Digital Democracy: Past, Present, Future

An Interview with Vinton G. Cerf

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In this 2019 interview, Vint Cerf, co-creator of the Internet, reflects on the evolution of the Internet from a computational to a social medium. He shares his concerns about the spread of disinformation and the way that the negative feedback loop created by rating systems encourage the propagation of sensationalism and falsehoods. He argues that, while authentication technology, in particular, will play an important role in fostering a more civil and civic Internet, ultimately, the solutions for strengthening democracy lie less with technology than in critical thinking by individuals and more democratically governed, bottom-up, and consensus-based institutions. Some of these institutions already exist while new ones have yet to be invented with robust new governance mechanisms to foster international collaboration on some of the hardest issues of our time.

1 CHALLENGES TO DEMOCRACY AND GOVERNANCE IN THE INTERNET ERA

BETH SIMONE NOVECK: Let's get started. You have devoted your whole career to ensuring that the Internet has been a force for the greater good and for humanitarian value. And in this conversation about the impact of the Internet on democracy, I wanted to ask you, looking back over your career, what do you think has been the Internet's greatest impact for two different things: democracy and governance?

VINT CERF: It is certainly true that I have devoted a large portion of my career to the Internet and trying to make it a useful tool for everybody—a humanitarian tool. However, I think that, in the space of democracy and governance, some of its impacts were not entirely anticipated.

The term “democracy” in my view is a kind of rubric for agency. It is about people being able to express themselves. It's very much like the Universal Declaration of Human Rights where people's opinions count, their ability to act on those opinions, to vote in a plebiscite, to assemble; all of those various things are very much

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related to democratic principles where we try to organize a legal system in which those popular agencies are preserved and people feel like they live in a safe and stable environment.

“Governance” is the mechanism by which we achieve those objectives—and that’s speaking more or less in the, let’s say, national, regional, local kind of governance—so it often has to do with regulation. It has to do with law enforcement. It has to do with the provision of social services and the like; and the Internet has had a growing role to play in all of those spaces.

The Internet certainly has been an enabler allowing people to both express themselves and to hear what other people have to say. In fact, in a sense, it’s quite unusual, because it is a two-way mass medium, which is unlike other mass media, which tend to be one way. For example, a newspaper—if you wanted to express yourself through that medium—you had to be the owner of the newspaper or you had to be engaged as a commentator but that was under the control of a small group of people. The same is true for television channels and radio channels—these are all the traditional mass media.

The Internet puts a twist on this, because it has both the capacity to distribute information widely, but it also is a two-way channel. People can provide feedback.

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So I believe that, on the whole, we can point to some very positive effects of the Internet and the World Wide Web that sits on top of it: a better informed electorate, better informed consumers.

But at the same time, we’ve also encountered a negative effect and that is the openness of the system, the reduction of barriers to access to information that, in turn, leads to the injection of disinformation. There’s a lot of misinformation and disinformation in the system, whether it’s deliberate or out of ignorance, and that has had a significant potentially negative side effect. People’s beliefs which are not true but which they hold dear can be exacerbated by the feedback loop that the Internet and social media provide. That leads to social and economic collisions that we have to understand and learn how to cope with.

So, at this stage of the game, we haven’t learned entirely how to cope with that. We do not know which is the regulatory structure that we might need to put together and how do we cope with problems that occur across international boundaries? For example, when fraud is committed or bullying or some other harmful activity happens across borders. How do we cope with finding the perpetrator, how do we engage, what international agreements are needed?

Just to underscore the importance of all this, the United Nations Secretary General has created a high-level panel focused on digital cooperation to explore what kinds of cooperation we should promote between countries and other international organizations in order to improve the quality of democracy that is achieved in this online environment.

BETH: Years ago, Kurt Andersen in *The New Yorker* described the Internet as the “bath house of information” where lies and falsehoods spread like diseases. You’ve talked about some of the malicious activity that can take place online. Looking ahead, are you optimistic or pessimistic about our ability to confront these threats to democracy? Should we be scared?

VINT: Well, I’m not sure scared is the right term. We survived the invention of the printing press, which allowed people to print all kinds of things—some of which were true and some of which were not—and the same is true in the Internet environment. One of the things that’s different is that the Internet environment is so immediate. It really does shrink distance. This is true, by the way, of the printing press, if you think about it, because once you printed something it could go anywhere, so it also shrank the distance between the author and the reader.

Because the Internet is so widespread now—about 50 percent of the world’s population is now online—and because the information transfer is nearly instantaneous, there is a kind of side effect, which is that anything that happens in the world feels like it happened locally. And the side effect is that you may feel somewhat overwhelmed because every bad thing that happens propagates everywhere, and so people feel as if these bad things have happened in their backyards. So, this kind of immediacy exacerbates some of the side effects of online information generation and distribution in this internet environment.

In spite of all that, I believe that we have managed to work our way through other kinds of situations where some of these problems have arisen. We’ve adopted useful and pragmatic agreements and practices to reduce the negative side effects of some of these behaviors. We have used laws and regulation and other kinds of incentives in order to drive the kind of behavior that we want.

It is going to require cooperative work among governments, and that is sometimes very difficult, especially if the governments don’t happen to have an agreement about what’s acceptable and what isn’t in this online environment.

Not discounting World War One or World War Two, the Vietnam War and other kinds of extreme situations, we have been able to work through difficulties and, here, too, we will tackle these challenges and the Internet will become the useful technology it was always intended to be.

BETH: I am surprised that so many of the solutions you refer to are legal rather than technological.

VINT: Well, we should talk about that, because there are a lot of people who misunderstand and believe, for example, that artificial intelligence or machine learning will somehow erase all the problems. I can assure you that’s not the case.

Some of the solution resides in the “wetware” [pointing to his head] that we all have inherited. One of those solutions is called critical thinking where you actually ask yourself: “Where did this information come from? Is there corroborating evidence? Was there a reason this information was put up on the Net to be shared? Is there a motivation? Are they trying to convince me of something in order to get me to do something that I don’t want to do?”

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As individuals, we must use critical thinking to try to resist the misinformation that shows up in the system.

The reason that algorithms don’t necessarily solve the problem is bots. Bots are those *which* amplify the population of apparent users who are expressing a particular opinion. And so if you’re using any kind of a statistical method for assessing the level of agreement with some particular point or argument, you can be rapidly misled by someone who has created a herd of bots that appear to be human but are just phantom participants.

BETH: Is there a correct word for a herd of bots? A gaggle of bots?

VINT: A gaggle of bots? I don’t know, that’s an interesting challenge.

2 FROM THE COMPUTATIONAL TO THE SOCIETAL

BETH: I don’t want to miss the chance to come back to the very personal aspect of our reflection on the past 25 years. Can you tell that story of how you scaled that wall and broke into that lab that led, ultimately, to the Net?

VINT: Actually, that happened more than 25 years ago. We were in high school, Steve [Crocker] was one class behind mine. I was 17, he was 16. It was around 1960 and we got permission to use the computers at UCLA. So,

we would show up in the evening or on the weekends and, one time when we showed up, the door was locked. We had permission to use the machines, but the door was locked, so I noticed that there was a window that was open on the second floor, so I climbed up on Steve's shoulders and climbed in and opened the door and we taped the door open so it wouldn't lock on us. Steve remembers reading about the Watergate break-in and how they taped the door open and he remembered thinking that, "Wow, you know, but for the grace of God, went us."

We were really quite intently interested in what you could do with computers, and at the time that was mostly all about computation, whereas today, of course, it's all about information, exchange of content and opinion, and social mingling.

BETH: I cite this incident because I imagine at that moment in time you weren't thinking about the political or democratic or even societal implications of the work that you were doing. Do you know when, in the evolution of your own work and your own thinking, you came to start reflecting on the impact of the Net on democracy and to start thinking about the political implications of these technologies? Was there a shift for you from the computational to the societal?

VINT: So, that's a very good question. I would say that there were several stages of awareness. The first thing that comes to mind is just after we got the ARPANET built, which was a project that precedes the Internet, again sponsored by the Defense Department. Ray Tomlinson figures out how to do this networked email idea among the various machines on the ARPANET. Very quickly thereafter distribution lists were invented in order to send messages out to everybody who was a member of the list.

And the first two distribution lists that I remember: one was called "sci-fi lovers," which was all about science-fiction. We debated who are the best authors and storytellers, because all of us were geeks and we all read science-fiction.

The second distribution list that I remember was called "yum-yum," which was all about restaurant reviews, first, in the Palo Alto area and which expanded over time. The implication for me was that this is a social medium and that it could be used that way.

I wasn't thinking about abuse particularly, I was more thinking about the fact that this is a mechanism for positive social interaction. Then the more negative effects started to show up. I would say around the mid to late '80s the first worm—or virus, if you like—shows up on the network propagated by Robert Morris Jr., which knocked out a significant number of UNIX servers on the Internet.

So that led to my recognition that this thing could be used to spew malware in various and sundry ways, and that became a big concern. Then, as we moved forward over time, I would say especially during the *dot-com* boom period—that is, after the World Wide Web shows up and after Netscape Communications had its IPO around 1995 or so—we started to see irresponsible attempts to invest heavily in anything that appeared to do with the Internet. This boom foundered around April of 2000 when a lot of the businesses that had been invested in failed because they didn't actually have a business model!

The investors were too busy saying, "the Internet is going to be a huge thing. Look at the IPO at Netscape. We want one of those too!" They very quickly discovered that these businesses didn't have any air underneath them—there was no engine running—and so a lot of them failed. But in spite of that, interestingly, the Internet continued to grow quite rapidly.

The underlying infrastructure—namely, the communication capability—was extremely attractive for a lot of different reasons, and that of course was instantaneously inflated by the public appearance of the World Wide Web around 1991. We saw this avalanche of content that started flowing into the network once people had access to the Web. This was another surprise for me. The fact that so many people wanted to just share the information they had in the hope that it was useful for somebody else; they weren't trying to monetize it at all.

Then if you fast-forward closer to the present... You know, we get the 2007 invention of the mobile phone and a sudden proliferation of imagery, videos, texting; all kinds of interpersonal communication rapidly proliferating around the globe which led to, I would say, even more potential for misinformation showing up in the network.

And so, over the course of the last two decades in the beginning of the 21st century, I have become increasingly worried about side effects of fraudulent content showing up on the Net deliberately injected into it with the deliberate intent to confuse or mislead.

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BETH: I want to push a little bit more on this question of the evolution of your own perspective. Do you think differently now about these challenges than you did 25 years ago?

VINT: I would say over this period of time from the early 1970s to the present, I have become increasingly concerned about social and economic consequences of the Internet's presence.

So I would say it's been to some degree a gradual recognition that there are social and economic consequences of these kinds of systems, and I have a responsibility at least to do what I can to articulate what those problems are and maybe chart a path forward to avoid their harmful outcomes. Whether it's a digital divide problem or people who should have access but don't, either because there isn't any infrastructure or it's too expensive, I'm very concerned now about the misleading content problem.

I have a responsibility at least to do what I can to articulate what those problems are and maybe chart a path forward to avoid their harmful outcomes.

I'm fully aware that I'm not able to stop all these problems on my own. But I'm trying to get into the core of where those problems come from. Why do they manifest that way? What could be done to steer away from some of those problems? These questions are very much on my calendar.

That is why, as you know, over the course of my career I've been engaged in various of the institutions that have grown up around the Internet to address such challenges, such as the Internet Architecture Board, the Internet Engineering Task Force, Internet Research Task Force, ICANN, the Internet Society, ARIN, and some of the other regional Internet registries. All of those I've had—sometimes a small and sometimes a much larger role—to play either in their creation or operation.

3 INTERNET INSTITUTIONS AND COMPETING VISIONS FOR INTERNET GOVERNANCE

BETH: You have mentioned the formative and formidable role you've played in setting up the institutions for governance of the Net itself. And obviously central to that has been the creation of a multi-stakeholder model and the concept of bottom-up governance. What inspired your own commitment to the values of multi-stakeholderism? Were there alternative visions for Internet governance? Can governance of the Net teach us anything about how to govern "the real world"?

VINT: I think they call it the real world, but the Internet is as real as anything. Not to go down an alley here, but when John Perry Barlow wrote his manifesto he made it appear as if this was an ethereal realm that was not rooted in the real world, and of course all the ills that we see today are a consequence of the Net being rooted in the real world, where there's physical equipment in different geographic locations and a hundred different jurisdictions. So, we have to be careful not to fool ourselves into thinking that there is no real world associated with the Internet.

To come back to answer your question, I think that we are obligated to try to cope with these kinds of new technologies, recognizing that they are not necessarily born with a governance structure to go with them.

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When automobiles were first invented, we didn't have paved roads, street signs, or stop lights, or traffic control, or anything; even rules about which side of the road you drove on. The notion of the side of the road even wasn't necessarily clear, so we had to invent our way through that.

The Internet is not too different. We've had to invent our way to defining its governance. It could have gone many different ways. It could have remained a purely government operation; there might have been no privatization at all.

I pushed for privatization as early as 1988, just five years after turning the Internet on, on the grounds that I believed that, in order to reach the general public, we needed to have an economic engine that would drive it, sustain it, make it survivable or sustainable. So, that's one possibility.

Another possibility of course is that a whole different protocol suite might have been adopted. The Open Systems Interconnection model (OSI), which was being pursued by the Organization for International Standards (ISO) was a fierce competitor, and a lot of governments adopted the view that, since this was the ISO, that standard was the way to go. Of course, it didn't turn out that way, but it was for many years thought that was the expected outcome. There were other proprietary solutions to these problems: Digital Equipment Corporation had one called DECNET IV. So there were even those possible paths *that* might have been followed.

It took a lot of work to persevere and insist that the solution lies in this particular TCP/IP design.

Multi-stakeholderism became more visible to me as I became the chairman of the board of ICANN way back around 2000. I joined the board in 1999 and became Board Chair in 2000. And it was very clear that the notion that policies developed for the Internet should respond to the voices and views of all the parties who would be affected by those policies was a very attractive model.

What has emerged is a bottom-up consensus model. It was very clear that you could quickly bog down into the details if you had to deal with every possible constituent who had an opinion about one thing or another. But the idea of allowing as many of the voices as possible who would be affected by a choice of policy to say something was important.

Then, you come up with some kind of a consensus out of that and then the policy itself, once adopted, might be enforced by a smaller portion group. So, for example, we pass a law like Congress would, but in the same way that enforcement of that law may be done by a police department, implementation happens at all levels—national, statewide, or local. I believe that the bottom-up and distributed notion is very important.

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The UN introduced, as you will remember, the World Summit on the Information Society in 2003, which was responsive to this question of the government representatives observing the Internet and asking: "What should we make of this?" What is an information society? How should we treat it?

Eventually they were unable to come to the conclusion about how one would govern such a global system, such as an information society. And so they spun off the Internet Governance Forum, which met, I think for the first time, in 2006 in Athens.

And the question was, how do we fashion an Internet Society that is able to take into account the concerns of all of its users, and then how do we have a process for adopting policy that's considered democratic?

I think we've achieved a reasonable result. By the time the World Summit on the Information Society concluded in 2005 there were a fair number of mechanisms that were put in place, but there were details that still needed to be worked out and so for every year since that time—2007, 2008, 2009—we've got together as a collection of

interested parties across a broad range of interests to try to propose norms or policies for adoption that would essentially be beneficial for all the people who use the Internet, and try to limit some of the harmful potential hazards. So, we have a long way to go. I think we're at the point now where major institutions including the United Nations and World Trade Organization are beginning to pay attention. And so I am looking forward, frankly, to coming to some common agreement about what it means to protect people's interests on the network and yet give them this freedom of expression.

4 FUTURE CHALLENGES FOR INTERNET GOVERNANCE

BETH: You've alluded to some of these—but what do you see as being the most difficult governance challenges for the Net in the next few years? Do you think the institutions that have been created are going to be up to the task or how do they need to evolve?

VINT: So, first of all, it's my belief that we don't necessarily have all the institutions we are going to need; or alternatively, we have not engaged in a way that allows some existing institutions to assume additional responsibility. The institutions that we normally think about tend to be pretty narrow in their scope: the Domain Name System, Internet identifiers, protocol standardization... All these various things lie within a small range of bodies that are responsible for further evolution of the technology of the Internet.

But that evolution is not going to solve some of the problems that we've been talking about. Those problems have a lot to do with human behavior. They have a lot to do with the kinds of content that humans put up on the Net and share. It has to do with the kinds of uses or abuses that arise out of the Internet—bullying, for example, or committing fraud or spam or generating and spreading malware. All of those kinds of things have to be taken into account and dealt with if we want to maintain a safe and secure environment for the people that use the Internet.

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Now I'm convinced that we should not fall into the trap of imagining that the technical communities like the Internet Engineering Task Force or the Internet Architecture Board are proper vehicles for coping with abusive behavior.

In some cases, the World Trade Organization or the World Intellectual Property Organization may be able to help, but we might also need new bodies. It's certain that we need a lot more collaborative and cooperative work between countries to figure out how to cope with abusive behaviors across international boundaries.

There'll have to be some kind of extradition treaties or have to be some kind of agreement about what constitutes a legitimate law-enforcement request for information in a different jurisdiction.

We're going to have to be very thoughtful about strongly authenticating and identifying people. And you know, at the same time you're thinking about privacy, you're worried about anonymity; we have to worry about the other side of this coin, which is strong authentication of a party at interest. And the reason for that is you don't want just random people coming up and saying, "I want to look at Vint Cerf's or Beth Noveck's information without having authenticated authorization for it." So, while there is a desire for privacy and even anonymity, there is this other side of the equation which says we absolutely have to have a strong way of authenticating people so that someone else can't do that. This is especially important, of course, in the case of contractual obligations that are entered into, among other things.

So, we have a lot of work to do, I think, to create mechanisms that will help us with law enforcement, that will help us with international commerce, that will help us with transactions that require legal enforcement and binding to the parties who made these agreements.

I think we still have a lot of work to do to make the infrastructure capable of performing this way, while at the same time protecting ourselves from abuse, such as the injection of malware or false information or a direct attack against some portion of the infrastructure with the intent of seizing control. It is going to take years to get through all of this.

BETH: We have had tremendous success with inter-governmental cooperation, especially relative to our response to climate change, for example. It is the success story of cooperation in our lifetimes. Does it teach us any lessons about how to govern what John Perry Barlow nicknamed “meat space,” or the real world? Do you hope to see us move toward global governance and away from nation states?

VINT: Well, first of all, I don’t think that we’re likely to get rid of nation states. I think the concept is extremely powerful. The treaties of Westphalia in 1648 have a lot to do with the world structures that we have today, and I think it’s very important. The notion of sovereignty is an extremely important concept and part of the reason for that is that there’s some coherence on a national basis about the people who populate these countries. It is interesting to note, however, that some countries have a massive influx of immigrants coming from other cultures and other parts of the world, and they are mixed into what would otherwise be a monolithic society. That can go either way, as we’ve seen with, you know, Brexit and some of the recent US votes. There is an antipathy to the “other,” to someone coming from a different culture.

On the other hand, I see this as a very positive story. The fact that we can bring people together from all parts of the world and all kinds of cultural and historical experiences is very encouraging, because you get this hybrid richness that comes out of that. So, I’m still persuaded that there’s more good to come out of the network than there is bad, but that we have to be alert to adopt practices that will avoid or at least, let’s say, mitigate the problems that arise.

BETH: Do you agree with the argument that whereas the Internet has transformed every aspect of economic and social life, it has had dramatically little effect on democracy and democratic institutions? I mean, if you look at our legislature, our presidency, or parliamentary systems, they look relatively the same as they’ve looked long before the Internet existed.

VINT: So, let me challenge that a little bit. I think you’re right that many of the practices and procedures we’ve inherited over, in some cases, hundreds of years have tended to work, and so we haven’t felt the need to make major transformations. On the other hand, if you start looking a little more closely at the making of law and how that works and the nature of the interactions that feed into lawmaking, I would say it’s been pretty dramatically changed by the presence of the Internet, mobile phones, and other devices.

I think there’s perhaps more “discipline” given that everybody has a mobile camera—and can take a picture and upload it anywhere. I think people are thinking a little bit more about the consequences of that. So, there has been some shift in practices and procedures. It’s not a hundred percent, but I still think that there are sufficient changes and differences that we will find ourselves compelled to reconsider actions that we would otherwise take without thinking about it.

So if I’m asked, for example, to contribute to some debate or discussion, I might prefer to do it online as long as I can’t be misquoted by claiming I said something I didn’t, because I digitally signed the content. I think that we will see very different ways in which we reach consensus and in which we document and categorize our choices and how we implement them in this online context.

I’m actually still fairly optimistic that we will reach the point where these tools become truly augmenting in the way that Doug Engelbart intended way back in the 1950s and 60s with his online system. He saw computer capabilities, especially advances like artificial intelligence, as tools for human use as opposed to things that dominated what we were doing or somehow inhibited our creativity. So, I believe that these new tools can in fact be applied successfully to allow participation in policymaking in ways that would have been impossible before, if you had to show up in person.

BETH: So, of course I don't disagree with you. The first use of any technology is to amplify or make faster what we're already doing. So, we allow televisions in courtrooms and Twitter or Facebook Live into parliaments to amplify what we do already. Now in the second wave, we see the introduction of participatory technologies that change how things work. I'm not sure if you're following the evolution of crowdlaw or online participatory lawmaking in places like Taiwan. Even in Iran a person can ask a question of a legislator in a way that you can't do here.

VINT: Well that's kind of scary in a way, the Land of the Brave and the Free is falling behind in that case.

BETH: Oh, dramatically. You're obviously a global observer of the evolution of technology and its implications. Are there places that you are observing where the innovation is really happening in terms of digital democracy?

VINT: The poster child for a lot of this is Estonia, which, of course, suffered at the hands of the Russians in the past, but which has built an extraordinary technological framework in which digital identity is possible. They make use of this strong authentication in a wide range of ways with regard to government services, and now they've even made it possible for others to obtain an Estonian ID. You don't become an Estonian citizen by it, but you could use that to authenticate yourself to third parties. So, because there are only a million and a half people in Estonia and you can see what happens when everybody does it—you know, when it is rolled out to a hundred percent of the population.

I also believe that some of our other institutions, like the Internet Corporation for Assigned Names and Numbers, or the Internet Society, the Internet Engineering Task Force, are all working very hard to build the mechanisms that take advantage of a lot of these online capabilities. So, I'm optimistic about a lot of this, but at the same time I am very worried about misinformation in the network and the way in which it influences people's thinking.

This whole feedback loop in social media is very alarming. You get a success metric on YouTube showing how many views something has had or how many tweets got retweeted. So, the worry I have is that these techniques induce a kind of negative feedback loop, where the most outrageous thing get the most visibility. And so, people—if they're looking for visibility in the world, they choose to do something, say something outrageous which propagates very rapidly through the network. And so, figuring out how to counter that effect is a big problem.

5 TRANSITIONING TO THE NEW DEMOCRACY AND ECONOMY

BETH: Looking forward now—10 years, 20 years, 50 years, your choice—do you envision new technologies having a significant impact on democracy? And what technologies are those going to be? Are there technologies you're particularly excited about in terms of their democratic implications? Is it machine learning?

VINT: It's not blockchain!

VINT: So, ironically, strong authentication of some kind, probably using cryptographic means, possibly using some biometrics but not exclusively relying solely on biometrics.

All of those things I believe have very important positive potential. If you see the Aadhaar program in India, although there are some concerns about surveillance, for instance, and facial recognition, I think there's also this very important effect which happens when a faceless and unknown party becomes known as a citizen because there's an identification associated with him or her.

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You become a person with whom communication can happen. Though I'm a big fan of some of those developments that have come out of the Internet, I still worry a great deal about misinformation and disinformation

campaigns and figuring out how to teach people to defend against that I think is going to be important. I'm a big fan of critical thinking, as you know, and I worry of course in some cases you don't have enough information to make good decisions in the critical thinking sense of the word, meaning you have to have a body of good quality data in order to validate information. I think teaching people how to think critically will turn out to be very important.

I also think that the Internet has a role to play to deal with the worry that people have that someday artificial intelligence will take away their jobs. I think the solution to that problem lies in teaching people to learn how to learn and to want to learn new things.

It's hard, it takes work. People don't like to change and, you know, if you're going to survive to a hundred years of age and, let's say, you have an 80-year career, you really do need to have the right technical support in order to learn new things to stay relevant in the workplace. And so I'm hopeful that the Internet can solve some of those problems.

BETH: I did not ask you about the capitalist takeover of the Net. Do you want me to?

VINT: I'm not necessarily authoritative on any of that, really.

BETH: So, what didn't I ask you?

VINT: Well, interestingly enough, we didn't pursue one of the most pernicious problems I think we have in our Western society right now, and that is this notion of shareholder value being the primary goal of the company.

I start to sound a bit Marxist, but I think that what has happened is that we have kept ourselves organized as owners and workers. The owners benefit from the value of the company and the workers don't; they just get paid. They don't participate in the equity in the company; at least this is largely true.

I think that needs to change. I think that the fact that you have the freedom to invest some wealth in a new company, and then you end up being better rewarded for that than somebody who makes the company valuable by working in it is not quite the right formula.

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VINT: The IPO and the ownership of stock creates a distortion field. There are a few companies, like Gallup, that are employee-owned. I think SAIC (Science Applications International Corporation) was employee-owned for a long time. I like that mechanism, because it means that you are rewarding the people who make the company valuable and useful.

But I don't know that that is likely to change. This frenzy of startups is all very much associated with the kind of venture capital that goes into these things. And they're all focused on early exits or they're all focused on quarterly results, and they get rewarded for that. But the problem is we need a different incentive pattern that will lead to benefits for everybody who is in the company who is creating that value. And I don't think we're very close to that. I think some serious rethinking of how the enterprise works needs to happen.

BETH: You know, it took science-fiction to give us the vision for the technologies we've built—maybe we need the science-fiction for the future of the company and the future of democracy. We need some more mental models to give us something to work towards.

VINT: It's true, although I've often wondered about the 24th century *Star Trek* and how did they ever get to the point where they didn't require money! What did the transition look like?

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