

“Sharing”

Keynote Remarks Chinese American Networking Symposium Hangzhou, China

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I would like to thank the CANS organizers, and our host CSTNET, for inviting me to speak with you this morning. It has been almost 15 years since the first CANS event was held in Washington, D.C., and it is both exciting and sobering to reflect on how much China, America, and Research-and-Education Networking have evolved over the course of those 15 years.

The odysseys that China, America, and Research-and-Education-Networking have followed since CANS began are not independent odysseys. They are a shared odyssey. America’s story these past 15 years has been very significantly a story about China. China’s story these past 15 years has been very significantly a story about America. Both those stories have been very significantly about the internet and about higher education.

My main goal this morning is to take this idea of a “shared odyssey”– a trip in which we are all passengers in the same boat – one step further. I would like to ask us all to think about our journey as part of an odyssey of sharing.

By this “odyssey of sharing” language I mean to suggest that the very notion of “sharing,” and its importance in our lives, is changing at an astonishing rate. Rather than simply talking about how we are sharing a boat of development, I would like us to think about the idea of sharing as the boat itself, the way in which China and America and higher education are sailing towards a common destiny. And that boat is being redesigned and rebuilt while we are in the middle of the ocean. We, the passengers, are rethinking the rules and conventions that determine what we share, and how.

On the positive side, we want to be able to share more and more, with more and more people. We do not want limited resources or limited technology to constrain our capacity to share. We aspire to infinite sharing.

On the negative side, we worry that perhaps a world of infinite sharing is not so desirable. Such a world could be fundamentally incompatible with other notions that we value: notions of private property, nationhood, personal privacy, and even human identity.

We want sharing, we want infinite sharing, but what we really want is perfectly controllable infinite sharing.

The technologies of storage, data processing, bandwidth, and identification and security have come a long way since oracle bones, abacuses, smoke signals, and secret handshakes. Each iteration in the development of those technologies has taken us farther down the path towards perfectly controllable infinite sharing. This is the odyssey that we have been following.

And it is worth reflecting on how the development of our capacity to share has expanded our ideas about what we might want to share. As with so many things, greater capabilities spawn greater desires. We extend the perimeter of what we believe should be included in a world of perfectly controllable infinite sharing.

This extension proceeds along two dimensions: *what is to be shared*, and *with whom it is to be shared*.

What is to be shared? Our capacity has proceeded rapidly from bits of data to snippets of text to samples of sound to 2-dimensional pictures to 2-dimensional video clips. Today it is easy to imagine sharing all the features of a virtual reality – smell, taste, texture, as they are experienced inside a realistic 3-dimensional space. And we can believe we will achieve these extensions through continuously improving technologies of digitization, storage, processing, and network connectivity.

With whom should we be able to share? At one time we thought it remarkable if we could use technology to share a kilobyte of data with someone on the other side of the room. Today we want to be able to share zettabytes of data with an unlimited number of people, scattered all over the planet, simultaneously.

Our national research and education networks have been very, very busy along both these dimensions. On the first dimension – what we want to share – we have in our lifetimes witnessed tremendous breakthroughs in our capacity to digitize the world. But each new feat of digitization produces a larger imaginary basketball that we want to send through the imaginary snake’s digestive track -- that is to say, our networks. Our research and education networks are dedicated to growing fast enough and operating smart enough to keep pace with the increasing diameter of that basketball.

On the second dimension, the research and education networks have been perhaps even busier. How can we deliver an unlimited amount of data over unlimited distances to an unlimited number of people simultaneously? Here we are very much still feeling the pinch of resource constraints. Bandwidth is not distributed uniformly across the world. The bandwidth that is there is not lit up in the same ways everywhere. And it is not fully linked up to provide a robust global backbone that is secure and resistant to disruption and interruption.

When one physics or genomics or astronomy researcher wants to send a large batch of data to another researcher halfway around the world, a lot of work has to be done to make it possible, but we can do it.

But what about an ultra-high-definition multipoint global videoconference? Well, I had the privilege of participating in such an event this past May. It was the ribbon-cutting ceremony for a new community data exchange in Singapore. The ceremony included participants from 11 sites, including locations in Beijing and Shanghai and a number of locations in the United States. And it came off seamlessly.

This was truly an impressive achievement. The sites were all using different kinds of videoconferencing equipment, at different resolutions. It took an enormous effort from many people in each of those locations to make it happen so successfully.

Yet the fact that so much was required to make the event happen illustrates how far we still are from the dream of perfectly controllable infinite sharing. We cannot yet digest the basketball that we can easily imagine. For a conference like this, we still need to travel.

That is especially true where China and the U.S. are concerned, and that happens to be the interconnection the world needs the most right now. Which is why CANS itself is such a critical endeavor. The work is definitely going forward, and it is going forward very impressively. The technological challenges of expanding capacity and ensuring that the capacity is fully used may be enormous, but some incredibly talented people are working on those challenges, and I am confident they can be overcome.

As we overcome those technological challenges, however, I think that we should not lose sight of another, non-technological challenge. This challenge is one that might be described as social, or cultural. And I think it may be the most significant barrier at all on our odyssey towards a future of perfectly controllable infinite sharing.

This barrier has to do with a different kind of sharing. So far, I have been discussing the sharing that individuals do with one another. The kind of sharing that researchers and teachers do – with one another and with their students.

But individuals usually work in the context of institutions. Universities, research labs, network organizations, and government agencies. These institutions operate independently from one another. Sometimes they see their work as competitive with one another. And so they discourage sharing.

I must be careful here not to overstate. This phenomenon is not “all or nothing.” These institutions are never 100% competitive / 0% cooperative. Perhaps instead of saying that these organizations *discourage* sharing it would be more accurate to say that I do not believe they *encourage* sharing enough.

Permit me to spend a few minutes talking about the kind of institution I know best – universities.

Universities are defined by their faculty and their students, and they compete with one another to recruit the best faculty and the best students. Those domains of competition – exacerbated by the ubiquity of ranking systems – make it easy for universities to fall into a competitive mindset, in which one’s own achievements are defined purely in relative terms. In such a world, a university’s leaders might come to prefer a world in which their school worse off by 1 unit, as long as the school’s rivals are all 2 units worse off. In such

an environment, it is easy for people to members of the university community to see other universities as “the enemy.” Principles of decorum might prevent active sabotage, but in this hypercompetitive environment members of university communities would certainly feel no encouragement to help one another, no encouragement to share.

This way of thinking – in which we define success purely in relative rather than absolute terms – is of course contrary to our very reason for existing. For that reason, university leaders have a duty to look at every area of competition – for students and for faculty – and to ask how important is it for a university to “win” any one competition.

Consider first the notion of competition to attract students. On the one hand, one’s ability to attract quality students could be taken as a signal that one is offering students a good education. And since students do learn from one another, attracting quality students can actually improve the education one offers to all one’s students, so that the promise becomes self-fulfilling.

But to the extent those ideas have merit, it is only at a highly aggregated level, when the differences in question are large. Whether one succeeds or fails in recruiting an individual student whose SAT scores are 100 points above one’s average is completely irrelevant to the quality of education one offers.

Let me use NYU Shanghai as an example. There is of course a part of me that would love for every student in China to hold NYU Shanghai as her or his first choice.

But China is a huge country filled with extraordinary capable high school graduates every year, and we are only taking 150 of them. We could certainly let Peking University and Tsinghua and Fudan and Jiao Tong and Duke Kunshan all choose their students first, and we would easily be able to select an astonishingly talented class from the “leftovers,” a class that would in reality be indistinguishable from the ones chosen by those other schools.

I would not speak quite so strongly on the faculty side. Honestly there is a smaller pool of faculty who are of the caliber we seek. I would not be quite so quick to let Peking University and Tsinghua and Fudan and Jiao-Da and Duke choose first. I would insist on an

opportunity to try to persuade a star professor that NYU Shanghai is the place for her.

But the key point here is this: If this star professor is not going to come to NYU Shanghai, I want her to go to Fudan or Shanghai Jiao-Tong or Duke Kunshan. My objective here is not to wear down our rivals, to stay ahead of them in a *relative* sense. My objective is for us to keep improving in an *absolute* sense. And that will happen if, even though this star professor is not teaching our own students, she is a part of our local academic community. Having her nearby would increase the likelihood that she would engage in collaborative research with our faculty members, and would participate in our workshops and guest lectures.

This same point about how we should think about competing for students and faculty extends more broadly to the importance of nurturing a general attitude of cooperation and sharing as we think about other universities.

The most important benefits from such cooperation and sharing follow from a critical difference between universities and for-profit enterprises. In the private sector, the central missions of different companies – selling goods and services to customers – are mostly *rival* missions. One more phone sold by Samsung is one fewer phone sold by Apple.

But things are different with universities. Our missions of teaching, our research, and our service to the larger community are *not* rival missions. If Duke professors do a better job of teaching their students this year, that does not hurt our students. If Duke professors do better research, or if they do more to help society, that does not hurt us in any way. To the contrary, we want ours to be a world of ever-better teaching, research, and service, so the better Duke is at doing those things the happier we are.

The fact that we have nonrival missions has fundamentally important implications for sharing. Suppose we discover a better way to use CSTNet to teach our students. Suppose we discover a better way to engage our students with their counterparts on other campuses. In such a case our first impulse must not be to hold it as a proprietary secret (perhaps on a theory that doing so would allow us to “beat” Duke by doing a better job of teaching). To the contrary, our first impulse should be to share our discovery. That way more students in the world could benefit from that discovery than just our own.

Universities can influence whether their faculty and staff have such impulses by establishing a culture that respects and rewards people who share well. University leaders can, through their messages and through their nonverbal signals, create and help to sustain such a culture.

To put it slightly differently, university leaders should be actively working to create a culture of sharing at their institutions. Sharing their experiences. Sharing their successes and their failures. Sharing their views on best practices.

By the way, I want to make an important distinction very clear here. When I advocate greater sharing among universities I am *not* advocating uniformity among universities. Innovation occurs more readily when individual institutions are free to choose among competing approaches rather than required to follow one approach selected for them by a master planner.

What I am suggesting is that, in an environment where universities are free to make different choices for themselves, we should be nurturing a cultural of maximal sharing, so that each university has the broadest possible set of alternatives to choose among.

I recognize that, to some people, such a view might sound naive. Some people distrust others' capacities for activity that is not self-interested. Other people distrust the ability of organizations to produce the highest quality of work if they are not organized on a platform of unrestrained competition.

And, indeed, fifteen years ago I would myself have been pretty skeptical of talk such as the one I am presenting this morning. But the past fifteen years are filled with examples of successful organizations that aggregate the wisdom of crowds, wisdom that members of those crowds share voluntarily.

When I want to decide where to eat, I first consult Zagat's. When I want to decide what hotel to stay in, I first consult TripAdvisor. Indeed, when I want to know something about human history, I first consult Wikipedia. I do not believe everything I read in those places, but I have no doubt that the world is a better place because these institutions exist.

Closer to home, we have the extraordinary open source community. Whether we are talking about Linux or Android or Sakai, we

have seen how products of exceptional quality can be built through the interactions of volunteers sharing their ideas.

Perhaps the most pertinent example of all is that of open-courseware, the project that has now spawned the massive open online courses.

I remember when I first heard Chuck Vest, at that time the president of MIT, advocate a world where professors everywhere shared their course syllabi, and even their lecture notes, with one another and with their students. I thought he was crazy.

I thought, “A professor’s syllabus and lecture notes are her most important intellectual property.” I thought, “The aggregation of the syllabi and lecture notes of the entire faculty are a university’s most important intellectual property. If universities give that property away for free, how can they justify charging tuition?”

But I was wrong, and Chuck Vest was right. The quality of a university does not consist of the collection of words and ideas that exist in its professors’ minds at a particular moment in time. It consists in its capacity to create a community, a culture, where such words and ideas are generated and refreshed every second. And once those words and ideas are generated, our mission must be to share them with the world.

And this brings me back to the research and education networks, to CANS, and to our odyssey of sharing.

At the dawn of the twenty-first century, we are blessed to be living at a moment of extraordinary promise. During our lifetimes, we are experiencing a radical extension of the community that we are encouraged to think of as our natural community for sharing. In the era of globalization, we are seeing more and more willingness for people to see their natural community of fellows as their fellow human beings rather than their fellow citizens of a particular country. The natural community for sharing is tending in the direction of humanity rather than one’s country-folk.

To be sure, nationalism is still by far the dominant sentiment. Borders are not open; the world is not flat. But today the dominant sentiment of nationalism faces a worthy challenge. More and more people are comfortable holding both a sense of national pride and also a sense of transnational commitment. Without sacrificing their identities as Americans or Chinese or Indians or Japanese or Ger-

mans, they are developing transnational souls. They identify with people everywhere. They are eager to understand and absorb their different cultures. And they are eager to share with them.

To do this effectively and affordably, they need to be able to make full use of a transnational research and educational network. That network has a hardware dimension. It has a software dimension. It has a middleware dimension. It also has an institutional dimension. A standards dimension. And even a cultural dimension.

Here at CANS 2013, all of you will be working to advance all these missions.

You will be working to continue our progress on everything from the roll-out of 100 Gigabit hardware, identity management middleware, and research applications. You will be looking at different dimensions of the future internet, especially as it bridges continents. You will be looking from the perspective of the networks themselves and also from the perspective of the user communities.

I wish you all a successful symposium, one full of insights, full of productive sharing.

Thank you.