The Long Boom of the New Economy

Kevin Kelly, Editor-at-Large, *Wired* magazine

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Editor's Note: Mr. Kelly's opening remarks were not picked up on tape. He began with a discussion of the proliferation of computer chips in objects of all kinds, which together add up to what Mr. Kelly calls "dumb power".

Kevin Kelly: ... not very smart broadcasting very simple information like saying, 'I'm on, I'm on' or 'I'm over here, I'm over here' or 'I'm hot, I'm hot' or 'I'm half full' or 'I was used on Tuesday', or 'Here's my identification number.' These things cost a penny. They're put into everything, they're on labels, they're on soup cans, they're on shoes. They're put into your shirt. They're sewn into the hem of clothing. The smart shirt has a little tiny chip. All it knows is the laundering instructions so when you put into the smart washing machine the chip in the shirt tells the laundry machine its laundering instructions. This is a commercial world by the way, so the chip says, 'I prefer Tide detergent'.

So alone these things aren't very smart. But the important thing is that there are lots of them. Already in the world there are about 200 million PCs in the world, plus or minus a couple of hundred million but at the same moment there are 6 billion non-PC chips and they're embedded in everything else. They're in your microwave, your camera, your car. And the number of those is increasing much, much, much faster than the number of PCs because how many PCs can you use in your life? One, or two if you work at *Wired* or three if you're a total geek.

But the rest, on a number of other objects that you can use in your life is unlimited and all these things will have these little tiny chips put into them. These little chips are, as I said, not very smart. They're disposable. They are dumb power. The magic is you take - putting a little tiny chip into a shoe or to a doorway, or to a light switch alone doesn't do anything. It makes no sense to put a little chip inside a glass on the table.

But if you put all the chips in all the glasses, if you take lots of them and you hook them together you get something very powerful. This after all is how the Internet works, lots of very dumb PCs, connected together to make the Internet, the most powerful force in commerce right now.

If you take also the little dumb web pages - and most of the web pages in the world are very dumb - and you link them together you get the world's smartest library and the best publishing medium in the world. Your own brain that you're using right now to listen to me has lots of dumb neurons that alone, singly, have no meaning, and are not very important. But together wired up they make something very powerful.

So this is what we're doing. We're taking lots of little things that alone make no sense. Why put an Internet into your toaster? Well, by itself it doesn't make any sense but you can take all the appliances in all the houses in all the lands and you have something very, very powerful. And when it costs almost zero, a few cents, to do that, then that's what we'll do.

And what we're seeing is that rather than trying to make things that think, it's things that link. That linking becomes actually more important than thinking. You don't have to make a great big super powerful smart things in the sense that we think of them as thinking. We can take lots of little things that are linked together and we have something very powerful. This can be done with people too. You can take lots of people who don't know very much, you connect them together and collectively they can make something very, very powerful.

The thing to keep in mind is that - in my opinion - the computer revolution has long been over. It's over. It's happened and gone. We've already lived through it. All the changes that we're going to see in our life because of computers as these stand-alone devices that sit in front of us have already happened. They've sped up our lives, word processing . . . that's all happened. Nothing really very important from that.

Computers didn't make any difference until they were connected together. And what we're involved in is not a computer revolution but a communications revolution. My suggestion is that communications is the foundation of our society. It's the foundation of all cultures. It's the foundation of our identity as humans and when we start to mess around with communications this is a big deal. This is why this is such a big deal. This is why this is not just a fad. This is why this is not just about the Internet. This is a big deal. We are in a communications revolution enhancing, augmenting, amplifying, deepening, widening, increasing the speed of, the dimensions of communications.

Communications' memories, institutions, libraries, all the stuff. This is a big deal.

So the idea is that when we talk about the net, when we hear "the net", don't think about AOL. Don't think about people typing. Don't think about email. The "net" is this entire thing which I've just described of every cash register in the world sending up information, every article that we make sending information laterally through infrared like this thing. Cell phones, medical records going from one office to another. Sensors in the farmer's soil sending information to the tractor. That is "the net" around the globe that we're talking about and that is the net on which the network economics in the new economy is taking place.

So the net isn't that email, it's everything. And I believe that the Internet is not hyped enough. People say it's over-hyped. It's not, it's under-hyped. We're underestimating the long-term effects of the Internet. That's dumb power.

The second idea which I want to connect to that is that when we have these things linked together with many, many different nodes where there's no centers, there's all edges, that something very different happens. What we'd see is that money is a kind of information that can be transmitted over this network and what we're doing is we're seeing the effects of network economics.

The first fax machine, there was the first class 3 fax machine produced in Japan that came off the conveyor belt, the first person to buy that was an idiot, because it was worth nothing. There was nobody to fax to. Nobody to fax to. He's paid a lot of money for nothing.

Now, the second fax machine that was produced made that first fax machine worth something because there was somebody to fax to and each additional fax machine that came off the conveyor belt made all the fax machines before it become more valuable - all the fax machines before it.

Same thing with email. I've been getting email since 1982. It was very lonely. Where were you guys? It was very, very lonely. Very few people to email to, a few computer scientists here and there, so I became an evangelist. Do you have email? You should get email. Why? It makes my email account more valuable.

So we have this phenomenon which we see which is very important. We actually have the customers going out and selling the thing. I'd no financial interest in selling email accounts. I just had, personally, as a customer, increased my value. So the first fax machine worth nothing, each additional fax machine is increasing the value of all fax machines sold before it. The same thing with email, the same thing with Windows, Microsoft Windows.

We see this again and again and what's interesting is of course that the first fax machine was sold for thousands of dollars. Now you can buy a fax machine for $200 and when you buy a $200 fax machines you're not buying a $200 fax machine. For $200 you're buying a $3 billion fax network. You get the higher value of the whole network.

The message very simply, is that in the industrial world and age of materials value is linked to scarcity. Think of the emblems of wealth in the industrial age: diamonds, oil, gold . . . all hinged on this scarcity, the fact that they were limited. Now, think about the emblems of the information age: Microsoft, Intel, the Internet, Yahoo! - all dependent on the fact that the more people that have them the more valuable they become.

So we have a very curious phenomenon where we have wealth coming out of plenitude rather than scarcity. It's inverted the entire basic economics involving diminishing returns to where now we have the law of increasing returns.

And the law of increasing returns does a couple of things. One thing is that it says that the more that you have the more that you get. The more customers you have, the more customers you get. The more Windows you sell the more valuable it becomes, the more attractive and so forth.

So we have this thing, this viral sense of self-infection, self-amplification. Think about these websites that do this; you know, Ebay, what is Ebay doing? Ebay is not doing anything really very much. They have a market place for people who auction off their junk and they're selling their junk to the other customers and the more people that have the sales there the more attractive it becomes for you to try and sell something because you know that the audience is big, and the more people that come to sell the more attractive it becomes for you as a buyer because you know that that's the place to go where everything's being sold. So we have this self-amplifying circular, virtuous circle phenomenon.

Amazon who reviews the books. Amazon are the customers. AOL, what do they produce? They don't produce any content. The more customers on - the customers produce the contents so the more customers they have the more value they have, the more attractive it becomes.

So that's the great assignment in most of these new economy businesses is to identify something that you're producing whose value increases the more people use it rather than the fewer people that use it. That's what people are looking at. Is there something that we can do where the more people, the more use, the more plentiful this becomes, the more valuable it becomes?

Because what we see in this world is that replicating things becomes really easy, and things replicate. The Internet is the worlds' largest Xerox copy machine, and anything that can be copied that's moved anywhere near the Internet will be copied quickly.

So copies of things are very easy. So you have to work with plenitude. You can't go against it because it becomes very difficult to keep things from being copied.

So the logic of this which you extend - if you extended this logic to it's ultimate absurdity you would say, well, if things become more valuable, the more plentiful they are, then obviously they should be at the maximum value when everybody has it, when it's ubiquitous, and that's true.

And what's the most direct route to ubiquity? Give it away. So that's why we see so many, so many, so many new businesses giving things away, because they're trying to reach ubiquity. Now, I have to say, because I know this is a question - obviously you can't give everything away, and I'm not suggesting that. I'm saying you begin with things that are free and you follow those later.

Often times they aren't really free. They're just as if they are free. Magazines and publications have done this for a long time. We operate "*Wired*" as if our magazines are free because the amount of money that you pay for them when you subscribe do not pay for the magazine. We get our income from advertising. So we behave as if these issues are for free, though they're "as if they're free", they're "almost free". There's lots of things that operate this way. But again we see cell phones, giving away free cellular service. People very early told me they'll never give email away for free. People said this. They really said they'll never give email - well, they do.

Then they said, well, email maybe, but they'll never give ISP service - Internet service away for free - okay, well. They'll never give computers away for free - that also. Refrigerators for free, this woman in England said. Well, she was wrong.

And someone said, 'Okay, cars, I know they'll never give cars away'. But in fact some of the new lease programs where for five years you pay for gas, maintenance, insurance, everything for five years, the car's almost free. Basically you subscribe to a car. And that subscription model becomes much more common.

This is what software - software is - free software, the manual's $100. Free software, the upgrades are $50. Or free software, the service support is $2,000. And that's how things are going.

Here's what I want to put into your mind. This is a very important thing. The web is less than 2,000 days old. The web is less than 2,000 days old, okay? What that means is that we are on the beginning of a curve. What we're seeing for the first time is exponential growth in technological systems. We're seeing biological-like growth in exponential systems.

The web is doubling every year. There are now - and this is almost an inconceivable number - there are now one billion web pages. One billion web pages made in 2,000 days. This is an incredible human achievement. But the picture is that it took us 100 years to connect the first billion people on earth through telephones and telegraphs. It's only going to take us five years to connect the next billion.

So what we're on is we're on this curve, it looks like this, and that slope that goes up will never be infinite but that slope is as if it's infinite. So for a period of time we have to behave as if things are infinite. So at the same time we have this "as if things are for free".

So what I'm suggesting is that for the first time there are two numbers that were never allowed in business before, which have to be considered, and they are zero and infinity. They used to be taboo numbers. You couldn't have business where you talked about zero price and infinite growth but now you can. You have to think about those numbers.

So that's "dumb power", "follow the free". Now, all hard products are going to behave like software. Okay? All hard products are going to behave like - software has a very strange behavior. It costs nothing to replicate once you have the first copy. You know, your customers will often do the difficult work of finishing the product. Sometimes they even

become salesmen for your own product. There's lots of very strange things about software.

But the hi-tech business, software, the net, and all this kind of stuff, the strange behavior that we see in these companies is actually going to become the behavior of all companies. And that's because in this shift which is not new and it's going on but we can see it very evidently now is that more and more of the value in anything that we make is not in the materials. That means that more and more of the value is in the intangibles. And the intangibles have their own behavior.

In the industrial age if I had some oil or gold and I sold you some oil or gold, you'd give me some money, I'd give you the gold; you have the gold, I got the money. That's the transaction. That's the basic foundation that we based everything on.

In the information age it's very different. If I have an idea, and I sell you the idea, you give me some money. I give you the idea, you have the idea, but I still have the idea. I have the money and the idea. You can go and sell that idea to someone else and you'll still keep the idea and give someone else the idea. So there's something very different here. More importantly, the more people that have the idea sometimes the more valuable that idea becomes, which is even weirder.

So there's a very fundamental different behavior going on when we have an economy based on ideas and knowledge. And so what I'm suggesting is that all businesses - it doesn't matter whether you're in chemicals, transportation, automobiles, any of the ones we thought of as completely, supremely industrial - they're all beginning to behave like software.

Right now for a GM car, only 16 percent of the total cost of making the car is in the materials, and that number continues to drop every year. So what we see is that most of the cost of making the car is in the intangibles, in the labor, which itself is shifting. It's in the patents, in the marketing, the design, all these other things.

Even in the US right now there are only about - less than 10 percent of the total adult workforce is working in a manufacturing job. And it's headed to be a few percent in another 10 or 15 years, basically on a par with farmers, which are 2 percent.

Most of the people in the US are working in new economy jobs but nobody has told them. If you're sitting down doing a job you're probably in the new economy job.

But nobody has informed these people that actually there are new dynamics and that what's happening is that all businesses are starting to behave like hi-tech businesses. That's because all copies are becoming cheaper. We have these machines that make things cheaper and cheaper. Whether it's - not just a copy of a movie but a copy of a glass. I mean, this glass here most of the cost of it is not in the sand but in the design and marketing of that.

So here's a three-minute phone call going down to towards zero, . . . Now, the interesting thing is that even though the cost of the three minute phone call would head towards zero, and by the way we will have zero cost or flat rate long distance telephone call in the States probably within a year, if not now.

If this stuff is free how come I'm paying more to the phone company every month? Well, because I have five phone lines and, you know, a cellular phone and call forwarding and ISDN and DSL and all this other stuff and so what's happening is that yes, the three-minute phone call's free but all these other things on top are happening. What we're doing and what the product cycle is about is a mad rush to keep generating stuff to send down that slope faster and faster because everything will go down that slope.

A copy of a car would decrease, it will become easier and easier to make a copy of a car. This is a concept car called a "hyper car". It has a hybrid fuel motor, no radiator, no transmission, a fiber composite body. It's all electronics. Even right now the cost of the electronics costs more than the steel. This is almost all electronics. Basically this is software. This is a chip with wheels. These new cars will behave in the same dynamics as the software and computer chips do.

We tend to think of the new economy as a special case. It's true for you guys in California. It's true for those net people. It's not true for my business manufacturing auto parts, or it's not true for my company which does industrial chemicals. Yes it is true. It's absolutely true because this is going to take over the entire economy.

So we have this economy in abundance. We have this 'will all these things become cheaper and cheaper headed towards zero but maybe never getting there'. Information being towards zero. It used to be that you had to pay for the information, like stock quotes, hundreds of dollars a month. Now there are so many stock quotes available on the

Internet that they have their own protocol for free, band width for free.

So we have this world where everything is cheap, copies of things are cheap, in abundance, in plenitude. And the question is well, what's scarce? What's valuable in this world of abundant cheapness? And I think there's only one thing that becomes scarce, one thing that technology will never change and cannot change. And that's human attention.

Human attention, the finite 24-hours a day that we have will not be extended by technology, will never change and that becomes a focus. That becomes the one scarcity upon which the wealth of the new economy has to be generated because that is in finite supply. Everything else is in infinite supply.

And so relationships - human relationships - this attention relationship becomes fundamental, becomes a building block upon which the new economy is being built. It's a scarcity. That works in both ways. The amount of attention I have to give as well as the amount of attention I have to receive. And so this is, I think, really big news because there's a tendency to think that this is about technology but it's really not.

That's why in this new economy we have such fanatical obsession with brands. What's a brand? A brand is an attention management device in a world of exploding choices and opportunities. It's a way to have somebody pay attention. The typical American supermarket has 30,000 different items for sale. So you're expected to go in and choose eight of them in 10 minutes out of 30,000. How do you do that? You use the brands. That's how you do that.

So what we're seeing is that in a world where copies are cheap the things that are most valuable are things that cannot be copied. What can't be copied? Trust, knowledge, experience. These things are very, very difficult to copy. You can't buy a CD-ROM of trust and download it into your computer and use if for your company. You can't get experience and have it poured into. You can't install knowledge. These things have to be accumulated, grown. They're very difficult to copy and that's why they become the foundations, the things that are most valuable. And they all have to do a round with attention and relationships.

So what we're doing, I believe, with this communications technology, is making relationship technologies, devising ways to try and enhance and amplify relationships. That's what Amazon does, Amazon and Yahoo!, they're all concerned about relationships. That's why they're spending so much money to get these customers and keep them.

Relationships - I go into Amazon and they tell me, "Based on what I know about you or we know about you, you should like these books.' And then it's amazing because I actually do. They actually work. They know me, 'Based on other people like you, here's what we think you should read.' So they're really trying to get to know me. They're trying to establish a relationship and they actually do do that. It does work.

I think the great untapped frontier, the one new thing that E-commerce has brought to us is not business to customer which we've had. It's not business to business because there's been lots of business to business. It's customer to customer. That is the new place.

Okay, I mentioned Ebay. Who is doing all the selling on Ebay? Ebay doesn't sell anything. It's the customer who's selling to other customers. It's AOL customers talking to other customers. Who's doing all the work? Where's all the value? It's all being generated by customers. That's something that we've never been able to do before. I'm not saying all businesses will do this but this is the frontier. Customers are completing the product.

If you want a really finely tailored suit you've got to go and get yourself measured. You have to participate in the creation of that suit.

Microsoft Windows 2000 sent out close to 500,000 data versions, incomplete versions of their software out to their customers to try out and they estimated it was about $3,000 per site. So every company that got this on the beta site, the total amount of work that they spent in trying this and giving back bug fixes, they spent about $3,000. Microsoft basically has subsidy of $1 billion from their customers to finish their product. Their customers invested more into the development of Windows than Microsoft did.

So this is not desperation. This is the only way to get a fully customizable product. You have to be involved. Your customers have to be involved in finishing and creating the product. So what we see is we have customers teaching companies. That's what I'm doing with Amazon. I'm spending all this time teaching Amazon to serve me - I like this, I don't like that, serve me here, forget about that, do this more.

I spend a lot of time - I'm completely invested into them. Even if they sold books somewhere else cheaper I wouldn't

change because I have taught Amazon to serve me. At the same time Amazon is involved in teaching customers how to be better customers because being customers is no longer easy. It's not. The days of being a passive customer are over. You've got to be engaged. You've got to do stuff. You've got to fill out forms, you've got to participate. And the interesting thing is that whoever has the smartest customer wins. So that's where we're headed. Whoever has the smartest customer is the one who wins.

So that's relationships. Let me kind of wrap up here to the next section. I think this is the most important one because I think the biological model for business I think is much more profitable to look at than as a mechanical thing and what we see is we see this net out there as being something biological-like. That's a bot. A bot is a little piece of software code that goes out and searches the Internet and search indexes are based on that.

When you do Yahoo! you're using a bot which has gone out to all the millions of sites and come back and told you where they are. Now the problem with a lot of little sites is they have all these bots going out and they clog up the phone lines keeping out the humans who should be there.

So some of the sites invented something they called the robot exclusion protocol which basically is an anti-bot. So they had a bot to keep out the bots.

Now, a lot of the Yahoo! is really a tremendous incentive to make sure they got to all the sites so they made the anti-anti-bot to get around that guy. And the sites that really didn't want anybody and they really didn't want it - you can see where this is going - they have the answer anti-anti-bot-bot.

And the point about this is that this is one example. There were many, there were SPAMs, and anti-SPAMmers and all kinds of things with email. The point is that every single successful innovation creates a territory, a space for two or three or more other innovations to come up with. When email was invented there blossomed an entire territory of email related innovations.

Every successful business creates a space for other successful businesses to occur in, just like in life. Every single species that's successful creates this world where you have other species on top of it, whether they be parasitic or predatory, or co-operative.

So what we're seeing right now is that this Internet is generating more and more opportunity. It's generating more and more territory. We're actually involved in a gold rush. But this is a gold rush unlike the first gold rush in California about 150 years ago where the more gold that's found the more gold that occurs, where the more people that come to California the bigger California gets.

This is an expanding world of opportunity. There's a whole frontier that's expanding and the faster people seize opportunities the faster that frontier expands. It's really incredible. So there's several things to say about this. There's lots of things to say about it. But the one thing that I want to say is that it shifts the general dynamic.

In the industrial age everything was about efficiency, productivity, optimization. You found out how to make typewriters or motor scooters and you made them more and more efficient.

In this new territory where we have this expanding opportunity frontier, lots and lots of territory being created, the skill set is very different and it's all about exploring, learning and opportunity. So the competitive advantage goes to the nimble and the quick rather than those who are efficient.

Efficiency still has a place. People will still make money that way but the number of opportunities growing is so huge that in the words of Peter Drucker, who coined this, "You want to seek opportunity rather than trying to solve problems." Solving problems only mars you in your weaknesses, plays to your mediocrity, whereas seeking opportunity plays to your strength. That's because in this world it's all about opportunity.

Instead of perfecting the known we're imperfectly seizing the unknown. That's where the great profit margins are because out in the frontier, total ignorance. Nobody knows anything, and a little bit of information and knowledge is tremendously profitable.

Here we have opportunity cascades, this thing going up like this. More and more we're at the beginning of this curve going up and the one thing, if I have to leave you with nothing else today, is that you are not late. You are not late.

Whenever you have an exponential curve everything that's happened before doesn't count. When you have the doubling of things, basically what's happened before doesn't count. You're not late. There are no experts. There are

no web experts. 2,000 days old. There are no web experts. We are at the beginning of the beginning. This is a frontier. The fact that Amazon and Yahoo! have had such success only makes more room for other people's successes, right now. That's what this means.

So what does that - I think what this leads us to is this radical idea that there's actually the possibility of a long boom globally, particularly in the developed countries of the US, Europe and parts of Asia. We have four different strong things pushing us: the technological change, the demographic bulge of the baby boomers who are at their peak spending and earning years, openness globally to the markets and a complete revolution in the nature of money - the information we call 'money' - the financial revolution which is just beginning. IPOs, day trading, E-money. We haven't even begun - I mean this is a complete revolution in financials.

All these four things conspire to the unthinkable but now thinkable proposition that we could have 20 years of ultra-prosperity. By ultra-prosperity I mean growth in the developed countries of like 4 or 5 per cent for the next 20 years. This was unthinkable before. There was no justification. Now we can at least consider it. It's not a prediction.

What I'm suggesting is that unless you prepared for this - we all are prepared for the worst. We know what will happen if the stock market crashed and everything collapsed. We know how we would react there. We don't have any idea how we would react to 20 years of ultra-prosperity. And I'm suggesting that it pays to think about that. Here's what that look like. The Dow basically goes to 100,000.

And as you can see this is a historical log curve and you can see that even the log curve is starting to accelerate and if you take it very conservative you get the Dow at 100,000 very easily, without even changing anything. What does that mean to you guys?

I think we haven't begun to think about that. Right now in America there's one new millionaire made every minute, right now. There's 8 million millionaires in America. Millionaire's becoming middle class. One new millionaire made a minute and by 2020 I think we can extrapolate to say one out of three workers will be millionaires, just like there are at Microsoft today. One-third of the employees in Microsoft are millionaires - on paper.

What we see is an expansion of equity culture. Equity culture is what you have when you have lots of places that you're part owner. You started with pension funds in the US. Right now 50 per cent of American households own stocks. At the same time we have the spread of equity culture in the Silicon Valley which says that nobody will work unless they have a stake in their employment and that's starting to spread.

And I think the result of that is we get something - it's a web of ownership where many, many people have a little bit of a stake in many, many other people's dreams and ambitions. This is a very, very powerful thing. We see over and over again that having an ownership is much better than having a debt position; that there is something very powerful about that and that we're seeing the spread. I think eventually we'll come to an equity majority which will be a tremendously powerful force in politics, wherever that is.

What are these guys who cash out with multi-millions of dollars from the start going to do with their money? Well, they do two things. One of them is they start them and they give money to the next crazy guy and his crazy idea. They make a lot of money and what do they do with it? They go to the next person. So it's actually self-cascading, . . . propelling, and they also give a lot of this away because they have no other choice. They can't really spend it. They buy their house and their car, what else are they going to do with it? They're only 25 years old. They're not going to stop working. They're just going to increase this equity culture.

We see also an increased immunity, the higher risk tolerance. That's one of the consequences of this. People actually become more risk tolerant. And the most important, I think, consequence of a long-term prosperity is permanent shortages of people. Lots of money, lots of good ideas and nobody to make them happen.

We see this - I mean, I can give you many stories about this. We all feel this. I think this is what we're going to see for 20 years. It has a lot to do with - a lot of consequences on immigration, consequences on unions and other kinds of things so I think this is a very important factor.

The other expected consequence of a 20-year boom would be a prosperity dividend. The resurgence and revival of grand projects, doing big things, lots of money to tackle some big projects for the first time. "Big" may come back, the idea of thinking big, and the big give-away. Paul Saffo had this great quote which is, "The Lexus of the next decade will be the personal charitable trust fund." And I think we're beginning to see that, a great interest in doing very creative things with this money because what else is there to do with it?

So are you prepared for ultra-prosperity? That's the question. If this was to happen how would you seize it? But I think it's at least thinkable. It took about a billion years for the first living cell to evolve on earth and all those living cells were exactly the same size and shape. They were little specks, little blobs, little round dots. There are many species of them but they were all identical and there were billions of them, of course.

It took about another billion years for the first multi-cellular organism to evolve on earth and they were all adjacent - all these little cells had to be close to each other to manipulate their reproduction and their metabolism but they were all basically the same size as well. They were all blobs. And then in the third billion years something special happened. There was a piece of communication technology evolved called the neuron which was a specialized tissue that allowed two cells that were separated by distance to communicate.

As soon as that happened - boom. We had the Cambrian explosion. We had life now possible in all sizes and shapes and functions. Chameleons, star fish, oak trees, kangaroos, it was all possible because life did not have to be a little blob.

Till now all our companies have been blobs. Every company in the world basically has been the same size and shape. All sorts of institutions have basically been the same size and shape because everybody had to be next to one another to make things happen.

With this communication revolution, with this clothing of the globe with these neurons, this global net that I've been talking about where every single person as well as every single object eventually gets wired up, we are headed into a boom - a boom of opportunity, a boom of variety, a boom of tremendously new, different kinds of businesses, different shapes, different shaped institutions, different ways to structure our culture.

That's why this is so exciting. A planet goes through this process only once. There's only one time in the history of the world when we take everything and start to wire it up together and you are living right at the edge of that.

That's why this is so exciting. This is a tremendously exciting time to be alive and to be involved in business because we are now going to make everything different. What we're trying to do is make technology more like us, rather than the future of cold steel.

All this stuff does is it plays into the strengths of humans. What are we about? We're not about making copies of stuff. Robots do that. We're about being creative, being generative, seizing opportunities, creating opportunities, being creative and expressive.

And so I think people are the Killer App that that we're all looking for. It really plays into the strengths of that and I want to thank you for your attention this short time.

Ronnie Chan: I learned two things: No. 1 somebody said that in the last century capitalism overcame communism. I think whoever thought that way would have to re-think. 75 per cent of the equity will be belonging to the people that work there. No. 2, it's not too late so if you want to take off your tie feel free to do so.

Okay. I know time is late but anyway for those of you who have to leave, go ahead. But for those who want to stay let's spend another five or ten minutes, any questions from the floor, please?

Question: I have a question about the backlash. This hacker attack last week against certain - it seemed to be concentrated on E-commerce oriented sites. The analysts responding to it have suggested that it's an even possibly justifiable attack on people who are using the Internet for, you know, to make money, that that's different from what the ethos of the Internet was originally all about. So I'd love your comments on that and whether you think there is a backlash out there that could spoil some of these visions.

Kevin Kelly: Well, actually as Ronnie mentioned I was involved in the first conference for hackers which at that time had a more benign terminology. So I have hung around. And one of the first editors at "*Wired*" was an actual bona fide cracker/hacker type and one of the things that these guys do, and they're all guys, is they have great fantastic justifications for what they're doing, which is really basically screwing around and seeing if they can make trouble.

So I know that these layered analyses are put on top of them for their justifications but there they are to see if they could do it and to get the status of proving to their friends that they actually can engineer up such a very complicated feat, and they are very, very complicated and sophisticated.

So I don't buy that this was in some way a concerted attack for any kind of logical reason. I think it was very concerted

but just to show that they could do it.

The issue about whether this stuff is vulnerable, yes, it is and we'll go through a whole bunch of a war, an arms race with people trying to make it more robust and more difficult and whereas the Internet has not had very much government or rules I think this is going to be one of the things that we will see. We will see the emergence of a governmental and rule-based, police-based, if you want, apparatus being brought into the Internet to make this work. So it will have to have more government and rules than it does right now. So that's what I think we'll see from this.

Question: You talk about this ultra-prosperity, 20 years of ultra prosperity. I'm kind of curious though in terms of what your feeling is about the haves and the have-nots. I mean, in the Valley we've got these young entrepreneurs, $1 million, you know, it's middle class but then there's these people that are not in the industry that have nothing to do with this. We also have the developing countries in the world that are not wired and, you know, what's going to happen to these people and what's your feeling on that?

Kevin Kelly: I guess my short answer is that this can change very fast, and it has changed very fast in the past. We sometimes forget the amount of change that can happen. As I mentioned before I was first in Hong Kong in 1972. I was first in Taiwan in 1972 and Taiwan then compared to the Taiwan now is almost unrecognizable, basically in one generation. The country went from a third-world country to one of the richest countries in the world within one generation. I think we can see - we can see the changes we want to see within a couple of generations. That's thinkable.

The second thing to say is that I suspect that this will come faster than we think in some areas. There will still be some areas that won't get this. But I don't think in some cases that the solution to this is technological. I think this is often political. Amartya Sen, who won the Nobel Prize in economics last year, won it for his work on famines and what he established was that there was no famine in recorded history that occurred in a country where there was freedom of speech and freedom of information flow. Basically, famine was famine. Real famine, starvation, was an information disease. He won a Nobel economics prize for that work.

So I think that what I'm suggesting is that there are the haves and the have-laters. And what we want to do is we want to speed that up as much as possible of course so that the have-laters are not so have-late. But there is so much economic value to making this happen.

Do you know in the US right now, we have cable TV penetration very high, TV penetration of 99 per cent. The cost of buying Internet and a computer is just about the cost of getting a TV and cable per month. So the reason why people don't have in the US, for instance, why we don't have 99 per cent Internet penetration is not cost. It's culture. People don't find it valuable. It's not worth their money. It's not because they don't have those dollars. That's the US. That's not the rest of the world.

The rest of the world, what we know from many workers is that the most important thing that you can do to get economic development in a country is not electrification, it's not building roads, it's putting in telephones. And we see that by the work of people trying to put cell phones in villages. What happens when you have one cell phone in a village everybody can use, is it liberates economic development like crazy.

So it's communications. I really believe that communications is probably the most powerful way to do it and what these governments should do is de-regulate and de-monopolize communications as fast as possible.

Question: ... old economy you have competition which exists and can be quite fierce, mainly because it works on a more or less zero-sum game model. In the new economy if we're to believe that there is an extended prosperity and there's a bigger pie, what happens to the competition?

Kevin Kelly: I think what you're saying is, what happens to monopolies? I think monopolies become a more benign force. I think, first of all, they're ephemeral. They're much more temporary and while they're there they're actually very beneficial.

This is a Macintosh. I went through a lot of trouble to hook this Macintosh up here. I love my Macintosh. Macintosh is better than Windows. But I am on the side of Microsoft because I think what Microsoft says is true, that they're in a very precarious position. Their monopoly is not really very stable and who's complaining? Just the competitors. Customers of Microsoft aren't complaining because they're getting cheaper and cheaper software.

So I think what Microsoft has done is overall much, much more beneficial than whatever supposed harm they have.