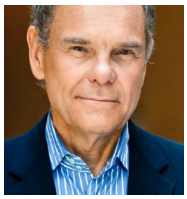
The Internet Governance Network
Transcript of Interview with Vint Cerf

Guest:

Vint Cerf, Vice President and Chief Internet Evangelist for Google. He is responsible for identifying new enabling technologies and applications on the Internet and other platforms for the company. Widely known as a "Father of the Internet," Vint is the co-designer with Robert Kahn of TCP/IP protocols and basic architecture of the Internet. In 1997, President Clinton recognized their work with the U.S. National Medal of Technology.

Interviewers:



Don Tapscott, Executive Director of Global Solution Networks and one of the world's leading authorities on innovation, media and the economic and social impact of technology. He is CEO of the think tank *The Tapscott Group* and has authored 14 widely read books. In 2013, the Thinkers50 organization named him the 4th most important living business thinker.

Steve Caswell, principal researcher, Global Solution Networks. An early pioneer of the digital age, he was founding editor of the Electronic Mail and Message Systems (EMMS) newsletter in 1977, author of the seminal book *Email* in 1988, and a principal architect of the AutoSkill Parts Locating Network. Steve teaches business and technology.

The Interview:

Cerf: By way of background, I can tell you that your GSN work is of particular interest to me, not simply because of my historical involvement in the Internet, but I've been charged by ICANN with organizing a committee to examine the Internet ecosystem and the institutions that are part of it and to speak to the role that those institutions have collectively and individually in maintaining this, you know, extraordinary global system.

And before I forget, let me draw your attention the recent work of Bertrand de La Chapelle. He is on the board of ICANN. He is right now focused on what we'll call a post-Westphalian view of the Internet ecosystem. By this, I recall the 1648 Treaty of Westphalia that ended the Thirty Years War and created the notion of sovereignty among nation states. And what Chapelle has noticed is that the Internet is a commons. It's not a commons in the classic sense, in fact, if I don't forget I will also want to say something to you about the difference between the traditional commons and the tragedy of the commons – overgrazing, for example, of a fixed plot of land – and the commons that the Internet creates. And the reason I think it's important to make a distinction is that the Internet commons has two very interesting properties; one is it's a shared environment, which is true of a commons in general, but it is also a commons that is not limited in scale. It's grown by a factor of 1 million since it was originally launched in 1983, and it continues to grow because we can make it bigger. We can make investment in the fundamental infrastructure and grow the total space in the commons. So it does not have the same dynamics as a limited space commons tends to have, and so a lot of the dynamics, motivations and incentives and everything else that are associated with a finite commons simply don't apply.

Tapscott: What I would like to do in this conversation is get a bit of history. The US Government was deeply involved the creation of the Internet and presumably could have tried to take control of it or handed it off to a Government committee or something like that. But it didn't. It became an independent ecosystem.

Cerf: It's not quite as simple as your description sounds, so we need to walk through that. Second, the person that you might find useful to talk to is Bob Kahn, and the reason is that Bob has frequently observed that the legacy of the Internet is not just the technology, not just the physical realisation of it but the institutions that it created and I think he's right about that and he's very cogent in his thinking there. So I would encourage you to talk to him about that.

The creation of the Internet was fully under the control of the Defense Advanced Research Projects Agency.

Bob Kahn and I personally guided the initial efforts but we very quickly turned to our colleagues. We wanted a broadly-based initiative to develop a non-proprietary network. Back in the late 60s, whatever networking that existed was very proprietary. IBM machines talked to IBM machines, and Digital machines talked to Digital machines but not to each other. One reason DARPA wanted all computers to connect with one another was that it would save money.

Okay, so now let's back up to ARPA. In the late 1960s, ARPA sponsored the ARPANET project to test packet switching technology and devise ways to allow computers of different kinds and brands to interwork. During the period from 1973 to about 1982, the effort was absolutely ARPA managed. In addition to the ARPANET, we had three more projects: the Internet project, the packet radio project, the packet satellite project. I managed all of those while I was at ARPA. It involved a fairly significant number of people, and the Internet project itself very, very

quickly – after the initial paper that Bob and I wrote in 1973 and published in '74 – very quickly after that there were three implementation projects at three different places: University College London, Bolt, Beranek and Newman, and at Stanford University. By the end of 1975 and beginning of 1976, we were starting to see others trying to build this software for time-shared hosts and workstations. Eventually, at MIT, even for the personal computer, for example.

So to get to the institutional issue, around 1982 the National Science Foundation received a proposal from Larry Landweber, from Dave Farber, and possibly a couple of others, to do what was called CSNET, and it was for a computer science network to bring universities who were not ARPA-sponsored into this networked environment. NSF funded them and Larry and Dave decided to use TCP/IP. Not very long after that NSF decided that it wanted to bring all of the research universities in the US onto a network, and when it wasn't clear that the ARPANET could be used for that purpose, they decided to build their own network and the called it NSFNET. And I think it's important for you to know at least historically that Al Gore was very much involved in the initial funding of the National Research and Education Network project, which led to the NSFNET. This is while he was still a senator.

In the early to mid-1980s we start to see NSF, the Department of Energy and NASA getting interested in this. Now, NASA and DoE had made a big investment in use of DECnet for their high-energy physics network and for NASA's internal network, and so it took them some time to conclude that they wanted to go build an Internet-based system. But by the mid-1980s, they were underway as party to this now growing Internet phenomenon. So what we see in the mid-1980s is individual efforts by four research agencies in the United States to build independent nets to be connected by the Internet. We're also starting to see about that time the emergence of commercial products, in particular, Proteon with its token ring network and routers and Cisco Systems coming out of Stanford University.

My recollection is that during this mid-1980s period the four project managers at ARPA, NSF, DoE and NASA were coordinating with each other on their investment in expansion of the Internet. They called themselves the Federal Research Internet Coordinating Committee – FRICC. FRICC turns out to be a critical element. At this point, we're starting to see commercial interest in the network. Sun Microsystems is starting to show up with the use of Ethernet, and the Sun Microsystems workstations are using the protocols.

We're also starting to see program management move from ARPA to NSF. So NSF became responsible for the domain name system and the IP address allocation – the IANA contract– in that time frame.

The thing I wanted to get at though is that there was a transformation from this little four-person ad hoc FRICC to what was called the Federal Networking Council, and that was formalized, and it reported up to something called FCCSET, which goes up into OSTP. So the Federal Networking Council formalized the US government's coordinating body for policy on the Internet. So it’s still government controlled.

In 1988 I asked the Federal Networking Council for permission to hook up MCI Mail to the Internet, and they gave us permission to do that in the summer of 1988. It took as a year to build the gateway, and we announced the interconnection in summer of 1989. Immediately all the other commercial email carriers asked to join, which they did. This had two effects: one of them was that these guys were suddenly surprised to discover that their users could communicate with all other users of commercial email, because they all were going through the Internet. The second thing that happened is that that same year we saw three commercial Internet service providers emerge in the United States: UUNET, PSINet, and CERFnet. I judge 1989 to have been a pivotal year in the emergence of operating institutions that have an interest in the Internet that are not US government.

At the same the Internet was growing in other parts of the world, particularly Europe. There was an enormous battle between OSI and TCP/IP. The battle continues. Some of the institutions that were battling on the OSI side continue to battle for control over the Internet. The ITU is an example. Some others who battled in favor of OSI have capitulated and are now part of the Internet environment.

Tapscott: Well, so standing back, how would characterize how all this occurred? The Internet is not controlled by states. How can that be?

Cerf: A lot of diplomats didn't understand that, so in the World Conference on the Information Society everybody said what's an information society? And people pointed to the Internet and said that looks like one, and they said who's in charge and we said nobody, and they wouldn't believe us. They didn't think anything this big could be so distributed.

So let me step you through this. ARPA starts out and gives away the Internet protocols. We did that on purpose. Consciously, we said a properly designed non-proprietary protocol would be implementable everywhere. So how can we unleash the potential for a common non-proprietary standard for networking? The only way we could see to do that was to reduce the barrier to adoption to zero by giving it away. So we consciously did not try to patent it. We didn't try to copyright it. We couldn't anyway; we were government employees. So we did that absolutely on purpose.

The next thing that happens is that the Federal Networking Council decides that it will break its appropriate use policy on purpose to allow commercial traffic to flow on the government-sponsored backbones. I was the one who asked for that. I didn't tell them it was because I wanted to break the AUP policy; I told them I wanted to do an experiment with email. But I wanted to break the back of the AUP policy, and this was what I thought was a clever way to do that. The important point to be made here is that by allowing this to happen, they allowed the commercial sector to see what a national-scale network might look like, and that there is this opportunity in it, without having to build their own commercial backbone initially. So again, barriers were removed.

Next example: NSFNET gets created around 1985 and launches in 1986. They keep upping the capacity of the system from 1.5 to 45 to 155 to 622 and on mbps, and we also see the creation of intermediate level networks, a dozen of them. They create these -level networks so that the people running the NSFNET backbone don't get nibbled to death by 3,000 ducks. So each one of the regional networks served some number of research institutions, and then the 12 or 13 regional networks are the ones interconnecting to the NSFNET backbone.

NSFNET took off like a rocket. They cleverly arranged that they don't own it. This is a service that they've purchased, and it's being purchased from a non-profit consortium. It eventually incorporates as Advanced Networking Services – ANS, the non-profit – and it's providing the NSFNET service. So the reason this is so clever is that NSF doesn't own any of this stuff; it's just a service contract, which means they can cancel anytime they want to. So, you know, by 1990 ARPA decides to get out of the business and shuts down the ARPANET. Meanwhile, the NSFNET and NSINET, for NASA, and the ESNET from the Department of Energy are basically taking up the load as the triple backbone in the US.

In December of 1991, Tim Berners-Lee does the first World Wide Web and nobody notices except for Marc Andreessen and Eric Bina of the National Center for Supercomputing Applications, and around 1992 they build the Mosaic browser with a graphical user interface, and it takes us all by storm. Suddenly, the text-based Unix command line Internet got pictures! It looks like a magazine. We're totally stunned. And so everybody and his dog downloads Mosaic. Jim Clark goes and hires Eric Bina and Marc Andreessen and starts Netscape Communications. Now it's 1994. By this time, I'm back at MCI trying to put them in the Internet business, and the first thing we do is buy $7 million worth of licenses from Netscape Communications for their server and browser software. By 1995, Netscape Communications goes public. It blows through the roof. Everybody goes nuts. The dot.com boom is on and NSF says we don't need the NSFNET anymore because of all this commercial service available, so they planned to shut it down in 1995.

And what they do that’s brilliant is to decide that they don't want to lose the connectivity that the NSFNET backbone provided, so they say, let's create network access points, NAPs. So they fund four network access points, saying they have to be self-supporting in three years' time. It ended up taking five years. But the idea here is that the commercial networks interconnect with each other at the NAPs, and the deal was if you want to be at a NAP, you have to agree to interconnect with everybody. The commercial networks all agree. So the NSFNET gets shut down, and NSF maintains the NAPs which eventually become self-supporting. So step by step the US government extracts itself.

Now we get to 1996, and the NSF agrees that Network Solutions should be allowed to charge for domain names in order to remove a cost item from the NSF's research budget. So again NSF takes a step to extract itself from financial responsibility to run a piece of infrastructure and hands it over basically to the private sector. It's still under contract, but they're allowed to charge. So this of course sets off an incredible, tumultuous two-year period when Jon Postel says he wants to institutionalize the group that has been managing domain names and Internet

addresses under government contract, which has moved from ARPA to the Defense Communications Agency – and then it became DISA, the Defense Information Systems Agency. They were running the contract, which was with SRI International and with ISI. Eventually, that got re-competed and a company called Network Solutions won the contract, and was subsequently bought by SAIC.

Caswell: When does ISOC enter the picture and start coordinating all of the standards activities?

Cerf: It's 1979; Bob Kahn says to me while we're both at ARPA, if you get hit by a bus what are we going to do? And he says, you need to have a brain trust, and I said, okay. We set up the Internet Configuration Coordination Board. After I leave ARPA, Barry Leiner recreates this as the Internet Activities Board, creates about ten task forces, one of which is the Internet Engineering Task Force. Then things got restructured so that there was an Internet Engineering Task Force and an Internet Research Task Force, both reporting to IAB.

Caswell: What I'm really interested in: how does that get to a non-profit corporation?

Cerf: The IETF was self-forming and didn't have a home. It got big enough that by 1988, I went to NSF and received funds for a Secretariat in order to manage the IETF workload and to organize it. But in 1990, Steve Wolff of the NSF said to me that he was not going to be able to continue funding this activity because most of the activity is really commercial. And so, in a way, this is the same line of reasoning about the charging for domain names. So when I learned that, I immediately said, well, okay, I have to create an organization that can solicit money, so I proposed to create the Internet Society, and I had two ideas in mind. The first one was create a non-profit that could ask for funding to support the secretariat for the IETF, and the second thing was that I'm patterning this after ACM. I thought that the Internet Society would reflect a society that would emerge from the Internet.

So I believed that this infrastructure would create a kind of online society, and the IAB was supportive of this. So in June 1991 we announced the creation of the Internet Society. We adopted Larry Landweber's INET conferences as our flagship conference, the '91 meeting of INET in Copenhagen was where we announced that the Internet Society would begin on 1st January 1992, and that I would serve as its first president. So that's where Internet Society comes along in 1992, and it is intended to be the institutional home for standards-making because we believed that we were getting to the point where standards were becoming important commercially and that there needed to be a legal entity that would house the IETF, which is still an unincorporated element.

Caswell: Now when did, in your mind, you start calling this stuff multistakeholder governance or multistakeholder network?

Cerf: This language doesn't emerge until ICANN. And so now we need to fast-forward again to 1996. So the Internet Society is in operation. It's mostly doing support for IETF. I travel a great

deal touting the growth of Internet. And by 1996 we start to see that there is a real business in the domain name side of things and an international ad hoc committee gets formed to try and figure out how to institutionalize the domain name system because Postel realizes that, you know, he isn't going to last forever and that it shouldn't be a person, it should be an institution that does this.

Well, this ad hoc committee started talking about incorporating which angered some members in Congress. They thought the US should retain control. The issue got to the White House and Clinton assigned Ira Magaziner to go fix it. So Ira, somewhere during this 1996-97 period, issues a green paper, consults with a bazillion people, issues a white paper which offers an opportunity to bid on the creation of an institution to manage the domain name system, Internet address allocation and the curating of the parameters of the Internet protocols. ICANN wins.

So in October 1998, ICANN is created and the white paper and green paper contemplated multistakeholder components. It incorporated civil society, the technical community, government and the private sector into the structure of ICANN.

So what is important, I guess, is that the Congress gets into this in the 1996 period/1997 period putting a political twist on this. NTIA becomes the responsible party for overseeing the private sector entity, ICANN. It formed contractual relationships with ICANN and with Verisign, which had acquired Network Solutions from SAIC in order to manage the domain name system and in the case of ICANN, the Internet address space and the parameter space for the Internet protocols. So there were two documents connecting NTIA with ICANN. One of them was a procurement contract, for what were called IANA services. The other was a memorandum of understanding that outlined the more broad things that ICANN was supposed to do. And there was a cooperative agreement between NTIA and Verisign for its part in managing the root zone. I believe the period of ’96 to '98, which put into place these various institutional arrangements and contractual arrangements with the US government, cemented a path which has been filled with turmoil that continues to this day.

Tapscott: Would you say that it is true that the key stakeholders – government agencies, companies, technical community, others – collectively decided that it would be in everyone’s best interests that the Internet should not be controlled by a government or a company but rather by a multistakeholder ecosystem?

Cerf: No, it's not true. And the reason it's not true is that that decision was not made by those parties. The decision was actually made the US Government and that's something I think – and others may disagree with me – but I believe that step-by-step, from 1968 to the present, the US Government agencies involved in the predecessor network and the Internet wanted to remove themselves completely and move this entire ecosystem into the private sector. And the only remaining control, right now, is with NTIA, and it's a sore point with countries around the world because there is still a fear that NTIA might, for example, order ICANN to pull something out of the root zone. It's never done that.

The problem is that it could do that. And, of course, you know the consequences of that would be an absolute catastrophe. There would be an uproar. It would destroy a lot of the ecosystem and people would, you know, move to other root zone managers, or something; I mean some bad thing would happen. So nobody in his right mind at NTIA would ever do that. The problem is that there are countries around the world that fear that that could happen because they would do it; like the Russians, the Chinese and the Brazilians, and the Syrians. Well, the Syrians can't do anything right now, they're in a mess, but you get the point.

Caswell: Okay, yes. So, basically, from your point of view it's kind of close to multistakeholder but not quite fully, correct?

Cerf: Yes, that's correct. It is largely multistakeholder at this point except for this one special authority that the US Government has. And I have to say, despite the fact that it has created huge tension and in some ways led to some of the schism in the World Conference on International Telecommunication, that NTIA has been vastly circumspect about intervening. And it speaks very, very articulately – especially Larry Strickling, the incumbent Assistant Secretary – about multistakeholder. At the last IGF, for example, in Azerbaijan, he was extraordinarily articulate on this point; insistent that Internet governance must be, will be, and if the US has anything to say about it, shall be multistakeholder. Now, ICANN, itself, has had to craft and re-craft its own processes in order to become increasingly effective as a multistakeholder organization. Civil society, in particular, has had to grow up in many ways. Part of the problem is that civil society counts for seven billion people and there is no mechanism currently that is credible speaking for seven billion people.

Caswell: You have a multistakeholder network that formed. What makes it legitimate?

Cerf: Well, that's a very good question because some people still say who are you, ICANN, to make any rules at all? Who gave you, you know, the power and authority? And, of course, the honest answer to that is the US Government did because the organization responded to a request for proposal from NTIA. I would say that the IETF has earned its spurs. It is a place where the Internet standards have developed and continue to evolve and they absolutely deserve credit for what they have done and what they continue to do. So I think no one questions that.

Caswell: You know what, the only real legitimacy these things have is that they kind of grab their own legitimacy. It's the legitimacy of all the stakeholders that gives it legitimacy and the IETF would seem like a perfect example of that, wouldn't it?

Cerf: It does but I don't like that formulation. I don't think this is a grab. I think this is legitimacy because what they do works. This is strictly voluntary. No one is required to use the Internet protocols, except they understand if they don't use them things won't interwork and the Internet is all about interoperability. For the same reason, the people that run pieces of the Internet – and there are tens of thousands, hundreds of thousands of operators of pieces of

Internet – and I hope you have that well-fixed in your heads. This is not a few. There's hundreds of thousands. They're all independently operated. They make independent decisions about hardware and software. They decide who they connect to. Nobody tells them or dictates the terms and conditions of interconnection. Every single one of them recognizes that it is full connectivity that makes the Internet what it is.

So the operators have every incentive to do what they can to make sure any packet handed to them by the customer will get to its destination, otherwise it isn't Internet. The IETF's work is to prepare, to the best of their abilities, the technical proposals or technical protocols that will satisfy those requirements, keep the Internet secure, increase its scope and scale and so on. And its legitimacy comes from the fact that it works.

If you look at the root servers, for example, the reason they have legitimacy is that they were picked. They volunteered or Jon Postel asked them to run root servers way back in early times. In some sense a lot of this is a result of Jon Postel being so trusted as a non-authoritarian servant and steward of all of this. Jon's personal legitimacy is a lot of why this stuff worked. So Jon asked people to run top level domains. He asked people to operate root servers. The root server community is not closely coordinated except for the fact that they absolutely stay on top of making sure that everybody's copy of the root is the same and is up-to-date. But their legitimacy comes from the fact their stuff works and they have done it for 20-plus years – 30 years – and they've done it well, some of them better than others.

Tapscott: But who's to say that?

Cerf: This is a meritocracy. It doesn't have anything to do with land grabs or anything else or declaration. It is flat out a meritocracy. If your stuff works, you get legitimacy. If it doesn't, you don't.

Caswell: Would you say that is generalized to almost anyone of these networks that might get created?

Cerf: I don't know the answer to that. I can speak only to the way the Internet tends to work and it is absolutely a meritocracy.

ICANN's history has been rocky and difficult and there have been complaints about legitimacy and everything else. The one thing I can tell you is that the domain name system has not collapsed. The root zone has been maintained well. The system has worked. Since they started, 15 years ago, and since the domain name system was started, what, 25 years ago, the fact that they have survived and served and managed to get through a whole lot of really hard policy issues gives them legitimacy even when they didn't have it at the beginning.

Tapscott: So legitimacy comes from efficacy. It's effective. It works.

Cerf: Just to give you one other little example. There is no way to join the IETF. There's no membership. You just show up. That's it. If people like what you say, then your ideas get some purchase. If they don't, they won't. But it's pure meritocracy. All you do is show up. You can't join or pay to be a member. What gives you any imprimatur is your ideas.

Tapscott: So this is a market of ideas that's brought to bear on every single activity and decision. This brings the best stuff to the fore.

Cerf: David Clark of MIT had the wonderful quote that: "We reject: kings, presidents and voting. We believe in: rough consensus and running code."

Caswell: The Internet, itself then, and I think you've alluded to it before, is there some sort of element of democracy baked into the Internet?

Cerf: In several ways, yes. I mean the meritocracy aspect of it, I think, has a democratic component. Second, the design was intended to be completely open. Anyone should be able to use it. You should be able to reach any destination on the Internet and run any protocol that you wanted. As you see commercial entities providing Internet service, you see a certain amount of concern for congestion and for dealing with parties who consume more resource than they have paid for, at least for the commercial entities that are charging for the service, and so you see a certain amount of business-related reaction that is not entirely democratic, except for the fact that there's a general belief that everybody should get what they pay for. But the most important part is keeping the network open to evolution, new ideas and new business. I like the phrase *permissionless innovation*, which means anyone should be free to get on to the net and offer a new service without having to negotiate a contract with every ISP in the world. That's an important property to preserve, because if you had to negotiate a business deal with 20,000 ISPs, you'll never get your service up.

The other democratic element is that the Web, in any case, has proven to be a wonderful megaphone for voices that would not normally ever be heard. You can speak to the community without owning a television station, a radio station, or a newspaper or a magazine. And we've never had a technology ever in the past that allowed ordinary citizens to do that.

Tapscott: Well, of course, there's always been this analogy between the sort of structure and architecture of the Internet and the nature of the kinds of organizations that it enables. The governance of the Internet parallels a loose, decentralized, small d democracy because, as you point out, there's not voting. It's more of a consensus. Is that true, that the governance model parallels the architecture itself? Or is that too simple?

Cerf: No, I don't think that's too simple. The idea behind the Internet is that if you could build a piece of something that follows the Internet protocols you should be free, A, to build that and B, find somebody to connect to. When Bob and I were envisioning this, I think we had the idea that it would grow organically precisely because people were free to build something and then find somebody to connect to, and if they used the Internet protocols it would work. And that's

pretty much what's happened. So the other thing which is pretty clear is that because of that property then institutions all over the world, independently of each other, are able to participate in the use of this system. And, of course, this is quite scary for regimes that not accustomed to having the public getting access to information from all around the world, or being free to express themselves to virtually anybody who would listen.

So the Internet's a threat in that regard. But I think you're right that its history and its technology invite this very diverse democratic element. There's one other technical element which I think is important. I'm sure you've heard the term loose coupling. Loose coupling is like a universal joint which doesn't use gears. The reason that's sometimes important is that a universal joint can withstand a great deal of rough surface without breaking because there's play in between the pieces. So this is a loosely coupled architecture that says that you don't have to use exactly the same code everywhere. As long as you observe what the packet formats and the protocols are on the line, on the wire, so to speak, then any number of implementations can be made to interwork. This is called a loosely coupled system, and I think that our governance principles are also reflecting that so that we don't have to have voting. We need consensus as a loose coupling mechanism.

Caswell: That's nice. Very interesting to know.

Tapscott: You wrote a piece in the New York Times about keeping the Internet open and the showdown at the OK Corral in Dubai. The meeting is over. Could you characterize what happened at that meeting in a sentence or two?

Cerf: This was the first time in the history of the ITU's international telecom regulations that there was a gigantic schism between the states. Part of the reason is that some of the states want more control over content on the Net. Even though Hamadoun Touré kept saying this wasn't about the Internet, the minute you start talking about spend and interconnection principles, peering rule and so on, you are talking the Internet. And a significant fraction, 55 countries, said the ITU-T ITRs is not the place to have that discussion. And the idea that the ITU would insert itself into the Internet's rules was offensive to those 55 countries. The other 89 countries signed the agreement, in some cases, because they liked other parts of it and, in some cases, because they liked the idea of somehow controlling the Internet. So you found the more authoritarian governments on the 89 side. This is a schism which is not going to go away. It will be visible, once again, in the plenipotentiary meeting that comes up in 2014 where the ITU-T makes decisions about what its work plan will be for the subsequent four years.

Caswell: I want to get into the issue of issues, itself. ISOC and ICANN, for whatever you can say about them, have done a wonderful job in technically growing the Internet. As you say, it works. Yet, when you get into all of the policy kind of issues they kind of still boil along and in most cases they're still unresolved. Is there like a limitation to what we can expect that would happen in the multistakeholder governance environment?

Cerf: Well, you know, this is a really good question because here are the tensions. One: privacy. Two: freedom of expression and accessing information, freedom to assemble in cyberspace. Three: protection from harm; cybersecurity and cybersafety. Four: I don't know, authoritarian governments versus democratic governments. These are all elements that are facing us today and the Internet plays a big role in all of them. What is unresolved right now is how we balance safety in the Internet and privacy, for example. You read about all the issues with the NSA and the things that have been disclosed by Snowden, and you wonder how far is a citizen willing to go in the name of safety before he or she is pushed too far away from privacy.

One has to be very worried for a number of reasons. One, democratic principles of freedom of expression and privacy are important, certainly in the United States and some of the other Western countries. Second, we have to understand that this is a fragile environment. It's almost, you know, you're familiar with the quantum theoretic problem of being in two states at the same time; entanglement. We are entangled in the Internet. I hadn't even thought about this as an analogy. I may actually use it for an op-ed. But we are entangled between privacy and freedom of expression in one state – the democratic state – and protection from harm in the other. And we know that if you want to absolutely protect people from harm, then you remove all privacy, and you know what everybody's doing and nobody can do anything without, you know, being caught. That's not a society that most of us want to live in. On the other hand, if everything is only focused on privacy and freedom of expression and action, then anybody can do whatever they want. It's called anarchy, and nobody wants to live in that state either. So figuring out how to find the balance is part of the struggle that you see going right now and that is a part of an evolving sociological and socioeconomic debate.

Caswell: And who would be the one to decide? Could the Internet Society actually even make that decision?

Cerf: Well, in fact, I would tend to say that this is not a decision that we can make on a global scale. In my view there is recognition that there are harms that occur on the Internet. They're perpetrated by people in one jurisdiction with victims in another and often those jurisdictions are international in their scope. The consequence of that is protecting their citizens from harm which is one of the reasons governments exist. We give up some of our freedoms in exchange for safety. And the question is how much freedom are we willing to give up? How much latitude of action are you willing to give away in exchange for safety for yourself and your family? In the cyber environment, we know that there are unsafe conditions. We have penetrable software. We have viruses, worms and Trojan horses. We have fraud. We have denial of service attacks. There all these various things that happen. We cannot, should not and must not ignore them. What we have to do is figure out how to defend against them and there are only three ways to deal with these problems.

One way is to prevent the bad thing using technology. Sometimes cryptography or hardware reinforced security can help us. And so if we're lucky technology will prevent some of those harms from happening.

Most of the time we're not that lucky and so we have to have a kind of *post hoc* enforcement. We have to say to people, if you do these things we all have collectively agreed they're socially unacceptable and if we catch you doing them there will be consequences. If you want to drive your car while you're drunk, ok, but if we catch you we're either putting you in jail, taking your license away, fining you or doing some other thing. And this is post hoc enforcement; very common in many of our societies. That's what law enforcement is all about. We agree to laws in exchange for some protection from people who are caught that we generally consider anti-social. Now, the problem is that we won't have the same views of what is unacceptable in every country and in every culture. And so this is the struggle that we have dealing with a global system in which various harms can occur across these jurisdictions. We're going to have to struggle through on a global scale what it is we globally consider unacceptable and we have to cooperative agreements to deal with those problems.

Another way of dealing with this is called moral suasion. You just tell people “don't do that because it's wrong”. It's just not acceptable. And although that sounds weak, I have to say that it is the one thing that makes our society habitable. When we walk down the street, you know, facing each other we generally get out of each other's way because that's easier than confronting the other guy and forcing him to get out of our way. We just don't do that generally because, you know, it's less pleasant than simply and easily avoiding each other by walking around. And that's part of the moral suasion that I think is part of this tripartite equation.

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