THE BROOKINGS INSTITUTION

A FIRST 100 DAYS INNOVATION AGENDA FOR THE NEXT ADMINISTRATION

Washington, D.C.
Tuesday, November 13, 2012

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P R O C E E D I N G S

MR. WEST: Good afternoon. I'm Darrell West, Vice-President of Governance Studies and Director of the Center for Technology Innovation at the Brookings Institution and I'd like to welcome you to our forum on developing a first 100 days of innovation agenda for the next administration.

And we are webcasting this event live, so I'd like to extend a warm welcome to viewers from around the country and around the world. We will be archiving the video for this event on the Brookings website, so anyone who wishes to view this after today will have an opportunity at Brookings.edu.

We also have set up a Twitter feed, so that is #TechCTI, for those of you who wish to post comments during the forum, and also during our Q&A session, we'll be taking questions both from our virtual as well as the live audience, so if you have any questions you can direct them to that Twitter feed.

The Internet is creating enormous social, economic, and cultural value. Through digital communications, people are communicating with one another and building businesses. Yet despite the many positive benefits of the Internet, the United States is experiencing slow economic growth and major barriers to public and private sector innovation. So, we need to develop smarter policies that take full advantage of the digital economy and strengthen our capacity to sustain long-term economic growth.

In June we convened two-dozen innovation leaders in California to discuss smarter policies for building an innovation-based economy. And that workshop in conjunction with an online crowd-sourcing forum involving several hundred experts from the areas of innovation, technology, and economic development, helped us to identify promising reform ideas designed to encourage growth through innovation.

Today, Allan, Walter, and I are releasing a paper on ways to promote a

strong 21st century economy. We need to promote innovation and entrepreneurship both in the private as well as the public sectors, and we can do this by leveraging the digital economy, enhancing our digital infrastructure, and laying the foundation for a strong and educated workforce.

In particular, we propose a number of new initiatives. First of all, we argue in the paper that we need better metrics for measuring worker productivity. There's been a revolution in technology and in organizations, but we still measure productivity through hours worked or total employees, so we argue that we need to do a much better job and develop more nuanced measures suited for the digital economy.

We also suggest that we need to encourage entrepreneurship, and we can do this by expanding Small Business Administration credits for startups and also making changes in immigration policy that encourage entrepreneurs to come and stay in the United States.

We need governments that learn how to innovate and collaborate. We can do this through the better use of data analytics and social media to improve decision-making.

We need to strengthen our infrastructure by investing in broadband, data centers, and mobile cell towers and by improving access to spectrum for wireless applications.

We need to improve knowledge transmission through faster adoption of digital textbooks as well as the adoption of new types of education technology. And we need to harmonize cross-border laws in order to promote global innovation and freedom of expression.

For those of you who want more details on our recommendations, there are copies of our paper out in the hallway, or for those watching on our webcast, the

paper is available online at Brookings.edu.

To help us understand an innovation-based economy, we have brought together an outstanding set of speakers. Alex Howard is the Government 2.0 Washington correspondent for O'Reilly Media. He writes about the intersection of government, the Internet, and society. He covers how technology is being used to help citizens, cities, and national governments solve large-scale problems. He's contributed to a number of different publications including *the National Journal, Forbes, the Huffington Post*, and *the Atlantic.*

John Wilbanks is a senior fellow in entrepreneurship with the Kauffman Foundation and also serves as research fellow at LiBe. He works on ways to promote innovation. Prior to joining the Kauffman Foundation, he worked at the Harvard Law School, at MIT's computer science and artificial intelligence lab, and at the World Wide Web Consortium.

Betsy Masiello can't be with us today, but we're pleased to welcome Bob Boorstin. Bob is director of public policy in the D.C. office of Google. In that position he works to promote online free expression and various geopolitical issues.

Prior to joining Google, he worked for the National Security Council under President Clinton, and he's also served as a senior advisor to the Secretaries of Treasury and State.

Allan Friedman is a fellow in Governance Studies at Brookings and Research Director for the Center for Technology Innovation. His current research focuses on cyber security policy and privacy, and prior to joining Brookings, Allan was a fellow at the Center for Research on Computation in Society in the Harvard computing science department.

Walter Valdivia is a fellow at Brookings in our Center for Technology

Innovation and he studies innovation policy and focuses on technology transfer and the governance of emerging technologies.

So, I'll start with Alex. What do you think we need to do in order to build an innovation-based economy?

MR. HOWARD: Well, I think the first thing is to be aware that innovation is an overused buzzword on both coasts at this point. Everyone's looking at it as a Holy Grail, that if we just were more innovative, things would be better. And understand what it often means, which is doing something differently. In way of culture, it might be adapting a new technology, it might be adapting a new process, it might simply be asking the people within an existing agency or institution what they think should be done to run it better and then letting them vote up the ideas.

Now, this is not a novel idea, certainly the Save Award in the current Administration looked at doing that, but certainly finding ways to get the best ideas and put policies behind them makes a lot of sense.

And some of these things are fairly obvious -- investment in science, technology, engineering, and math education, so-called, STEM, makes a lot of sense. Looking at the fact that the changes in the economy mean that the combination of so-called big data, automation, and artificial intelligence are going to put a lot of pressure upon a lot of jobs that were hitherto not as sensitive to the changes means that retraining and skills development will become very important.

I think that in the innovation economy, so to speak, it's easy to get focused upon what's happening in the Valley, what's happening in research centers, what's happening with, you know, revolutions in how things are created, designed, collectively moved between borders, but to enable as many citizens as possible to become full participants in that is absolutely critical. And if you look at the fairly resilient

high unemployment and very high underemployment, it strikes me that making sure that those investments in education are very much carried through.

There are some things that this Administration has done in actually working with Congress that will make a lot of sense to push for in this new Administration. One will be access to early stage seed capital, the so-called crowd funding provisions. The SEC has concerns about fraud in those areas, but making access to capital available for early stage entrepreneurs to enable platforms like KickStarter and all the other ones that have now sprung up, to be really useful vehicles will be very important.

Something near and dear to our hearts at O'Reilly, the open movement, open source, open data, open government data, is something this Administration has been a leader in. It will be interesting to see what kind of priority they put in that area. I think the so-called smart disclosure movement is something that will be very important to watch. That's getting people personal data released to them and to entrepreneurial companies for them to use it to buy things, to have more of a say in that, if you're looking at the data economy.

And then I think the last -- and that goes to my first point -- is really around access to spectrum. If you looked at the impact of railroads in the 19th century and then broadcast in the 20th, I think now open standards in spectrum have become a very important way for people all across this country and around the world to participate in what we're here to talk about, and the Administration has talked a good game with its broadband policy, it's broadband plan, it's posed a broadband map.

The FCC has made moves towards making spectrum auctions pop up in a couple of years, but this needs to move faster, without any question at all, and if we don't find ways for schools and libraries to provide access to the people who need it most, then you'll see people becoming unequally empowered in the economy beyond

what already exists.

It strikes me that if you want to see an innovation economy, it would be equitable to make sure that everyone can participate as fully as they can, to their means and to their abilities.

MR. WEST: Okay. Thank you. John, you are interested in data access and policies to foster entrepreneurship, so what should we do to promote greater data access as well as encouraging a greater sense of entrepreneurship?

MR. WILBANKS: So, just to pick up on Alex's comments about the idea of open government data as something that the Administration's really been a leader on, and I think you're starting to see the emergence of innovation happening on top of that data, you're starting to see applications written, you're starting to see services provided, you're starting to see startups built on top of that information, and what it sort of shows you that when you take a closed asset like data and you make it open, the network has a pretty good way of figuring out things to do with it that you might not have thought about.

And that's something that is actually a fairly common thread in the web. If you look at the web, Google exists because they're allowed to download it, index it, and make a better search engine. There was no control at the center of it.

And so I think one of the things we need to be doing is thinking about how the Administration can take that ethos and apply it in other spaces. So, we pay for an enormous amount of research literature at the federal government level and the vast majority of that literature is not available to us as citizens or as startups. And so academic search lingers in a world that is pre-Google, for the most part, comparatively. There are no hyperlinks in the articles, it's very hard to find what you want.

And so, pushing some of the ideas that have been successful in the web, right, these open standards systems that have sort of shared values at the core as

opposed to control, and applying that to other information spaces, is a fairly low-cost way to create the conditions from which innovation can emerge.

So, innovation, to me, is something that happens if you can get the conditions right. It's more like agriculture than engineering, and you get the openness in the middle is one of the ways that you get that to emerge.

One of the other things that I think would be nice to see is the sort of things that we're doing at home in the Administration on open systems, so there's open access to literature, open data or open government, is that we're actually currently exporting the opposite of that in our trade agreements and in a lot of our other work, we're actually exporting closed systems and promoting closed systems in our trade policies in a way that we're actually not doing at home right now, and so I'd like to see those come into a little bit of harmony as well, because a lot of the innovation on the data that we create or the knowledge will come from outside of our borders.

It would be nice to be able to benefit from that to the best extent possible, because right now the transaction cost to entrepreneurship in data are quite enormous and the reductions in those transaction costs are going to emerge from open systems more quickly and at a cheaper cost than from closed ones.

MR. WEST: Okay, Bob, which role should the government play in facilitating innovation?

MR. BOORSTIN: Well, first of all, I'm not Betsy Masiello, and I apologize for that. She's a lot more charming and smart than I am, and I'm sure that you can read some of the stuff that she's written along the way, we can make that available to you. And I thank Darrell and the folks here at Brookings for putting together this paper and having this forum.

What role should the government play? Well, I would say that the one

thing that, to me, is missing from the paper when I look at it, and I basically buy off on almost all the recommendations in the paper, is the general context of what the government ought to be doing or kind of attitude the government ought to have towards innovation, particularly in the IT sector, because, you know, as you know, we've been around Washington long enough to understand that if the government sees something to regulate, it's going to regulate it. That's the natural bias of a government.

And in this case, the government ought to be very careful not to strangle the golden goose that's laying those eggs. And I think we see more and more creeping regulation in this area, and it worries us and it worries a lot of companies, not only because of what we do, but because of where we came from, and that is the fact that we came from a garage and we came from a very, very small idea originally, and grew into something that is now Google.

But there are many entrepreneurs out there who are trying to innovate, and if you make it more difficult for them to get hold of capital or you make other kinds of regulations, if you put those into place, they're going to have a hard time, and then you're going to counter the very environment that you want to build for innovation.

I mean, the government's job is, in essence, to build an environment that is conducive to innovation, and innovation today is not really about snap invention in engineering, it's more about a biological evolutionary process, and it requires all sorts of things to happen at the same time and also room for eccentricities and room for different kinds of people and different kinds of companies and different kinds of products and services.

So, if the government puts a stranglehold or a hammerlock on those different elements that need to be built and need to surround that environment, then I think we're in trouble.

The other thing the government has to demonstrate, frankly -- and I'll stop here -- is political will. I mean, we are at the beginning of a new Administration, and once these folks decide whether or not to jump off the fiscal cliff, it would be nice if we went back to some more constructive discussion of how do you build an economy that needs more jobs, and what sectors can be powerful drivers of economic growth.

We believe that the Internet has already proved that it is a driver of economic growth, not only among the IT sector, but also among traditional industry, among manufacturing, and among very small enterprises that now are becoming what people call micro multinationals.

This is an area that I think is ripe for development, and the government really just has to take it upon itself to put into place that environment that will encourage this.

MR. WEST: Okay, Allan, you work on cyber security, so what should we do to protect our vital digital assets?

MR. FRIEDMAN: Okay. Those of you who have been following the cyber security debates know this is a really contentious issue and the challenge is in understanding how this sort of relates to innovation and unfortunately, security is classically framed as added cost, something that no one wants to do, whether you're inside a government organization or even inside a private company, researchers have been looking for a way to think about security in terms of return on investment for a while and have not found sort of a general way of thinking about it from that perspective.

So, we look at security as a cost.

And so the first path for an innovation forward environment is to find another way of thinking about it, building off of what Bob was saying, that innovation comes from -- I'll use another overused word -- platforms, and if those platforms aren't

secure and they're not trusted, then no one will be able to sort of build out a larger and more complex ecosystem with new entrants.

I think, perhaps, one useful analogy, looking through the history of industry, is the quality movement in engineering in the '70s and '80s where it used to be that, you know, there was a tradeoff between quality and cost, so no one really wanted to ramp up the quality in their manufacturing. Then we had the total quality management revolution where people said, no, this is -- if we all move for quality, we can have that as a chief competitive advantage. And we're going to have to have that shift on innovation.

So, how do we sort of drive that? Inside the public sector, we need to reform how the government regulates itself. FISMA, is the Federal Information Security Management Act, was an idea ahead of its time. It understood -- the first drafts were written before 2000 -- understood that security is not about specific technologies, it's about a process and agencies need to just identify what their risks are and how they're addressing them. Sounds wonderful on paper, reads well in legislation, maps horribly as implemented by -- into regulation.

So, we need to reform that approach and find better ways for agencies to understand their own risk.

We need to bring together successful solutions for risk, particularly from third party vendors, so that when we're concerned about, you know, some new technology coming into the government, is this robust enough, is it secure enough to run government systems, to have citizen data on it. Once we certify, go through a process that can spread throughout the federal government.

This is a process known as Fed RAMP, which is the Federal Risk and Authorization Management Program, which we really need to expand and accelerate as much as possible.

And then finally, I think we can gain a lot of security and efficiency advantages in the private sector by taking advantage of cloud technologies, moving data away from individual data centers, as we note in the paper and Darrell's previous work on this has talked about how there are over 1000 different federal data centers. We consolidate that. There are many companies in the private sector that can run this sort of thing much more efficiently and we should take advantage of that without sacrificing the data security and management capacities that we want in government systems.

Where it gets a lot trickier is when we move to the private sector. How do we foster this trust without everyone looking around and essentially using security as a tragedy of the commons? Everyone would love to have more secure systems, but investing too much into it means that you're losing to your competition; it's too much of a cost. How do we do that without having the heavy hand of regulation is one of the key questions that I don't think it will pass in this Congress so the next Congress will have to face, and I think the first attempt to move forward in that direction without a particularly heavy regulatory hand is transparency.

We need to find a way of allowing companies who are successful at defending their systems, who have invested in security to have some way to communicate these investments to the market, and the flip side of that is to punish those who have failed to make that kind of investment and transparency is the first pathway forward for that.

MR. WEST: Okay, Walter, you study technology transfer and the commercialization of knowledge from universities and federal labs. What can we do to speed up the spread of knowledge from universities to the marketplace?

MR. VALDIVIA: Technology transfer is sometimes a bit of an esoteric term, so I thought I would clarify what we mean by this, at least with respect to the

policies suggested in this paper.

The innovation process is distributed across specialized organizations. The government sets up the research agenda by allocating funds through federal agencies, universities and laboratories, both in the public and private sectors conduct research, and the industry, through small companies, larger firms, financial capital, take the development of this research into commercialization of this research.

The transactions that exist between these organizations that constitute the innovation process is what we refer to as technology transfer, and perhaps about three decades ago the idea was that this was a linear process where universities would pass the new technologies onto industry, but we understand better now the innovation process and we know that the transactions go in both directions and there are feedback loops and there is a complex network of interrelations between these organizations.

And technology transfer tries to capture the dynamics of these transactions. So, when we talk about accelerating, streamlining technology transfer, we imagine how to make these different organizations forming the innovation system that articulate it. How can they establish partnerships such that they can mutually benefit from performing not only their traditional activities, but facilitating the other organizations to perform better in their own specialized area of the innovation process?

For the government, there is a dual challenge here. One is to create an environment in which technology transfer can be seamless, there are clearly assigned property rights, that partnerships between, for instance, universities and industry can take over easily and could benefit both the interests of industry, university, and the larger public.

But as a second goal, there is also the question of how to make R&D public investments work better in the public interest. The government invests a

significant amount of resources in R&D and a challenge in technology transfer is how can we make sure that these investments return, not only in terms of economic activity, but in jobs, productivity gains, but also in improving public health or securing further national security.

What do we propose with respect to these two challenges? As I was prefacing, allowing a system in which property rights are well assigned and clearly defined, is an important part of this. The patent system serves for it, but there are many other formal relationships between the organizations of the innovation system. Certainly, the government can facilitate the information of those partnerships.

Technology transfer also occurs in tacit knowledge and informal ways, here there could be another -- this could be another area in which the government could foster a more easy interaction between the actors of the innovation system.

Now, with respect to the second challenge, the regime that governments the transfer of public R&D findings into commercialization is governed by an act enacted thirty years ago, the (inaudible) Act. There has been significant research on this act and the outcome suggests that it has favored commercialization, but at the same time it had the unintended consequences and this Act may need reform in order to create a better framework for the partnership between public funded research, generally conducted at universities or national laboratories, and industry, such that we do not remove the profit incentive of the patent system, and at the same time, the commercialization could follow policies that benefit a larger base of consumers, taxpayers, who, in the first place, paid for the R&D research.

MR. WEST: Okay. Thank you. I'm going to throw out a question and any of you who want to jump in are welcome to do so. Some of you mentioned data and the need for better access, and we know that there are various barriers to data usage

both in the United States as well as around the world. How can we improve data access and data sharing?

MR. WILBANKS: I'll dive on the grenade. So, data is hard to deal with because, unlike documents, data is not, for the most part, made by people. Data tends to come from machines, sensors. And so capturing the information about the data in a way that makes it usable to a third party is actually really expensive and it's very rarely funded.

So, the catch all term for this is Meta data, but you need to know if you take a temperature measurement whether it was taken at 8:00 o'clock in the morning or 8:00 o'clock at night. You need to know whether it was taken in the winter or in the summer, because then it's going to tell you a lot about whether or not you can predict what the temperature is going to be at a given time and date.

And it's gotten a lot easier to explain this because of Nate Silver, right. Seriously, trying to explain Bayesian models two weeks ago was really hard, and now you can say it's like 538, but it's not a joke, right, so we can do things like predict whether or not someone is likely to respond positively to a cancer therapy based on the individual genetic variations and a large enough data set of those people and whether or not they had a benefit from a cancer drug or not.

But we have to have enough data to feed the models. If we only had five polls from four states, Nate Silver's models wouldn't be very predictive, but we're in a world now where the data liquidity doesn't exist yet, and so the amount of effort that's required to make a data set useful in a modeling context is, you know, seven to ten X more than the amount of time to make the model or the effort to make the model.

And so there's this technical challenge of Meta data, and then on top of it we have a lot of questions about how do we actually access the data, either legally or

socially. Do we have the right to the data? Do we have the right to data about our selves that's been collected about is? Do we have the right to then invest that data or donate that data? And that's at a personal level. It gets even more complicated when you start thinking about government and sort of civic information.

So, there's sort of the Scylla and Charybdis are the meta data and the legal access, because you need both of those to begin even starting to do interesting things, but, you know, I went and I talked to Google a while back about getting lots of genotypes and their take was, as soon as you have it, give it to us and we can do something awesome with it.

The most important thing is getting clean copies with provenance that are unambiguously available for corporate reuse, right, because then people can run like hell and we can make lots of mistakes and one out of a thousand will work, and that's back to the sort of biodiversity idea of innovation that you were talking about, which I think is going to be essential in data. No one's cracked it yet.

MR. WEST: Alex?

MR. HOWARD: I'd add a couple things in that. I mean, I mentioned it in the first bit of remarks. I swim in the world of open data quite a bit and, you know, the Administration deserves high marks for starting this but mixed reviews for how they're finishing, at least as we come to the end of this stage. So, the question is: what happens next?

And there's three different things to look at. One is to the extent to which (inaudible) delivered upon data by the operations of government, right. Now, does that actually relate to innovation? Well, it could create some more transparency in the market about what government is actually spending upon, and if you follow the discussion in this space, Jim Harper at the Cato Institute, another institution in this town, has written a very

brazen report upon the Administration's record in data transparency in terms of its own spending structures.

Now, if you look at USASpending.gov, a site that was actually created by then Senator Obama, and then look at the Sunlight Foundations clear spending, you'll see that there are some real issues with the quality there. So, that's one direction they can go in. I think adding some transparency there would make a big difference. One direction the Administration could go in there is instead of being obstructive with respect to the Data Act, which has made it through the House and is now being reformulated in the Senate, they could work together with Senator Warner and anyone else in that space to try to work to create some more certainties, particularly around spending standards.

The second would be looking at what actually high value data that the government has that has not been released. There's immense amounts of it, particularly in the regulatory agencies, but also in places like the Department of Commerce, that has not come out.

And I've got a story I'm about to write about a search engine called Panjiva. Now, Panjiva needed to create a way to track who's a trusted supplier, and they tried to make a Yelp for B-to-B global trade and they had a lot of trouble doing that for a number of reasons. Someone said, hey, go look at U.S. Customs data. They actually track which goods are being shipped by whom.

So, they ended up going to Customs and over the five years, they paid them $100 a day to get 30,000 records every day on a disc, and have made that into a search engine you can go to and then see who's shipping what and what relationships can be trusted. Now, that's something that the Administration could unlock, right, instead of charging for it, they could be putting it out there. There are many, many other data sets like that, particularly in the regulatory realm that would be relevant because

government is collecting information.

Now, that's something that there actually is bipartisan support for, right, this is something the government could do that would create more transparency in the marketplace, create more business intelligence, and without huge amounts of costs, and without having to enact new regulations or rules or laws. Right?

If you wanted to talk about something to move fast on, that's it.

The third thing that I mentioned before is personal data ownership. This is something that John Wilbanks has, I think, been a leader on, but there are a lot of other people who are interested in this as well. There needs to be some principles by which we are allowed to understand what government has about us and what private companies have about us.

Now, is that going to unleash vast amounts of innovation? That's actually a huge question. It will be interesting to watch what's happening with the My Data movement in the UK, because they're doing this precise thing. And they're incubating companies trying to work with this. And I'll tell you that people who are way out in front of this in terms of thinking through what the data economy will mean, think that personal data ownership is one of the most important things that we can get behind. I certainly think, as a principle, it's a very important one to support.

MR. WEST: Allan, you wanted to jump in?

MR. FRIEDMAN: Yeah, so building off the personal data ownership question, it's fascinating because it gets around some of the privacy questions by trying to sort of get rid of the word privacy. And just as -- a general problem with data is when you have a lot of it, personal identification becomes very easy. Eighty-seven percent of Americans can be singlely identified with just their birth date, their zip code, and their gender. These are not things that we usually think of as protected data, but as soon as

you put that with anything else sensitive, we know it's you.

And so as we think about the challenge of sharing lots of data and having lots of data coming together, it becomes very difficult to argue that this data is anonymized. There's a growing initiative to say we shouldn't use the word anonymized at all because it's so easy to break that system, we should use the term de-identified because it implies that you can re-identify a lot of data.

So, one of the sort of positive aspects about this personal data approach is it allows user control. What we don't know is very much about how individuals think about their own data and how context-specific that is, and I think the economic forces are very interesting, but the behavioral economic forces are even more interesting, how asking a question a different way will get different results. There's some very interesting research out of Carnegie Mellon that shows all I have to do is ask questions in a different order and I can get a lot more people to admit that they've had extramarital affairs or that they've cheated on exams, just by the order of a questionnaire.

So, there's a lot of work to be done on that.

The final aspect of data, and this goes up to people who are sort of still in the education phase of exploring public policy, learning to think computationally is the best thing that one can do for learning how to function in an era of data. Building on John's comments, the data is out there and traditionally policy research has happened on large datasets often collected by the government, everything's neat, things are cleaned, you run your regression models.

The future of thinking about public policy from a creative perspective is to go out into the information world and scrape and script and build your own dataset, and that's a different set of skills because it involves actually understanding how the data works and how to take messy things and still create science out of them, so that has to

be part of our education.

MR. WEST: So, Bob, you work on data access in an international framework, so I was just wondering kind of your thoughts on the implications of either the ease of access or lack of ease of access to data.

MR. BOORSTIN: One of the points you made in the paper is the need to harmonize laws that had to do with data access, basically. And I guess my bottom line on that is, good luck, because, you know, there's this great myth out there that the Internet is some kind of borderless creature. In fact, it has as many borders as there are nations and if you look around the world and you look at the different laws that different nations apply to the Internet, they're certainly not the kinds of laws that a lot of us who are in favor of openness and transparency and, dare I say it, free expression, would believe in.

One of the things we're noticing and other companies are noticing is a movement among governments around the world towards data center localization. What do I mean by that ugly expression? I mean that there are governments that are saying to us, you must put the data center that has information about our citizens within our national borders in order for you, company X, to offer products and services in our country.

Now, there are many reasons they do this, not the least because they want access to the data we have for sometimes not so great reasons, one might even call it nefarious reasons, if one was cynical, as I kind of am. But I would say that this is the kind of trend that should cause us all to worry a great deal because if we and other companies are forced to start locating data centers based on the whims of governments that want to look into their citizen's private affairs via the data that we hold, then I think it's a brave and not altogether beautiful new world out there.

MR. WEST: John?

MR. WILBANKS: This is a great example of how some of these policies have unintended -- negative unintended consequences beyond that. So, we're trying to run a clinical study that lets people donate their data to mathematical computational research. And we cannot accept data from the EU because EU citizens, as a result of many of the data protection policies, which are intended to affect social and search companies, make the right structures and the control structures make it quite difficult for individuals to waive enough of the rights to donate their data to research.

And so even control policies have lots of unintended consequences and very few of them are pro-innovation.

MR. BOORSTIN: Let me give one shout out here to a U.S. government agency and that is the U.S. Trade Representative's office, because in the current draft of the Trans Pacific Partnership, which is a big trade treaty that is being negotiated right now between Asia and Latin America and the U.S. and other countries, there is language that calls for the free flow of information and data across borders, and that is purely due to the work of the USTR and its folks.

So, I'm hoping that that's the kind of trend we can also see in the future.

MR. WILBANKS: I like that part of the TPP. I don't like all the copyright parts of the TPP.

MR. HOWARD: I don't think of that as the paragon of open process.

MR. BOORSTIN: Neither do I, but I'm saying that portion of it -- that portion of it gives me a little hope.

MR. HOWARD: One thing someone prompted me to bring up too, we have a lot of cabinet appointments to watch that will be coming up and one of them which I can say that the intellectual property/open access community, certainly the Internet

freedom community is quite worried about is the prospect that Howard Berman might have the Secretary of State. Now, the reason that people are concerned about that is because he was one of the cosponsors of the Stop Online Piracy Act, which there was immense opposition to, and there's a feeling that if that appointment were made, it would be a pretty clear sop to the entertainment industry, which has been a tremendous donor to the Democratic Party, as opposed to perhaps align Administration with the upstarts, we're disrupting that industry rather significantly.

Now, that's something that we just don't know that much about yet, but there is going to be a lot of important symbolism to some of these areas and I would look at that particular choice as one to watch.

MR. WEST: So, I'm going to raise a question about the public sector because Allan mentioned in his opening remarks the need for government to reform itself and do a better job. So, I'm curious in terms of innovation and collaboration, what do you think government agencies should be doing that would promote greater innovation in governmental processes? It's okay. Take your time. Allan?

MR. FRIEDMAN: So, one of the large challenges in sort of government innovation is risk-taking. It's an incredibly risk-averse environment. And part of that challenge is the way the private sector ideally engages in a new initiative, is it an options-based investment approach? We're going to start something, let's see how it goes at every phase of the way you reevaluate it to see if it's worth working on, and they kill a lot of things.

We don't do that in the government except after it becomes blatantly obvious that something is a spectacular failure. The FBI's case management system should have been killed off at least eight or nine times before it hit the front page of *The Journal*, I think, twice, and then they decided that they would scrap it and reinvigorate it.

So, trying to find processes that allow you to make mistakes and take risks so that you actually can find more creative initiatives is very important, and part of that involves sort of thinking through projects that you can start small and then as they expand, you can grow into them rather than trying to define your initiative writ large.

Now, that's hard to do when you're governing a country of some 380 million people, but I think that's going to be the area to watch for greatest innovation potential.

MR. HOWARD: Just speaking of that, this morning the Department of Health and Human Services announced its first class of innovation fellows, so it's the same model that the White House has tried to roll out here with its own innovation fellows. If you're not familiar, this is a program where you basically have a six month stint where people come in and try to build something within that time period, and use what's known in the startup world as lean startup methodology, right, so you build a minimum viable product, you expose that to your customers, in this case those might be citizens, and then you iterate against that based upon a very data-driven methodology, and if something doesn't work, you pivot, again to use a start up term, and try something a little bit differently.

That's something that frankly hasn't been tried very much in government before. As far as I know, it's never been tried at that level. What will be interesting to see is the results from this first class, which we'll be able to actually look at. If you look to GitHub and their projects, you can actually see the code right now, but, you know, if you don't want to get out ahead, you can look at what happens then. And then maybe, if there's enough return, to look at how fellows and that methodology of creating things acting like a startup might be rolled out across more agencies, at least at the federal level. Cities are trying this too, by the way.

MR. WEST: Walter, do you have thoughts on how governments can become more innovative?

MR. VALDIVIA: Yeah, I was -- I'd like to offer in the private sector there has been a greater interest in innovation prizes, and this is an idea that the public sector could import, where as innovation could take place in the form of specific advancements of science or technology, it could also take place as organizational innovations, and that's something that the government could benefit from, incentives for government employees and civil servants to imagine better ways to do things, better ways to serve the public, efficiencies in the provision of services of government and so on and so forth, and ideally, leveraging technologies that are available and that are being used in the private sector, particularly it would be interesting to see government leveraging more social media and other advancements that are being now standard in the industry.

MR. WEST: Okay, I'd like to bring the audience into this discussion, so if you have a question, raise your hand, give us your name, your organization, and we'd also ask you to keep your questions brief so we can get to as many people as possible. Questions. We have one here in the front row. There's a microphone coming over to you.

MR. MITCHELL: Thanks. I'm Garrett Mitchell and I write the Mitchell Report. I was sort of hoping somebody else would get called on first, but I think what I'd like to do is -- I'll pose the question to Dr. West and you can determine who is best to respond to this.

I'm intrigued with the title of the session itself and the project, which is an innovation-based economy, and I wondered if I could get you to talk about that a little bit, and here's the context that I'm thinking about, and you may disagree with the context and that will shorten the conversation.

My assumption is, to put it in simple terms, we've had an agricultural based economy, an industrial based economy, and now an information based economy or whatever you want to call it, but the successful economies, like the United States and elsewhere, have always been innovation based. So, what's different now? And is the -- I've not read the paper, I've only looked at the first few pages and the eight, sort of, key topics that you're talking about -- I'm wondering what it is that has changed, if you will, so that this group of people and the people that you assembled in June think that there's a demand for something new and/or something that has not been done before.

So, I think I'll stop rambling, but that's really what I'm really kind of interested in hearing some thinking about.

MR. WEST: Okay, that's a great question, and you're exactly on target in the sense that what we're trying to get at with this whole project is kind of repositioning the United States for the 21st century world, because we perceive that there are at least two big categories of barriers right now, we have a lot of public policies that are remnants of either an agricultural era or an industrial era and are not so good in terms of promoting innovation in the digital world. So, there are policy changes that we address in the paper that we think need to be undertaken in order to promote innovation and to get rid of old policies that actually continue to discourage innovation, either in the public sector or in the private sector.

And then secondly, we also feel that there are a number of organizational structures that are poorly designed for the 21st century economy. The example that I gave in my opening remarks about just how we measure things, how we measure GDP, how we measure worker productivity, a lot of those measures came out of an industrial world.

We argue in the paper that we have not really adapted to the digital

economy in terms of how we measure things and that if we start to measure things better, we will have a better handle of what this new economy looks like, plus it also can start to create incentives to innovate for this new digital economy.

So, I think those are the general things that we're trying to address in this project. I don't know if there's anybody else who wants to jump in on that.

MR. BOORSTIN: I would just ask the audience a question, I mean, when was the last time you thought of the U.S. government as nimble, flexible, flat, or innovative? I mean, I don't think of it that way and I think those are definite needs in an information-based economy.

I mean, nothing happens now without a transaction going through a data center, without lots of data changing hands, and our economy doesn't reflect that. The way it's built in both the private sector, for the most part, and certainly in the public sector, it simply doesn't reflect that, and I think, if I may, that's what Darrell and his coauthors are getting at here.

MR. WEST: Okay, other questions. Here in the aisle there's a lady with her hand up.

MS. KINGSCOTT: Hi. I'm Taffy Kingscott with IBM. One of the things that struck me about the comments earlier was that there was little reflection on what other nations are doing to build innovation economies and the actions -- I mean, what you all mostly talked about was what's happening here, and of course that's the title of the briefing, U.S. agenda, but I think for all of us who are concerned about innovation and economic growth, what we mustn't forget is that the rest of the world isn't standing still.

And to the point just made about the U.S. government not being perceived as the hub of innovation, I mean, the rest of the world provides incentives for companies to invest, provides a much better tax system. The U.S. has the highest tax

rate in the world for corporations, 35 percent. Nobody else has a tax rate even close to that.

So, I think there are a lot of things that we need to do to build an integrated agenda that would help drive innovation. Somebody talked about research partnerships. I mean, there's an awful lot that can be done to build and amplify the relationship between public sector, private sector, universities, on research partnerships and reducing the barriers to innovation in that regard.

With respect to IP, somebody mentioned maybe we could have a model IP agreement that would make it easier for corporations to work together with the private sector. It seems to me there's this whole integrated agenda that's an opportunity for all of us in this community who care about this to be focusing on and I just wonder if you all -- if those comments resonate with the panel.

MR. WEST: I mean, I think you're exactly right. I mean, there are bunches of other countries that are rushing ahead and innovating and embracing a 21st century economy.

I was in South Korea a few weeks ago to give a talk on technology, and there they have high speed, nearly universal access to broadband, and when you have that type of infrastructure, the type of creative and innovative applications you can build on top of it are extraordinary in terms of data sharing networks that link hospitals, providers, and patients, they're now doing the data analytics to which the United States aspires but has not yet reached.

In the education area they are pushing the boundaries of innovation in terms of digital technology, digital textbooks. They even are starting to put robots in classrooms for instructional purposes. I think the jury is out on that particular one, by the way, but there's just a lot of stuff going on in Asian countries, in Europe, as well as in

other places.

John? Or Walter, do you want to jump in?

MR. VALDIVIA: I would just add that one of the transformations that we have seen in science in the later years is science has become more global, and this invites for international collaboration at all levels and therefore the very enterprise of science will benefit from having the standardization of data exchange from searching guidelines or best practices on collaboration.

And if science is made globally, of course the benefits of science will accrue globally as well. So, it is very important to have the international dimension in mind when we think of how to restructure the regime of technology transfer.

At the same time, companies will and have already started shifting some of the R&D functions abroad. So, that's another area for considering, not only internal policy here, but the kinds of partnerships and the kinds of things that are discussed in bilateral and multilateral trade agreements with trade partners.

So, thinking along those lines, thinking of the internationalization, the globalization of the production of science and of business, it is a very important component of thinking of the policy structure here at home.

MR. WEST: John, did you want to jump in?

MR. WILBANKS: Yeah, so, to your point on an integrated agenda, I think it's spot on, and there's been a lot of attempts to create standardized templates for public/private engagement, but it's sort of like with technology standards, right, they're like toothbrushes, everyone wants to use their own, and so it's very difficult to get adoption of the sorts of standard agreements.

I mean, I've written them and promulgated them and I've had, you know, a couple of companies sign them here and there, but it's very hard to get them to attain a

network effect.

And so, one thing that the government could do is actually get behind a set of standardized agreements, bless them, and provide, essentially, technology backing for things that use them and don't alter them. Because people take a standardized materials transfer agreement and they add an addendum and it's no longer a standard materials transfer agreement.

So, I think we definitely need to get a unified agenda and way of thinking about those things, but for this panel, at least, what I was trying to focus on was some of the sort of small, high-leverage changes that you could get, and so if you think about what prepared us for the 20th century, one of the small changes that prepared us for that was the shift to a merit-based civil service from one where you could buy your positions.

That was made during the Theodore Roosevelt Administration and it had significant impact on American competitiveness over the course of the century. We had a government that was better because you couldn't buy the positions and be bad at them, at least in theory, for 100 years. And so these are the sorts of changes that I take this report to be about, which are, what are the small, high-leverage choices we can make, not necessarily a unified agenda, but some small, high-leverage choices that flip the government to being a competitive advantage instead of being a drain on competition.

And in an information world, access and liquidity and ease of transactions, in a technical sense, the word transactions, are competitive advantages. And if you think of them -- you put that into the context of my interaction with government, right, even the ability to take a picture of a pothole in my neighborhood and vote on it to be fixed is an interaction with government that I couldn't have had 15 years ago, and it's a positive one, and it starts to create that sense of flatness and of nimbleness and of trust that's really eroded in the democracy.

And so a lot of what I took this report to be is, how does the government make those small choices that are maybe not so controversial but really high impact? And things like openness and things like open data and things like nimbleness can come out of that.

MR. BOORSTIN: One of the interesting points that you all make in the paper is the need for adoption of digital textbooks in schools. In a world where countries are competing to see who can educate their kids the best and the fastest and most up-to-date, the fact that this country doesn't have digital textbooks in more than 5 percent of cases, I think is the figure you used, is ridiculous.

So, I mean, that's the kind of thing that if you leveraged it, and hopefully quickly, it would make a difference. Of course, we then have local school boards to deal with in this country and --

SPEAKER: There are down sides to letting anyone edit the books.

MR. BOORSTIN: The big upside, of course, is that I won't have to be paying for back surgery for my children.

MR. WEST: Alex?

MR. HOWARD: Just one point, you mentioned innovation in the sense of contests, and it's notable, actually, that one thing this last Congress did is pass this prizes act, which allowed the government to do that and I think you're starting to see a number of the agencies, at least in this context, push to do more meaningful contests, and I think the point there for the Administration is to actually elevate some of these contests into something that isn't just discussed upon Twitter and blogs and online, to actually make an effort to get these out there in front of the American people in speeches by the President, in broadcast, actually involve the American people in a much broader level on these things to tap into that distributed intelligence.

If you're really going to do it, do it. Don't just put up a challenge on challenge.gov and try to get people like me to write about it and Tweet about it. I mean, look, there's got to be an engagement of a much broader group of people. And there are real results, tangible results that the private sector has found in open innovation projects. Sometimes you call it crowd sourcing, whatever you want to call it, there's a real return on it.

The second, and I don't want to ding the Administration too much on this because I think that they've actually made a number of real advances in getting diverse representation in different appointments, but I had an audience member here comment that there's all men up here, and I saw that on Twitter, so hi, Gwen, and the thing that I have seen in my experience and certainly everywhere else, is you get better results when you've got a much more diverse set of people working on the problem, that's across regions, that's across genders, that's across different kinds of education.

If you wanted to get true innovation at any level and in any context, getting that diversity of perspective is key, that's something that I think you can credit this Administration for, but certainly if we're going to talk about this particular topic, it would be very important to see leadership at every level of government in making sure that that's true in whatever taskforces or discussions are out there.

MR. WEST: And just to respond to that, we did have a woman on the panel who got sick and was not able to join us, which is how Bob ended up on the panel.

Stephanie has a question from our webcast audience.

STEPHANIE: Hi, we have a question from Jonathan Alger, who is an equity analyst based in the UK. He's been asking several questions, which Alex has nicely responded to on Twitter, but here's one that he just Tweeted.

Much innovation happens within regional clusters. Is that destiny, or can

innovation become more geographically disbursed?

MR. FRIEDMAN: Geography makes for a very handy network. You know, this is one of the sort of popular myths, just as on the Internet there are no borders, is that Internet distance doesn't matter, and we know that, in fact, information networks make local space even more important frequently because you have sort of used multiple channels to have a very quick feedback loop, as Alex was just talking about.

So, I think there will be increasing global networks, but you can see -- so, there have been some interesting studies, in fact, I think one of them came out of IBM, that sort of showed that the effectiveness of collaboration dropped off with verisimilitude. So, in person was the best and then very high tech, realistic, modern offices where you have an entire digital wall and then more virtual spaces, then classic email and phone, you sort of have a slow degradation of the collaborative skills.

So, I think there are -- the focus should be on how you're building your network, and geography is important for that because it allows all the different parts to connect -- your upstream suppliers, your basic research, the social support that you have in your life, all of these things are very important to building an ecosystem -- to use another overused word -- and so that's why we still see geography.

MR. WEST: Here in the front we have a question.

MS. COLEMAN: Good afternoon. I'm Monica Coleman with *Capitol Hill News & Commentary, PWR Talk Network*. First I'd like to thank the panel for an excellent presentation.

I'd like to focus on the thought and the concept of changing the government model from these huge projects that are very costly, that they don't examine as they go along, to a more business model structure that you mentioned where they start small and grow. That's very appealing, especially when you look at highly

innovative industries and such.

For example, NASA, who has had huge projects, billions of dollars, cancelled, simply because they couldn't reach benchmarks in time because they ran into problems and how to fix something that was unanticipated?

The question becomes, though, when you look at the regs, the plethora of regulations that have been developed over decades that causes this problem, how do you turn that monster around? What would you recommend to government what first steps to take to change that model?

MR. WEST: Allan?

MR. FRIEDMAN: So, regulations don't appear out of nowhere. There's, I think, a Brookings press book that sort of argues that every mistake that has been made by government becomes a regulation. We're very good at not making the same mistakes twice, but, you know, that means that any time you want to do something; you're fighting against a couple decades of other peoples' mistakes.

You know, the path forward, one is to sort of find a way to sort of move above or outside the orbit, bringing in outside experts -- we talk in the report about Expert Net -- and another approach is bringing all the stakeholders in pretty early, so one of the more interesting initiatives that I've seen recently is outside of the National Reconnaissance Office. It is a very large budget, very small profile component of the intelligence community responsible for satellite in imagery and other forms of signal intelligence. It Spent $16 million doing a truly revolutionary shift to building some cloud-based data infrastructure.

What's incredible about that is, one, just how small that price tag is in terms of government IT operations and, two, we have most civilian agencies throwing up privacy concerns for all sorts of cloud transitions. This is the deepest heart of the

government classification world that has found a way to actually solve the problems by working with stakeholders regularly and not taking the requirements, going off and working for four years, coming back and saying, here it is, we hope you like it.

MR. WEST: And one of the best sources of government experimentation actually is American federalism, you know, the cities and states, because when you look at what's happened over the last few administrations, we've had our federal government grant waivers to the states in the education area, in the healthcare area, in welfare, so that states can experiment with different approaches.

But I think what we need to do is to kind of think about that as a more fundamental governance change, where we not only do the experiment, but we add evaluation on top of it so we have a better sense of what works and what doesn't work and then use that to grow programs, as opposed to the large-scale policy-making model where we do Obamacare or, you know, we do comprehensive immigration reform or whatever, that we start to think about ways to innovate in a better way so we get stronger results.

Over here we have a question.

SPEAKER: How would you use innovation in the future to handle something like Super Storm Sandy? Because you had all these pieces of this agency and that agency and local and, of course, Chris Christie, how would you use the innovation of the future to deal with that?

MR. HOWARD: Can I take a shot at that?

MR. WEST: Sure.

MR. HOWARD: So, I've been watching with great interest what's been happening in the context of crisis response and disaster response because a lot of the tools that we all have literally walking around with us, give new opportunities for people

responding to see what's happening.

And some of the people who have been out in front of this for years are looking now at the public as a resource, not as a hindrance, in this context. You know, you see one person put up an update about a tornado, okay, you see 50 within the course of five minutes, you know something is happening there. That enables someone responding to move more quickly.

One of the things that's been very interesting to see in the response to the outcomes from Sandy, not necessarily the storm coming in itself, because there, I think, maybe a lot of the innovation is out there -- we have wonderful weather satellites, we can see the modeling, the data has been released, there are incredible interactives that were built showing where things might be going to, tracking where the flooding might be, telling people to get out of these zones, I mean, doing what people can using those tools -- but the response itself. And one of the things I think that's interesting to watch right now is how the Occupy Wall Street Movement's distributed ability to work in terms of protesting has actually proven to be quite interesting as a relief -- volunteer relief network, and aided with new kinds of tools -- there's a new startup called recoveries.org, which has been standing up instances in the various affected neighborhoods -- they've been able to find ways to connect people who need help with those who want to give it.

There's a huge amount of interest online, well, how do I do something? How do I send goods? So, you can go to a registry that was set up on Amazon to send something. You know, can I donate batteries or clothes or medicines, et cetera? And it's needed.

Unfortunately, as I try to do my best to listen to what's happening in the Rockaways, what's happening Staten Island, what's happening in Long Island, what's happening in other parts of Jersey, and people aren't getting what they need, they're still

out of power, and the Red Cross may not be right on the spot. FEMA has taken, you know, the application, but they haven't gotten the disbursement yet.

Often these volunteer networks where people are helping each other through the technologies we have at the moment, mobile devices, social media, and basic websites which allow mapping, that right now is doing something. I'd watch that to see what happens next, and I think a lot of it is actually going to come as reverse innovation from other countries where the state is actually much less developed. They don't have a FEMA. Red Cross is much more limited. There is no Doctors Without Borders, unless it's in the most grievous sense, so people are finding ways to use the same tools often in a pretty open way, using open source, to help one another and to be generative using them.

MR. BOORSTIN: Let me just add to that, because he just said open source, and to me, this is, you know, not only flagging for my company, but also actually believing this very much so, which is that the open nature of the technology platforms that different companies have built, it's absolutely critical to making these disaster response systems work.

I mean, we have an entire unit devoted to crisis response and other companies react very quickly, but if you couldn't build on top of our maps with your own layer that shows something that's important to the community, it would be essentially useless.

So, we have that on purpose, not only for commercial purposes, but also, we hope, for purposes to do with disasters and other emergency situations.

MR. HOWARD: I mean, it's worth pointing out too that public data feeds were infrastructure that you all were able to use in those crisis maps. If you haven't seen Google's crisis maps, absolutely check them out in these contexts, and what becomes

very interesting in the aftermath, you can start to fold in ConEd data to see where there's power outages, you can start to do other things like, see, oh, there might be a need for not only knowing the GIS locations of where the gas stations are, but maybe status. So, is there any way you can build a way for people to report how long the lines are and what gas availability is in stations, and then build that into maps like that?

And government has a role in terms of convening, right, around that, and also in putting verified information into the system. Certainly media does to, often holding government to account, to make sure, but all those three things working together absolutely gives us a picture of what's happening next.

MR. WILBANKS: And just real quick, why are the models of the hurricane so good? Right? They're good because of NOAA. They're good because we've had 20 years of consistent open data in weather. Actually, we've had a lot more than that despite some of the best efforts of senators who represent Pennsylvania, to privatize weather data.

But the weather data has been open, and that's why, now, Sandy could be modeled in such a clean fashion so that we really knew -- it wasn't a surprise when it came ashore or how big it was, and you compare that back to the Perfect Storm back in 1991, which it really was a surprise when it happened and the scope of it, and so I think as we get better and cheaper sensors, as those become ubiquitously distributed in the environment, as our phones become more and more integrated into that, you're going to see that level of increasing accuracy of weather modeling happening at more and more local ranges.

Tornadoes are vastly more complex to model than hurricanes, right, they form under vastly more localized circumstances, but there's a similar effort to get the sensors out there into Tornado Alley and begin gathering enough data to do the modeling

so that we can get that Sandy-level storm prediction for tornadoes.

And so, it's the -- data feeds are public infrastructure, just like roads, and they need to be created and they need to be maintained, and they need to be built out, because then we'll be able to do more and more prediction, because prediction is a key part of the resilience. If we understand where it's going to hit, then it's easier to deploy all of these responses afterwards.

MR. WEST: Okay. In the very back. I'll come to you next.

SPEAKER: Following up on that, my question is, what role, if any, do nonprofit organizations, say, Doctors Without Borders, have in promoting innovative practices?

MR. HOWARD: I mean, that, I think, goes to maybe the comment around open source. If you have knowledge that would be useful to the public good, there are more ways to share it than ever before, certainly better instrument, a better way for cleansing a wound, a new means for taking a ship of paper to diagnose whether someone has a given disease or not, and then share that in a mobile device -- whatever it happens to be -- those are innovations that could jump borders.

I think there are some really thorny questions around intellectual property in those contexts, right, if someone develops something that is worth a great deal of money, creating market incentives around that is something that you have to think about, but, you know, nonprofits like MSF have done tremendous good around the world. It's hard not to see why you wouldn't want to support their work.

MR. WEST: Okay, standing up in the very back, there was a woman with her hand up.

SPEAKER: Hi, my name is Gwen, I'm with the GSA, and I have a question for -- one thing you were talking about -- I'm hearing about is kind of like the

challenges we have with the accretion of rules and regulations over time, and then the other thing I'm hearing about is like some of the things we're doing on the edges around innovation. How do we start like getting those two pieces together? And what would be the policy agenda to really kind of take care a lot of these rules that stop innovation from the inside out so we don't have to just keep going around the edges?

MR. FRIEDMAN: I can take a stab at, you know, something that's revolutionary, because essentially the challenge is, you know, so everyone makes a big deal out of, you know, we have too much regulation. Okay, which ones should we get rid of? Well, the one that hurts my business. And, you know, okay, so we start talking about that and start looking for advocates for that and that's why you realize that we're in a pretty static mess.

One thing that is useful that we're beginning to develop the capacity to do is to think about law computationally, and this is -- we're still pretty far from this point, but I think that's going to allow us to sort of take some of these edge cases -- and I like that framing of we have sort of a dense mess in the center and innovation happening on the edge, looks an awful lot like the Internet -- and begin to sort of build models and like the Internet where we don't have a very clear idea of what it looks like at any given one point in time and need to collect a lot of data. I think that's going to be one path forward.

MR. HOWARD: I mean, I think, it's a really hard question and you know it is because you're living it, right? If you're not familiar with the GSA's mobile government efforts, that's Gwen's portfolio.

I think there's a number of a different methods. One that's still near and dear to my heart is an un-conference. Has anyone here heard of an un-conference or bar camp? Okay, it's a user-defined conference. It's very much out of the open source world; it's actually something that my company, O'Reilly, has had some hand in creating.

Instead of going to something where there's a set group of speakers with a set group of topics that where you sit and talk at people, you basically put up a board and let people propose sessions that they want to lead and other people can then choose to go to them or not.

And in a government context, if you create the right group of people coming in, people maybe from the edges, people maybe from policy, to help them understand each others' worlds, there's some opportunity for cross-pollination that might not exist otherwise if you can create those in-person moments.

And I say that because I've seen some of the camps here in town that have done some of that. I don't know if it's the only way to do it, but I think putting people who understand what the rules and regulations are with the people who understand the technology, has some really interesting outcomes and I would refer you to what the State Department has done with its tech camps for an example of that at the foreign level.

MR. BOORSTIN: I would just say that the other answer here may be cash, not to be too crude about it, but if you're going to offer prizes and incentives to government employees for coming up with good ideas, why not give them prizes and incentives for finding the worst things that exist and pinpointing them and then getting rid of them? I mean, we have those kinds of contests inside of our company to get rid of the worst kinds of bureaucratic things that exist and to clean up, for example, various administrative functions.

Now, we haven't had a long time to develop them, so there are many fewer, but nonetheless, it seems to be a good way -- and it also gets employees involved in a quest to clean it up and do better.

I mean, the one thing I learned in my seven years in the government is there are lots of people -- lots of government employees who share two characteristics.

One, there's a lot of talent, and two, they're not paid too much.

So, if you kind of combine that, it might work.

MR. WEST: Okay.

MR. VALDIVIA: If I may add, there is another way to look at regulation under particular settings and that is, sometimes the government has the ability to help an industry or an emerging industry create a standard or agree on a standard, and this is a different type of regulation that may actually be promoted by the very participants of an industry.

So, that is another way to look at the problem of regulation, if the making and reforming of regulation is participative and it brings to the table the stakeholders, then maybe you can actually have something that individually these companies would not have achieved.

MR. WEST: Okay. There's a gentleman right here who had a question if we could get a microphone over to him. Microphone's coming over, this gentleman right here.

SPEAKER: Thank you very much. My name is Joni; I'm from Mitsan company, Japanese multinational. I have a question about the government role. And in Japan, government of Japan, confronted with social issues, such as aging population, so many elderly cannot use the sense of listening or seeing, so government is inviting innovation for other three senses to communicate better, or taking care of the nursing using the robotics technology and so forth.

What sort of social issues or social needs do you think would cultivate or stimulate innovation or the other way around? Thank you.

MR. FRIEDMAN: I'll take a stab at flipping it around and using a technical determinist argument to say what technology I think will promote strong

innovation, and that's additive manufacturing, commonly known as 3D printing, I think, has a real potential to allow -- take advantage of sort of distributed innovation to allow people to say, here's a problem. I think I have a solution. Working -- building a fairly loose knit network of people who know how to use the technology, marketing, and actually getting a solution out there quickly.

This can happen in the private sector, this can happen in the public sector.

MR. WILBANKS: And maybe we can think about some principles for that kind of government investment that stimulate innovation, right. So, when the government makes an investment in a technology, like a robot for nursing, should the code be open source or not? Should we be able to debug it and improve it collectively, or should that become a vendor lock-in?

Obviously, I'm biased by the way I'm framing the question, but I think that if you don't understand that you're making those choices when you make government investment choices, whether it's research or procurement or whatever, you are making the choice and you're choosing the closed path if you don't ask the question, because it often doesn't even occur.

And so you'll see this now in the U.S. and, you know, the National Science Foundation is beginning to move towards not just open access to the articles that get published, but to the knowledge products that are created.

And so I think that thinking of those as principles, when the government does need to make an investment to stimulate a technology, the principles under which the investments are made, I think, determine whether or not it has a positive or a negative innovation impact because either it creates, you know, a vender lock-in, or it creates a market, and that's the beauty of the open approach from a government

perspective is it creates markets where you have competition and diversity of startups taking on a problem.

And just statistically the odds that someone solves it go up when you have lots and lots of people trying.

MR. BOORSTIN: Let me just give one example of something our company is developing that was developed for two reasons, first for safety, and the second to serve people who are elderly or have certain disabilities, and that's the driverless car. I don't know how many of you have read about our wacky engineers who have come up with this thing, but it actually really works. It's driven 300,000 miles on California highways and Governor Brown just signed a law that allows driverless vehicles to actually be driven now on California highways. You can do that too in Nevada, but then again, you can do anything in Nevada.

In any case, you know, there's a lot of application there for people who don't have full use of their eyesight, for the elderly who should stop driving, and also for your average person who would rather text than pay attention to the road. And, you know, down the road -- excuse the expression -- down the road, these kinds of vehicles, I think, really will be out there and will make a difference for people, for two reasons, one is just safety for the general population, and the other is to serve the specific population with disabilities.

MR. WEST: Okay, back there is a --

MR. CARO: Alex Caro with the MIT Washington office, and you had mentioned the importance of digital textbooks, and I was wondering what impact you thought massive open online courses like edX might have on the future of higher Ed?

MR. WILBANKS: I'm going to take a shot. So, I think you're basically seeing an old system of education pretty badly disrupted at multiple layers

simultaneously, and so textbooks are one layer. The fact that if you had a textbook about Northern Africa that was three years old, that you had bought in a warehouse, that would be a pretty lousy asset to have in a warehouse compared to a book that you had the right to plug in a new chapter, reprint on demand, or push to your iPad or your Kindle or whatever.

So, I think that's why the textbook piece is in here.

There's an enormous amount of experimentation going on in asynchronous and asymmetric learning, right. What's clear is that people can learn in those environments, what's not clear is how we measure progress, and so it's back to the report's comment about new metrics.

Right now we measure progress by certain sort of episodic events in which we grant pieces of paper that dictate that you have passed certain tests, you're a high school graduate, you're a community college graduate, college graduate, graduate student, but there's no way to measure that lifelong learning that comes out of these sort of massive online events.

And so I'm not too stressed about the impact they're going to have. I think the overall system is just going to get completely ripped apart and reformed over the next ten years, and that's the only prediction I will confidently make other than the fact that textbooks are going to drop radically in price. Textbooks have to drop radically in price.

And so, I'm more curious about how we assess learning in these asymmetric and asynchronous environments than anything else, because that's going to be how we integrate them into the system.

MR. WEST: I mean, in general, I think there is tremendous innovation that's going to take place in higher ed, and the fact that Stanford, Harvard, MIT, and

Carnegie Mellon, elite institutions, have moved into this space kind of gives a lot of those changes legitimacy and puts resources behind them that I think is going to push innovation even further.

The particular innovation of the massive open online courses, I'm not sure that is going to be the primary driver of innovation because there's a supply and demand issue there of, you know, if you're offering a computer class or an engineering class and attract 150,000 students, you know, how many times can you offer that class before you actually exhaust the demand that is out there? But certainly there's interesting innovation in terms of distance learning, particularly in terms of ways that make education resources more accessible to people in rural areas. We're seeing lots of tremendous innovations in that area, so I would pay more attention to that part of it than the (inaudible) in general.

MR. WEST: I make one point in that too, though. Institutions like Harvard and Stanford and MIT and Carnegie Mellon that have the best professors in a given area stand to massively benefit from these environments at scale, especially if you're looking at the large, say, lecture classes that freshmen get stuck taking.

The value of going to an institution and being there in person is often -- and peer-to-peer learning and culture and in the labs, in being with people in a place where you can be studying something at the same time together, now, is that something you can fully change when you have a high bandwidth environment, very low latency, with things like Google hangouts and you're all working on the same spreadsheet together? Maybe you can shift that a bit.

The thing that I mentioned at the very beginning, though, that's desperately needed right now, is skills matching with the jobs that are going to be created. And as people continue to lose work in industries that have not seen huge

layoffs yet, but when things like automated processing and e-discovery software really gets into the law firms, really gets into the medical industry, then there will be need for massive retraining and it may not be going back to a four-year college. It may be a community college, it may be a grad school program, it may be some version of that that's offered in collaboration with one of these environments.

I think it's still very early days, but it's really interesting to look at what's happened with things like Con Academy that people said couldn't work, and now clearly are offering something to people that we didn't anticipate.

MR. WEST: So, I'm personally optimistic about the innovations that we're seeing in education, in healthcare, even in the public sector we're starting to see some interesting ideas come to bear, but we obviously still have a lot of work to do, so our Center for Technology Innovation will be continuing our efforts to promote this.

But I want to thank Bob, Alex, Allan, John, and Walter, for sharing each of their views with us and thank you very much for coming out as well.

(Applause)

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Expires: November 30, 2012