking up on the podium today about how

the media have been especially quick, off the mark, to understand the new technology. Now all of us can't understand what's in the media yet on this topic, but I think we should all try. So my answer to your question is government will inevitably have a role. Government must have a role in many of these aspects. The role can be positive. But unless it's done with great care and consideration, it's unlikely to be positive.

ROBERT STOVALL: For Steve Case, coincidentally this morning's news pre-market opening was dominated by the number one headline in *The New York Times* financial page – AT&T plans to raise fees on long-distance service. Then the piece went on to say that just with great fanfare a week ago they were talking about reducing rates. And at the end of the day, the Microsoft decision unfolded further and penalties and time of appeal and whatnot were laid out and we'll read about it in tomorrow's paper apropos Microsoft. Now this, both these things have to do with giantism and power. You said tonight, and I read what you said earlier that the consumer is at the center of everything you try to do. Yet, there was a flap not long ago. Disney and ABC Television and yourselves and the consumer was sort of a ploy in between all that. So I'm not bright enough to figure out how this works, so maybe you could elucidate me.

STEPHEN CASE: Well, there's many parts to that. As it relates to the Disney - ABC thing, we said, Jerry and I, promptly – I think it was within 48 hours – that was a mistake. And ABC went back on the air and quickly ABC and Time-Warner entered into a long-term re-transmission agreement so that would never happen again. And Time-Warner has long-term re-transmission

agreements with all the major networks so, at least with Time-Warner, it won't happen again.

And it was a mistake because from a technical legal standpoint, looking at it through the prism of the cable company, they felt they were acting appropriately because they did not have the right to carry that signal. They were not able to extend the agreement they had, therefore, they were obligated – they felt – to drop the signal. But if you look at it just through that prism, you sometimes miss the bigger picture. And the bigger picture is exactly this point we keep making, that we do shoulder some responsibility, we think considerable responsibility, not just to do what's maybe legally right, or in our business interest, but also in the public interest. And hopefully, we can learn from our mistakes. Companies are people and people do make mistakes. And every company tries to minimize those mistakes but you're always going to make mistakes. AOL, for example, as some of you may recall four years ago, had huge problems related to busy signals. And we were embarrassed by that and mortified that so many people had decided to trust us and we had let them down. But after fixing the problem, we really re-doubled our commitment to billing out networks and providing customer support and so forth so that kind of problem would never happen again. As it relates to the broader issue of bigness in general, I think that you have to really look at each situation. I think Microsoft and AT&T and AOL and Time-Warner actually are very different situations. In the case of AOL-Time-Warner specifically, we don't think bigness is necessarily goodness. We think each of these businesses needs to be effective in their own right and we take some comfort, and I think governments take some comfort in that all of the markets we compete in are intensely competitive. And indeed, from the time I was growing up which was not that long ago, we've seen massive fragmentation

of media and innovation in media so now instead of having four TV networks to watch which is what I had, there's dozens in almost every system and hundreds on satellite systems. And now we have tens of thousands of magazines and we have millions of websites. So in the last 20, 30 years we've seen dramatic innovation, dramatic fragmentation, and that entrepreneurial fervor is forcing all companies to really reinvent themselves constantly. And ultimately, we really do believe when all the dust settles, the people at the finish line are going to be the ones that had a, were closest to consumers and the kinds of products and services they developed really resonated with consumers. And that may come from big companies in some cases, and as this world converges, there are some benefits in having more pieces of the puzzle you're able to assemble, but it also will come from many, many small companies.

CHAIRMAN WILLIAM J. MCDONOUGH: We'll have a final question from each of our questioners.

SUSIE GHARIB: I think we have a lot of investors in this audience so I've got to ask an investor question to both of you, and a specific one, I guess, to you, Steve Case, is that, I mean I guess everybody in this room knows that your stock is down about 40% since just before the announcement of the big merger. And, you know, there's a lot, the view on Wall Street is that it's not, AOL now is not quite a media company. It's not quite a, you know, an internet company. And that, you know, how are you going to get investors re-interested in this company and to show that it is a growth company? I mean there's just a lot of value that's been lost in the

turnover, in the kind of investors that you have. I'm just wondering if you can address that.

STEPHEN CASE: Well, there are several aspects to that. The first is I'm no expert on Wall Street, but many experts on Wall Street expect that the, as the companies get closer to the merger there may be some renewed momentum. Right now, since there's enormous liquidity in both stocks, there's not a sense of urgency. But as it gets closer to coming together, there may be more and more interest. Well, time will tell, but that's a view that's been held by many and is reflected in many research reports. But there's two other aspects that are worth touching on. The first, I don't think it's gone down 40%, or at least it's not presently 40%. I think it's more in the 25-30% range. And I'm not saying that a 25 or 30% decline in your stock is something to be proud of, but in that same time frame, Microsoft has gone down 40 or 45% and Yahoo, I think has gone down 35 or 40% and many internet companies have gone down 80%. So I think what we've seen since January is a major correction in technology stocks, particularly internet stocks, and it's not surprising that our stock came down as well. So I think it's difficult to make any logical linkage that it's related to the merger. Nobody would know for sure, but our stock has actually outperformed almost all the other internet stocks since we announced the merger. But I think the bigger point, and the longer term point is we do believe that these companies coming together create some unique opportunities and they are going to be able to develop a whole host of innovative products and services, particularly things like reinventing television or music, while also benefitting from extraordinary synergies within the company. For example, AOL alone spends almost a billion dollars marketing its various brands, not just AOL, but Netscape and ICQ and so forth. And a lot of money goes to Time-Warner magazines and TV networks and

so forth. And similarly, AOL is going to be able to broaden the distribution for Time-Warner's many brands. So we really do believe we have a unique opportunity here we do believe this world is converging and as it starts converging we'll be able, we think, to do some things that really are going to benefit consumers and that will enhance our business and we'll be able to generate substantial momentum over the years ahead. So we're actually very bullish about the prospects for this company coming together. We think the markets go, markets go down, we can't really affect that, but we can stay focused on the consumer, that really being our, sort of the guiding light of all our thinking. And we do believe consumers are getting, and I'm sure some of you would see this yourselves, are getting frustrated by the fact that their PC experience is so different and disconnected from their cell phone experience or from their television experience. Why, if you have a buddy list on your PC screen and can instant message with your friends, why can't you have that buddy list on your cell phone? And if the PC empowers you so you can really control what you do and how you do it and you can bookmark your favorite websites, why can't you do that on your television? Why can't you bookmark your favorite TV shows? And if the TV is so easy to use, you kind of turn it on and go through with the remote to get things, why can't the PC be that easy to use and have that kind of multimedia experience? And so these worlds that have been separate are going to start coming together and the opportunity is going to be building bridges between these devices, building bridges between these networks, all focused on trying to improve consumer's lives. And we think AOL-Time Warner is better positioned than any company in the world to do that. And it's now a simple matter of execution and that's all shouldered by Jerry Levin. (Laughter and Applause)

ROBERT STOVALL: A straightforward final question for Dr. Haseltine. You brushed on this, I think, sir, but the ultimate value, in your opinion, of genomics to the whole therapeutic marketplace, I think you said that it would surpass in time pharmaceutical R&D work and the like? Is that true? And if you were drawing in the air here a graph, what year do you think that would cross?

DR. WILLIAM A. HASELTINE: Let me take that question from a little broader perspective, but get to that specific point at the end. The pharmaceutical industry writ large is in a crisis today, and it's in a crisis of productivity. If you look at some very simple parameters, and this is well known in the industry and there are monographs written by some of the major CEOs, you can predict that if you're going to invest 20% of your revenue in R&D which is a good number, and these numbers are large numbers, \$10 billion, \$20 billion in sales, \$2 billion, \$4 billion investment in R&D, you expect, as any investor would today, to have a double digit return. Now to get a double digit return at \$10 billion sales a year, you need at least four new drugs to enter the marketplace – some people say five – because you know that with some predictability, your other products will go off-patent, and when they do, the profit will drop by 80%. And so there's some very simple calculations you can do. The pharmaceutical world also knows that today these companies that should be producing or requiring four new products a year are only on average getting one per year. That cannot continue. That is what's driving the mergers. It isn't the kind of opportunities you've just seen presented here tonight. It is a real problem of maintaining growth.

And if you can't do it by productivity in terms of new products, you have to do it by consolidation. And that problem, you can confidently predict, will go on for the next five to seven years because the time horizon for introduction of new products is so low. At its heart, what the genomics revolution has done, and the particular type of genomics that I was describing today where you use genes not as inherited entities, genes not as a way to find new chemicals, but genes and proteins themselves as drugs, is a revolution in productivity. I believe that we have hit upon a new and scalable source of productivity. I can't tell you yet whether it's 10 or 40 times more productive than the other means of finding drugs, but it is clearly far more productive. You cannot have these two kinds of systems operate in parallel for very long without some serious readjustment of what goes on. What I predict will happen is one or two of the big players, and you cannot predict today which ones they'll be, not necessarily the early adopters, maybe even a very late adopter, will eventually flip into this more productive form. And so these new products will begin to hit the market three to five years from now. By ten years from now, these genomic products, which are human genes, proteins, and antibodies themselves, and something I didn't talk about, but also our own cells as medicine, will become a dominant form of medicine, and by twenty years, the predominant form of medicine. So whether it's a chemical, a protein, or an antibody, 90% of all drugs that are introduced to the public will come from this new science that we now call genomics. (Applause)

CHAIRMAN WILLIAM J. MCDONOUGH: Ladies and gentlemen, join me in thanking two of the most interesting speakers I think we've ever had. (Applause) And thank you to our very good

questioners. (Applause)