

# TECHONOMY

TECHONOMY 2012 • NOVEMBER 11 – 13 • TUCSON, AZ

## The End of Offline

### Speakers:

Susan Athey, Harvard University  
Douglas L. Gilstrap, Ericsson  
Robert D. Hormats, U.S. Department of State  
David Sze, Greylock Partners

### Moderator:

David Kirkpatrick, Techonomy

### Video:

<http://techonomy.com/2012/11/techonomy-2012-the-end-of-offline>

**Kirkpatrick:** We're going to start with a session that we're calling it the end of off-line. But the idea really is to look as big picture as we can at the changes that the world is undergoing, and we do think that this permeation of connectedness which leads to everyone effectively going online is the single biggest thing that's happening in the world and truly transformative.

So we have four very different people up here to talk about that. I'll just quickly introduce them from my left. Because I'm turning around. Susan Athey, who is currently a professor at Harvard in the economics department, but about to move to Stanford. And is also chief economist for Microsoft. She's going to teach in the business school at Stanford.

Next to her, Doug Gilstrap, who is head of strategy for Ericsson, which is, as many of you know, by far the world's largest provider of the infrastructure behind mobile networks. He's been in the telecom industry since 1991, which is the same year I started writing about technology.

And next to him is somebody who I have known for many years and I really am pleased to have, Bob Hormats, who is Under Secretary of State for all that business stuff. They changed your title in midstream, actually, and now it has environment and energy in it, so commerce, energy and environment. He's Under Secretary of State for that.

I used to appear on a show called CNN Digital Jam years ago and Bob was amazingly sage about tech matters every time he appeared on that show. So for a guy who came out of Goldman Sachs where he spent all those years, he was the vice chairman of Goldman Sachs after having been in the State Department and now back in it, he really gets tech. So we are terrifically happy to have him here.

And finally David Sze, who is a well-known venture capitalist with Greylock Partners. Is it Partners? Did I get that right?

**Sze:** That's right.

**Kirkpatrick:** And was number four on last year's Forbes Midas List, so a very successful venture capitalist who I actually got to know better as a result of writing a book about Facebook. Because he was in the second venture round for Facebook, also deeply involved with LinkedIn, Digg, and many other very prominent Internet companies.

So that's who we've got up here.

Now, Doug, could you just start by telling us, where is connectedness going? And how dramatic is this, shall we say, non-wiring of the world that we're in the middle of?

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**Gilstrap:** Sure, let me start by saying Ericsson is a strong player and leading player in the infrastructure services and software. And we're in 180 countries so we have a really good view in terms of the fixed line versus the mobile side and particularly the technologies and their trends.

To answer your question, you have to look at, say, the fixed broadband. We have about 650 million lines today in terms of subscribers. Just by 2018, the mobile broadband will have 6.5 billion subscribers.

**Kirkpatrick:** By 2018.

**Gilstrap:** 2018.

**Kirkpatrick:** 10X. Over the next six years.

**Gilstrap:** Absolutely. So just think of the billions of new Internet users through mobile broadband.

**Kirkpatrick:** That is the end of offline.

**Gilstrap:** That is. And they are at the speeds that today, you know, I'm driving down one particular city, I pull out my LTE, I get a faster speed than I do with my premium cable provider today.

**Kirkpatrick:** You made an analogy also when we were talking the other day about how a T1 line that would go into the biggest financial institution how many years ago?

**Gilstrap:** I used to sell T1s and T3s to this financial institution.

**Kirkpatrick:** Goldman Sachs.

**Gilstrap:** Goldman Sachs. Today, this particular LTE, I'm on a bus, I was having 16-meg download.

**Kirkpatrick:** How big was a T1 line say 15—

**Gilstrap:** One and a half.

**Kirkpatrick:** One and a half. So we are 10X what a T1 was when we're in the bus with our own cell phone today.

**Gilstrap:** This is the beginning of the LTE rollout. So if you look at LTE today, just at the beginnings, the United States has done a great job in its rollout. But the rest of the world will roll out and by 2018 will have about 50 percent of the population covered by LTE. So that's a tremendous amount of the population in that short period of time.

**Kirkpatrick:** Wow. I mean, what would you say the biggest social consequences of that are going to be?

**Gilstrap:** It's access to information. Of course from that, you have healthcare. You have education. Those are the primary drivers, I think. And then you have the economic benefit of trade and transportation in some of these developing countries. And today we have pharmaceutical companies coming to Ericsson, we have insurance companies, we have all sorts of different industries coming to Ericsson to change their business processes and their business model to basically have mobility in their service offering. Because it's going to be so pervasive.

So you have to look at all the different applications, but I think the big issue is going to be 70 percent of mobile broadband will be driven by Asia-Pac, Middle East and Africa. That's 70 percent of new additions.

**Kirkpatrick:** So, Bob, if education, healthcare and trade are going to be radically affected as Asia and the Middle East and Africa are brought online, is that going to bring the world closer together or push it farther apart?

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**Hormats:** I think it'll be bring the world a lot closer together, for a variety of reasons. This doesn't mean there are not vulnerabilities, particularly when there's intermediation in big areas like the financial services industry where there's a lot of intermediation through big institutions. There are certain vulnerabilities that exist as a result of what's going on and particularly the greater degree of connectivity. But I think there are a few areas that I'll just touch on and we can perhaps elaborate a bit more.

One is science and technology, where the number of science and technology papers, the number of patents that have been introduced over the last five to 10 years has become much more internationalized. And that is to say for science and technology papers, you have more and more papers written by people in several countries. Twenty-five percent of science and technology papers are written by people in different countries.

**Kirkpatrick:** Multiple authors who are from different countries.

**Hormats:** Multiple authors from multiple counties.

And second patents. More and more patents are introduced by a multitude of people in a variety of countries, roughly a quarter now. It's up from about 9 or 10 percent 15 years ago. So it's increasing at a very rapid rate.

So innovation, science and technology is becoming more internationalized.

The second element which is, I think, particularly important is that it's bringing developing countries, people in developing countries, more and more into the game. If you look at the use of cell phone technology in Kenya, for cell phone banking, individuals in India, we have a technology system or we utilize satellites that we put up with the Indians to provide information that's downloaded to individual cell phones that tell people what the weather is going to be, when there's a good time to plant, when do you put your fertilizer on, when should you harvest your crop. Utilizing space technology connected to cell phones in rural villages in India.

Another example, in Haiti, we have a lot of cell phone banking, but we also used a company called Ushahidi, which is a company founded by a Kenyan and the woman who founded it lives in South Africa. During the Haitian earthquake, Haitians were told a cell phone number to click into if someone were buried. That information went to the Fletcher School in Boston. It was assessed and it went back to the American Army headquarters and they went to that place on all a real-time basis.

**Kirkpatrick:** Using a system founded by a Kenyan who lived in South Africa and it was funded by people from a lot of different countries.

**Hormats:** Yes, yes. Let me give just quickly give two more that I think are of interest. One, it's changed the way foreign policy is conducted. Foreign policy almost entirely used to be intermediated by the State Department for foreign offices around the world. Now, every agency of every government has its own state department. And they are emailing one another on a constant basis, the Treasury, international part of the Treasury, with its colleagues.

**Kirkpatrick:** Just because they can.

**Hormats:** Just because they have the ability to do this. They are driving home at night and they want to provide some information on what's going on in the markets, they can interact. The various agencies of the federal government all interact with their counterparts. They used to have to go through the State Department because the State Department had the only channel, State Department cables. Now they can interact everywhere else.

And one more example and then one that I think is worth talking about in a little while because it's a good model, one is that it empowers people politically. Even if they cannot vote, they now have the opportunity to use cell phones or any other technology, primarily cell phones, to put pressure to hold their leaders accountable.

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Leaders cannot fail to pay attention to what these people do. It's not just tweeting. There are a whole series of interconnections that enable people in various countries, not just to communicate with one another, but to constantly send large amounts of information to their government and put pressure on them. In China, on environmental issues, on health issues. If there's—

**Kirkpatrick:** Corruption.

**Hormats:** If there's a corrupt official, people start sending little messages to the party chairman of a given province. He can't ignore them. Twenty years ago, they used to have what they called big character posters. They put a poster up outside and run away. Now they do it, thousands and thousands of them do it.

The last is healthcare, where I think there's a lot going on that is not well understood and it's relatively new.

Here's the question. We are constantly vulnerable to pandemics in this country. Where do they come from? By and large, these flus that emerge and we get flu shots for come from East Asia. There is a whole network under the WHO, but also utilizing the Center for Disease Control and Prevention, the CDC. And they have this beautifully constructed network where there's a constant flow of information. We need to get the information on these flu viruses months and months and months in advance so that we can prepare the vaccines. We have to determine what virus going to be the one to come over here. To do that, you have to have a network and analyze the DNA of these viruses and figure out which is the most robust and the one most likely so you can start preparing the flu vaccine months and months in advance.

That kind of thing could not happen without the kind of technology we're talking about. It's totally new. And it saves thousands of lives because if you only get the information a week before the flu hits, you can't have any kind of shots or vaccines. Now you can prepare them in advance.

In return, we provide these countries that provide us this information with the information on how to make the vaccines. And we provide them with a certain amount of vaccine. And we do that because we know where the flu is going to be likely to be breaking out in East Asia.

**Kirkpatrick:** Again, a data challenge, right?

**Hormats:** Data, utilization of data, smart utilization of data. So you have this whole panoply of issues where the whole question of e-mobility, the whole question of interactivity among people, crowd sourcing, practitioner communities as working together in these very organic viral ways.

**Kirkpatrick:** A lot of implications there. Susan, now you are not quite as optimistic about the world coming together, if I am not mistaken. Tell me how you feel about that question.

**Athey:** Sure, so I wouldn't say I'm pessimistic. I just have maybe some nuances on all of the democratization we see. So I think we're all very familiar with the anecdotes and the examples where having lots and lots of people having access to social media and being able to post information can come together virally, that's had a huge impact on the world.

So we can think of mobile devices and online as just democratizing everything. But there are a few key bottlenecks that remain and those also concern me, especially from a business and industry structure perspective.

So one of the kinds of bottlenecks is that the mobile platform industry is quite concentrated right now. And then even there's a couple of players there. People still have to find information. And so a mobile platform and the way—is going to have a lot of control over how you find your information. And say you may not realize that in mobile search, 97 percent of searches today in the U.S. come through Google.

**Kirkpatrick:** It's a very high percentage in Europe, also, right?

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**Athey:** Absolutely. And Google, it's in the 90s on the PC as well. So it's maybe not so surprising.

**Kirkpatrick:** But it's even higher on mobile.

**Athey:** Yeah, so in the U.S. it's like 75—25 on the PC but in mobile 97 percent. And a lot of that comes through deals and so on that are done to setting the default search engine on the mobile devices which people are less likely to change because they are not sort of going around and browsing and so on.

So what that does, it gives a very small number of players—in this case, Google being a single player, access to an enormous amount of really valuable information. And so one of the things we talk a lot about in this conference, I'm sure, is the importance of data mining and machine learning and big data.

And you can learn, you know, so much more when you have all of that data. Users on the phone are going to expect that if they say a muffled word with a lot of background noise, you can understand what that word is. If you type three letters and depending on where you're standing when you're typing those letters, you want your phone to understand what that is. But the only way you can have that understanding is through mining lots and lots of data. In some sense, the space is even bigger than the query space because you also have the geo-location information. So that makes an incredibly complicated machine-learning problem.

**Kirkpatrick:** So is the issue then not so much whether the world comes together or not but whether or not the companies that serve as the gatekeepers continue to play a fundamentally positive role in that function? Is that the way to think about it?

**Athey:** That's right. So there's lots of information and data out there about your credit card company knows about you, Amazon knows a lot about you. Lots of companies know about you. But what we have seen is that knowing what you want right now, what you are going to want to buy, not what you bought yesterday, but what you want to buy now, what you want to find now, that contextual information is much, much more powerful. That's why search ads sell for much more than display ads and so on because you want information right then. And so being sort of a bottleneck for that kind of information is very powerful. If only one company or maybe two companies have access to that data, then we don't necessarily expect that the benefits from that data will get shared with the ecosystem.

If you think about, say, search advertising, the search engine is sort of a middleman between users and advertisers. Okay. So if you have maybe a million advertisers or so have come on board right now with Google, there's, say, another 20 million advertisers, at least 10 million advertisers out there still to come onboard that really haven't had to worry about online because they are brick-and-mortar stores. People found them by walking by them. But now people are going to expect to find you on their mobile phone. And you may have to pay to be listed there.

So we need to think about what's the role of that middleman who really sees, you know, all the information about what users want? And also is the only way for businesses to reach them.

**Kirkpatrick:** Okay. Clearly, you're talking primarily about Google. You're affiliated with Microsoft. Microsoft is affiliated with Facebook. Don't many of the same points apply equally to Facebook as well?

**Athey:** Sure. And I should say definitely you should take my perspective with a grain of salt there. But what I see, of course, Microsoft is also in the business of matching advertisers to users. I think what's really important is the competition between players is what forces you to provide the information in an unbiased way and that competition is also what keeps advertising prices down and forces the search engines to share the revenue with the rest of the community.

**Kirkpatrick:** But from the standpoint of a gatekeeper, Facebook has more of a monopoly position in some respects even than Google does. Because it doesn't really have competition, so to speak.

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**Athey:** Facebook is very interesting. It's got a lot of data about certain kinds of things. Now, people aren't telling Facebook necessarily what they are about to buy. And they aren't asking Facebook questions to find—to actually find things that are out there on the Internet. So it's got a different kind of data. And as a result, you're going to see a different kind of advertising taking place. But Facebook does have, you know, more and more—as people have their Facebook apps on their mobile devices, they do know where the user is, which I think will be very interesting in terms of serving targeted advertising there.

So I think, you know, overall, what we see is that there is definitely different kinds of information have concentration and therefore bottlenecks. So in some ways the mobile devices have really democratized information. They allow peer-to-peer sharing of information. But on the other hand, on the small form factor, somebody is choosing. Facebook is ranking your news feed. On your mobile device, it's choosing what comes first. It's demoting some of your friends whose posts aren't popular and promoting other friends based on their algorithms. And how you rank makes an enormous difference. You know, we do experiments, re-ranking links. If you are managing a screen, you are like a puppeteer. I can move this up and I move clicks. I move it down, I take the clicks away. I increase the font, I change the background color, I get more clicks. You know, I make it less prominent, you get less clicks.

So you can really—you're going to balance sort of optimizing for your user and your revenue objectives. You can decide whether you want to have only information in, say, your free part or whether you want to put ads. Facebook can decide whether they want to put ads in their News Feed.

Those types of decisions, if you have competition, you have got a lot of constraints on you in terms of what you can do. But if you don't have competition, you are going to be very tempted to do the thing that's going to maximize revenue or promote your own products over what the users want.

**Kirkpatrick:** Yeah. Well, we'll talk a little bit about—actually quite a bit about some of those points as regards to Facebook at our session midday Tuesday which we close with.

Now, David, you live your life in this Internet ecosystem that has come up in a number of respects already.

There's been several issues. You can say anything you want. But I'd be curious to know, going back to some of Bob's points about bringing the world together and whether you agree with that, and maybe how you respond also to some of Susan's points about the complexities that the Internet ecosystem represents and possibly slowing down some of the positives that we could otherwise expect.

**Size:** Yes. I guess, I mean, stating my biases out in front, having been in venture for 13 years, having been in start-ups 10 years before that, I've seen a lot of change over that 20—15, 20 years. And, yes, there's been things that have been challenges. Yes, there have been moments in time when there were people that were too powerful or companies that were too powerful. But in general, I have to say I'm a technology optimist. And if you look at that time period, the change it's had on our life has been incredibly positive. One of the things most exciting for me today is—so I joined what was one of the first search engines called Excite back in late '95, early '96. And then when that had its ill-fated merger with At Home, we saw I think what was one of the largest second waves in the Internet around broadband.

And to Doug's point, I think we are sort of in the third inning, fourth inning maybe of the largest next change, which is the unification of that through mobile. And Greylock, before I joined, was an investor in Open Wave early in the day. So we have seen—we've been involved in mobile for a long while. And it's only now that you see all those things tied together.

And so I actually think there's going to be more value created in the next five years than there's been in the previous 15 of the Internet because I think about you're always having different technologies added into the stack. It's almost like a layer cake. You started out with DARPA and then Mark Andreessen creating the original browser, and then you needed SSL and all these different technologies and they all layer on.

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But what's fascinating is it isn't a linear progression. You get these break points, where a certain layer in the cake will cause a recombination of the pieces below and you'll get a jump. So we saw that certainly with the browser. It wasn't that DARPA or the Internet didn't exist. The browser catalyzed it into this totally different experience.

We saw that with broadband.

**Kirkpatrick:** I think Windows also is a key factor there that you left out.

**Sze:** Fair enough. I think Windows in the computing line of that history and talking about the Internet line, yes, it affects it. But I really think, in my experience, from the Internet line, then broadband was another massive catalyst. The fact that you could always be on and the experience was so fast and that creators could create rich content that you could experience not just light text. I think the same thing is happening in mobile.

So you go from technology to sub-ecosystems. And when those come together, you actually get value at a totally different level. There's a beauty when that happens that the technology actually recedes into the background and it's the end user experience that grows up.

If you listen to Jack Dorsey talk about Square and the experience of going into a coffee shop and how that should change, you can't get sort of less historically low tech than a coffee shop purchase and his vision for it and how that works with mobile and transactions and all these layers of the cake combined, to make the simple thing that recedes and makes the experience so much better, that's I think the excitement of what's going to happen finally in the next five years here where the technologies now have all the pieces in place.

We don't sit and talk about—when I was in college it was the first Macintoshes, right, and they were 64K and the phone that we have in our pocket is so much more powerful than the first computers I was using when I worked. Throughout the '80s it was all about speeds and feeds and statistics. We haven't talked about really any of that here. We've hit this point where that doesn't need to be the core focus. Yes, we talk a little bit is it a better screen or—

**Kirkpatrick:** We are talking about healthcare and education now.

**Sze:** Talking about healthcare and education. That's such a major change. In the next five years, I just see that taking off. You know, you go in and buy something at Starbucks, it's not about the technology, it's not about those pieces. But you can do it seamlessly with the app and get that. It can remember your preferences.

Think about what you did getting here. Checking in to an airline, you know, being able to do that online and being able to get your boarding pass. Probably many of you having it on your mobile phone and going right through the line. Those of you lucky to go to San Francisco and have a clear account, being able to be pre-cleared and walk right through. You just couldn't even imagine that. Fifteen years ago I was arguing with my wife about whether I should log into dial-up and use AOL to look up a phone number or she should just call 411 or use the Yellow Pages book.

And that's really the change of pace and it's really going to just take off exponentially going forward.

**Kirkpatrick:** Yeah, yeah. Quick, both of you. Go ahead, Doug.

**Gilstrap:** If you take exactly that point and say, okay, I get my push notification that my plane is late or all these things that make our lives so much easier, think about what's happening in Africa and the Middle East and Asia-Pac. They are just getting a mobile phone that has capability to get data in the Internet and the access. So I hear your point about the bottlenecks. But the broad information that they need to get and are able to get, soon they will have what we're used to.

**Kirkpatrick:** They could have Jack Dorsey's app on there, too, even in Africa.

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**Gilstrap:** Just the trends of where we're going.

**Kirkpatrick:** Yeah. Bob.

Okay. Quickly, Susan.

**Athey:** I was just going to say that what I was mentioning earlier about the next businesses to come on really picks up right off your point that there was a set of businesses that found it worthwhile to join the Internet when the browser came on. And that took a long time to ramp up. And, of course, there were tons of new entrepreneurship that came on there.

But then the mobile brings in a whole another set of businesses. And in some sense, the long tail, that sort of democratization of this process yet again. And your little mobile device, when you walk into a park and you're buying a souvenir on the street and they've got a little iPad with a little card reader on there. And suddenly, they have leap-frogged from no technology and just taking cash to being sort of in the cloud.

**Kirkpatrick:** Right.

**Athey:** It's just amazing. But then they are also going to be findable and they can tweet—the trucks can tweet their location and these even tiny little carts can let their location be known. That's amazing. And I think that next revolution, again, it's a revolution. Again, I totally agree with you can sort of again be as much of a leap as the first wave of the Internet.

**Hormats:** Two observations. One, following up Doug's point, which I think is really an interesting one to think about. That is if you look at the end of the Cold War and end of the Iron Curtain and the fall of the Berlin Wall and the end of the Bamboo Curtain, from an economic point of view, what was it about? It was about these countries joining the global trading system and joining the global financial system. But many of them really were not at that point able, as a result of lack of infrastructure, a lot of other things, to join the global information system.

Now they are. And they are joining it at a very rapid rate. China has more netizens than there are people in the United States. India, huge amounts. I was just in Russia, where I'm the co-chair of the U.S. Russian Innovation Dialogue. The Russians are building out information technology at a very rapid rate. Brazil is a little behind, but they're catching up. Korea is more wired than we are.

So that's one thing that really is changing. When you get them—they have changed the system dramatically by their participation in global trade and global finance. Now they are going to change it as a result of global connectivity in ways that we can't even dream about.

And the other point that's interesting is if you look at the volumes that David was talking about a little while ago, the volumes are staggering. What's just as interesting from my point of view is that it won't just be the volumes, it'll be better distribution.

What I think is quite interesting, people talked about the digital divide. And there is a digital divide. But less and less than before. If you go to Kenya, there are people using cell phones, they do everything. South Africa, I mentioned Ushahidi. Haiti. More and more you're seeing countries that were on the wrong side of the digital divide 20 years ago catching up. Now, you know, they won't be as wired as Korea is and they won't have as much technology as we do. But they are getting more and more of it. And they are using the functionality in ways that are appropriate to their needs. They don't need all the doodads.

**Kirkpatrick:** I have two fundamental questions about that.

And I want to ask Doug on the first one. The first one, these are fundamentals. Peace, we talked before about ways the world is coming together in some respects. But as a company that operates in 180 countries and deals with governments and the largest companies in all those countries, do you have the gut feeling that the impact of this infrastructure that's becoming so pervasive will help us get along better on balance? Just your gut feeling.

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**Gilstrap:** My gut feeling is yes. I think it basically gives so many people access to information. And from that, there's certainly a chance for misinformation to be brought in and pushed out. But I think people are smart enough to look in different sources and understand where the world is today and try to understand where they are in that world. I think what we saw in the Arab Spring was telling. We all know about what happened with the mobile infrastructure there and how that was fundamental to understand the support that was needed outside of the particular countries.

You know, to Bob's point earlier about different countries having new ways of doing business with mobile apps and things of that nature, I know operators that are actually saying I know you can't afford the \$40 data plan or the \$10 data plan, but here's your two hours to get on this particular application—

**Hormats:** That's all you need.

**Gilstrap:** —to just taste it, just to understand what's out there, to see what's there. And I think it's really smart of these operators—

**Kirkpatrick:** That's in developing countries?

**Gilstrap:** In developing countries. And people were used to SMS and voice call. Now the technology is there to see, you know, be it Facebook or whatever the application is.

So it comes back to your question that people are getting great visibility of what's out there in the world. We do educational programs in different cities in Africa and South America, Connect to Learn, Millennium Villages. We bring technology. Others bring the education materials. Others bring healthcare issues. You're talking about the viruses. And, you know, it's that worker that says we have a problem here, we need so-and-so medicine. So it's all these things are very beneficial.

So to answer your question, I think it's a better place.

**Kirkpatrick:** Okay, good. I want to get to the audience. David, go ahead.

**Sze:** I do think—

**Kirkpatrick:** I want to get to my other big question and then the audience.

**Sze:** I'll go quickly, which is I do think, like, technology doesn't have a mind, right. What technology tries to do, if it has an impetus, is it tries to spread, scale and reduce friction.

**Kirkpatrick:** Nice.

**Sze:** The interesting thing we're confronting isn't whether technology is good or bad. The question we're asking is, what are human beings like when they can interact at much bigger scale with low friction?

And so when the question comes up, is it going to be more unity or stress, there is lots of research that says actually humans are most happy when they have very little diversity and where they are in a completely safe environment. There's a lot of research that says Singapore has a large amount of happiness in its population. The other country that comes up high in that research is Denmark. And for different reasons. But social stability and safety.

Now, philosophically, I would say keep everyone separate, have homogenous—I think in general we believe—not everyone, but a lot of us believe that the conflict, the interaction, the learning, the stress that comes from that engagement at scale actually causes really great things to happen that's important for humans over the long run.

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And technology is just pushing us there very quickly. I guess I think that's where the question of, will it cause stress? I think it will cause stress. It's already causing stress. Arab Spring is an example of that. But do I believe in the end that's going to be better? I do. I do believe.

**Kirkpatrick:** It will emphasize our commonality in some fundamental way.

**Sze:** Exactly. You can argue the best thing about people coming together is they understand each other. And when they are separate, they don't have to understand each other.

**Kirkpatrick:** Okay. Let me give you my other big one to see if you can pursue that thought further. The global economic crisis continues. We still don't know what's going to happen to Europe. Things are not so great here either, let's face it. Will this possibly in ways that is not sufficiently understood have an impact on that, maybe in a good way? I'm just crossing my fingers somebody might say yes to that. I don't know. Does it have an impact on the world's ability to emerge from an economic malaise that has become so widespread?

**Sze:** I think it does. I think it does because we understand the interdependentness and we are scared of that so we have to communicate. If you look at our economy, in previous times we would look inward and say how do we fix ourselves. We're as worried about Asia, China. We're as worried about Europe. And they are worried about it, too. So I think you have to interact when you're interdependent. And technology helps you do that. It's also what created that.

**Kirkpatrick:** Yeah, the transparency is a big factor. Yeah.

**Sze:** Yes.

**Kirkpatrick:** Does anyone here strongly disagree with that?

**Athey:** I just say, again, a lot of this technology has enabled enormous growth. We have seen eBay entrepreneurs in the early waves and now we see app developer entrepreneurs. And we see that the Internet has allowed people all over the world to trade. It's really enabled the long tail of entrepreneurs to find their customers.

But we have also seen, you know, that a lot of these technological changes have had unequal impact and redistributed and sometimes a lot of concentration. So again, I talked about the example of Google taking a big share of the pie as the middleman. But overall I think we are going to see some more somewhat uncomfortable redistribution.

Think about cloud computing. So it's brilliant if you walk around Silicon Valley, people don't have to have servers in their garages anymore, you know. Everybody is using cloud computing. And that's fabulous. And it has really increased the ability for young companies to get started, especially on the web, and to scale quickly.

The promise is amazing. All the academic departments in five years, 10 years won't need to have these IT guys who are very expensive for them and are distracting from their core function.

**Kirkpatrick:** Not to mention textbooks.

**Athey:** Exactly. We can take that big room that was taking a lot of air-conditioning and causing global warming and all sorts of other things and instead this is all in a big data center. If you walk to the data center and you walk around, you'll see this huge football-sized building with all of these servers and no people. And so all of the people that were supporting all of those servers all over the country are going to be out of jobs. And so we'll see that's just one sort of microcosm of the kinds of redistribution that we see.

So I think that growth, absolutely. Some kinds of entrepreneurs, huge winners. But, you know, the consequences for inequality are not entirely clear.

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**Hormats:** I think it works the other way. A word maybe I'm a contrarian on this point. But I think it actually works to improve the distribution benefits. I use the Indian example. The Indian farmer now has opportunities as a result of this connectivity and better information about the weather to make far better decisions than what otherwise would be the case without the information.

In certain parts of Africa, Kenya as an example because it's so well wired, fishermen go out. They have cell phones. At the end of the day, they determine which port they take their fish to because they get, at the end of the day, a message on their cell phone, what is the price of fish in this port as opposed to another port?

I think a lot of—to the extent there's better distribution of this technology, and that is increasing at a very rapid rate, it gives people with no access to information, zero in the past, a copious amount of information to make their decisions. So you get this supply chain benefit that I think is going to be very helpful if they get the opportunity to get this technology, and more and more they are.

**Kirkpatrick:** But the implication to that, and I want to go to the audience, it might be really good for some of the fishermen in Kenya, but it might not be good for American IT guys, or who knows. IT guys may be better. But this issue of whether employment may get decoupled from economic growth is a very interesting one which we're not going to have time to talk about.

**Hormats:** But that's not a function of this.

There are many issues of productivity technology—

**Kirkpatrick:** I'm glad Susan brought it up because it's something that we at Techonomy are concerned about.

**Hormats:** It's certainly an issue.

**Kirkpatrick:** The job question is not clear, right.

**Athey:** Just to be clear, I didn't want to say that it balanced out one way or the other or even that it might not be clear—

**Kirkpatrick:** I'm a little negative about it myself.

**Athey:** The positives, right, but I just want to—

**Hormats:** It's a huge issue, but the reasons for that concern are several. And this is only one part of it. And I think that is a deep issue that has to be really dealt with because people—it's not only that people's jobs are at stake. It's wages—

**Kirkpatrick:** Oh, yeah.

**Hormats:** —in many sectors are suffering.

**Kirkpatrick:** I can't live with myself if we don't get at least one or two questions. Who's got a question? Get a mic over here real quick and identify yourself. And I want to hear one more, too, also.

**Stathis:** Sam Stathis from Theometrics. First, David, thank you.

We heard a lot about farming. I heard healthcare. I did not hear construction up here. Construction, \$4.6 trillion industry, second largest in the world, most dysfunctional.

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How does the panel see all other recessions, depressions, I believe infrastructure and construction helped bring this out using technology to improve our construction processes and create jobs and all that other good stuff that comes with it. I believe that's the game changer. I'd like to hear if the panel would agree with that.

**Gilstrap:** I don't think there's any disagreement that technology in the things that are coming together can affect every industry. So if we left out construction, it's key. If you leave out housing. I mean, there's important industries that I can't—I'm sure, sounds like you're from that industry, that you would argue in the last 10 years has been massively affected.

**Kirkpatrick:** He's going to argue that on stage, actually. So I'll call that a comment and not a question because I think it's a really good one and it's a good thing to intersperse with these other points.

Who's got another comment or question? Okay. Back there. Can we get the mic to this guy? And identify yourself.

**Woo:** Hi, Ben Woo from Neuralytix. This goes out to Bob. Bob, you are saying it's great that the fishermen in Kenya can get a cell phone and so forth. Doesn't this break down culture in one way in the sense that these people have that handed down to them generation after generation? Doesn't that also break down some of the value that can be created because, all of a sudden, if everybody knows what the best price is, we don't have arbitrage any more? Therefore, we're going to drive down the prices to its absolute lowest level? So where is the value creation in all of that?

**Hormats:** The value creation is that if you believe in markets to any degree, the value creation is that the individual, in this case fishermen, finds the market where he or she will get the highest price and, therefore, they will earn the highest return. So in many parts of Kenya where you might not otherwise have a fishing industry because it loses profitability, the person knows where to do it—where to sell their product.

You see this in the farm community in India, too. They will get the idea, where's the market. Just like you. You want to sell your labor to people who are going to be the highest bidder. The farmer deserves the opportunity to have the information, or the fisherman has the opportunity to get the information, to get the best price.

That's the way you incentivize people to do things.

And you will have arbitrage because at some point someone will pay X and then someone—if they want more fish in another village, pay X plus 5 to get people to deliver their fish to that village.

**Kirkpatrick:** Not surprisingly, the economist has an opinion on this.

**Athey:** I just wanted to say when the Internet came out, we all thought there was going to be zero cost of search and so prices would all go to marginal cost and there would be no price dispersion on the Internet. Actually, Eric Brynjolfsson is out here, is an economist from MIT, and he did some early research showing basically that just never happened. So even though people can get lots of information, price dispersion and arbitrage opportunities are remarkably persistent beings.

**Hormats:** There's still competition.

**Kirkpatrick:** Good. I like the optimism with which we are going to have to end because we're actually over our time already. There are so many good things to discuss. Thank you guys for being here and joining us for this really good opening discussion. I like the big picture.

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