

# Tending the Garden of Technology

by ANDREW LAWLER



For *Wired* magazine cofounder Kevin Kelly, technology is neither the practical nor the neutral result of scientific discoveries, but a powerful universal force for creating opportunities. He speaks in unapologetically theological terms. The internet is “a miracle and a gift” that allows humans to organize and create in radically new ways. He says that we are moving from being People of the Book to People of the Screen. Kelly’s radical pronouncements earn fire from both sides of the chasm between religion and science, even as he seeks to see beyond those dogmas. Today he wants to “talk about faith using the vocabulary and logic of science.” When I arrive at Kelly’s home south of San Francisco, he’s sweaty from riding his bike up the steep hill, which rises from the coast. Poet, wanderer, publisher, cross-country bicyclist, former hippie, and self-described nerd, Kelly’s trimmed white beard is that of a New England clipper-ship captain. His home office is perched in a wooded neighborhood and has the pleasant feel of a lived-in tree house, the floor strewn with books and papers and gadgets.

**LAWLER:** There are few people today who talk about science and spirituality in the same breath without criticizing one or the other. You are an exception.

**KELLY:** My larger agenda is to bridge the technological and the holy. These are not two

words that most people normally associate with each other. It is going to be a long conversation to bring them together.

LAWLER: Is this what you mean when you describe yourself as a “techno transcendentalist”?

KELLY: Right.

LAWLER: But can you really imagine Thoreau multitasking on a BlackBerry? How do you relate transcendentalism to technology?

KELLY: I don't mean transcendentalist in a monkish or hermitlike way. I mean transcending in the sense of connecting to a state of awareness, of living, of being, that transcends our day-to-day life. It's not a withdrawal, it's an emergence. And tools can be used.

LAWLER: Or misused.

KELLY: There's been a lot of chatter about information overload recently. It is true there's something different about this [modern] environment in our day-to-day and minute-to-minute awareness. What it means and what we should do about it is really not so clear.

I acknowledge the fact that multitasking and BlackBerrys and iPods and Twitter can be distracting. But we don't really have the option of ignoring it. The proliferation of devices is necessary to learn new things. And the cost of learning new things is an avalanche of fragmented information. We just have to learn how to live with it.

LAWLER: But don't we get to choose?

KELLY: It's not that we don't have the option to remove ourselves. This phase of cultural evolution, in which we are growing and discovering, requires this tide of twenty-four-hour information. I think it's necessary and good that there will always be an opt-out option. We want to encourage that diversity, but it will always be a niche. Barring some disaster, society is not going to become a world where everybody stays at home writing poems and reading one long book after another without interruption.

LAWLER: Where is the transcendentalism in this view?

KELLY: The roots of technology go deeper than just human culture. They weave and string all the way back to the Big Bang. Technology is an example — like life and intelligence — of an extropic system, a system that feeds off entropy to build order.

And not just order, but self-amplifying order of exploding complexity and depth. Extropic systems create even more entropy in the process — that is, energy runs through the system at a faster and denser pace. This is the definition of self-sustaining systems like a living organism. There's continuity from the beginning of the universe, which is expanding out and creating space to allow diversity to flourish.

What we have is a long-term trend of increasing diversity, complexity, and specialization — all characteristics of self-sustaining systems. That could be a galaxy or a sun or intelligence. The resulting density of power is technology. I use the term “the Technium.” A galaxy is a system composed of individual technologies, complex enough to have its own self-sustaining qualities including self-preservation. It is self-perpetuating and self-increasing. You could say that humans are the sexual organs of technology — that we are necessary for its survival. But it has its own inertia, urgency, tendencies, and bias.

LAWLER: Other than to reproduce, what is the purpose of these systems?

KELLY: These systems are evolving evolution. They are increasing degrees of freedom. And this is the theological part — we have the infinite game. The game is to extend the game, so that the game will keep going. The game is to keep changing the nature of change. And that infinite game is my view of holiness. You play the game not to win, but to continue to play to make room for all expressions of truth, good, and the beautiful. You are opening up the world to possibility. Every child born on Earth today has some particular mixture of genes and environment, of capability and intelligence to unleash. The game is about trying to educate that individual into a position where they can maximize their potential and possibility. And technology is the instrument.

LAWLER: You have spoken about what would have become of Beethoven if he'd been born before the invention of the piano . . .

KELLY: That helps me think about the people born today who may be missing some technology that would allow them to be their best. That's what technology is in the larger sense — the discovery of potential and possibility.

LAWLER: But tools are not creativity.

KELLY: At a deep level, the act of discovery and the act of creation are identical. The steps that you would take to find something are exactly the same steps you'd take to make something. So you can say that Edison discovered the light bulb and Newton invented gravity.

LAWLER: Wendell Berry might say that is all well and good, but technology doesn't

change the essential nature of humanity. It doesn't make us better people.

KELLY: I disagree with Wendell. We have created our humanity. And I think our humanity has been created by technology. Our humanity is defined by things we have invented. Like the alphabet. Our culture is one thing we've created. But I also think there has been an evolution of morality. Culture and cultural inventions are part of the Technium — they are technologies.

LAWLER: But the Ten Commandments were likely tribal rules passed on orally long before they were written down. It was just the medium that changed.

KELLY: Language is part of the Technium too. And language allowed us to structure laws and rules, our ideas of inherent fairness and sense of right and wrong. These are associated with society and culture and all that Wendell is concerned about. And they were developed over thousands of years. Our humanity is actually a result of the invention and the distribution and the enhancement and growth of the Technium.

LAWLER: Man the Toolmaker — it's an old concept. Surely we are more than toolmakers.

KELLY: But I don't think the Technium is only about humans. It's a type of learning. It's a type of expression. It's a type of possibility.

The Technium works as an ecology. Just as evolution has a longterm direction as we look 4 billion years into the past, so technology increases complexity and diversity, with increasing power.

LAWLER: So technology is part of evolution or God — that which drives the universe?

KELLY: Exactly. Some people call this the Great Story. Roving preacher Michael Dowd talks at churches about this alternative creation story. It is about evolution through God, that which started from nothing, grew into particles that gained mass and complexity, and then clumped into molecules and then became dust and planets and so forth. And technology is the latest variety.

LAWLER: So the Technium is one of the ways in which the universe is getting to know itself? And by increasing complexity, the universe becomes more self-aware?

KELLY: Exactly. I think of God as the intelligence of mind that is increasing the complexity of the universe.

LAWLER: That makes me think about the way new ideas appear to spread almost simultaneously. Five thousand years ago humans suddenly began living in cities from

Egypt to India. There was something in the air. Is this the Technium at work?

KELLY: Simultaneous invention is actually the norm for science. That's why we have patents. I'm not talking about the supernatural. Inventions never happen in a vacuum. Every idea requires the support of four or five other ideas. There's a necessary subset of other surrounding inventions that are required. As they appear, the new idea becomes more obvious. It's an ecological growth. There are two kinds of changes that we see in nature. One is developmental and one is evolutionary. And the developmental changes are fairly predictable in a certain sense. We know what the pattern is and I can map your developmental trajectory very clearly. You go from fetus to child to adolescent. I may not know what kind of teenager you're going to be, but I can say you're going to be a teenager. A lot of what we see in culture right now is developmental, not evolutionary.

LAWLER: But we can't say that about human culture — we don't know where it is going.

KELLY: We don't, but only because we're ignorant. I've looked at the sequence of discoveries and inventions around the world to see whether they follow generally the same sequence, and it seems that they do. Certain things you discover first. The moment a planet decides to wire itself up, to connect everything to everything, is an inevitable developmental stage in civilization. It is a stage like puberty or metamorphosis — pick your biological analogy.

LAWLER: I'm struck by an analogy you make between nature and the Technium — that technology also needs pruning. You pull the weeds in your garden or you won't get vegetables.

KELLY: This is husbandry. You are not your garden's puppet master, pulling each leaf off the tree. You train it in a general direction. The work is still being done by the tree. We are tending the garden of technology, moving things around, noticing a plant coming up here that would do much better in the sun over there. Or it needs a little more fertilizer. You don't control it.

The banning of genetically modified organisms in Europe is a typical response these days. GMO critics instead would like us to use fruit produced through genetic gambling, which is what natural breeding is. If genetic gambling came along now, it would never be permitted. It's all mutation, all random. The point is we've never had control. We get the best results by doing a little bit of training and pruning and letting things unroll.

LAWLER: So where does evolution come in?

KELLY: It's very hard to unravel what is evolutionary and what is developmental. My suggestion is that evolutionary change is unpredictable, while developmental change is not.

LAWLER: There is a lot of fear around the pace and impact of technology. It is all happening so quickly. Isn't fear of weapons of mass destruction, genetic modification, and advances in nanotechnology prudent and reasonable?

KELLY: That's a good question and I may not have a very good answer for it. There's no single source of this fear — it can be as simple as discomfort with change. And for all our talk about the need for change, people resist it — particularly if we are comfortable in the moment. Change brings discomfort.

LAWLER: So how can we cope with the increasing pressure to change?

KELLY: We're now in a new regime of information. For hundreds of thousands, if not millions of years, the manner of change on an individual's soul and life was very minimal. That fostered appreciation for continuity and enduring values, and that persisted even though new inventions came along. Those inventions diffused slowly and generally didn't happen within a single life span. That changed with the coming of science, and with that came increasing prosperity and a dramatic rise in population in the last two hundred years. The pace of change within an individual lifetime accelerated. One consequence was the invention of science fiction, part of a large-scale investigation of the future. It became a survival tactic.

LAWLER: You have said that the next century marks the great identity crisis of our species.

KELLY: Wendell is probably right that we aren't really wired very well to cope with this. But I have no problem thinking that human nature will change, that we will change human nature, that we will engineer human nature amid this rapid change. The nature of humanity has been changing all along, but until now very slowly. And as I was suggesting earlier, part of the nature of humanity is wrapped up in our own inventions — it is, in fact, our own invention. Each time we make an advance in artificial intelligence, we redefine who humans are. Each time there's a discovery in science related to intelligence or even the animal world, we redefine who humans are. At one time we defined ourselves as the toolmakers. Now we find out that termites and birds use tools, so we've redefined what it is to be human.

LAWLER: Are we moving toward something that shuts out the past, or is there a place in which low-tech tradition and high-tech science can meet?

KELLY: We generally reinterpret our older selves, rather than discard them. Right now we're very biological; we're very meatbased animals. We have the benefit of a very highly evolved sensual body. So whatever improvements we make, I think very few people would really want to evolve out of their bodies, though they may want to better the body. We contain 4 billion years of evolution, and it's not a matter of casting that off completely. It's a matter of reinterpreting it and enhancing it.

LAWLER: Already people are talking about designing babies for specific traits. Technology often starts with the best of intentions — to ensure a healthy child — then deteriorates into thorny and even nightmarish scenarios. In India now, you can go to a clinic to ensure you have a boy rather than a girl. The long-term implications — lots of male teenagers and few females — are horrific.

KELLY: My suggestion is not to take the technology away, but to educate those making the choice. What we want is greater choice. And these choices are always bound up in politics. I don't think technology is neutral. But the proper response to bad technology is not to stop it — to stop thinking — but to have a better idea.

LAWLER: You go so far as to say that it would be immoral for us to put prohibitions on technology. Are there any exceptions to that?

KELLY: I haven't been able to find any. What we want to do is find the proper home for technology. Technologies are like children. They're often asked to do things that they're incapable of doing, don't really want to do, are ill suited to do. We need to find the right place for technology. DDT is actually a very good insecticide for eliminating malaria — used judiciously around the house, it's very effective and does not cause much harm. Spraying it on 25 zillion acres of cotton is terrible. So you find the right home for that technology.

LAWLER: You could argue Rachel Carson did that for DDT, but only after a long struggle. How do we create a conversation, a structure, for making such decisions?

KELLY: Conversation is the correct word. Our current default is to not proceed to the next step until you can prove no harm. That doesn't work. You have to use inventions to evaluate them, to see them in action. Their consequences in the very complicated world are impossible to simulate. You have to have constant vigilance, to re-evaluate constantly. If they don't work out, you don't prohibit them, you move on to something else better.

LAWLER: What if they discover that this Diet Coke I've been drinking will increase my chances for cancer? Are you saying it should not be banned?

KELLY: It should not be prohibited for several reasons. One is it may only cause cancer in people who have some subset of genes. It may not have an effect on other people. Before we prohibit it for everybody, we have to find out what's going on. First we need your DNA, and then we need constant twenty-four-hour self-monitoring. This idea that every five years we go for a checkup, well then of course people are going to get cancer from drinking soda. Most people will be lucky if they have their blood tested once in their life. We need noninvasive, constant information about our bodies so that we can determine right away whether something we drink has an adverse effect. The proper response is not to ban something — the proper response is better technology. If there is something wrong with aspartame, modify it. Find a new home for it.

LAWLER: What if you have a company that has spent millions developing and producing the chemical, and they hire lobbyists to argue for its widest possible use? Look at the tobacco or alcohol industries. And scientists with a financial stake in the system have been used to justify wide use of toxins. You make a logical argument, but one that leaves out the reality of the marketplace. Where's "the conversation"?

KELLY: We need a more sophisticated system. That is why we are locked in a binary pattern — it is either approved or prohibited. There is the option of education — to take an approach to life that is more scientific.

LAWLER: Does that mean that if enough people have access to the data on chemicals, and could understand it, they could pressure a company to make a different choice?

KELLY: I haven't thought about this until this moment. Let's say a study finds the substance causes cancer, that it is really bad. Then the question is, what changed since the time of approval? Maybe you have to drink it every day for five years, so it is an issue of dosage. So what is a better dosage? And you could decide to use a different dosage or use something else instead. And you could use the substance for something else that would not cause harm.

LAWLER: How do you factor in human complexity — the corporate executive who wants a profit, the researcher who is more concerned with creating than monitoring? Such motivations can overwhelm scientific logic. Look at tobacco smoking — you can say it's a bad idea, but people do it.

KELLY: I'm not talking about just the market solving problems. I'm assuming there is government to regulate. What I am proposing is that you have more choices than approving or prohibiting. When you have more choices you can have a more sophisticated response. I think prohibiting tobacco is the wrong idea, because we'll get the same result as with Prohibition. But obviously you don't want people addicted to smoking. We need to find the right home for tobacco.



The market and science and education can provide more creative solutions. Consider marijuana. The medical use of it here in California is interesting, because we are trying to find the right home for it.

LAWLER: So do you support funding bacterial warfare, for example, since it expands our knowledge?

KELLY: No. I would prohibit technology that kills people, for sure.

LAWLER: But you are against prohibiting use of technology.

KELLY: So nuclear weapons are okay, but using nuclear weapons is not. Take the AIDS virus. It's nasty, bad stuff, but we can use the mechanism of a virus infection for good. You hijack it and use it for gene therapy. The technology of viral infection is okay. There is a way we can redeem a virus to make it into something good — but not if you prohibit the research.

LAWLER: You are walking a fine line — prohibitions for certain areas, but no blanket prohibitions.

KELLY: I think funding new ways to kill people is not a good use of technology. The same discoveries, however, can be used for better purposes. I'm not actually a pacifist. I believe that there should be restraint, but not necessarily killing. Killing is a binary response we fall back on, but there are other options.

LAWLER: How do you reconcile faith with logic and reason?

KELLY: There's always the question of how the universe began. Then you ask, what was before that? Either you believe that it goes on and on by itself or you believe that there's some ultimate being which caused it. Both of those views are logically unsatisfying. Either could be true, but not both. And neither is provable. You come down to faith. Faith for me is simply experiential. My faith is that God unleashed creation as a way to know himself, to express and fully manifest his fullness. Our job as creatures of this creation is to surprise God. We're co-creators in a certain sense — we have a divine spark in us. We have the same attributes as the creator of the universe, which is that we can create something. We can make something out of nothing in our small world. God has bestowed sparks of his creativity in the right places so they will surprise him. He's allowing us to make something from our free will that maybe he would not have thought of making.

LAWLER: So we're instruments of the divine?

KELLY: Right. Going back to the infinite game, the goal is to keep the game going for the purpose of maximizing the potential of this creation. We create other beings and other worlds. In so doing, we eventually discover different views of God, of the universe. Our own minds are incapable of comprehending the universe as a whole; we're just too small and limited. But we can create other worlds, and technology gives us a sure hand to do so.

LAWLER: That feels so ineffable, so unquantifiable.

KELLY: My experience with God is no different than my own experience of my own consciousness and reality. Descartes' observation is that in the end, the only certainty we have that we exist is that we think. But if we look at consciousness, it evaporates when we attempt to translate it into bits. The nature of consciousness is still a total riddle.

LAWLER: Why is there such a lack of sophisticated conversation between religion on the one hand and science and technology on the other?

KELLY: The only place we see it is among the theologians of our day, the science fiction authors who tackle the big questions. Religions appeal to tradition, to people who are afraid of change. But at the same time the Catholic Church has proved remarkably adaptable over two thousand years. There is a blockheaded rejection of evolution among Christian evangelicals, which has been tremendously harmful. It has turned a religion that was at one time at the forefront of science into an antiscience stance. I have little glimmers that in another generation or two, this will change. When it comes to climate change, for example, there has been rapid change toward recognizing the problem.

LAWLER: You are leaving out the spate of books by scientists which dismiss and even mock religion.

KELLY: There are fundamentalist atheists, just as there are fundamentalist Christians. The real conversation will happen in the middle and not at the extremes.

LAWLER: But how do you kick-start a more mature debate?

KELLY: My view of technology as holy is a minority view. Right now, technology is either the devil, or, if it's embraced, it's called neutral. Nobody is saying that it's divine. An alternative view is not going to sweep the country overnight. It will require people smarter and deeper than me to work it out. Right now I'm a church of one.

*Andrew Lawler lives in Maine and writes for Smithsonian, Discover,*

*and Science among other publications. For more about Kevin Kelly, go to his [website](#).*