CARNEGIE COUNCIL *for Ethics in International Affairs*

What Technology Wants

Public Affairs

Kevin Kelly, **Joanne J. Myers**

Transcript

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Introduction

JOANNE MYERS: In thinking about the time and era in which we live, no discussion would be complete without having one that focused on technology and our future.

To have that conversation with anyone is easy enough, but when that someone is a person who helped launch the definitive online periodical *Wired* and is recognized worldwide as a visionary, this is a conversation that you want to have with no one else. With that in mind, it is my pleasure to welcome Kevin Kelly to the Carnegie Council and our program today.

The themes in his latest book, *What Technology Wants*, raise some interesting questions. Specifically, he asks why particular technologies are inevitable and why we have a moral obligation to increase the amount of technology in the world.

To answer these questions, he posits that "technology is an expression of a self-organizing universe, better understood through the metaphor of biology than engineering." He argues that "technology has a life of its own and advances independently of humans. Technology in this sense is a product of ideas, plus actions and choices, that allow an individual to generate and participate in a greater number of ideas."

It is at this point that he introduces the discussion of what he calls "the Technium." "The Technium," he writes, "is a provocative new way of thinking about the sum of all technologies—the society, the culture of tools, and the self-reinforcing system of creating them that we now find ourselves experiencing."

He writes that "when we enlarge the variety and reach of technology, we increase options, not just for ourselves, not just for others, but for all those who come after us."

For any of you who have visited our speaker's website, you will recognize that his book is a summation and refinement of the hundreds of creative ideas and thought-provoking notions he posted in the past six years. As Mr. Kelly looks at the inevitable technologies to come, he will introduce us to a brave new world where you will become acquainted with fascinating new

technology and receive a better understanding of the true nature of its increasing presence in our society.

Please join me in giving a very warm welcome to our guest this afternoon, Kevin Kelly.

Remarks

KEVIN KELLY: Thank you very much. It's my pleasure to be here.

This is the launch day of the book, so you are the first audience I get to talk to. I'm looking forward to having a discussion, more than just a lecture, because the questions you ask will be part of how we think about this topic.

I want to begin by describing a little bit about how I came to write the book.

I was a college dropout. I left the United States and spent time in Asia, roaming around some of the most remote villages that are possible to get to, with very little money. These were villages that had very little material wealth. There were some parts in the Himalayas where they had almost no metal; it was mostly wood, fiber, and stone.

Remarkably, the people there were seemingly content. Although they were very poor and in need of things, there was a certain happiness that I couldn't find in my own suburban home. At the same time, they were leaving those places as fast as they could to move to the city. There was obviously something that they wanted.

I left Asia and I rode my bicycle, human powered, across the United States. I encountered the Amish in Pennsylvania and was very struck by their lives. They were able to live a more simplified version of life than what I had seen in cities.

I came back and I started to work for the *Whole Earth Catalog* in California. It was written for hippies who want to go back to the land and make their own lives, drill their own wells, and build their own houses. It was a kind of how-to manual. Again, that spoke to me in terms of being simple.

Eventually, I did some more Appalachian Trail hiking, and found my way back to California to work for the *Whole Earth Catalog*, where we were reviewing tools. The idea was that we would find the most appropriate tool for people to do what they needed to do.

It turns out that one of those tools happened to be my calculator, that was sort of a computer, and we got involved with making the first online computer network access, called The Well. It was actually propelled by the Grateful Dead followers who would meet online and swap tapes and things like that.

Suddenly, this other facet of technology was entering my life. This seemed to be a softer side than what I normally associated with technology.

Do you know what technology is? We commonly think about technology as anything that was invented after you were born. My friend Denny Hills made kind of a version of that through his statement, "It's anything that doesn't work yet."

That's not true, because most of the stuff in our lives was invented long before we were born. All of this stuff here was invented a long time ago—the chairs, the ductwork, and the stuff outside these buildings. Obviously, there is more technology in our lives than just what's been here since we were born, but that's how we normally think of it.

As I got involved in technology, I began to see a different facet. I had normally thought of it as kind of big, overbearing, industrial, and grimy. But here was another version of technology. In the online world it seemed to be a little bit more organic. People would come together in these forums and they would help each other. They would do things for free. There were things that we now understand.

In the mid-1980s, it was remarkable what people were doing—writing for free and doing all kinds of things. To me it felt almost like an Amish barn-raising that was happening.

I began to change my mind about it. I began to look at the culture around technology. I wasn't really ever that interested in gadgets and things. I was more interested in the culture that would be built around it, and I was interested in what these things meant to us.

I was involved originally in photography, then writing, and then editing which led me to editing the *Whole Earth Catalog*.

I eventually got involved in editing a magazine called *Wired*, which was not about the technology, but about the culture around the technology. We like to think of ourselves as a lifestyle magazine. We are a magazine about technology culture in the way that *Rolling Stone* is a magazine about music culture.

In my role at *Wired* I got to hang around with a lot of people who were making the technologies of the future. These were people inventing the chips, the software, the computers, the pharmaceuticals, and the biotech. I became more and more interested in the tools themselves. I started a blog where we reviewed one tool a day.

I have hands in both the old world, where I was trying to keep the amount of technology in my life to a minimum, and this new world that was all about maximizing the number of technologies in the world.

This book came out of a little bit of my own efforts to try to understand what technology meant and where it should fit into the realm of the world. When a new technology came along, should we embrace it, or hold off? Was there a framework for understanding that?

Another way of saying it was: What's the theory behind technology? Do we just deal with each one, one by one, or was there a kind of a framework to understand and have a perspective on technology?

That's what this book is about. It's trying to answer that question of what's the framework, what's the situation, how is technology situated in the cosmos, so to speak; how does it relate to us, how does it relate to nature, how does it relate to the meaning of it all?

It took a number of years and thinking to look at that. I was mostly more of an editor type than a writer. I was hoping that I could just find that right philosopher, the academic that had this all figured out, and I could interview them and they could tell me their stories.

It didn't work out that way. Instead, I spent some years thinking about it. *What Technology Wants* is my version of what techno-literacy is, and what we need to know about how this system works.

Again, we think of technology as anything invented after we were born.

What's interesting about this [shows his cellphone], is that it happens to be almost the same size and shape as a stone tool of a caveman. He could have made that himself and nobody here can make this. In fact, all of us here cannot make it. This technology requires probably about 1,000 other technologies to exist.

All these technologies that we have now made are interrelated, they are codependent, and they form a kind of an ecosystem of technologies. You might even think of it as if these were species, as if it was a super-organism of technology.

That's what I'm interested in. I'm not interested in these little things. I'm interested in this super-organism of all the technologies. I gave it a name. I call it the Technium.

When I talk about the Technium, I'm including this and I'm including us, because we're connected to it. I'm also including all the things that we make from it, which is the output. All the movies and stories that we tell, are all things that we have invented with our minds. In the larger sense, the Technium is anything that we make with our minds.

That is different than maybe what we normally think of as culture, because all these things are connected together and they form an interacting whole, a kind of a super-organism, that has in many ways its own slight bit of autonomy, and its own agenda.

I talk about it wanting things. What I don't mean is that it wants in the way that you and I want, which is a conscious, deliberate, intelligent want. It wants in the way that a plant wants light and so it will lean towards the light. It has an urgency to go towards light. It's not intelligent, it's not aware of it, but that's what it wants.

The Technium as a whole, as a super-organism, wants certain things, not intelligently or consciously, but it drifts in those directions.

The question I ask myself is: What does technology want? If we have made this large organism that is surrounding us and that we're part of, what does it want? If it does want things, it means that it wants it independent of our choosing.

At the same time we are making it; it is there because we exist. It's not independent of us, but it has some slight bit of autonomy.

That autonomy is growing. Autonomy is not binary, it's not here or there; it's kind of a continuum. It has a little bit of autonomy.

What does it want? That's the question.

What it wants is in many ways is where it came from. When I stood back and looked at technology as a whole, it seemed that it was an outgrowth of our minds and our own culture, which has been on

a 3.7-billion-year journey. That journey, if I looked at what evolution wanted, has a very distinct direction.

Biologists are slowly coming around to admitting that there are directions in evolution. The standard orthodoxy for many years was that it was completely random, and that there was no direction whatsoever. Any ordinary person found that shocking because they could definitely see a direction in evolution.

The major direction was from simple to complex. We see that there were initially very simple cells and organisms, and over time the most complex became more complicated. We have our bodies today, which have 250 different cell types, whereas there was just one cell type 3.7 billion years ago. We see an arc of increasing complexity in the long journey of life.

We see other things too, if we look at them in an abstract way.

We see that there is a trend towards increasing diversity. We can take quantitative measurements in the biology of the historical record of fossils and different families, and we see that over time there is more diversity in life. Along the long history there is movement towards increasing diversity.

There is also increasing movement towards specialization. The first cell was a general cell. Over time you have more and more specialized cells. We have 250 different kinds of cell types—we have skeletal cells, muscle cells, brain cells.

The same thing—and this is where I am going with this—is you can apply the same kind of macro trends to technology. The first hammer was just a general-purpose hammer. Very quickly, we started to make specialized hammers that would break bone, hammers that would be used for pounding wood; in the Industrial Age there were all kinds of specialized hammers. We had a cutting implement, and then we specialized it, and made a special kind of knife or scissors or other things.

We do the same thing with computer chips. We have a general-purpose chip, and we make specialized chips. We have a camera, and we make specialized cameras. That trend toward specialization, even in our own jobs, takes place. That is another long-term trend.

There is a trend towards increasing structure. Things become more and more complicated.

There is a trend towards emergence, which means that as things become complicated, they form into a hierarchy of levels. Cells combine into an organism, organisms combine into colonies, colonies combine into societies. Those increasing new levels are something else that we see a trend in the Technium.

There are other trends—towards ubiquity, towards energy efficiency, towards degrees of freedom.

I will give one example of what I mean by energy efficiency. All these systems, including life, come out of a class of systems called exotropic systems, which means that they are self-organizing. This self-organization is built up over time.

One rule of the universe that we know is true everywhere is the rule of entropy. The universe is running down in terms of energy use. It is going down and coming to some finite end-state called heat death, where everything is flat, so to speak. That is true anytime you do anything—you increase

entropy, it goes down—that's true around.

Except for a few little pockets here and there where things are running up, things are getting more complicated. That starts in places like the galaxies, which have their own ongoing structure. They spin around and they maintain themselves over billions of years.

Planets maintain some kind of order against the entropy of the rest of the universe by building up mountains and things.

Stars have maintained a very complicated order and a whole sequence of complicated arrangements and structures for billions of years.

Here and there, we find we have one planet where we have life, and we see the structures of those things sustaining in permanent disequilibrium against the heat death of the world. That exotropic system continues to get more and more complicated.

What I'm suggesting is that there is a continuum, a connection back all the way to the Big Bang with these self-organizing systems that make the galaxies, stars, and life, and now is producing technology in the same way.

The energies flowing through these things are, interestingly, becoming more and more dense. If you take the amount of energy that flows through one gram per second in a galaxy, it is increased when it goes through a star. It is actually increased in life.

We don't realize this. We think of the sun as being a hugely immense amount of energy. The amount of energy running through a sunflower, per gram per second of the livelihood, is actually greater than in the sun. Intuitively that doesn't make sense, but that's because the sun is just so huge and the temperature is so high. Actually, it's so dense that when it's multiplied out, the sunflower actually has a higher amount of energy flowing through it.

Animals have even higher energy usage than the plant, and a jet engine has even higher than an animal. The most energy-dense thing that we know about in the entire universe is the computer chip in your computer. It is sending more energy per gram per second through that than anything we know. In fact, if it was to send it through any faster, it would melt or explode. That's actually one of the problems with computer design right now. It is so energy-dense that it is actually at the edge of explosion. This is a challenge for them designing it.

I went through that just to show you that there is a continuum with the origins of the universe, with systems like galaxies and stars, with life and technology. There is one long arc all the way back to the beginning.

What I hope to show is that we're just in the middle of it. We're not by any means at the end of it. This is going to go forward into the future.

What I'm suggesting is if we take the long view, we can say: "Well, what about technology in the future? Where is it going?" Here's a couple of things we can say about it.

    - It's going to become more complicated. It is never going to become simpler.
    - It is going to become more diverse.
    - It will be more specialized.
    - It is going to become more energy-dense.
    - It is going to become more ubiquitous.
- It is going to have more degrees of freedom or choices.

The other thing that is evolving over time is the evolvability of the system. One of the things that life is doing is it's evolving its ability to evolve. In the beginning, life didn't evolve very much. As it made more structures and more things, the varieties of the ways it could evolve changed, so its evolution was changing. That's what technology is doing. It is accelerating the evolvability of life.

Another way to think about this is that one of the things that life likes to do is make eyeballs. Life evolution independently invented eyeballs 30 different times in different genres and taxonomies. It invented flapping wings four times. It invented venomous stings about 20 times independently, from bees, to snakes, to jellyfish. It also has invented minds many, many times.

The problem is that there are many kinds of minds that biology can't make but technology can. You could think of technology and us inventing the kinds of minds that biology could not invent. We are going to invent all different kinds of minds.

Your little calculator has a mind that can do arithmetic a lot better than you can. It's smarter at arithmetic than you are. That's all it can do, it can't think of anything else, but it can do arithmetic much better than you.

We're not freaked out by that. It's a different kind of mind.

Most of the minds that we are going to make are not like us. They won't be like us. There's no reason to make a human mind, because it's so easy to do otherwise. We're going to make different kinds of minds. We're going to make minds that basically biology can't.

We are going to fill the universe with all different kinds of thinkings, because only by having many different kinds of minds can we actually understand the universe. Our own mind is probably insufficient to completely comprehend the universe.

What that means is that technology is accelerating and amplifying and extending the very same things that evolution was doing in life. Now it's going faster and faster. We are going to use it to create options and opportunities, which is what we get from it in the end, that biology itself can't give us.

The reason why we want to embrace it with our full arms is because what technology brings us is an opportunity for everybody's special mix of talents to be expressed. Just as we all have different faces, we all have a different mix of aptitudes and abilities. We use technologies to express those things.

The anecdote that I'll end with is imagine the loss to us as a civilization if Mozart had been born before the technologies of the symphony or the piano had been invented. He would have been lost. We would never have had that genius.

What if Van Gogh had been born before oil paints, or Hitchcock before the technologies of cinema; what a loss it would have been to our civilization.

Yet today, throughout the world people are born whose genius we will never be able to share because we have not yet made the technology for them. What we want to do is invent all those things so that their genius can shine—and not just the new stuff, but we need to bring the technologies of clean water and abundant food and education to them as well. We want to bring all that so that every person in the world has the opportunity for their genius to flower and blossom and to be shared.

We have an obligation to increase the amount of technologies in the world because they can be used for this generation and future generations to spark the genius of everybody on Earth. In that way that technology has a moral dimension that we don't normally see. That moral dimension is that it brings us good choices, opportunities, and possibilities.

I want to end now. I'm sure there must be a question or two about this, and I'd like to answer them.

Questions and Answers

QUESTION: Don Simmons is my name. You spoke of infinite progress and expansion. Are there any limits—for example, the speed of light—that would cause you to find some exceptions to your conclusions?

KEVIN KELLY: Yes. I'm not sure I actually used the word "infinite," because I don't think it is. There are constraints. Evolution itself cannot make anything; it can only make certain things.

It is actually constrained by several different things. It's constrained by the physics and chemistry of material things. Secondly, it's constrained by its history, and what has come before it. Thirdly, it is also constrained by some of these internal dynamics that I was mentioning. When you have large, complicated systems, they also restrict where it can go. There are lots of restrictions.

Having said that, the possibility space is still so huge that it could be infinite to us. We still have plenty of room for all kinds of things.

QUESTION: My name is Todd Gailun. In the book you talk about Carver Mead and Gordon Moore reevaluating what Moore's Law is all about. I had always thought that Moore's Law was simply that

adding transistors was bound by laws of physics. But, according to Mead and Moore, they said it was actually propelled exponentially by way of economics and belief.

I was wondering if you could describe what role belief plays in the exponential curve of technology vis-à-vis what Kurzweil says.

KEVIN KELLY: To recap, there is this observation, called Moore's Law, which was started off by Gordon Moore noticing very early, when computers were being invented, that the number of transistors on a chip would double every 18 months and their cost would halve. You would increase the power of computers while getting cheaper. That observation has actually been on almost an incredibly straight line for 20, 30, 40 years.

What Moore's Law means basically to most of us is that you don't buy your computer until you need it at the last minute because next year it is going to be twice as good and half as costly.

The question is: Was Moore's Law inevitable? What drives Moore's Law? Where is this coming from?

The founder, Gordon Moore, and Carver Mead believed that this is a self-fulfilling prophecy, that because it started in this way, the entire industry could see where it was pointing to and the financiers and the engineers would all have a goal to work towards. They would know where they have to get in the next year, and they would move towards it.

That turns out to be probably not true. By that, I mean not that they weren't working on that, but that that's not really what's driving it, for several reasons.

One is because other people have done calculations to show that Moore's Law, not in terms of transistors, but in terms of measuring computer power, was happening long before Moore or anybody even noticed it. The effect was happening before anybody believed it.

We see these same kinds of curves happening in many industries, and it happens before people believe that there was even one of these curves happening.

What this suggests is that this is actually an inherent attribute of the physics, and it suggests that it is independent of the economy. Even if the silicon chip had been invented in Stalinist Russia under a command economy, it probably would still follow exactly the same kind of curve.

Recently, Geoffrey West at the Santa Fe Institute looked at a whole bunch of technologies, like solar and batteries and other kinds of things, and they show this this scaling law holds true in many industries.

There is another scaling law that happens even more widely, which is that there is a direct proportion of the cost of things to the volume that they are produced in. They have shown this across about 2,000 different industries. They can show that the cumulative volume of things that are produced is inversely related to their cost; It drops down as volume increases.

It has something to do with the basic shape of the economy and of physics, and it's not really a self-fulfilling prophecy. In this way I suggest that these kinds of curves are inevitable. One of the characteristics of the Technium is it exhibits these scaling laws.

What does that mean? Well, imagine it's 1960 and the only thing you knew was that computers are going to get twice as fast and half as cheap for the next three decades. First of all, you'd be incredibly wealthy. But you would also be able to engineer your education system and your political system, and all other kinds of things. If you really believed that and knew that, you could do all kinds of things to really prepare, and to gain the full benefit of the fact that this was going to happen.

When you use the word "inevitable," those are kind of fighting words, and a lot of people find them scary. But we should actually just take them as an opportunity to optimize.

QUESTION: Barbara Speck, the director of Inside Art. If this is not relevant and you can't answer it, I understand. Having just seen *Social Network* and realizing how socially inept the founder, Mark Zuckerberg, was socially—but a man like that, who grasps technology the way he does, do you think that's evolutionary, do you think that's genetic? Whatever your answer is, how do you encourage it in your grandchildren?

KEVIN KELLY: I have not seen the movie. However, I'm friends with the guy who wrote the book on Facebook [Ben Mezrich]. What's very clear is that you have to understand that is a fictional movie. The person is real, the company is real, but a lot of the things that happen in there were just made up for a movie.

What he says about it is there's no way that the character portrayed in the movie could have ever built this billion-dollar company. You just need a different kind of personality to build a company like this.

That doesn't really answer your question about whether or not people—and it's a question people ask: Are we breeding a generation of kids that have more of an aptitude at these kinds of things? Is this something that's cultural or genetic? There are several things to say about it.

One is we do know that the media that we have does rewire our brains. We know this by studies of people who are literate. They took scans in Peru of people who were illiterate and those who could read and write. They found that in fact their brains work differently—not just when they're reading, but just in general. After having five, ten or twenty years of education and learning to read and write, it actually changes how your brain works.

We are not the same people who came out of Africa. We are different. It takes us ten or fifteen years to train our minds this way.

It's also very clear that if you are spending five or ten hours a day in front of a computer, that is going to change how your brain works. It is going to rewire how we're doing things.

We are just learning now about that and what that means. We don't know how it changes our brain, but it will in fact change how we are thinking. It is going to continue doing that.

We have a dependency on the alphabet. That's how we think about things. We need reading and writing. We think in terms of words. We imagine it. We see it around us. It's ubiquitous. We are dependent on the alphabet. That doesn't seem to bother us very much. We're not freaked out by that.

As these technologies become more ubiquitous and as we become dependent upon it, that's what it is. We will be dependent upon it. It will be our exobrain. We'll use it to remember. It will always be around. As long as it's around, we'll be good.

We are already dependent on technology. If you removed every single bit of technology in the entire world, including our knives, blades, and scrapers, humans would die within six weeks. We are incapable of surviving without our technology.

We invented the external stomach, it's called cooking, that allows us to digest stuff that could not otherwise increase nutrition. It changed our jaw and our teeth. We are physically different people because of our inventions. While we can live on a raw diet, it's actually very hard to breed on a raw diet.

What we have done is become dependent on our technology, and we will become ever more so. That's just the definition of who we are. We are the first domesticated animals. We are a technology ourselves.

That's why there is this tension between the selfish technology which has its own agenda and us being masters and creators of that is a self-creation. When you're self-created, that means that you are both the created and the creator. That tension will always remain. As long as there's technology, which there will always be, we are always going to have the tension between the fact that we are the created and the creator.

QUESTION: Nancy Kirk. I wonder about the moral dimension. There was technology prior to World War II in which there were scientists collaborating on research into the atom. When politics came into it, we had total destruction. Are you talking in a way that says we're back before World War II again and the scientists won't let this kind of destruction happen?

KEVIN KELLY: No. What I'm saying is that there is only a little more good in technology than bad, but a little is all we need. If we create one-tenth of a percent more than we destroy every year, we can make civilization, because that tenth of a percent compounded over centuries is all that we need.

If you look around the world and say, "Hey, half of it's crap"—yeah, that's about right. But a half plus 10 percent is actually good.

Here's how that comes out. We tend to say, "Technology is just neutral, it's just half-bad, half-good. It's kind of what you do with it."

Every time there's a new technology that comes along, we have the possibility to use it for harm or for good. We also suddenly have a new possibility and choice that we didn't have before. That new choice is that little tiny tenth of a percent that's better, because we have now another freedom that we didn't have before. That tips it into the good side.

It's not much better, but that's all we need over the long term. That's why over the long term it's good, because it increases choices and possibilities.

QUESTION [Program Director Joanne Myers]: You say that technology is a positive force. Yet people are also saying that all these new gadgets dumb-down culture. How do you reconcile the two?

KEVIN KELLY: Technology is not powerful unless it can be powerfully abused. There is going to be a learning period. There are going to be phases that people go through and then become addicted. They don't know how to use it.

We forget the entire uproar and the dismissive nature that romance novels had. Romance novels were completely discounted as a terrible waste—"We have all these young people reading!" This was terrible, really. They were considered a waste of time, a debasing of culture, all these things.

The telegraph when it first came in was the same way. It was something seen as subversive, leading to all kinds of romances and abuses.

Every new technology when it first comes, as the culture tries to figure out where it fits into things, is often seen as debasing and catering to the base instincts or addictive behaviors. Those in some cases are true. It takes a while for us to understand our own limits and where things fit into it.

That's what is happening with online life. There are some people who are addicted to it, but there is also a rearrangement of understanding what it is and learning how to use it.

People go through phases very quickly. Just 20 years ago or so, the discussion among the academics was the end of writing. Nobody was writing anymore, it's like: "It's dead. What are we going to do?" People are writing more now than ever before. Kids are writing far more than they ever wrote before.

That's because this thing came, this thing that was dismissed as something only nerdy, adolescent, pimply boys were going to use—that's what it was called; I know, because that's what they were telling us. That's what revived writing. Writing has gotten a huge expansion in quantity and quality. It's because we finally figured out what it's good for.

That's part of what I see the Technium as. Its that we have technologies we want to find a good home for, a good job, and we want to find the right place for it.

DDT is horrible. Don't give it a job as a pesticide, and spray millions of acres of cotton fields. That's a terrible job and causes all kinds of havoc. Yet used locally and sprayed around households, DDT eliminates malaria and saves millions of lives a year, and it has very little environmental impact that way. That's a better job for this technology.

We want to find the right jobs for these things and the right frame. Just like there are no bad children, there are also no bad technologies. You've just got to find the right place for them.

QUESTION: Todd Gailun. You don't Tweet, but I know you have a blog where you obviously spend a lot of time expounding on your ideas. You obviously read a lot of books. Do you feel like people may write more in terms of 140-character Tweets or Facebook updates? Are people really writing, expounding like you are, in essay form on your blog?

KEVIN KELLY: I don't Tweet just simply because right now I have decided instead of staying on top of things I want to get to the bottom of things. That's my phase of life.

I will probably Tweet and do all those other things at a different time. I believe in sabbaticals too. I

literally take a sabbatical from work, and I think we should take some sabbaticals from media. It doesn't mean I'm going to reject it. It just means I'm going to take a break and do something and come back in.

You think differently when you're Tweeting and doing all these things. That kind of thinking is actually necessary. It's actually part of this continuous partial attention that we have to things and is actually a proper response to the degree of change in our environment. We need to have this kind of thinking.

We don't want to lose the contemplative, introspective, well-informed delving into an idea. From my own experience, it's not that hard. You just step back, you unplug. Okay, you can do it.

Most people are finding that they are getting by. They are adapting to this kind of environment. This kind of choppy surfing, assembling of mashups, is the way that we have to deal with this environment for the most part.

My research has shown that there are very few species of technology that ever go extinct. That's the difference between biological evolution and technological evolution; in technology things don't go extinct. They can be resurrected. They are always there. Those options are usually there.

If you want to live like a caveman, you could do that tomorrow. You sell all your stuff, you buy an airplane ticket to Brazil. Within 30 hours, you would have the full opportunity to live like 50,000 years ago. Very few people do this.

You could go live like the Amish. Very few people go backwards.

Why? Because we have to surrender so many choices and options. I know the Amish and that life is very attractive. They have incredibly strong families. They build your house if it burns down. They pay for your medical expenses. It's so welcoming and supportive that they have a very low attrition rate even after the kids do the *rumspringa*, which means that they're allowed to live as civilians and have sex, drugs, and rock 'n roll. They still come back because it's so supportive.

The price of that is that they surrender options and opportunities. If you are a girl, I can tell you what your destiny is—it's a housewife, to be a mommy, and to have babies, that's it. If you're a guy, you are going to be a farmer by hand, or maybe a tradesman, but you're not going to be a mathematician or a musician playing in a symphony.

As wholesome and as satisfying as those lives are, the price of going back to these places is surrendering choices and opportunities. In general, the whole arc of evolution is towards expanding those, and that's why by embracing technology we can align ourselves with this long arc throughout the cosmos into the future. That's something bigger than ourselves.

JOANNE MYERS: Another thing you do is you evaluate new technologies. I'm just wondering what was the most interesting, fascinating, or unusual thing that you have seen that's coming out of the pipe?

KEVIN KELLY: In this book I don't try to talk too much about new technologies, because it would date very quickly.

JOANNE MYERS: You do talk about the robot.

KEVIN KELLY: I do talk about the robot. We are making technology and designing into it more and more autonomy. Besides this kind of super-organism of technology with more autonomy, we are trying to make artificial intelligence in robots, so that make they can make their own choices, they will be kind of like children, and they will have their own will power.

I went to visit a place where they were making one of the more advanced robots, called Willow Garage, in Stanford. I was there because this particular robot has the ability to actually find a plug and plug itself in to repower itself. No one has taught it where these things are. It can actually proceed and look and travel around on its own. It actually gets its arm and takes its tail and plugs it in.

I stood between it and a plug. It was very clear that it wanted power. It had a want that was very visible to me. It was never going to hurt me, because part of its program was not to hurt, but it was very clear it was going to get power. If I stopped, it would go around. It was somehow or another going to get it.

It's not conscious, it's not aware, it's not even very smart, but it definitely wants something. It's comparable to if your cat or birds wants something. I'm using it in those kinds of terms.

The stuff that is coming down is going to be more smart and more sentient. It's going to become more complex; it's not going to be simpler. It's going to be more codependent on other things.

We have life in our gut, we have bacteria in our gut, that has always been surrounded by other life. The first life on Earth was surrounded by inert material, and then over time there became more and more life, and so a lot of life has never touched inert material at all, and it has been codependent on other life around us. Ecological systems are that way.

The more complicated robots they are, the more mutualistic they are with other species of life. The same thing is happening with our technology. We are making technology that relies upon other technologies. That will go into the future, where we will have technologies that are dependent on more technologies.

I did a calculation that showed three-quarters of the total energy that we use on the planet right now, at least in the United States, is used in servicing technology. Roughly, three-quarters of the gasoline that you use in your car is used to move the car and not you. You're just a minor passenger in this whole thing. We have energy used to heat the warehouses that are holding the stuff that we have or to move the stuff that we have. Already this Technium is consuming three-quarters of our energy.

That is also where it's going. There will be more technology used to support more technology. Most of the traffic on the Internet is not people talking to each other; it's machines talking to other machines.

QUESTION: Caryl Rappaport. Part of that is also all the data tracking everything that everybody is doing. Whether it is the robot—because I know they have started with the robots—I remember the dog ten-plus years ago. All of that is also reacting to how you would use it.

So yes, the energy is more and more, but the collection of the data and your privacy really is extremely different than the romance novel that you mentioned before and that impact on society.

How do you really feel about all of that data being collected and the use or the misuse of it?

KEVIN KELLY: There's two ways for me to answer that.

Personally, I am willing to surrender—you can think of privacy as a currency—I am willing to pay for that in terms of the good stuff that I get in return. That's me personally. Not everybody is the same way. I really respect and honor that.

QUESTIONER: To what degree?

KEVIN KELLY: Pretty much all the way. In other words, here's what it is. Total personalization requires total transparency. You can't say, "Be personal to me, tailor everything to me, but I don't want you to know anything about me." That doesn't work. If I want to be treated as an individual all the time, then I actually have to represent myself as that individual. I want total personalization, so that price is going to be total transparency.

Not everybody is going to go all that way. That's fine. We'll have choices in that. But it becomes a currency.

One of the things about privacy is that there are a lot of illusions—or not illusions, but there are some paradoxes about it. At times it is illusionary.

In the small town, there was actually very little privacy. There was the lady across the street who watched all your comings and goings. She knew everything—who your friends were, were you there, who's new.

The thing about that was several things. One is you knew everything about her. It was symmetrical. You could see her comings and goings.

Secondly, there was benefit, because if you were out of town and someone was coming who wasn't your friend, she called the cops. She knew you well enough to actually give you a benefit by being a watchman.

There were two things about it. One, it was symmetrical, so you knew as much about her as she knew about you. Two, you got benefits from it.

Part of what the Internet has come off is that it has been asymmetrical. It's like they know a lot more about me than I know about them. If we can bring it down to where it is symmetrical again, where I know as much about them as they know about me, and (2) I get to correct or make sure that it's correct information that they know about me, and (3) I get a benefit by this exchange, then we're a lot more comfortable with this. It's a little bit more like a small town.

JOANNE MYERS: I want to thank you for introducing us to a new way of thinking about technology.

Audio

In a brand-new view of technology, co-founder of *Wired* magazine Kevin Kelly suggests that it is not just a jumble of wires and metal. He argues that technology is actually a living, evolving organism that has its own unconscious needs and tendencies.

Kevin Kelly is editor-at-large for *Wired* magazine which he helped to launch in 1993. During his tenure, *Wired* won the National Magazine Award for General Excellence.

Generous funding of the Carnegie Council's 2010-2011 sustainability programming has been provided by Hewlett-Packard and by Booz & Company.

Video

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