THE BROOKINGS INSTITUTION

U.S. MANUFACTURING:
POLICIES FOR A NEW ECONOMIC REALITY FIRST ANNUAL JOHN WHITE, JR.
FORUM ON PUBLIC POLICY

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PARTICIPANTS:

Welcome and Introduction:

DARRELL WEST
Vice President and Director, Governance Studies
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SOLVING THE CHALLENGES FACING THE MANUFACTURING SECTOR:

Moderator:

DARRELL WEST
Vice President and Director, Governance Studies
The Brookings Institution

Panelists:

PHILLIP SINGERMAN
Associate Director, Innovation and Industry Service
National Institute of Standards and Technology
U.S. Department of Commerce

THE HONORABLE DON MANZULLO (R-IL)
U.S. House of Representatives

THE HONORABLE DAVID CICILLINE (D-RI)
U.S. House of Representatives

JOHN WHITE, JR.
President, Taco, Inc.
Trustee, The Brookings Institution

HOW LABOR AND MANUFACTURERS ARE FORGING MANUFACTURING'S NEW PATH:

Moderator:

JAMES R. (BOB) HAGERTY
Manufacturing Reporter
The Wall Street Journal

Panelists:

THEA LEA
Deputy Chief of Staff
AFL-CIO

STEVEN RATTNER
Chairman
Willet Advisors, LLC

SCOTT PAUL
Executive Director
Alliance for American Manufacturing

MANUFACTURING: A TOOL TO RECAPTURE AMERICA'S INNOVATION EDGE:

Moderator:

ANNIE LOWREY
Economics Reporter
The New York Times

Panelists:

ROB ATKINSON
President
Information Technology and Innovation Foundation

MARK MURO
Senior Fellow and Policy Director, Metropolitan
Policy Program

GEORGE TASSEY
Senior Economist
The New York Times

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P R O C E E D I N G S

MR. TALBOTT: Good morning, everybody. I'm Strobe Talbott, and it's my great honor to welcome you all here this morning. It's particularly good of you to come indoors on a beautiful summer day before the temperatures reach a hundred degrees or whatever they're going to.

This is a very important day for Brookings, and I think you're going to find it a very stimulating program for yourselves as well. This is the inaugural and from now on the annual John White, Jr. Forum on Public Policy.

John, who's here in the front row with an extraordinary pink and purple tie, is one of my bosses here at the Brookings Institution, which is to say he is a member of our Board of Trustees. He is also a distinguished leader in the private sector. He is the president of Taco, Inc., which is a leading manufacturer of hydronic systems. I like to think of myself as a reasonably literate guy, but I did have to ask him: what exactly does "hydronic" mean? It means using water either to cool rooms, like this one, in hot weather or warm them up in cold weather. Have I got it or the essence of it, the essence of your business?

MR. WHITE: You absolutely do, as much as I know.

MR. TALBOTT: John, by the way, is, as the CEO of Taco, the third generation of leadership in what is a family business, and it is terrific that his wife, Liz, is here with us this morning and also his two sons, their two sons, John and Ben, who are also part of the company and therefore represent a fourth generation. And that actually establishes a bit of a connection between Taco, Inc., and the Brookings Institution. We like to think of ourselves as being something of a family enterprise ourselves, but we go back even more generations than that, nearly a hundred years, to Mr. and Mrs. Robert S. Brookings, and all of the scholars here are, in some sense, the progeny of their vision for

the original think tank. And in that spirit, we have always tried to make Brookings, in many respects, very family friendly, including in the engagement not just of our trustees but of their families as well in the life of the institution.

Now, the topic for today's forum is U.S. manufacturing, and I would suggest that that is a doubly appropriate subject for us to be discussing. First of all, it's a sector of the American economy that Johnny White knows very well, and he has been part of the solution to some of the problems besetting that sector. And the difficulties that American manufacturing is now having are absolutely key to the larger difficulties besetting our economy.

For the manufacturing sector in the United States to get fully back on its feet is going to be closely related to the health -- or maybe I should say the restoration of the health -- of the U.S. economy, including the health of our workers, which is to say the whole issue of affordable health care. And it obviously also relates very much to our country's ability to compete in a highly competitive, interdependent world with emerging powers exercising great muscle, including in the manufacturing sector.

And then, of course, there is the critical issue -- and I might add politically critical issue -- of jobs, jobs, jobs. The U.S. is in some ways, and I guess we should say hopefully in key ways, at a crossroads, which is to say we are coming out of a period where our country has lost five million jobs over the last decade. There are of course some signs of recovery, but that recovery is far from robust.

We're going to have a number of panels over the next couple of hours. They will bring to bear on the subject of manufacturing a great deal of expertise, a variety of perspectives, and engagement with all of you.

The first panel will be moderated by my friend and colleague, Darrell West, who is the vice president and director of our Governance Studies program. He

came to us from Brown University in Providence, Rhode Island, which is the home town of the Whites, and one of his many achievements as the head of our Governance Studies program is bringing Johnny and the other Whites to Brookings.

So, Darrell, I'll turn the program over to you.

MR. WEST: Good morning. I'd like to thank all of you for coming out, and I'd like to add my thanks to what Strobe started with to John; his wife, Liz; and sons, John and Benjamin, for their tremendous generosity in supporting this forum.

Our goal with this annual forum is to use this and other events to raise awareness about manufacturing issues and work towards improving the climate for manufacturing in the United States. As we all know and as Strobe alluded to, it's been a challenging time for American manufacturing, that industry's percentage of the overall employment situation has fallen. The sector has lost more than 5 million jobs over the last decade; unemployment now stands at around 12 million workers.

However, the sector is experiencing a renaissance. According to a new report by Marc Levinson of the Congressional Research Service that just came out a few weeks ago, manufacturing output has actually increased by 19 percent since 2009. But the number of jobs in that sector has risen by only 4 percent. There's been greater adoption of advanced manufacturing techniques and substantial improvements in worker productivity.

So, today we're hosting a half-day conference focusing on ways to improve manufacturing and overall economic performance. We're going to look at how to solve the challenges facing the sector; what are labor management doing to strengthen manufacturing; and what are the best ways for the United States to recapture our innovation edge. So, we have several panels this morning, and then we'll be serving you lunch after the last panel.

For our opening session, we have four distinguished speakers. Phillip Singerman is Associate Director for Innovation and Industry Services at the National Institute of Standards and Technology in the U.S. Department of Commerce. In that position, he is responsible for external partnerships such as the Hollings Manufacturing Extension Partnership, the Technology Innovation Program, the Baldrige Performance Excellence Program, and NIS Technology Transfer and Small Business Innovation Research Awards. Prior to joining the Institute, he was senior vice president at BND Consulting, which was a D.C.-based firm providing strategic advice and technical assistance to federal economic development programs.

The Honorable David Cicilline is a Democratic member of the U.S. House of Representatives from Rhode Island. The congressman has been fighting for common sense policies to help small business and manufacturers deal with our challenging economic times. He has introduced legislation to create a made-it-in-America block grant to help small manufacturers retool their factories and retrain workers with the skills they need to compete in a global economy. He has introduced and co-sponsored a series of bills designed to revitalize American manufacturing, including legislation to develop a comprehensive national manufacturing strategy. As a member of the House Committee on Small Business, he was an early supporter of bipartisan legislation that was signed into law to repeal some of the onerous reporting requirements on small businesses in America. In addition, he has worked to free up access to capital for small businesses and fought to maintain funding for the small business development centers that provide small businesses with the assistance they need to grow their companies.

And, as you've heard, John Hazen White, Jr., is president and CEO of Taco. Taco is a leader in the heating, ventilation, and air-conditioning industry. It's

located in Cranston, Rhode Island, and the company is part of the resurgence of manufacturing in America. Under John's leadership, it has invested in state-of-the-art equipment and processes and is committed to growing its international business. The company recently opened a new $20 million facility to help train employees and their families. The Taco Learning Center has been recognized as an outstanding example of progressive employee training, and it offers courses in English as a second language, math, civics, and other subjects.

And in a few moments, the last member of our panel will be joining us, the Honorable Don Manzullo, who's a Republican member of the U.S. House of Representatives from Illinois, and he co-chairs the House of Manufacturing caucus, and I'll introduce him more fully when he arrives.

But I want to start with Phillip in this conversation. I just wonder if you could describe the administration's actions on advanced manufacturing and what your agency is doing to meet the challenges that we face in the manufacturing area.

MR. SINGERMAN: Thank you, Darrell.

And thank you, John, for sponsoring and hosting this.

MR. WHITE: That's great.

MR. SINGERMAN: And thanks to Brookings for inviting us.

I want to start by acknowledging Brookings' excellent work and really helpful work in informing the administration's policy on advanced manufacturing, particularly the connection between manufacturing and geography and the major work that you've done on regional clusters.

The NIST -- you may be surprised or curious as to why the National Institute of Standards and Technology plays a central role in the administration's policy and implementation of advanced manufacturing. This is, of course, an historic role for

NIST going back over a century. We are, in a sense, industry's national laboratory.

And for those of you who have an historic memory under George Herbert Walker Bush, the National Bureau of Standards was reinvented as the National Institute of Standards and Technology and given a number of external partnership programs to respond to the Japanese economic threat of the late 1980s. These included the Baldrige Award; these included the Manufacturing Extension Partnership program, which helps small and mid-sized manufacturing and the very excellent advanced technology program, which invested in high tech projects with industry and academia.

Under our charismatic undersecretary and director of NIST, Patrick Gallagher, the agency has assumed a central role in responding to this generation's economic challenge from overseas. And this has occurred in the context of an interagency process working with the National Science Foundation, the Department of Defense, and the Department of Energy under the guidance of the White House oversight agencies -- the Office of the National Economic Council, the Office of Science and Technology Policy, and the Office of Management and Budget.

I bring a particular perspective to this I think. I've been involved in tech-based economic development for 30 years, my entire career, and I had the privilege of working in the Clinton administration as the U.S. Assistant Secretary of Commerce for Economic Development. And so I have the perspective of comparing the policy development and implementation of that administration with the Obama administration. And I think it's fair to say that no presidential administration has made manufacturing such an explicit and central part of an economic strategy nor pursued it in such a systematic and multilayered manner.

Some of you may recall that in the President's State of the Union message in February he mentioned manufacturing and manufacturers. Does anybody

know how many times?

CONGRESSMAN CICILLINE: Twenty-seven?

MR. SINGERMAN: Fifteen. Fifteen times. But who is counting? That's probably 15 more times than it's been mentioned in the past century.

MR. TALBOTT: Sounds like the people in (inaudible) County.

CONGRESSMAN CICILLINE: That's right. (Laughter)

MR. SINGERMAN: We were. And of course the President and the administration have been publicly advocating the importance of manufacturing ever since, which doesn't always happen after an announcement during a State-of-the-Union message. But the President's announcement really reflected a broad policy consensus within the administration that has been developing over a number of years. And let me highlight what I think are the eight pillars of that emerging policy:

First, that manufacturing is critical to U.S. industrial productivity and economic competitiveness. And there are a number of reasons why manufacturing is singularly important. First, as Strobe mentioned, jobs, the quality of jobs, and the importance of domestic spillover from manufacturing facilities located in the community. Second, the importance of advanced technology products to our exports. Without a strong manufacturing base and strong technology exports, we can never reduce the deficit in our trade. Third, and importantly, the importance of the defense industrial base to our national security capability, and the Department of Defense has recognized in the last few years that with the hollowing out of our manufacturing base and access to critical materials, we cannot maintain a strong security capability.

But perhaps most interestingly for this audience and for this subject is the recognition that manufacturing is critical to sustain our innovation ecosystem; the recognition that we cannot simply design here and build it there; that there's an

extraordinarily strong connection between manufacturing, between the shop floor and the development of new products and technologies. And that's a major theme that has arisen over the last several years.

Second, that the federal government has a role and responsibility to create a supportive environment for manufacturing in a multilayered effort -- technology, of course, but trade, training, taxes, and regulation. And the administration's policies have reflected the administration's recommendations to Congress and its administrative actions have recommended this comprehensive holistic approach.

Third, that a robust research and development regime is critical to technological development. And later this morning you'll hear from my colleague, Greg Tassey, who is the chief economist at NIST who has written extensively about this issue, and so I'm borrowing shamelessly from Gregg's writing.

But Greg identifies, really, three components of research and development:

One, the amount or intensity of public and private research and development funding and the important need to, in the face of international competition, increase the level of our funding through both public funding and leveraging of private funding.

Second, and very importantly, the composition of research ad development funding. There has been, I believe, an imbalance in our federal funding heavily oriented towards biotechnology over the last 15 years and to defense electronics. We need to rebalance that to physical science and engineering.

And, third, the efficiency of research and development funding. Greg writes about the fallacy of the black box model of technology transfer; that is, on one side science and technology goes in and on the other side commercial products come out,

and we really don't know what happens in the middle. It's kind of a magic sauce of entrepreneurs and venture capitalists and crossed fingers and university researchers. Obviously, that's not a sophisticated understanding.

Fourth, and flowing from the concept of the importance of the efficiency of R&D, is the notion of public/private partnerships bringing together all sectors of the technology lifecycle to develop technologies in a more seamless and efficient manner. Private/public partnerships in this context are not simply a cliché or a phrase but really of an effective tool to more rapidly and effectively develop new technologies.

Fifth, and in this regard Brookings has played an enormously influential role, the importance of regional innovation clusters, which in a sense is a special case of private/public partnerships. Regional clusters, the research has demonstrated, provide competitive national advantage. So, the linkage of innovation, science, and technology investments with geographic economic development programs is critical to transfer the results of research and development into domestic economic activity.

Sixth, and I would add that EDA, my colleagues at the Department of Commerce, have been the leader within the administration on promoting regional innovation clusters.

Seventh, the importance of small and mid-size manufacturing firms. As they link into the supply chain, one of the sad consequences of the outsourcing of major corporate activities has been the decay of the supply chain in our major industrial sectors. The Manufacturing Extension Partnership has focused on that and focused on it in a particular way, not simply through productivity and efficiency but through innovative technologies, innovation engineering to make these small firms more agile and flexible and responsive to the needs of large corporations.

And, finally, the importance of talent of workforce. It's well known that

there are hundreds of thousands of skilled manufacturing jobs for which there are no qualified applicants. The administration has proposed a number of initiatives in that area, particularly and most recently recognizing the skills that veterans develop within the military and using those as a gateway to certification.

In conclusion, the takeaway that I would provide that kind of captures all of this is, first, that innovation is not a black box -- it can and must be consciously supported, and there's an important role for government because of market failures; second, that manufacturing matters for innovation; and third, that geography matters for manufacturing.

Thank you.

MR. WEST: Okay, thank you very much.

Congressman Cicilline, manufacturing is an important part of the Rhode Island economy. What do you think would make the biggest difference for American companies in the manufacturing area?

CONGRESSMAN CICILLINE: First, thank you, again, for convening this. Thank you to Brookings, and the only thing more wonderful than being at Brookings is being at Brookings with the White family, so this is a great pleasure.

You know, Rhode Island has, I think, like many communities, a very rich history in manufacturing and was the birthplace of the industrial revolution, so it's part of our DNA, and I think this is an area in which public opinion was well ahead of the policy leaders in our country. So, the public understood that if we're going to maintain our position as a great economic power we need to make things in this country and export American-made goods, not American jobs. And so the people knew that instinctively, and I think we're coming through a decade in which people thought for a long time oh, you know, we're not going manufacture, manufacturing's dirty, someone else is going to

do that. And so people thought about manufacturing in a very negative way, and if a parent had a child who raised his hand in school and said I want to be manufacturer, there was “uuh,” and I think we have to change that attitude.

You know, manufacturing is central to our identity as a country; it’s central to our success as a world economic power; and it’s critical to rebuilding the economy today. And I think there are a number of things we can do. First and foremost is the development of a national manufacturing strategy -- you know, Congressman Manzullo is one of the sponsors of that legislation -- you know, to really set out in a smart, strategic way benchmarks and bring together the right people to set out a manufacturing strategy. Then we have to, again, correct some of our tax policies so that we’re not creating incentives to ship American jobs overseas and instead create incentives to keep manufacturing here in our own country.

I think we need to be sure that in our trade relationships we are not allowing our trading partners to have an unfair advantage in manufacturing by manipulating their currency. We have legislation to fix that, which some estimates project will create between a half million to two million jobs, and will cost the American taxpayers nothing but simply prevent trading partners from manipulating their currency.

I think we have to make investments in infrastructure so manufacturers who rely on their ability to move goods and services and information successfully in a highly competitive global economy can do that, and so rebuilding our country, and there are some good models, like the National Infrastructure Bank, that will allow that to happen.

I think we have to be very serious about our investments in talent and understand that manufacturing that we’re growing in this country is growing out of innovative entrepreneurial companies and individuals that are finding new solutions and

new technologies and that, in the end, the country that preserves and nurtures its best talent is going to lead the world in manufacturing. And so that is everything from Head Start to Pell Grants to vocational and technical education to workforce development to be sure that we have those skills, the skilled workforce necessary to do this work.

And I think the other piece of it is that we've got to understand that we need to make things like the research and development tax code and other tax policies permanent and more generous, and I think part of this is really about also recognizing we have to make investments. There have to be investments in manufacturing. You know, sometimes you'll say oh, you know, the government should be investing in private activities. We hear that all the time. We've done it for decades in oil and gas and in tax policies and subsidies. We've done it with agricultural corporations. We've done it in a million different places. If we're serious about reinvigorating American manufacturing, we have to be willing to make investments in what are good jobs and what are essential to rebuilding our economy.

One idea is to make an America Block Grant, which is my legislation decision, which will actually be a competitive regional grant process that will allow companies to invest in rebuilding their factories, retraining workers, buying new equipment, improving their exports. But we have to be willing to make those investments. These are good jobs which pay above non-manufacturing jobs nationally. They help build the middle class of this country. And we have examples all throughout our history. We've made investments in certain sectors of our economy because it's good for America and good for economic growth. It's time to do that in manufacturing.

MR. WEST: Okay, thank you very much.

Congressman Don Manzullo. Welcome to Brookings.

The Congressman is a Republican member of the U.S. House of

Representatives from Illinois. He co-chairs the 80-member House Manufacturing caucus, which he founded in 2003. He also co-chairs the House Auto caucus.

As chairman of the Foreign Affairs Subcommittee on Asia and the Pacific, he has focused his efforts on increasing export opportunities for American business owners while pressuring other nations to play by the rules of fair trade. And as chairman of the U.S. House Committee on Small Business from 2001 to 2006, he held more than 60 hearings on the state of manufacturing in America.

He helped win enactment of a 6-percent tax deduction for manufacturing production the United States.

So, Congressman, what do you see as the top priorities for improving manufacturing in America?

CONGRESSMAN MANZULLO: Well, you can have all the programs you want, you could have all the tax breaks you want, but if you can't get skilled workers, we're going to lose those jobs. I think -- and Dave, we agree on a lot of things -- the problem is there's too much government involved in manufacturing. There's a difference between setting goals and setting priorities in a national manufacturing policy.

Now, I know you don't believe in manufacturing policies, but we do agree there should be more discussion going on.

I was in Switzerland two years ago studying the education system there. At age 15, the students in high school make a decision whether they go into manufacturing or into other areas of non-manufacturing. It's not a matter of what we see today where the kids who go to college, who go to the regular high school campus, then the buses pull up and take the kids to a "Vo-Tech center" that are not going to college and they both look at each other and there's this class warfare that starts at age 16. That's not the way it is in Switzerland, because the people that do the skills with their

hands are respected as much as those who are not involved in manufacturing. That's the biggest problem, because 70 years ago somebody said in America everybody should go to college, that there's something wrong with going to machine shop, your dad worked there, your grandfather worked there, you deserve something better. And so unfortunately in America, manufacturing becomes a default job. And that's the problem with the entire educational system. That's the problem with government.

Second of all, there are 44 federal programs involved in job training. And the job training programs become job training programs for job trainers. One person after the other -- if you look at the workforce development that's associated with unemployment compensation, in Illinois you can apply for unemployment over the Internet and you'd never have to show up for job skill certification or to get into the pool to go and find a job.

So, what you're seeing is innovative people like John Hazen White, Jr., who just opened the Innovation and Development Center at his headquarters in Cranston, Rhode Island -- people like John and all over the nation where the private entrepreneurs are realizing that government is not the solution. If you want to create people, you do it yourself at your own facility, or you can team and go to community colleges, which serve as the best resource for training people.

The next problem that we see is we talk about advanced manufacturing. I was just at the Argon National Labs outside of Chicago, and some of the most incredible, innovative technologies are taking place in laboratories that the private sector can come nowhere near paying for, and so there is a role for government in terms of those jobs. But I was at a seminar just about two weeks ago sponsored by the E.U. dealing with advanced manufacturing. The problem is that no one here tries to define what advanced manufacturing is. The E.U. actually came up with a definition from the

European Commission Enterprise Industry Committee that is broken down into five areas: Nanotechnology, micro/nanoelectronics, photonics, advanced materials, and biotechnology.

Now, they've identified those areas into which manufacturing will move into the next generation. And what I see taking place here in this country, number one, is a complete lack of understanding as to the importance of manufacturing. Alan Greenspan said himself -- he said what we lose in manufacturing jobs will more than compensate for in value-added white collar jobs, and at least five different times as a member of the Financial Services Committee I asked him to give me a definition of one value-added white collar job, and he couldn't because the five minutes ran out. (Laughter) So, that's why Tim Ryan and I formed the -- he's a Democrat from Ohio. He had a great manufacturing area. I'm from Rockford, Illinois. We have over 2,000 manufacturing facilities in our congressional district. We founded the Manufacturing Caucus for the purpose of saving the domestic titanium industry. Eight years ago, it was under siege where most of the sponge or a good part of it was coming from the Ukraine. And we worked together, had a massive meeting, brought together every single major player in the titanium industry, including the defense industry, and we helped put together the basket that ended up saving the titanium industry here in America.

So, there are a lot of things that we have to do. I've made available -- I'll make available -- an eight-point American jobs agenda, which talks about job retraining, favorable tax schedules, et cetera. But let me just leave it at that point and finish.

If you can give me 30 more seconds, I got a call from a constituent who makes injection molding. Very, very complicated tool and die system. And he wanted to get in the aircraft industry. So, I said I'm with them, got him lined up to get his AS 9001 certification, and said you got to do two other things: Join the local Economic

Development Council and, number two, the era of people going to the green Thomas books looking for the best industry in the world are gone, you can no longer depend upon a reputation and quality to sell your product. Fire your webmaster, because today quality is weighed by the quality of the web.

MR. WEST: Okay, interesting. Thank you.

CONGRESSMAN MANZULLO: All right.

MR. WEST: So, John, your company is on the front lines of manufacturing, so can you tell us about your new innovation and development center and also the learning center?

CONGRESSMAN MANZULLO: Well, that's a good segue, isn't it.

MR. WEST: It is perfect. He's a great warm-up act for you, by the way.

MR. WHITE: Thank you.

MR. WEST: And what you're doing to train manufacturing workers.

MR. WHITE: Yeah.

Thank you, first of all, for doing this. I'm still pinching myself that I'm actually here. This is --

CONGRESSMAN MANZULLO: Thank you for making it possible.

MR. WHITE: -- one of the greatest things I've ever done in my life, to be part of Brookings.

MR. WEST: Thank you.

MR. WHITE: I truly appreciate it.

I look at this from a bit of a street-level perspective, because I live it and breathe it every day as do all of us. So, I would say this. Our advancement, our growth, our development -- in fact, I think our survival has happened not as a result of any brilliance or super smarts but as a result of survival instinct. And policies are great.

Government funding and tax issues being dealt with progressively and whatnot are beneficial, but those of us living and breathing this every day can't wait for that, you know. We must proceed or fail.

In the early '90s, my company, Taco, was in very, very difficult financial condition. In fact, probably very lucky that the banks weren't being very carefully watched over and were quite lenient at the time, because we were about a 35 or $40 million company then with a $15 million short-term debt. Do the math on that. It's not very healthy.

MR. WEST: Sounds like Greece.

MR. WHITE: Losing several hundred thousand dollars a month, I might add, so it was headed right for the beach. We were confronted with either selling it or fixing it, and we opted, my father and I, who is alive and still actually running the business at the time, opted to fix it as opposed to give up a great heritage and legacy.

The way we went about that was to focus very fundamentally and very directly on the people, the people in the business. It brings to the education and learning facility.

You see, I do not subscribe, personally, to the thought that manufacturing is leaving this country due to the fact that we don't we have skilled workers. I believe that's true, but I don't think it's necessary, and I think it's foolish. I think it's cowardly actually, because people are people, and all of us have some unique ability to do something good, because we all generally want to.

I believe strongly in training -- training people -- for several reasons. Number one, it allows them to grow and prosper, and if we do this right, which is what we've done at Taco, I think, or we're trying to -- it allows them and their families, people in their families, to grow and prosper, to be safe and happy and work in a clean

environment.

David, you know, you're right about the image that's been projected about manufacturing and that's why so few people actually want to go into it.

I think we can provide some place that's quite different from that. Education in the workplace -- our education program starts with surely English as a second language and CNC machine programming, all of the work-related things -- gauge reading, blueprint reading, all of those things. But we have elevated this program up now to, you know, art and music, gardening, literature, you know, right up through an MBA program for folks onsite.

The loyalty, which is instilled through learning, is probably as great a benefit as watching people grow and develop. And this is a manufacturing company, now, with a national average in my particular type of industry, which I call metal bashing -- with like a 16 percent average national turnover rate, we have less than half a percent. Our tenure at Taco is an average of 20 years. And this has allowed us to grow the company with people contributing, being a part of that growth.

I believe -- and I was the general foreman in the plant for a while back in the late '80s, and that was not due to my ability mechanically or manufacturing as much as it was that we had some agitation problems at the time and they threw me out there to just love the people I guess, so -- and it worked out very well. But what I learned -- I think it's very significant -- is that people, all of us in this room, no particular segment, no particular job, but people, I learned, have really -- no matter what we do, people generally have forgotten more about what they do than the rest of us will ever know. And I learned that when in trouble or when in need for improvement or change to ask those that do to fix is very effective.

So, through all of those thoughts -- I mean, I could spend an hour and a

half on this and not even scratch the surface --

MR. WEST: But don't do that.

MR. WHITE: No, no, no, no, no, I -- (laughter) you do know me, don't you, Darrell.

MR. WEST: I do.

MR. WHITE: Yes, I -- yes. Notice I have no notes, by the way, so that's what gets me into trouble I think.

But having learned that I was able to -- we were able at Taco to really capitalize on what I call the human capital side of the business. And so I think education -- I think it's all about education. That's my own personal philosophy.

MR. WEST: Okay, great, no, that's been very helpful.

We'd like this event to be interactive and to have a dialogue between us and the audience, so I'd like to open the floor to questions. So, if you'd just raise your hand, we have people with microphones. Right here is a gentleman with his hand up. So, if you could give us your name and your organization and keep your question brief so we can get to as many people as possible.

MR. LAKIN: Is this --

MR. WEST: Yep, you're on.

MR. LAKIN: Hi, my name is Sam Lakin from Prosperity Projects.

Mr. White, I am the graduate of a $6,000 machinist apprenticeship program from the General Electric Company in Lynn, Massachusetts -- I won't say how many years ago. It no longer exists. G.E. closed it. You are a much smaller outfit. How is it that you can afford or are willing to invest in employee training when a company like G.E. is closing its stuff down?

MR. WHITE: Well, I think, you know, I feel badly about that when I see

that happen because I just do believe that it's the best investment we can make. The difference probably is the fact that we are small, and I've kept this company small. The way it's structured and managed is in buckets, you know, so to speak -- divisions, units -- so that no part is bigger than the manager can handle. I want to be sure that the manager of any particular segment of my business knows the employees and knows their families. That's a difference with a company like mine and G.E., because when you have 6,000 -- how many people? 6,000 people?

MR. LAKIN: Oh, that -- 13,000.

MR. WHITE: Oh, yeah, that's hard to get really well acquainted with them, you know, on a personal basis. (Laughter) So, you see the difference. I mean, I think it's easier to take a quick attitude and move than it is to try to really get into it.

CONGRESSMAN MANZULLO: Can I say -- let me, Darrell -- I mean, I think -- and because I visited Taco I feel like I can speak to this really directly. That statistic of turnover of less than half of 1 percent as compared to 16 percent of the national average is extraordinary, and it speaks to the loyalty and the kind of respect that John and the whole company has for its employees.

But it also is a cost saver, a tremendous cost saver when you talk about retraining and the loss of productivity of a new worker. So what Johnny I think has brilliantly figured out is, and his dad was the same, is invest in your people, keep them there at less than ½ of 1 percent and you save 15½ percent turnover, you translate that into real money. And so I think that's a really unusual model. You don't go to very many manufacturing facilities that have MBA programs and art programs. But, I'll tell you what, you go to Taco and the employees love working there. They love the company, they are incredibly loyal, and they don't leave. And that's an unusual model which I think is worth thinking about.

CONGRESSMAN CICILLINE: I visited a facility in my district that ironically also makes insert injection molds, and there are nine employees. Three of the fellas were under age 25. And I said what did you do? And the owner said I recruited these kids when they were 16 years old. I went into the high schools, and I said anybody here who's interested in becoming a tool and die maker, using his hands to create art, you come and visit me, I'll give you a part-time job, I'll train you, and put you through the first two years of college to get your basic skills certification. And so here's this tiny shop, went directly into the high school, changing people's minds about manufacturing, elevating manufacturing to an art form, which it is. And that's how he was able to bring people in.

And, John, I'll be you do the same thing on your recruiting.

MR. WHITE: Absolutely.

MR. WEST: Okay, we have another question right here.

MS. WERTHEIM: I'm loving this. I'm Mitzi Wertheim with the Naval Postgraduate School.

I joined IBM in '81, and one of the first things I learned was they were giving $20 million to universities to set up manufacturing courses, because nobody was training anybody to go into manufacturing.

I have a request for Brookings, which is could you make a list of all of the tax items he thinks needs to be done so the general public can understand it? I think the story that I've heard here is an amazing narrative. I haven't heard it anywhere else. And the question is how do we get the stories out so the general public understands it? It is so important to educate the voters as to what can be done, what is being done, and the models that we need to basically explain. So, I give this to you as a responsibility. Educate us and find these fabulous models. But we also have to know about the barrier,

such as the tax laws. But it has to be done in a way that I don't have to read 25 pages and pull it out. And academic institutions write lots of words. I brought with -- I just bought all of the data bacology -- you guys from Rhode Island must know who he is --

SPEAKER: We all do.

MS. WERTHEIM: -- *How Things Work*. He does what I call children's books for adults.

MR. WHITE: Right.

MS. WERTHEIM: You need to do children's books for adults. Academics don't teach. They write for each other, and they don't educate the general public. The media's not educating us. I think the academic field has to start writing things in a form -- they can do it for each other, but they need to do it in a form that the rest of us can learn what we've paid for.

MR. WEST: Okay, this is exactly what we're trying to do in this series to really --

MR. WHITE: That's great -- increase awareness.

MS. WERTHEIM: But you need to -- I want it spread out. (Laughter)

CONGRESSMAN MANZULLO: If you want to go to my website, manzullu.gov. It's called American Jobs Agenda. And it's eight or nine points, and the first point talks about the various tax issues that have to be done. The biggest problem that Dave and I have is that probably only about 60 members of Congress have a significant manufacturing base --

MR. WEST: Right.

CONGRESSMAN MANZULLO: -- where we bathe ourselves in manufacturing. And the rest of congressional districts don't have that concentration, so the members of Congress know very little about manufacturing.

MR. WHITE: So, that's, like, 15 percent of districts basically have manufacturing.

We have another question over here.

MR. McCREA: My name is Christian McCrea at Norman McCrea Foundation. Building on what the last lady said, my own quest would be to -- both Brookings and NIST to develop a sort of unseen wealth. Baldrige -- now, in 2000, end of 2000, Brookings published a report on unseen wealth basically saying the system is broken in terms of valuing anything that is longer than 90 days, whether that's investing in training of people or advanced manufacturing if that's something which takes more than 90 days to invest it. And Baldrige 25 years ago, or you know the time, was the best ever chain system popularization process that this country has ever had, well, in my 40 years of looking at it. So, if you put those two together and then you could go visit these extraordinary facilities, which are leading edge, a lot like Taco appears to be, with learning facilities, and you could sort of popularize it and hopefully get it on TV as well as getting businessmen and investors to go and see it.

MR. WEST: Okay, Phil.

MR. SINGERMAN: So, just on your comment about the publicizing these issues. There's a website -- we have a website, too, manufacturing.gov, so it's easy to remember: manufacturing.gov. It's hosted at NIST, the Manufacturing Extension Partnership Program, and it has a wealth of information about policies and programs and examples. But I think the Baldrige reference, the Baldrige National Quality Award, is an important illustration of how the education process needs to work, because one of the requirements of being Baldrige winner is that the private sector companies have to go out and proselytize --

MS. WERTHEIM: They discovered that that was very expensive.

MR. SINGERMAN: Well, they continued to do it. They -- the Baldrige community is a very large community, and it's a very committed community. And my point -- the point from that example is the education must be led by the private sector. There's very broad, I would say, consensus. There's a bipartisan consensus on the importance of manufacturing. There may -- differs perhaps on some of the specifics, but I think across the board there is a general feeling that manufacturing matters, and it matters importantly; but to get that message across, to change the image of manufacturing, to encourage young people to go into manufacturing spaces -- that requires the leadership of the private sector to proselytize and educate in their communities and their elected officials.

MR. SINGERMAN: Can I make one quick comment. There's another thought that occurs to me. It's something that I think is often overlooked whether it's a manufacturing or other segment of employment, but I think manufacturing -- I don't know of a greater wealth creater than manufacturing and for a whole host of reasons -- but that's another subject. But, you know, so much -- back to the question about why G.E. moved out of Lynn, Mass., you know. So many things in business, particularly, I think, industry, are driven by profitability, you know, and --

MR. WEST: And short-term profitability.

MR. SINGERMAN: Yeah, yeah, short-term profitability, right.

But, you know, what occurs to me and I think is really important is that running a business is largely revolving around employing people; and employing people, ladies and gentleman, is a social responsibility, and it carries huge responsibility with it. Everybody really should be able to achieve a status in life in which they feel good about themselves, and that, to me, is a large part of driving more job creation, and it takes us away from -- look, I'll tell you, we're a profitable company. We really are. And a healthy

company. But that's a result of people being loyal and honest and hardworking and happy, not me cutting jobs and letting people go and sending things to China, you know. It's about doing things right and about -- and I just think if we can do more of that in this country, we'll quit -- we could in time come back to where we were at one point in history.

MR. WEST: Okay, we have time for a couple more questions. Right here on the aisle is one.

MS. CLINE: Hi, Andrea Cline. I'm a development consultant working in nonprofit America, particularly in workforce development.

A two-part question. With regard to the national strategy, how are you using technology -- primarily remote educational distance training -- in facilitating those that are considered the underserved or in transition in that educational process, especially in the basic skills so that they can move forward, integrating it with small businesses? And then, second, how do we go about educating shareholders on the importance of instead of that immediate gain making an investment in bringing our country in a more competitive but much more sustainable position with regard to the global economy?

CONGRESSMAN CICILLINE: Well, there was a -- and Darrell will remember this -- there was a Brown University study that was recently released, I think, that said that nearly two-thirds of the workers for the next decade are going to require a post-secondary education, and so this question of our ability to provide these career pathways, which may not necessarily mean a four-year college degree but some post-secondary education, particularly for manufacturing. You go into a manufacturing facility today, and it's not your grandmother or grandfather's manufacturer. It's a different facility with different kinds of technology and different kinds of equipment. So, I think critically we have to maintain our investments in a whole range of workforce training opportunities

and be sure they're aligned with what actually is needed in the manufacturing sector. But I think it gets back, in many ways, to this woman's point, and that is we have to continue to build a national momentum or national movement on this issue. We've put together a very comprehensive agenda and the Democratic Caucus called Make it in America. It's not -- it's about making things as manufacturing, but it's also about, you know, another message of this is how you make it in America is you make things and how you build success for your family and for yourself. And there's a whole comprehensive, really robust set of strategies and policy that we can implement. We're not powerless to fix this, and we're not powerless to grow manufacturing in this country. We just have to enact these. But I think workforce training is a very key part of that for all the reasons that we've discussed this morning.

MR. WEST: Go ahead.

CONGRESSMAN MANZULLO: A lot of that's already done. There are 44 federal government programs on workforce training. I've had it. You know, I'm sorry. I've had it with that. I've visited hundreds of factories in my district and throughout the United States and Europe and Asia.

Emily Stover de Rocco, used to be in charge of workforce development for George Bush, went over to the Manufacturing Institute, just left there --

CONGRESSMAN CICILLINE: Right.

CONGRESSMAN MANZULLO: -- and she worked for five years. She consolidated over 300 programs to come out with this manufacturing skills certification. It's done.

CONGRESSMAN CICILLINE: Right.

CONGRESSMAN MANZULLO: It's already done. It's a five-step program that can be easily incorporated into any community college and get people with

the basic certifications on machine. So, move on to something else.

CONGRESSMAN CICILLINE: But it has to be funded. I mean, you're right, it's done, but there's been efforts to eliminate funding for programs like that.

CONGRESSMAN MANZULLO: Stop the funding, Dave. You're looking at money all the time.

CONGRESSMAN CICILLINE: I know. What I'm saying, you design the workforce training program --

CONGRESSMAN MANZULLO: This isn't money --

CONGRESSMAN CICILLINE: -- but if there's not money for it, it's a great idea but there's not much impact.

CONGRESSMAN MANZULLO: The curriculum is done. Community colleges are supported on the local level with very few federal grants. It's not an issue of money; it's an issue of knowledge.

That's an interesting statement, isn't it?

MR. WEST: We have time for one more question right here, then we'll move to our next panel. But stick around, because we'll be continuing this part of the conversation.

MR. SALINGER: Good morning, I'm Gearhardt Salinger. I work at the National Science Foundation and for the last almost 20 years I've been head of the program on advanced technological education and not training. And we have centers in all the centers that Mr. Silverman mentioned *(sic)* in all the areas -- biomanufacturing, microsystems, nanotechnology, big and auto, and additive manufacturing. So, my question really is what are some opportunities for businesses to work with community colleges more? All of our centers and all of our projects are industry driven, but rather than have an industry program why not pay employees to go to the community college

and get similar -- and work with the college to get the types of courses to educate your workforce.

MR. SINGERMAN: So, not a program that requires funding but they -- and actually a program that was mandated in the America Competes Act in 2010 to link the needs of small manufacturers with a curriculum developed at community colleges, and this is, again, run by the Manufacturing Extension Partnership at NIST. So this is -- which is also actually involved in Emily's program on school certification. So, that's an example of the role of government as a supporter and a convener of private sector-led initiatives, in the case of the skills certification, and local initiatives, such as the community college relationships, and connecting those to the needs of small- and mid-size manufacturers. So, not everybody has the vision to do what you've been able to do, and so a number of those, particularly the smaller firms, have to be connected to the right partners. So, that's a way that that's happening.

CONGRESSMAN MANZULLO: Well, Phil, to add to you, the Manufacturing Extension Partnership, which NIST runs, works on a 50/50 basis.

MR. SINGERMAN: Right.

CONGRESSMAN MANZULLO: It's 50 percent government money, and the company puts up the other half, and when I had to work with this company to get the AS 9001 certified, we got a hold of an MEP. They came in and within four phenomenal months they put together a program, got this company certified, and actually MEP got an increase in their budget, which is most unusual, because --

MR. SINGERMAN: Right; and we're very grateful. Thank you.

CONGRESSMAN MANZULLO: Well, it works. It works.

MR. SINGERMAN: How odd.

MR. WEST: Okay, please join me in thanking John, Phillip,

Congressman Manzullo, and Congressman Cicilline.

So, while these gentleman go down, I will invite our next panelists to come up. That panel will look at how labor and manufacturers are forging manufacturing's new path. The moderator will be Bob Hagerty, who's the manufacturing reporter for *The Wall Street Journal*.

MR. HAGERTY: Well thank you very much. Let me start by introducing very briefly our panelists. Thea Lea is Deputy Chief of staff at the AFL-CIO. She oversees research on international trade and investment policy. She's also worked as a trade economist at the Economic Policy Institute and she's even been a journalist at *Dollars and Sense Magazine* in Boston. As somebody who's been a journalist for well over 30-years now, I always find it a little bit upsetting when I run into journalists who have figured out how to do other things, but I'll forgive her for that.

We also have Scott Paul who is a Founding Executive Director of the Alliance for American Manufacturing. And he's previously worked as a principle lobbyist for the Industrial Union Council and a trade lobbyist for the AFL-CIO. And we have Steven Rattner who is now Chairman of Willet Advisors, the investment arm for New York Mayor Bloomberg's personal and philanthropic assets. Steven is most famous for having saved the U.S. auto industry. But I happen to be old enough to remember that among many other roles at one time, he was also a newspaper reporter for, I believe, a local New York paper.

MR. RATTNER: It's true.

MR. HAGERTY: So I'm just going to ask each of the panelists to talk for a few minutes and then we'll open it up to questions. So why don't you go ahead, Thea.

MS. LEA: Great. Thank you so much, Bob. Good morning everybody. It's a great pleasure to be here, especially on this panel with my old friend, Scott Paul and

Steve Rattner who of course I've followed very closely. But it's a particular pleasure for me to be at Brookings because it's a little known fact that I spent a very happy year here between college and graduate school. I was a research assistant at Brookings Institution and had a really fun time in the Economic Studies Program way back about a million years ago.

But the topic that we've been asked to talk about today is so important for the labor movement, but it's important for business too. How labor and manufacturers together are forging a new path. And this is one of those areas where in my view, it's always a nice thing when labor and management can work together. But in the area of manufacturing, I think it's not optional anymore that neither labor nor business can be successful if we don't work together to build a stronger manufacturing sector for the United States.

And I know there's some good signs recently, and we welcome those. There's been a somewhat of a rebound in manufacturing jobs over the last couple of years. President Obama has put a new focus on manufacturing here -- domestic manufacturing here in the United States on in-sourcing. He's talked about ways of rewarding companies that create good jobs in the United States and we think that's very welcome and overdue. Boosting some of the programs like the Manufacturing Extension Program, and so on, that have been helpful.

The Senate and the House are looking at a bill, I think next week, in the Senate. Debbie Stabenow from Michigan has sponsored a bill called, Bring Jobs Home. It's a, you know, fairly small change to the tax rules, but it's all about not rewarding companies that move jobs overseas with tax breaks for those costs, and then also giving some tax advantages to companies that create new jobs in the United States. And we think those are all putting us on the right track. But there are a lot of challenges that

remain, and I don't think it does any of us any good to sugarcoat or to pretend that everything's good or healthy in the manufacturing sector because it's not.

And if we're going to succeed we're going to need much more labor management cooperation. The advantages are many. One of the key areas of course, where labor management do today work together is in training and apprenticeship programs and joint labor management apprenticeship programs, in construction trades, but also manufacturing and health care and in education is one of the great unknown success stories of labor management cooperation. And it actually makes sense if you think about it for a minute, because of course, both labor and management have an interest in improving the skills of the workforce.

But when they work together, they bring unique perspectives to that conversation. The employers of course, know where the jobs are going to be, so that's crucial. Nobody wants to be trained for a job that doesn't exist and the employers are unique possessors of that knowledge of where they want to expand. But for workers, it's also important that a skills program have some long-term advantages for the worker, that the skills be portable, not region specific, and it's actually better for everybody in the long-run.

If an employer were to design his or her own training program, it might just be the skills that are needed for a particular job. And that might be useful to that employer, but for the economy as a whole and for a skilled workforce that's adaptable and flexible, we need the other piece of it, and that's what unions bring when they join together. And we have a lot of really successful programs in auto, telecommunications, steel, and aerospace. There's 72 local joint committees in 24 states that are offering courses in renewable energy systems and energy efficiency technologies.

And there are a lot of consortia of unions, management, universities, and health and safety. And this is an area that, you know, we'd like to see more of, and some of these are areas where the government has supported these. But it's also true in terms of technology. That it's important for business as well as for labor, that the government be investing in cutting edge technology and research so that the American manufacturing sector can be successful on a high-road path.

And we all know if you look around the globe, you can see that some of the countries that are successful in manufacturing are high-wage, high-tech countries like Germany or Sweden or the other Nordic countries where it's not about getting the cost of labor down and beating you workers over the head with a stick, it's about management and labor working together. That is the kind of manufacturing sector where the United States has a prayer of being successful. We're not going to get our wages below Mexico, Bangladesh, or China and we shouldn't want to because that's not a country that we want to live in.

But we should be trying to figure out how the United States can be at the cutting edge of high-tech manufacturing and high-road manufacturing. But the other place where I think labor and management need to join together is in politics. Right now this country faces a logjam -- a dysfunctional logjam of I would call it, misguided deficit hysteria, where politicians of both parties are terrified of talking about new spending or about new taxes.

But the United States is not going to be successful as a high-tech manufacturing country in a global economy in the year 2012 and beyond, if we don't invest in our workforce, in our infrastructure, in our communications, in our transportation. And we can't do it if business doesn't come stand by our side. And there have been some -- President Trumka, my boss, and Tom Donahue the head of the Chamber of

Commerce, have come together over infrastructure. I think that's exactly the kind of cooperation that is needed.

And let me just say the last piece, because I know we're just trying to tee up a lot of issues before we have I hope an interesting conversation with all of you, is in trade policy and tax policy. And I would say that this is an era where labor and business have not worked together, but should be on the same page more than they have been. And there's a key conceptual era that we have suffered through in this country for the last couple of decades, which is that it doesn't matter where we make stuff so long as our companies are making money.

And that has guided both democratic and republican politics and policies for a couple of decades, but it has not served us well because it has contributed to an economy which is bubble driven, which has extraordinary and unsustainable levels of inequality, and where we're falling behind in terms of technology, innovation, and a workforce development. And we can't afford to do that. So we need to figure out what kind of tax policies, trade policies, currency policies we need to support not just healthy profits for manufacturing companies, but good jobs here at home. And that's going to be the path for success to the future. I look forward to your questions and my fellow panelists.

MR. HAGERTY: Okay. Scott?

MR. PAUL: Great. Thank you, Bob. And I could just say ditto to what Thea said to save some time, but I'll add some independent thoughts on my own, because I largely agree with what she said. And I wanted to first acknowledge that fantastic work that Brookings has done on manufacturing. I think for about a decade, and not coincidentally coincided with the, you know, precipitous decline in manufacturing employment, there was very little work done on manufacturing policy.

You've seen a renaissance in that along with a renaissance in manufacturing, and Brookings has done some of the most groundbreaking and pragmatic work on that. And if you haven't seen it, I bring it to your attention because it does show that there is a high-road path to prosperity in manufacturing, and it really kind of, breaks away from the traditional silos that you sometimes see in reports like this. And I think they've done a fabulous job of that. The Alliance for American Manufacturing is an embodiment of labor management cooperation.

We're a partnership between the steel workers and many U.S. manufacturers that have a collective bargaining relationship with the steel workers. And the idea is -- actually dates back to the time when Steve's former colleague at the auto rescue, Ron Bloom, was at the steel workers. And you all may not remember this because we live from crisis to crisis, but after the Asian financial crisis in the late '90's, there were about 34 bankruptcies in the steel industry in the United States and there was a tremendous amount of consolidation that occurred and there was a lot of turmoil.

And there was a -- it was a private rescue, but there was basically, a private rescue that doesn't look too dissimilar to what was done for the auto sector in the United States recently. It -- you know, it obviously downsized the steel industry, but it made it hypercompetitive and we have the most efficient steel industry in the world right now. A lot of that was because of labor management cooperation.

And actually, the leaders of both the steelworkers and those companies decided at the time that there were some problems that they couldn't solve through collective bargaining or through private enterprise and that they needed to have a robust public policy presence, not only for the steel industry which of course already existed or for the labor movement which already existed, but for the interest of their customers. After all, no one goes out and buys a ton of steel. If any of you have one at home you

can raise your hand, but you know, most of you don't buy it. But it goes into almost everything we do buy, like automobiles and durable goods and things like that.

And unless the steel industry's customers are in the United States, they don't face good prospects either. I do think that our approach has started to pay dividends. You see this in proposals that as Thea mentioned, have been put forth by the Obama Administration, that get out of this traditional idea that the only way to strengthen business in your country is to cut taxes, cut regulation, have labor flexibility, do free-trade. That there's another way to do it which is make smart investments in innovation, tie those investments in innovation to production in the United States so that, you know, we're not just spending money to research things, but we're actually making them as well.

Invest in the workforce, be tough on trade enforcement, as I think this administration has, and use other tools in the toolbox. I do think that there are a number of tools that haven't been used yet, and I'm happy to talk about them in that discussion. I want to close with two items. The first is to kind of, preview a poll that we commissioned that is coming out next week. We've done a series of polls on manufacturing the last three-years. The first poll actually -- you know how Washington works. It actually got House democrats talking about manufacturing because they discovered that is was popular not only in Ohio, but also even in suburban Maryland.

And it helped to create a Make it in America agenda a couple of years ago. The poll coming out next week, I think will be interesting to a lot of people and I just want to preview a couple of highlights from that. You hear a lot and of course, Steve heard a lot during the auto rescue about people not wanting to pick winners and losers and how this may be a predominant point of view. The reality is when you put the best arguments for not doing anything against the best arguments for making investments that involve some risk, the pro-investment argument wins overwhelmingly. Wins

overwhelming in every part of the country and among nearly every demographic except for hardcore republicans.

Same applies to the auto rescue. I think the public perception is that it's still wildly unpopular. If you put the best argument for the auto rescue against the best argument that the other side is making for not doing it, it wins overwhelmingly. And it wins not only in Ohio and Pennsylvania, it wins in California, it wins in Florida, it wins all over the country because there is a great awareness of what was at stake here and what was at risk and it's paid dividends.

The fastest growing sectors of manufacturing right now are the auto sector, durable goods, kind of, fabricated metal manufacturing. They're growing exponentially, and so -- and these are actually relatively heavily unionized sectors of the economy, so the idea that it's all going to be this race to the south or offshore just defies what's been happening in manufacturing over the last year and a half. And if you don't think this approach can pay dividends, it actually can. We care deeply about China's currency manipulation. We have a strong disagreement with the administration about their approach on this.

We've pursued legislative remedies and there has been exactly one piece of legislation that's passed the Senate in the past year and a half over a Mitch McConnell filibuster that had any sort of substance to it, and that was the China Currency Legislation. That's the only bill that has broken through that gridlock that you see on Capitol Hill. We're trying to get it passed in the House of Representatives, of course, and we could if it actually got to the floor.

But that demonstrates this labor management cooperation because there has been a great deal of cooperation between the labor movement and domestic manufacturers on this piece of legislation, and so it's attracting support from about a third

of republicans in the Senate along with nearly every democrat and it's been able to bust through that. But we're looking to put together models of cooperation like that on procurement, on tax policy, and on other things that can make a real difference to the prospects of manufacturing. Thank you.

MR. HAGERTY: Okay. Thank you. Steven?

MR. RATTNER: So I agree with a lot of what was said before, but actually not all of it. So maybe we'll inject a little bit of liveliness into this rather than all of us being in agreement. I certainly don't agree with the idea of picking winners, but I'll come to that in a second. Maybe I'll start with a little bit of what I saw at the revolution so to speak, in the auto rescue because I came to it with no background in manufacturing. We can ask the different question, why I was asked to do this in the first place, but putting that aside, I had no background in manufacturing.

I was really a service industry guy. I certainly read a lot of stories over the years about what went on in the auto industry and manufacturing more generally, but it was all new to me. And so I think I had obviously, a big disadvantage. I also had the advantage of coming to it with fresh eyes. And what we found really, pretty early on and pretty clearly were a few things that I think might be interesting. The first is that from a productivity point of view, the U.S. plants even the unionized ones -- or especially the unionized ones perhaps -- were actually highly efficient.

And when you look at the number of man-hours or person-hours required to produce a car in Michigan versus in the south versus really almost anywhere else, we -- GM, Ford, Chrysler had made enormous progress over the years in improving their manufacturing efficiency and were right up there. The second thing I found -- I'm starting with all the good news, was -- and I remember vividly my first visit to Solidarity House in

Detroit where the UAW's headquarters is. And again, you know, I'd read a lot of about the UAW.

I was really taken with how professional they were, how analytical they were, you know, it wasn't a lot of bombast, it was the kind of discussion you might have between two business people and they were I think, very rational. That didn't mean they always agreed with us or did what we asked them to do, but the way that Ron Gettelfinger who was then the president, and his team thought about it -- and they had actually Lasard helping them. They had kind of, hired an investment bank and so on which was -- you know, by now was not actually that unusual for unions to engage that kind of professional help.

I think it was all a testament to the fact that they understood that this was not -- at least completely, management versus labor issue and that there was certainly, a common interest in saving these companies and a requirement for the unions to participate in that effort. The next thing that I found was a set of union agreements that did introduce some level of inefficiency and wasted cost into the process.

GM had something like 300 different job-- and Chrysler and Ford, 300 different job classifications agree with the union if you were in charge of pouring water, you couldn't touch the microphones. Probably have that at Brookings, I don't know, and you know, and vise versa. And that's the kind of stuff I personally hate because that's just wasted money for everybody. It could go into the pockets of the workers, it could go to the company, but it's just stupid to have people standing around because it wasn't their job to do what happened to be needed at the moment.

You had a number of other practices. You know, we all get the Fourth of July off. At General Motors you got the whole week of July fourth off. If you work at a place that pays overtime -- conventionally if you work more than 40 hours, you get

overtime. At GM if you work 10 hours on Monday and 4 hours the other days of the week, you still got 2 hours of overtime for Monday even though you had only worked 30 hours the whole week. So there was a bunch of stuff that we just felt didn't work.

And happily, we reached a very reasonably amicable but certainly satisfactory agreement in the end with the UAW, where all those job classifications, all those practices went away. What we did not do was ask the workers at -- I'm using GM as a kind of, metaphor for all three of the Detroit companies. We did not ask the workers to take a cut in their cash pay, we didn't ask them to take a cut in their pension plans, the famous healthcare problem had been already actually dealt with somewhat separately. I can -- that's a longer conversation.

So in terms of the workers who were there, their livelihood was not, I don't believe, affected in a material way. But what we did do was to accelerate a program that had already been started of what they -- of the so-called Tier Two workers, where GM was able to hire a certain percentage of workers at a much different price point. In fact, it was literally half of what the existing GM workers made. The existing GM workers got $28 an hour in cash, the new workers got 14. A traditional GM worker cost the company $55 an hour fully loaded, the new workers cost roughly half of that.

And this is a slightly troublesome issue for me. I'll put on the table, and it has repercussions, which I think one way to think about that was the union basically saying, there's a big pot of money, we can kind of, carve this up in any number of ways, we're not going to really take anything out of the pockets of our existing workers, so we're going to make these new people come in at a cash wage of less than $30,000 a year. These are not great middle-class jobs. And you had two people, you know, working side by side on an assembly line, one being paid $14 an hour, one being paid $28 an hour.

So that's what the union in effect, wanted. That's what we agreed to and the number of those workers has been increasing. So if you look at one of the so-called success stories in autos, GM agreed to move the production of a small car now called the Sonic, from South Korea back to Lake Orion, Michigan. Why did they do that? Because the union agreed to have a much higher percentage of these so-called Tier Two workers there. My point is that a key part of why we're doing better at that moment in manufacturing is because workers are being asked to and are accepting the idea of lower wages.

Another example I'll give you is in Chattanooga. Volkswagen showed up with 2,000 new jobs. I think they got over $100,000 million of incentives from the local municipalities. There was, you know, great fanfare, great celebration, everybody took credit for it. But what didn't get as much attention was that each and every one of those workers started at $14.50 an hour, which is also about $30,000 a year. They've since gone up a little bit, but not anywhere near what workers paid before. So I'm not convinced perhaps, unlike some others about our ability to compete in manufacturing without unfortunately, having to compete on price.

And so for GM, compared to the $55 in Michigan, in Mexico, they pay $7 an hour, maybe a little bit more now. Those numbers are a year or two out of date. In China, $4.50 -- in India, $1. I was in Shanghai a few months ago, I went to the GM plant there, it looks exactly like the plant in the Michigan -- it's just as productive, maybe more productive, with workers making a lot less. So we can talk all we want about wages in China going up, but there's a long way for them to go. I'll give you one more statistic and then move on quickly to finish.

GM four-years ago had something like 85,000 workers in the U.S.; today it has about 50,000. In the same period of time, it's workforce in Mexico went from 9,000

to about 9,300. Not a big increase, but a lot better than eliminating 35,000 jobs. So the trends are still there, and I don't believe that we can reverse them. I think there are a lot of things that my fellow panelists talked about, many of which I agree with, that would ameliorate them and allow us to be more competitive, but I don't think we're going to reverse them. The last thing I'll say, just going back to my first comment, is I am very leery about the government's role in all of this.

I certainly agree that the government has fallen down on its end when it comes to things like infrastructure and R&D spending. That's very clear in the numbers and we all know the reasons why, but I think there is a line. It's not a big, thick black line that I can completely identify, but I think there is a line. And I think when the government crosses over into what I will call, picking winners, and very tardy in the kinds of policies, I think -- I start to get worried.

I was in the government when there were several different programs going on, one of which led to the Solyndra loan, some of which were in the auto sector, and they were run by very nice people, smart people, certainly well-intentioned people. I actually don't believe there's any politics in any of those decisions. But I was in the private equity venture capital business for a good while and it is really hard. It is really hard and the idea of the government doing it is really scary to me. So I think there's a line and I strongly feel that while there's a lot the government can do, we should just try to make sure we stay on what I at least view, is the right side of the line.

MR. HAGERTY: Thank you very much. Thea and Scott both stress the need for -- and the benefits of cooperation between employers and labor, and we certainly have seen some isolated incidents of that bearing fruit. On the other hand, as Steven pointed out, there is still a power struggle going on in terms of who gets paid for what we produce and how much, and at the moment it does seem that labor is losing that

struggle. I've been out in Joliet, Illinois a few times in the past couple of months where workers at a Caterpillar plant are on strike.

Caterpillar basically told them, we're going to freeze your wages for the next six-years unless we decide that the market rate has gone up and we're going to reduce your benefits. The workers see this as a pay cut, which it is, and they've gone out on strike. Caterpillar is using replacement workers and going out to recruit more workers and says it can carry on manufacturing as usual. It's striking that there are very few strikes despite the widespread downward pressure on wages and the spread of two tier systems.

Recently, I talked to a worker at an auto plant in Mendon, Michigan. He was very happy to have a job. It's an auto parts plant, but he's making 9.67 per hour. On that he's supporting a family of five, which qualifies for food stamps. This 9.67 he makes is down from the $15 per hour he used to make 6-years ago at Chuck E. Cheese where he repaired the machinery. When I wrote about this incident in one of my stories, the editor in New York said, my God, that's less than I pay my babysitter. And we're probably going to see more of this kind of pressure on workers, people feeling that they have to do whatever the company asks.

Caterpillar is expanding a locomotive plant in Indiana, which has recently passed a right to work law. They were advertising jobs recently for 12 to $14 an hour and they had thousands of people lining up for them. I talked to some of these people, some of who'd used to make 25 to $30 an hour, now would be very happy if they can get a job for 12 or 13. So I guess the question is: how much further are we going to need to go until this wage issue is resolved? And is that going to prevent true cooperation between labor and management?

MS. LEA: Okay, well I'll take a first crack at that. I think it's really an interesting and difficult moment when we think about the economy. And I guess I want to say a little bit more about -- if you look at the macro economy today, we have a never-ending recession. I mean, officially the recession ended three-years ago. I don't think anybody running for president thinks the recession is really over, because it's not. And it's a crisis of inadequate demand. I think every economist would agree that that is the problem; there's not enough demand out there.

And if there isn't demand then business won't invest and then won't create jobs and so on. So the idea somehow that the answer to this is getting wages down further, getting -- you know, convincing more workers -- you know, more union workers to make concessions or busting unions, seems to me completely misguided. That is not the healthy forward-looking path for the U.S. economy because part of what we need -- and I think the innovation question is really interesting too.

For a successful manufacturing sector in the United States, and I know Scott talked about the great work that Brookings has done on this front, we're not going to be successful making, you know, concrete and widgets. We're going to be successful doing high-tech work in the United States. That's what we should be doing; high-tech, capital intensive, skill intensive work. And that kind of work is not one where, you know, chiseling a couple of bucks off of the hourly wage of your workers is going to be the path to success.

What you want is a good long-term relationship with your workers, where they are part of the team that is helping to figure out what the most productive, innovative ways of producing are. And you know, we see this kind of struggle of bargaining power in the labor market in the United States where employers do have a high hand. They have a lot of -- you know, they can go to another country, they can go to another part of

the United States, they can break American labor laws without much fear that they're going to be called to account, because our labor laws are pretty weak today.

So they can fire workers for trying to organize a union and they might or might not get caught and if they get caught, they might or might not pay a fine and that might or might not be more than a mosquito bite on their butt. But I guess -- I still think that it's a short-sided path. So you know, manufacturers to the extent that companies like Caterpillar are obsessed or focused on beating back their workers, they can win that battle.

They can fire workers; they can get workers to accept lower wages. But for the U.S. economy to get going again, to rev up, and to have some forward momentum, we're going to need workers to have good jobs, we're going to need to figure out our healthcare problem, we're going to need to figure out our retirement security problem, and that needs to be done at a national level. And if business takes a line in terms of the political debate, that we don't need, you know, a government funded healthcare program, we need to cut back on social security, and we need to bust unions, then we're going to end up with an economy that never does recover.

MR. PAUL: Just to add something very quickly to that, I think it goes without saying that for most of us, we've hopefully seen a once in a lifetime economic event, unless Doctor Doom is right about next year of the following year, in which case it would be a double dip. But part of this is as Thea -- I mean, you know, we're -- I mean, we're in a labor market that is -- where there are millions of people who are looking for work and there are an extraordinary number of people for every job opening.

And one of the most frustrating things to me in the manufacturing sector is, you hear this a lot from the -- kind of, the manufacturing association mafia which is, oh, there are no skilled workers out there. We can't find any skilled workers. Well if

you're paying them less than Chuck E. Cheese, of course they're not. Who's going to want to do that and try to get skilled up if you're going to actually bring home less money than you would working at Chuck. E. Cheese? And your job can't be outsourced at Chuck E. Cheese.

Meanwhile, these same companies that are asking you to sign up and get skilled up have outsourced, you know, hundreds of thousands of jobs over the last decade. It's not a surprise to me that you see this disconnect in many areas of the country. I think to some extent, the market will straighten this out because smart employers will realize that if they want a larger talent pool and they want to attract workers that can contribute to the long-term success of their enterprise, they will have to wage raises.

That doesn't address the point about the unionized workforce, which is very difficult these days because of the laws that have been passed. But you've seen a backlash to that in some states, as well. So think that the -- I mean, in theory, there are 250,000 opening according to the BLS in manufacturing right now that are unfilled. And there is a -- and in some places, you have massive numbers of people like in Chattanooga, applying for these jobs at the Volkswagen plant and other areas like -- especially for the small and mid-sized manufacturers.

You know, they have a hard time finding a welder or a machinist, and part of that is that the cost of getting skilled up, the architecture to do that, but also in many cases, the wages are not terribly attractive and you're working in a job that can be outsourced very quickly. I mean, people are not stupid. And this is unfortunately, I think -- I don't view this as a structural problem; I view this as a lack of management imagination in attracting a good workforce that way.

MR. RATTNER: Well, let me say two things. First, there is a skills problem. There's no question about that. And you mentioned Chattanooga and they had all these applicants, but when they actually got these people in the door, they realized they didn't have the right skills and so they sent over engineers from Germany to train them. So we obviously need to do a better job at a lot of that. But look, I just want to be sort of clear about my own view. I don't think this is as much or very much even at all anymore, a management versus labor issue.

This is a U.S. versus Korea issue, a U.S. versus China issue, a U.S. versus Thailand issue, certainly a U.S. versus Mexico issue. The management is I think -- and I guess where I disagree with some of the previous comments, I think management are rational actors. I think they're profit maximizers. That's their job, that's what they get paid to do just like Mitt Romney. And what they're trying to do is figure out how to do this at the lowest cost. And factoring in the skills, factoring all of this stuff in, they reached a set of decisions that this is the road they're going down.

And we're not going to -- I don't believe we can or should give up our basic position as a free trade country, and therefore, we're going to have to compete with these other countries and we're going to have to find places, industry sectors, ways that we can do that. And I think if we don't accept that or if we somehow think that this is all going to get solved by trying to get the surplus auto workers in Michigan down to some other part of the country or this or that, I think we're kidding ourselves. I really do.

MR. PAUL: Steve, do you think what China's doing is free trade, though?

MR. RATTNER: No, I think they're totally --

MR. PAUL: Exactly. I mean, if we had a much more vigorous trade enforcement currency policy towards China, that would --

MR. RATTNER: Yeah, that would be wonderful.

MR. PAUL: -- defer some of the --

MR. RATTNER: -- but that I'm not sure is possible anymore. It would have been possible before they bought a trillion dollars worth of our debt, but I'm not sure we're in a position right now --

MR. PAUL: They export a third of their goods to our markets --

MR. RATTNER: I understand that.

MR. PAUL: -- so we have more leverage.

MR. RATTNER: Well, I'm not sure about that.

MS. LEA: But the other thing -- Steve? I don't disagree with you that management are rational actors. The question is: they have a short-term lens which is the way -- you know, their jobs are constructed, you know, profits in the next quarter. So you have several different issues from our point of view, from the national interest point of view. One is short-term versus long-term, and the other is national interests versus an individual firm's interest. And so that is where we get back to this issue about what the government role is. What is the proper government role in terms of --?

MR. RATTNER: Yeah, but I don't know what that means. If you're saying that the government should essentially put in place a series of laws that fundamentally change labors ability to get higher wages or mandate higher wages for that matter --

MS. LEA: No.

MR. RATTNER: -- I think that would be a disaster.

MS. LEA: I'm talking about the decisions -- I mean, for right now, we have tax breaks for moving jobs offshore. We could have tax breaks for bringing jobs back home. We have constructed a tax code for the interests and the profits and the

short-term financial interests of multinational companies. And that's not good for the country.

MR. RATTNER: I don't disagree about our tax code. It is a real mess and it's a problem and it does create some perverse incentives. But -- and I don't mean to keep repeating myself, but if you're competing against the country where the wages are a sixth of the wages here and they're just as productive, it's not the tax code that's fundamentally the problem.

MR. PAUL: Although --

MS. LEA: But that's a copout because --

MR. PAUL: I would say it's --

MR. RATTNER: It's not a copout. What do you mean it's a copout?

MR. PAUL: For most manufacturing today, labor costs are nine percent or less of the cost of production. It's a factor, but it is not the factor. The factor -- exchange rates, energy costs, you know, the innovation and infrastructure architecture that we have in our country, kind of, the attitude that we have. We have short-termism that gets in the way of long-term business --

MS. LEA: We haven't invested in our own infrastructure and transportation for a couple of decades now. We have a $2 trillion infrastructure deficit. China doesn't have that, Germany doesn't have that. It's not just a question of whether the government picks winners or losers, which I agree is, you know, a little bit difficult and a little bit controversial. But there are a lot of other things that governments do that make a difference to manufacturers. One of them is investing in garsh darn infrastructure and making it profitable --

MR. RATTNER: Okay, we all hear you about infrastructure, so --

MS. LEA: The other is investing in education. But our country, our -- you know, go over to Congress and listen to the debate. We're not investing in our education, we're not investing in skills, and we're not investing in infrastructure because we're trying to save a few bucks. And that's the point that I'm trying to make, is that if the government doesn't do its part, manufacturers will make the wrong decisions and we will all suffer.

MR. RATTNER: I think one of the most successful elements of the tax code changes that were made over the last couple of years, was the immediate upfront deduction for plant equipment expenses. And it unleashed a barrage of investment in new technology, but it shows how incentives work. There was no incentive like that for human capital. Zero. It was zero incentive for -- like that for human capital.

And in fact, it costs a lot to train someone up and everyone else wants someone else to pay for it. The employer wants, you know, the worker to pay for it or the government and so there's -- unless we figure out a smart way to have an incentive for investing in human capital, I think we are going to run into the same. And I'm not saying that we're Germany or we're ever going to be Germany, but we can certainly draw lessons from their approach if we want a sustainable manufacturing base in the future.

MR. HAGERTY: Do we have any questions from the floor? All kinds. Yes?

MS. CLINE: Hi, Andrea Cline, development consultant. I have a question particularly for the AFL-CIO and the Alliance. With regard to training, how are you using IT, particularly broadband? If the cost of training is considered high, how are we taking technology to its greatest use to bring down that cost, but also maintain quality assurance?

MS. LEA: I don't know if you have a --

MR. PAUL: Well, let me comment briefly because there's a -- I mean, one of the challenges that -- and there is -- I do want to say, there's a lot of state and federal program money for training. Most of it gets misspent, because it's all about getting an outcome in a couple of weeks as opposed to training someone for a career like that. And I think that there has been a pretty sophisticated use of technology incorporated into workforce training.

I think the challenge is that the monies that are provided for this are much more geared towards getting someone to be a greeter in Wal-Mart in three weeks than building someone the skills they need for a manufacturing career over time. Now, that is beginning to change and the administration has a program called, Skills for the Future and there's a number of private sector partners and also academic institutions engaged in that. But this is like turning a large vessel around. It's not going to happen overnight. But I do think that there's a lot of technology involved with skills and training already, it's just that we're training for a lot of the wrong things right now.

MS. LEA: And there's one program that I'm more familiar with which is, the National Labor College which is associated with AFL-CIO, and they are really broadening their online outreach. And that's more of a degree program of helping workers get degrees, but in some very specific areas -- but I agree with you, that we ought to be figuring out how we can make this more cost-effective, make it available to more workers, and there are a lot of, you know, webinars and IT.

And I know that we have also the Workforce Investment Board, where we have local labor folks who sit on workforce investment boards all around the country. And part of what we do at the AFL-CIO and the Working for America Institute that works with us, is trying to figure out how to get them, you know, the most timely information to make sure that they are up to speed. So that is a good question. Thanks.

MR. HAGERTY: Yes? Way in the back there.

SPEAKER: Thank you. Danny (inaudible), with China's (inaudible) Agency. One hot issue nowadays in Europe -- excuse me, and some emerging economies is an idea called a Third Industrial Revolution propounded by a U.S. scholar named Jeremy Rifkin from the University of Pennsylvania. He's talking about the next economic driver -- the big driver, based on the green economy. And to some extent, the U.S. economic a success in past decades is based on the abundance of a cheap oil automobile and road assistant several decades ago.

But now lots of attention in this town is focused on providing a short-term remedy to the long-term problem, including the fiscal cliff and the extension of a federal reserve's operation. How can this country pursue more aggressively to grasp the Third Industrial Revolution chance? And what's the good time window for that? Thank you.

MR. HAGERTY: Who wants to address that very difficult question, but very good question?

MR. PAUL: I don't want to hog all the time. I'm just going to spend about a minute talking about this. First, I think that -- you have to understand that -- I mean, there is an energy revolution in the United States right now. It's in natural gas and it's bringing down energy costs for energy intensive manufacturers, and that is one of the cost drivers that's making them exceptionally competitive on a global scale right now. In the longer-term, I think you're right. I mean, we mastered solar technology and wind turbines a generation ago. And we eliminated production incentives for that.

The innovation, the production went overseas and so Germany is one of the world's leaders in solar. It's not because Germany is a sunny place, it's because they made, you know, specific public investments in trying to grow that sector. And you know, we're struggling right now. I mean, you know, David Cicilline and Don Manzullo agree on

some things, they disagree on many. But you know, the simple act of getting tax credits -- even though there's tax credits for other types of energy transmission in the Unites States, tax credits for solar and wind is a difficult proposition in this political environment on Capitol Hill. It's a struggle and we are missing out. No question about it.

MS. LEA: And I think this is an area where you can have a government role where the government can see with clarity, any idiot can see with clarity that we're going to need more energy efficient forms of production and heating and transportation in the future. It might not be profitable today to invest in those things, so governments like Germany and China can see that with clarity and they act on it by creating a market and by capturing a share of that market. And we all know the way markets work, that there is a certain dynamic.

It's not just, you know, at any one moment in time, you assess whether it's profitable or it isn't profitable. It's that once you've gained some traction, a market share, you're much more likely to be able to hold onto it. And that's where -- it seems to me a very good use of government incentives to be supporting. I mean, another area where the government could be more active is in retrofitting public buildings like schools.

Our schools are very inefficiently heated right now and we could have more demand for solar, for other kinds of renewable energy by making our schools more efficient. It would create a lot of jobs, it would save the government money over the long-term, and yet, you know, people over there in Capitol Hill are sitting there squabbling with each other over, you know, the transportation bill.

MR. HAGERTY: Ah, yes? The lady in the red there.

MR. MCMINN: Hi, my name is Chris McMinn. My question is for Steven. In the last panel, one of the panelists said that we spend a lot of money on incentives for biotech. What industries or sectors do you think the U.S. should focus its energy on?

MR. RATTNER: I think that our -- you have to look at where you have a comparative advantage. And I think we still are the leading country in the world of information technology, of media certainly, of all those kinds of businesses. And I think that's where we do have a comparative advantage. I think we -- well, you know, we talked a lot about the skills of our workforce. We still do have a very highly educated and skilled set of people close -- you know, further up on the food chain.

And I think we should try to take advantage of that and develop those industries. You know, again, I think we all agreed -- I think maybe the only thing we all agreed about was that we shouldn't be trying to compete in the cement business or very prosaic kinds of businesses. I think we need to look at places where there's a high value added component to the labor that goes in, a lot like what Germany has done somewhat by accident, somewhat by design in terms of their success in machine tools and other very sophisticated products like that.

MR. HAGERTY: I see a gentleman here.

MR. TYLER: Good morning. My name is Darrell Tyler. I am with VCU's Center on Human Need and I'm an economic Social Researcher for them. And my question is this: with the efforts for high-tech jobs and skilled intensive jobs, there are populations of people that are at the lower social economic strata. And what type of future do you see for them since the future as you said, were for high-tech and high-skilled jobs?

I mean, we still have issues of manufacturing jobs being created, but they're being created out in post-suburbia where public transportation does not take job seekers to jobs. Or you know, you've got just populations of people who are socially alienated from any type of jobs or manufacturing. What do you foresee as the future for those job seekers?

MR. PAUL: Just briefly, I want to talk about the steel industry, because the steel industry was obviously built around urban cores in, you know, northwest Indiana, Cleveland, and some other places and you know, notwithstanding the long-term prospects for industry. And I do think that in both fabricated metal and primary metal we can be globally competitive for a long time. But there's going to be a tremendous amount of demographic changes that occur in this industry and the folks working in these mills now and in many of the auto plants, are getting towards retirement and there are going to be opportunities for young people in these urban areas to work in this more traditional manufacturing that is now very high-tech.

And I know that our stakeholders are actively reaching out to very disadvantaged school districts to try to show young people what the opportunities are. That there will be opportunity in their community even though there hasn't been for a long time, and that they should consider getting vocational education in high school, pursuing a community college curriculum. In fact, they're willing to pay for it, really for a lot of them. They're desperate to fill the pipeline. But I think you'll see more opportunities than we've seen in maybe a generation in some of this traditional manufacturing, because of the demographic turnover that's going to occur just naturally.

MS. LEA: And I have something to add to that as well. I think -- we actually do have some programs and they're smaller than we'd like them to be, but some of the apprenticeship programs are really doing a good job reaching out to inner city youth and so on, to non-traditional both manufacturing and construction. But I think there's also a program in Chicago which is really interesting, where you have a labor management and the city working together in a school -- a public school. And I don't know if it's a charter school -- do you --

MR. PAUL: Austin Polytechnic.

MS. LEA: Austin Polytechnic where you know, you have an urban area which serves a lot of kids of very diverse backgrounds, and you're training these kids in high-tech energy, sort of, new energy areas in manufacturing. And that's something that's been extremely successful and they have good relationships with the local businesses and so on in terms of placement. But -- and there's no reason why manufacturing can't be in urban areas as well as in ex-urban areas.

MR. PAUL: One market solution to this problem of the skills mix match I think is the growing realization among young people and their parents that it may not pay off to spend 200 or $300,000 on a college education for everybody. And young people who will look around will see that there are some opportunities to start earning money immediately while being trained at the expense of their employer, often. I recently met a young man near Pittsburg who works in a machine shop. He was about 21-years old, high school graduate, making $65,000 a year.

His guidance councilor told him, “Don't go into manufacturing, go to college”. He decided he was going to start working. He's making good money, he has no debt, and he figures that he will be able to go to engineering school eventually at his employer’s expense.

MR. HAGERTY: Yes, sir?

MR. HARRISON: Hi, my name's Glennon Harrison with the Congressional Research Service. And my question and perhaps comment, is that, you know, there have been a number of surveys of manufacturers. And frequently, like the Manufacturing Institute, the Conference Board, and others, and they've basically said that training really for the most part, you know, isn't something that they should be doing. You know, and -- you know, they've gone in for a lot of, you know, community college

programs, there are a lot of schools out there that are for profit, training institutes, and whatnot.

You know, students require a significant amount of debt, you know, getting the training. And once they do -- and for instance, the Manufacturing Institute said that there are 600,000 jobs that are open that are available right now for skilled workers. Well you know, I heard the statement a little while ago and I agree with it, that there are only 240,000 jobs in the manufacturing sector that are, you know, currently open and the turnover is pretty rapid for those jobs. So I guess, you know, my question of concern is that, you know, why would somebody, you know, really want to rack up debt for a job where the technology is likely to change, where it's constantly evolving, where skills shift from -- you know, where the mix of skills for any particular job is likely to shift at any time?

And that's certainly happened over the last few years in everything from steel to autos to you name it. Computer technologies, to any type of assembly work, which mostly has been recognized by everyone as automated. And so if you could just comment on why young people would be attracted to this and perhaps explain where the -- you know, if you know, where the 600,000 vacant jobs are that are begging. And also the other comment that the Manufacturing Institute NAM made was that most current workers -- I think about a majority -- just over a majority, lack problem solving skills and aren't capable of doing the jobs that they currently hold. Now -- I mean, where does that come from?

MR. RATTNER: Well I think that the experience generally is that people who have math, science, and problem solving skills do have much better employment prospects than most of us. And so I think that is an incentive for young people and

middle aged people who are re-training, to study this kind of a course and for employers to invest in them.

MR. PAUL: I don't agree with the 600,000 number. I mean, it's from a survey of -- kind of, an opt-in survey. It's not -- I don't view -- I view the actual number of job openings as being a much more kind of, market. Not a lot of accurate information there. But I will say this: I'm not worried about the ability of fortune 500 companies to attract a skilled workforce. They have enormous human resources outreach, they have capabilities that way, and they have -- I mean, they have an obligation and as Steve said, they are rational actors when it comes to this and they're going to -- I mean, they're going to find a skilled workforce.

I'd worry about the small and mid-sized folks. The machine shop guys where there are 10 and 20 people, where there's an owner who's running around, the machinist or the welder who he's had for 30-years decides to retire, and he's got to find someone with the skills. Now that is a problem and it's a bit of a structural problem and here's what I mean. I mean, it takes a while to turn the ship around. I mean, we haven't had job openings in manufacturing really for a decade. For a decade. And you know, community colleges respond to demand. And you know, there are more programs coming online now for technical skills for manufacturing.

But it takes a while to reach critical mass. I think eventually it will get there, but I'm a firm believer that you need both through the tax code to provide manufacturers with the same incentive to invest in human capital as they do in plant and equipment, number one. And number two, I think you have to have much more flexibility in our job training programs to allow for longer periods of time and more resources, because it will take perhaps 18-months of community college plus an apprenticeship, to become a skilled machinist or a skilled welder in some cases.

MR. HAGERTY: Do we have time for one last question or comment? Yes, sir? Right here.

SPEAKER: Thank you. My name is (inaudible) from (inaudible) company Japanese (inaudible). I think the United States is still one of the best friendly markets for (inaudible) direct investment. And recently (inaudible) Industries opened up the factory and the Japanese is still investing in this country for manufacturing. But you raised issues of a skill gap or lack of infrastructure or so many issues. Do you see the (inaudible) direct investment coming? Inflow is getting some trouble or the trend? What would be the trend? Thank you.

MS. LEA: Thanks. I guess I haven't looked at the most recent numbers. I don't know if Steve or Scott knows what it is. But you're absolutely right that this has been a good steady source of jobs for the United States. It's an important source and I think it's another reason why we can't afford to take our eye off the ball. That we need to -- you know, we need to keep investing. I think for a long time, a country like the United States can ride on its past glory. You know, that we had good infrastructure that was put in place many decades ago, and a lot of its durable.

And we have -- you know, we have pretty good public schools compared to a lot of the rest of the world, but there's a lot on inequality right now I think, in the public schools. I think that's one of the concerns that I would have. The very huge variation between rich and poor public schools; what's available to kids in different kinds of neighborhoods. And my daughters just graduated from D.C. Public Schools. So I have very first, you know 12, 13-years in the D.C. Public Schools to watch just how messy the problem of public education can be.

But I think the point that you raised is really important, because this is something where, you know, we can -- we need to do our best to attract foreign

investment. From my point of view, what we don't want to do is to say, we want to attract foreign investment because we have the lowest wages, the weakest unions, and the most lacks environmental -- in health and safety regulations. We want to do something else; we want to be a place where people can come for skilled labor, for good, dependable infrastructure, and a good market -- a good consumer market. But we're going in the wrong direction if that's where we want to go.

MR. HAGERTY: Okay. We can probably all agree on that. Thank you very much.

MS. LEA: Thank you, Bob.

MS. LOWREY: All right. So we'll go ahead and get started. I'm Annie Lowrey and I'm on the Economic Policy Reporting Team at the *New York Times*, and here are our panelists. Greg Tassey is a senior economist at the National Institute of Standard and Technology in the Commerce Department. And Rob Atkinson is the president of the Information Technology and Innovation Foundation. And then Mark Muro is a senior fellow at Brookings and policy director of the Metropolitan Policy Program.

So to start off with, I'm going to start my clock here and each of them is going to talk for about five minutes, and then we'll get into our panel discussion. So do you want to start off, Greg?

MR. TASSEY: Sure. Delighted to be here. As of 4:00 yesterday afternoon, I did not know I was going to be on this panel, but nevertheless, I'm losing my voice. I want to make a general statement about where our manufacturing policy fits into the broader economic growth paradigm, because I think this is a huge problem for this area of policy.

The U.S. has a tradition of hands off the marketplace, so that leads to

many problems in defining and implementing appropriate roles for the government. And you cannot pick up a newspaper today or turn on the TV without hearing a discussion about monetary policy, should there be a QE3, how is Operation Twist working; on the fiscal side, what about the large deficits, are they working, do we need to have even larger deficits, as Paul Krugman opines in his op-eds for the *New York Times?* And I think this is causing us a problem and it certainly is showing up in the economic statistics, namely the weak recovery, if you can even call it that.

MAPO Stabilization Policies, monetary and fiscal, are designed to control the fluctuations in the business cycle about a long-term growth track. They say nothing and do nothing, or very little, about the slope of that growth track, in other words, the annual rate of growth.

That comes from long-term investment in a set of structural assets, many of which have been discussed here in the previous two panels: skilled labor force; technology through investment and R&D; capital formation; not only traditional infrastructure, but a newly evolving technical infrastructure that my agency, NIST, is intimately involved in. Without these investments, the growth track slope will be lower, and, in fact, the fluctuations become more pronounced, because when they're applied, for example, you run into inflation much more quickly than you do if you have an economic system in which productivity is growing. So manufacturing clearly is the centerpiece to driving long-term productivity growth, which should be the central element of an industrial growth policy.

Now, that leads us, of course, to manufacturing, which traditionally has been a major element of the U.S. economy and all industrialized nations. Now, you know that its share of GDP has shrunk over the past several decades and that's led some, including a lot of my economist colleagues, to kind of dismiss the issue of saving

manufacturing. Their argument is that if relative prices say that manufacturing should all be done offshore, the way, for example, Apple Computer basically produces its electronic products, then so be it. That's how global economic efficiency is achieved.

Unfortunately, economic life today is not that simple. Manufacturing increasingly employs high skilled and high paid people. So since the ultimate objective of growth policy is to increase real per capita GDP, if you have an industry where the potential at least is to produce high paying, stable employment, then you shouldn't ignore it.

But there's another less obvious reason for the importance of a domestic manufacturing sector. In the earlier panel, this idea of supply chain and the importance of coordination up and down the supply chain was mentioned. And I've studied this at some length and written about it because supply chains today are incredibly immigrated. The complexity of modern technology, I can't think of anything more complex than a manufacturing system as we now envision it in the future. Smart manufacturing, adaptive manufacturing, these are concepts that will only be delivered through complex systems of hardware and software, produced by a whole host of industries that have to be integrated, all the interfaces between these components have to work.

This is a huge, complex growth problem that's not going to be handled totally by the private sector. So what you see around the world is, there's $1.4 trillion in R&D being spent currently in the world, and that's a big number by itself. But when you think about it, every dollar of R&D stimulates multiple dollars of capital formation. In turn, that stimulates multiple dollars of investment and marketing assets and supporting infrastructure. So the leverage on economic growth is substantial.

Unfortunately, our manufacturing sector has the same R&D intensity as it did back in the 1980s. So even though we've had all these shuffles and we've

reorganized our supply chains, although reorganization unfortunately is meant a lot of hollowing out, which leads gaps, and hence this synergy problem that I was alluding to.

So we have a job to do there in terms of increasing the amount of R&D. But there are two other issues here in terms of sort of an overall growth model. The second one is the composition, which Phil eluded to this morning, and it's not just which technologies you invest in, but it's also the phases of the R&D cycle where government has a legitimate role. You know, most of my economist colleagues look at technology as a white box, so they don't see any role for government at all beyond science.

NIH and other government agencies are sort of implementers of this black box model. NIH funds billions of dollars of science, they stand out of the way, and then they expect industry, venture capital, small startup firms to come in, develop the new drugs. And the productivity of this model has been extremely low, and it's generally recognized as such, but they don't seem to have much of a clue as to what to do about it.

So you have to discard this black box model and understand that you don't just go from science to innovation, you have to have technology platforms, and that's where we're beginning to go in manufacturing.

NIST is now involved as the central point for coordinating research portfolios across government that will provide, in cooperation with industry and universities, these new platforms. And this model is not unique to the United States; in fact, to some degree we're playing catch up.

MS. LOWREY: I'm going to stop you there. Rob, if you have -- okay, Mark, five minutes.

MR. MURO: And Dr. Atkinson passed some of his time.

MS. LOWREY: And we'll come back.

MR. MURO: But I'll be passing back. It's great to be here. I want to

focus on another misperception or misdirection. You know, Greg has talked about the effective focus perhaps on the gyrations of macro economics; I'm going to focus on the notion that what manufacturing is has been misunderstood, as well.

I mean, manufacturing is innovation, you know. We set up this dichotomy and wonder if manufacturing is the root to get our mojo back in innovation. It is the prime site of innovation already.

So, I think that, you know, we've celebrated innovation properly, but we've done it in a way that has narrowed and simplified and disembodied and really turned into magic the kind of details of innovation. Innovation process has been isolated, it's come to seem like something much more akin to invention, meaning the sudden development of novel, new products, and it's often been reduced to unfair pouring, as Greg says, R&D spending into university laps. So we have a narrow account of innovation.

And as for the world of manufacturing, it's essentially been demoted and has not really been part of the discussion broadly. Dirty and noisy, where innovation was silent, you know, clean and spontaneous and exciting, that has left manufacturing as sort of fungible, a kind of work a day activity oriented towards commodity, mass production, it's been an after thought at best. So, you know, the reality here is, we're realizing the conventional view of innovation has been simplistic and misleading, and that has led to problems for how we understand manufacturing.

The two can't be separated. Manufacturing is, as I was suggesting, the principal site of commercial manufacturing in the system, in the U.S. system. Seventy percent of all company performed domestic R&D takes place in manufacturing companies, even though they generate only about 11 percent of GDP, so a major presence.

Half to two-thirds of engineers and scientists in this country are actually employed by a manufacturing or production concern. Twenty-two percent of all manufacturers produced a new product or service between ’06 and ’08, only 8 percent of nonmanufacturing. So in a very real sense, you know, production is where U.S. innovation takes place.

Now, not all that is equally innovative, computers and electronic products, or aerospace or highly innovative -- well, food and tobacco production clearly aren’t, but the point is the same. You know, importance of U.S. manufacturing are growing off constant streams of incremental and practical -- process innovations that drive productivity. That is a fundamental driver of U.S. innovation in general.

And, you know, we can’t separate -- this is not simply a matter of the direct manufacturing sector, it happens to the health services in this country: R&D, design, finance, marketing, consulting, you know, maintenance, all kinds of analytic functions are themselves tied up in, you know, major feedback loops around that originate with production.

So, you know, this is all bound together, we can’t separate these things. So to suggest that manufacturing -- I mean, manufacturing most clearly is a root towards increased innovation in this country because it is where that occurs mostly.

Now, this just offers us I think a few hints about how to get the mojo back. One is not rocket science. If manufacturing is where innovation occurs, then that would seem to counsel trying to retain some of our manufacturing, but not all of it is of the same importance as we’ve been hearing during the day. You know, IT, computers, electronics, aerospace, chemicals in some areas, medical devices, energy equipment, these are the places to look. So these are the industries that likely matter most to regaining competitiveness.

And then there's one more point that I think Greg is beginning to point to. More and more of the best analysts are showing that the optimal dynamics of innovative production suggests we should work harder to foster the co-location, the linkage of production and R&D. You know, people, Rob here, Greg, Danny Breznitz, (inaudible), Erica Fuchs at Carnegie Mellon are all now showing that high levels of innovation seen in strong manufacturing networks frequently depend on these synergies between production processes and design processes.

That argues that, you know, that those have suggested a prosperous economy can be had without production are, you know, looking in the wrong direction. We're realizing the proximity and interconnection of research design and production, if not in the same building, in the same, we would contend, metropolitan industry cluster is an important determinant of which industrial groups are going to lead the next technology cycles. You know, think about these feedback loops, information spillovers, and casual cuts of copy in a place like Silicon Valley that flow around this mix of R&D entrepreneurship and manufacturing places, like Silicon Valley, are a great model of this.

This synergy suggests that, you know, the way to recapture our edge is to foster the strength of these regional production clusters where the interconnections and feedback live between production and more classical R&D occur. So again, I would say that something would have to happen region by region, by metro area, industry cluster by industry cluster, and, you know, very supportive of NIST's decentralized network of innovation manufacturing institutions is a way to get at this, but that's maybe another discussion. I'm going to give the rest of my time to Dr. Atkinson.

MS. LOWREY: Okay.

MR. ATKINSON: Well, great, thank you. It's a pleasure to be here. I agree with everything Mark and Greg said, but I want to -- we want a disagreement,

though, don't we? I didn't agree with anything you said, ridiculous nonsense. But let me actually add another wrinkle to this, I guess.

So let me throw out two numbers to you, and, to me, they're completely related, but no one seems to think they are. One is 0 percent and the other is -33 percent. The first number is the number of -- the percentage change in employment in the last decade. Zero percent change in employment, it never happened before in U.S. history. And the second number is the percentage loss of U.S. manufacturing jobs, -33 percent, a loss that was greater than in the peak to trough of the U.S. Great Depression in the '30s.

So we lost more of our manufacturing jobs in a decade than any country in world history and in our own history, and yet virtually no one makes the connection between the first number and the second number. So when you're losing 60,000 factories being closed in 10 years, you're losing 18 to 20 factories a day being closed. That is, in sort of Federal Reserve parlance, that is a stiff headwind.

So, yeah, you can grow some other jobs some other places, but that is a leaning against the wind. So that is why it was so hard for the U.S. economy to gain traction. That's why it's so hard for the U.S. economy to gain traction today.

Just the loss of manufacturing in this down cycle, the Great Recession, was the biggest loss in any business down cycle we've ever had. The manufacturing loss this last time was the biggest it's ever been, and that's all in a report. There's some on the table out there we recently published called "Worse Than the Great Depression."

So why is that kind of not an obvious thing? I think it's not an obvious thing because the people who run economic policy in this country are either, as Keynes said, they're influenced by long dead economists -- in this case, unfortunately, they're still alive -- and it's still alive economists who are essentially called neoclassical economists.

And there's a sort of fundamental core belief of neoclassical economists which is every sector is exactly the same. We saw that with Christina Romer's op-ed, I don't know, five months ago, where basically she said barber shops, manufacturers, what's the difference?

Now, when I was head of the Rhode Island Economic Policy Council and worked with John White and his father back in the '90s, I can tell you, the governor did not have a policy towards barber shops. We didn't have a barber shop policy, not because we didn't think barber shops were nice people or barbers, they didn't provide a valuable service, it was really simple: if a barber shop went out of business, another one would take its place, because people would get haircuts.

Now, the problem with neoclassical economists is they don't want to make that distinction between traded sectors and non-traded sectors, and that really is the fundamental reason why manufacturing is important: it is a traded sector. It is the largest traded sector of the U.S. economy. Some services are traded, and we run a tiny, little surplus in services. But really for the next foreseeable 10 to 20 years, at minimum, there is no way for us to run a trade surplus or a balance of trade without a healthy, robust manufacturing sector.

So if I had one wish, anybody -- you all have seen *Men in Black* and Will Smith, when they go around and they get some alien thing, they have this neurolizer. This is a neurolizer. I would like to hold up a neurolizer to all the neoclassical economists and then erase from their brain this notion that they have that says -- and you think I'm making this stuff up, but I'm really not -- this notion that they have that the trade deficit, which is, by the way, the U.S. has run the largest trade deficit in world history in the last decade, the trade deficit has nothing to do with anything other than our savings rate.

So think about that for a minute. If you really -- by the way, I'm not

making this stuff up. Most economists in Washington, this is a core belief. And if you're in the room or you're looking -- they think I'm like totally nonsensical, I clearly don't understand economics because I'm rebutting this core fundamental pillar of belief.

All right. So if you believe this pillar of belief, then you should then agree with this following statement: Let's double the corporate tax rate to 70 percent and we will have no effect on the trade deficit. Let's have really, really bad managers running U.S. firms and drive them all into the ground, like we had with GM, and there will be no effect on the trade deficit.

Let's have EPA promulgate regulations for one part per trillion for every emittent they can think of and make U.S. manufacturers comply with it and spend hundreds of billions of dollars and there will be no effect on the trade deficit because the trade deficit has nothing to do with these things about productivity or cost by producers. It only has to do with this magic formula about the savings rate.

Lastly, we could then, if you really believe that, we could say, well, why do we even bother having NIST, why have MEP, why have the President's National Network of Manufacturing? None of those can do anything because they all basically are running up against this formula, this iron law that says the manufacturer and the trade deficits only are related to serving savings deficit.

So at any rate, I'll just close by saying, to me, that's sort of -- you know, I'm happy to sort of explain mathematically why that is wrong, that it basically is -- the simple answer is it's reverse causation. Yeah, the savings rate is equal to the trade deficit, but they think the savings rate causes the trade deficit rather than the other way around.

The basic bottom line is we need a healthy manufacturing sector because we simply cannot run a vibrant U.S. economy unless we have a healthy traded

sector. If you don't have a healthy traded sector, you're leaning into this very, very stiff headwind, and I think the last 10 years in particular have shown that the results of that are essentially economic malaise. I'll stop there.

MS. LOWREY: Well, that sounds great. So I think that the other big, wonderful, complicated discussion about manufacturing's role in the economy and in the recovery and in economic growth, we're here to talk about innovation and manufacturing, and that's grounded by the fact that the Obama Administration has made a calculated bet. If you ask the members of the NEC, they will say that one of the reasons that they want to support manufacturing and have tried in a number of bills and with some small policies, is that they believe that part of the reason that manufacturing firms are different and that they've developed this industrial policy is that you need manufacturing in order to innovate.

They kind of agree with Mark's argument that if you have people making stuff here, that will actually make the economy more innovative. And so they've tried very hard to, you know, create incentive for manufacturers to keep jobs in America, and part of that has been a jobs policy, but also part of it has been a broader economic policy.

But economists disagree about this. And there's definitely some evidence, but some of it also seems to have to do with, you know, whether the spillovers are due to kind of how close people are together versus whether they're actually making things.

So I guess that that's the first question that I'd like to ask the panel is, do we need to keep the manufacturing actual production jobs here in order to innovate or to help, you know, increase innovation? So Mark, I think, would agree with it.

MR. MURO: Well, the answer is absolutely yes. Studies have shown, and my conversations with high-tech companies certainly confirms it, that R&D and the

actual production have to be co-located, especially in the early part of a technology's life cycle.

No complex technology when it's first commercialized has lost attributes at optimal levels. There's usually not an optimal production process. One is kluged together from existing production techniques. As the market grows and the centers increase to investment optimal process technology, if you don't have the interactions back and forth between the product development people and the process people, you lose a lot of synergy, and hence, advantage.

And if you look at the evolution of aging economies, first they were offshore destinations for the actual production. They had to have some R&D capability to do that, and then they, to their credit, they expanded that R&D infrastructure to the point where now they're experts in innovation in the product and the process levels.

You can go all the way back to the Japanese experience in the 1980s, where they focused on process development, but then they realized around 1990, they had to become innovators, as well, from the long-term growth point of view. So the sort of general model is out there, but it's not well understood, as I think all of us have indicated, and it needs to become more of a core management strategy.

SPEAKER: Yeah, I mean, I just completely agree with that. I mean, if you look at -- I was talking recently with some folks from ITRI, which is essentially the big sort of NIST for Taiwan I guess, but with a broader mandate and a lot more money, and one of the -- they were talking about how did Taiwan really become the leader in memory chips. And the answer was really interesting, is they actually went around back in the '70s and they looked around to see if they could buy some technology. And they bought some technology from this little company in the U.S. called RCA, who thought, oh, yeah, we can license this stuff to the Taiwanese because this is making stuff and we're the

innovators.

Well, now they're the innovators and the world leaders with two major companies in Taiwan, world leaders in this, and RCA, I guess maybe they're still in business. I mean, who's ever heard of RCA? And the point was that there was this mythology that you could innovate here and lead production because they're just doing the low end.

And I think Clay Christensen's work has shown us pretty well from Harvard, they start with the low end and they work their way up, they work their way up, they work their way up, and they keep, you know, sort of taking parts of the production, and at first you don't notice it because it's the low end and the commodity stuff with it has, you know, low margins, it's like, oh, that's the low margin stuff, but they're working their way higher up and higher margin, and eventually they get the whole thing. And that's really, to me, emblematic of not just a few companies like RCA, but of the country as a whole. And that's our real risk, I think, is we have this view that innovation is science, and in a lot of ways we are very good at science-based innovation, perhaps the best country in the world, but what we're really not very good at anymore is -- that's engineering innovation.

You compare that to Germany, for example. Germany is just maybe, you know, maybe the world-class engineering innovation country, and it's not an accident. It's not because Germans are born engineers. It's because they work on it.

They have these Fraunhofer institutes, they've got great engineering programs and universities, they've got great engineering technician programs, apprenticeship programs. There's an engineering culture in Germany, and that's really what I think we've got to restore here in the U.S. We can't go down this path of saying, well, we do science and they do engineering. Engineering and science have to come

back together, and we're not going to be able to be good at science anymore unless we're good at engineering.

MS. LOWREY: But it seems like the experience -- and just to make the argument in the other direction, you know, the United States has remained massively innovative despite the fact that all of these jobs have been offshored, right. And so maybe looking at the next 20 years, there's an argument that that won't be true. But I guess the question, and kind of a question that's been touched on in a lot of panels is, which jobs do we want here and which jobs do we want to bring back if we can, or at least like, you know, keep here and keep co-located, since obviously I don't think anybody would argue that it would be good for the United States to be making widgets and bolts, and, you know, the really, really low-end labor. So I guess that's the kind of question is, what do you want to keep here and how?

MR. MURO: Well, and I think, you know, I mean, I think the answer is, to some extent, implied by all of this. It is those engineering-intensive, you know, R&D-intensive segments, but with the fear that if you aren't engaged on the production for those, you'll lose those, too. So I think that's the logic. A question is to whether jobs are the only metric, you know. And I think some of the factors that favor U.S. manufacturing include the disappearance of actual jobs from shop floors that are in some ways going to help level the playing field and will bring manufacturing jobs -- well, manufacturing back here, but maybe not so many jobs, because these are going to be extremely, heavily automated, extremely efficient and productive operations. I would still say whether or not they have large numbers of jobs, we need them because of the whole rest of the ecosystem, including on the services side that they drive. But, you know, so I think that's a riddle for us, and I think over-focus on jobs as the only metric here will lead to disappointment.

MS. LOWREY: Do you agree?

MR. TASSEY: Absolutely. In fact, another example of how as a society we still don't understand the modern technology-based road is when this talk of automation and improving the productivity of manufacturing comes up, there's pushback by people saying, well, you know, productivity reduces the labor content and, therefore, is going to cost jobs, which the exact opposite is the case, and this has been documented by a number of economic studies. If you're more productive, you gain market share, and, therefore, your volume expands and so you're going to employ more people, and those people are going to be higher paid and their jobs are going to be more stable. So, you know, we have to really get the basics in place of what is the growth model before we can start worrying about what the specific policy should be.

MS. LOWREY: Although, I mean, it seems like the policy questions are important now, right, because, you know, there's a lot of concern about jobs, and there's a lot of policies that are being created and fomented now to keep these jobs here, right. And I do think that the conversation in Washington is essentially framed in terms of jobs, right.

There's been tremendous hurt in manufacturing communities as these jobs have left, and, you know, cities like Detroit have essentially been hollowed out. And a lot of the argument is about like bringing those jobs back or at least, you know, on-shoring or re-shoring are keeping people here. I agree that a lot of the conversation gets this kind of like lump of labor policy that, you know, if these companies become too efficient, then there'll be no jobs for anybody, which has not, you know, been proven true by history.

But I do think it is a policy question, you know, since it's -- so what kind of policies do you think -- you know, you said that the policies (inaudible), but what may

need to change here?

MR. ATKINSON: Okay. Well, first of all, labor does not obviously exist in isolation, it has to be combined with technology, capital formation is important. The previous panels talked about small firms and the issues they face. And I've been at a number of conferences where I've talked to small startup firms, professors included, who have taken a risk, as well as time, to get involved in those. And they're okay at the R&D stage, they develop a product, and all of a sudden they realize they haven't either the capital or the expertise to produce it. So what is the infrastructure? In Germany, you get help, here you really don't.

MR. MURO: Let me go back to your original statement because I think it's not quite accurate, which is, well, we still lead on innovation, but we don't on manufacturing. I don't think we lead on innovation anymore. If you look at the metrics, we're actually falling behind relatively rapidly on things like venture capital funding, new business start-ups, corporate R&D, patenting, scholarly articles, on pretty much every measure, high-tech trade deficit. So we feel like we're leading in innovation because we all use Facebook and Twitter, and, yeah, those are cool things, I love Facebook and Twitter.

And to be fair, the one area we really do still lead on, and that's sort of Internet software kind of stuff, we do lead in that, and that's kind of everybody -- that's their daily experience. But how many of you recently bought an industrial laser for your home? Anybody? Well, we don't lead on industrial lasers anymore. So there are a lot of things we don't lead on anymore.

So what we need to do about it, I think, what we've talked about is what we call the four Ts: tax, trade, talent, and technology. We have the highest statutory tax rate in the world. We have among the highest -- one recent MBR study of 20 major

countries; we have the highest effective tax for manufacturers. We have a report coming out in a couple of weeks on the R&D credit now reusing the most recent data. We're now 27th in R&D tax credit generosity in the world. To get to the most generous R&D tax credit, we would have to increase our credit, triple it.

So we've got to have a better tax code, we've got to lower the rate, we've got to increase incentives, we've got to do a lot more on technology. Look at a program like the MEP, NIST Manufacturing Extension Partnership. It's a wonderful program dramatically under funded. Germans invest 20 times more than we do in that kind of program, the Canadians 10 times more, and the Japanese 40 times more. We need an NNMI. The President has proposed, and the Germans have Fraunhofer, Taiwan has ITRI, a lot of countries have things like that. We need a real apprenticeship and skill standards program for manufacturers. And the last thing we've got to do is we've got to really aggressively fight foreign trade mercantilism.

I mean, we can't win this battle when we have countries like China forcing U.S. companies to move production and technology there to get market access, manipulating standards, manipulating their currency, doing all sorts of onerous things, and now the Brazilians are following them, and the Indians are following them. So I don't think it's a mystery as to -- we don't have to get down and, you know, and pick, you know, John, this is your company, we're picking your company, that's the one, you know. It's like we don't have to do that. That's not a manufacturing policy, but we do need to get the big parts right.

MR. ATKINSON: So trade is the last T, right, so I'm going to add an R for everything has to be focused through a regional lens. That's a way to get the co-location of activities, the synergies and feedback loops that Greg is talking about. So it's four Ts plus an R, and I would say it's, you know, things -- it's a mix of hard centers of

regional dynamism, so hubs and institutes are an important model that the Germans and others have.

You know, you need a focal point to force that kind of collaborative activity between business and academia and labs and so on. And then we've advocated the use of competitive cluster grants, you know, that are simply to, you know, to match and turbo charge regional industry cluster efforts to try to put this stuff together, connect these, you know, really with often very diverse industry clusters with all kinds of actors that, you know, are hard to organize, and yet can't -- that will have the best knowledge of what is needed to connect the collaborations needed in a place.

So I think that's -- when we get to policy, we are often aspatial about it and don't understand that we don't have a single economy, we don't have a single manufacturing economy. We have the Rhode Island manufacturing emphasis; we have the Denver, Colorado, focus in aerospace, you know; and we have other ones around the country. So we have to have that specificity in some way to get at that self-organized activity in these regions.

MS. LOWREY: All right. And in some ways it's interesting because that might be somewhat easier. I think a lot of what Rob was talking about is it is policy that needs to happen at the federal level and can be very difficult. It's, you know, kind of hard to think about a huge sort of tax reform pass thing and a huge amount of investment in science necessarily passing. But regions competing for businesses to locate there, I mean, that's already happening, right.

MR. MURO: Well, there's a great history of that. I mean, there's a great tradition of southern industrial policy in which conservative southern states are the most aggressive about assembling industry and helping to resolve these corrective action problems and supply chains and so on.

But I was going to say, I think this is -- the regional piece is not a nice-to-have piece of it, it is a highly functional, politically viable way to get at these issues, and a little less obtrusive way than sometimes federal policy tends to be.

MR. ATKINSON: Let me just sort of clarify and, Mark, you will I think agree that besides you and Metro, I'm probably the second most strong advocate for regions in Washington.

MR. MURO: Yes, you absolutely are.

MR. ATKINSON: I have my bona fides here. I don't think it's an either/or, and I know you're not saying that. As much as regions are doing good stuff, and as I said, I worked for a governor, you know, they don't have, you know, they can eliminate their taxes, their tax rates are pretty low, you know, 5, 6 percent compared to 35 percent, so they don't have a lot of headroom there.

You know, they have big budget problems. They can't invest as much as -- so to get the scale we need, we've got to have a federal role, and clearly that role has got to be in partnership, it's got to see regions as a key enabler. But I think there's a real misleading view in Washington that, well, we'll just leave it to the regions and we don't have to do the heavy lifting in Washington, and that's just not going to get us anywhere near as far as we have to go.

MR. MURO: Well, we're lacking that basic national platform for regional activity, right?

MS. LOWREY: So I think we'll take some questions from the audience. The gentleman over here on the side.

MR. MALLOY: I'm Pat Malloy. I'm a former assistant secretary of trade at the Commerce Department, and I'm a trade lawyer. I salute Rob Atkinson because I think he's hit the nail on the head. Here's the way I see it, and then if I could ask you

guys to comment. We have these huge trade deficits because we're outsourcing more and more of our production and then importing things that we used to make, and when you're not making things, your ability to innovate is lost. Willy Shih up at Harvard Business School has pointed this out in that brilliant article in *Harvard Business Review*. And then when you can't innovate, then you're losing your ability to be next in the big things in manufacturing.

So as I think about these things, I look back at Kennedy saying we've got to get to the moon by the end of the decade. Nobody knew how to get to the moon, but we set a goal and energized the whole society.

If we set a national goal to balance our trade by the end of this decade, and then got serious about what policies we would have to put in place, would that be a way to energize us to stop this hemorrhaging of jobs and manufacturing that's going on in this country and begin to put policies in place that could reverse these trends that are killing the economy, killing the future for our young people in this country?

MR. MURO: Yes.

MR. MALLOY: Thank you.

MR. MURO: I mean, I would say the President boldly articulated doubling of export goals. You know, we may or may not make it, but I think it has done a huge amount to draw more attention.

MR. MALLOY: (inaudible) increasing exports, so the hole just gets deeper.

MR. ATKINSON: Yeah, I agree with Pat. I think the export goal is a nice one, but, you know, it's sort of a half of a loaf. You've got to really bite the bullet and say, no, it's really about balancing our trade. The one thing we forget about that, and again, you know, classical economists ignore this, but this is as much of a debt on our future

generation as the national debt. In fact, it's even more, because national debt is sort of within the country, you know, I'm loaning the government money or whatever.

So my son, or my daughter, at some point in their lifetime, they're going to have to be consuming five percent less than they're producing for a long time, because that's essentially what we all have been doing. We've essentially -- we have a new book coming out in September called *Innovation to Economics: The Race for Global Advantage.* And I calculated this: the average American is essentially getting a Jeep Grand Cherokee every four years for free because we're not paying for it.

So if you add up the trade deficit, all the money that -- things we're buying, we're not giving anything back, we're not giving the Chinese things, they just have these little pieces of paper with presidents on them and we can't do anything with those, they're worthless, unless you trade them in for something of value. I mean, the thing itself is worthless. It's basically a -- it's an exchange mechanism for other value. They're not trading it in for value because we're not buying anything from them; we're not buying very much for this. That's the amount every four years we're getting for free. And I love my Jeep Cherokee. Whatever, I don't have one, but I have a Honda, so I probably got it for free.

My point is we need to bite the bullet and say at some point we've got to least balance the trade deficit, otherwise we're going to be passing this big debt onto our children, even bigger.

MS. LOWREY: Okay. Up in the front here.

MS. WORTH: I'm Mitzy Worth with the Naval Postgraduate School. Rob, I love what you're doing. I come at this from a broader spectrum, which I think one of the dilemmas we have is that we don't teach in our schools complexity and systems, and we basically train people, and it gets worse when you get into graduate school. You

become narrower and narrower on a smaller piece of information, and until you start understanding the interdependencies of all of these components and how they affect the consequences of what we're living with, I mean, I think we're failing on that, because we are -- and I would argue that our three-month metric of having to produce a result is driving that, and until we can understand the complexity of the world that we live in, we're going to continue to go on this way. We look for the simple, short-term answers.

MS. LOWREY: Well, I think, you know, it seems like there's been a lot of efforts to try and get people to go into stem fields and to go into engineering fields as you guys have described. So do you identify any other problems in the graduate education system, ways that we could sort of use the educational system to help foster -- both to get more of the graduates that we need and to help foster innovation more generally?

MS. WORTH: I wasn't clear. Starting in kindergarten you have to start talking about (inaudible).

MS. LOWREY: Yeah. All the way down (inaudible).

MR. ATKINSON: Well, one quick thing we could do is, we could do, again -- I hate to keep bringing up the Germans, but we could do what they do, and a lot of other countries, which is restructure our engineering graduate programs to really be much more interlinked with industry and with industry co-ops and other things like that. We don't want to do that as much anymore.

Engineering has become a science and not a problem solving discipline. They have science, and we need to reorient engineering and education around practical problem solving and integrating it with industry and we don't do that.

MS. LOWREY: On the median right there. Thank you.

MR. CHATTERJEE: My name is Samar Chatterjee from SAFE Foundation. I'm curious, the heading of this session is "Manufacturing to Recapture

America's Innovation Edge." Do you want to really recapture the innovation edge that's been lost, or the manufacturing, or you want to have a lesser trade deficit? Because the others I -- the gentleman who pointed out the Chinese hold a piece of paper with a lot of money written on it, they're going to make use of it to make sure that their innovation edge keeps increasing.

So other competitors are not going to let you just recapture all the innovation edge or whichever. So what is the ultimate objective? Because if free trade means let the chips fall where they may, that's not what we're talking about; is that right?

MR. TASSEY: Well, trade policy is not something that I really want to discuss at any length here. But let me put it this way, if you removed all these barriers that we know exist in global trade today, and actually there's been several recent articles talking about how they're getting worse due to the global recession so it's even more of a problem, you still have to be competitive in what you make and sell. So whether it's a manufactured product or a service, you have to be able to do it better than your competitors. So the whole question is: what is the growth model that gets you to that end point? The trade deficit, which we've had a manufacturing for 35 years, actually going on 37, I think 1975 is the last time we had a trade surplus in manufacturing, so a deficit is a dollar-for-dollar reduction in GDP, so that's a dollar-for-dollar reduction in income, okay.

So the bottom line is, you have to find a way to be competitive, and the trade deficit is an indicator of your competitiveness, even making adjustments for restraints on trade, which are clearly issues.

But what bothers me is when a discussion gets too strongly on blaming the Chinese or somebody else, we're losing sight of what will we do if we solve all these trade restriction problems, and that's what we're discussing here more than anything else today is what's the right growth model.

And so we've talked about many elements of it, but one of the main problems, by the way, is inside the federal government, there is not an innovation policy infrastructure. When I was a graduate student at GW back in the '70s, there was more institutionalized innovation policy capability in the federal government than there is today, and on the congressional side, as well. When OTA got shut down, and we had a couple small programs on the federal government side when I was a grad student, they were shut down, and then we had the technology administration which was shut down, so there are some signs we're beginning to rekindle some momentum towards reestablishing a policy infrastructure.

When you think about all the issues we have discussed here today, how complex they are, how are we going to make intelligent decisions if we do all policy on an ad hoc basis, which, frankly, is the way we do it? So we've got to change that first and foremost.

MS. LOWREY: Over on the side here.

MS. EDMONDS: Good morning. First I want to thank the panelists for your very insightful comments. I have a question going back to Greg's initial opening remarks and the belief that, you know, science leads to innovation, and, you know, not supporting the actual maturation of these technologies.

So first I should introduce myself. I'm Corina Edmonds. I'm the tech transfer coordinator for the Department of Energy. In the last two years I spent trying to reduce barriers and trying to derisk these technologies to go from the lab to the marketplace. And I've seen that in the best situations where you have a proof of concept model in the lab, you know, even those cases, it takes a long time and a lot of funds to move those.

And I struggle because, you know, you just talked about innovation

policy, which we don't currently have, and it's a struggle because a lot of folks believe, you know, I -- there's people that actually think that once you have a plan, it's done, the commercial sector should be picking it up, and so how do we address that? I'm interested to know what NIST is planning to do to enable more maturation, derisking of these early stage technologies that we spend all these funds to develop, yet will sit on a shelf because we can't get it to a point where we can attract private equity.

MR. TASSEY: That's a great question, though I may weasel on this a little bit. And my boss over here, he manages the tech transfer programs in this, so he's the authority on this. But I will point out that NIST produces a lot of public good technology. After all, we're a government institution, so that's not readily patentable. It's technical infrastructure, I call them infratechnologies, many of which become the basis for standards. Without these standards, the high tech sector is bottoms up.

The semiconductor industry has well over 1,000 standards. You take those away and they don't function. So there's this element of government role in producing intellectual capital technology, which is not patented, but obviously the spinoffs from that work that is patented, and then we have the issues you have identified of what are the best mechanisms for getting that technology into the hands of the private sector. We addressed this at universities back in 1980 with passage of the Bayh-Dole Act; we tried to improve the flow of intellectual capital into the private sector through that law. There have been a number of acts since then, but this is -- it's definitely a complicated issue which needs attention. And this administration is certainly giving a lot of attention to that.

MS. LOWREY: In the middle here.

MS. CLINE: Hi, Andrea Cline, development consultant. I'd like to ask about the R&D credit. Do you see two different standards, particularly one focused to

small, medium capital firms with a greater credit so that they can have a greater impact in the market versus multinational companies?

And secondly, with regard to the competitive cluster grants, what are the conversations that are happening with foundations, NGO networks to go into let's say a three- to five-year program that will allow that, let's say that entrepreneur to work with that municipality or regional government entity and agency to bring forth production and having that regional localized effect, but also being able to break into the global market?

MR. ATKINSON: So on the R&D credit, a lot of countries have a more generous credit for SMEs than for larger corporations. We generally don't. And I just recently wrote a blog called "In Praise of Big Business" just to irk people. And my argument essentially was that we should be size agnostic, and I think we should be. I don't think we should have a better credit for small companies. What we really do have a problem on, this is a bill that Senator Chris Coons has just introduced that actually -- it actually was part of the start of America 2.0 Act which is a bipartisan act with Senators Rubio, Warner, Moran, and Coons, but it's a refundable credit out of the payroll tax for smaller -- for new companies essentially, companies that don't have any profits.

You can carry forward the credit for a number of years. Eventually you might have some problems, but it doesn't really work for startup companies. So this provision that Senator Coons has put in, which we support, is a good idea because it gives companies the ability to actually get a refundability part of the credit early on in their life cycle.

MR. MURO: I think you raise a good issue. In terms of stimulating these regional initiatives, you want to make sure that they're not being, you know, so short term that there's no impact, but you also don't want some ongoing sustained, you know, steady flow of government support for them. So I think some of -- there are a number of

competitive offerings for, you know, two, three, four year sort of start up with heavily matched funding for, you know, various projects and that's a way to get that kind of on-ramp, but then, you know, uptake is expected in the region. But you're absolutely right that, you know, a one-year, you know, grant victory can be almost disruptive. What you really want to do is the stimulating regional activity to solve these problems as best you can in addition to as we're seeing a national problem.

MR. TASSEY: One issue associated with the credit that's not discussed enough is the structure. We're the first country to implement an R&D tax incentive back in 1981. It's been temporary since, which shows how little we understand it and have confidence in it. But structure is also important. And the credit as it originally was structured was incremental based -- in other words, they had a formula which determines based on the amount of increase in your R&D base calculation that determines what is eligible for the credit.

The structural problems of that, and then Congress recognized it, at least to an extent in 2007, they introduced an alternative simplified credit it's called, which has some improvement, but it's still a partially incremental credit. Most countries in the world have gone to a flat credit, which I believe is the right way to go.

It's simpler to administer and then recognize it as all dollars of R&D are risky and have some degree of market failure associated with it.

MS. LOWREY: I think we have time for one more question, in the middle.

MR. HARRISON: Glenn Harrison, CRS. When you're talking about innovation and preserving innovation here in the United States, and you look at some of the economic and regional clusters that have formed abroad that essentially aggregate a lot of production in one place, Shinjin, for instance, in China, or other places, as well, in

fact, there are numerous locations where this happens, how do you go about, you know, pulling that back, you know, where a lot of the -- I think Annie mentioned screws and why do we need to make bolts and things like that. And, you know, I guess my question is, if all of these other countries are taking grounds up, you know, startup approaches to it, and we've lost that, you know, is there any way of recovering it and would it even be feasible to try? And especially when, you know, you look at Taiwan and chips and whatnot, do chips really matter? You know, is it the old potato chip versus computer chip thing?

MR. TASSEY: Well, that's an excellent question. And I think as Americans, we have to realize that we count for less than 5 percent of the world's population, so 95 percent of the world's consumers are outside our country and, therefore, that's where the growth is going to be in the future.

We will never, because of the size factor, be dominant in all technologies again. Nanotechnology is a great example of that. There are multiple countries who are putting substantial R&D resources and are achieving advances in nanotechnology. We are a player, but we will be one of a number of players, and that's a shift from the post World War II phenomenon in which the U.S. dominated every technology. In fact, we were the source of every technology. Those days are over. So we have to pick and choose basically.

My view is we focus on supply chains rather than individual industrials because of the synergies that we've discussed. But beyond that, it's choosing those supply chains and then providing world class infrastructure to support them.

MS. LOWREY: Okay. Well, I'd like to thank our panelists and the audience for listening. Thank you.

MR. WEST: Thank you, Annie, and our panelists for sharing your

thoughts. We have a buffet lunch out in the hallway, so please help yourself.

And again, I want to thank John Hazen White, Jr., for the leadership that he has demonstrated, and we will be continuing our work in this area. Thank you very much. (Applause)

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I, Carleton J. Anderson, III do hereby certify that the forgoing electronic file when originally transmitted was reduced to text at my direction; that said transcript is a true record of the proceedings therein referenced; that I am neither counsel for, related to, nor employed by any of the parties to the action in which these proceedings were taken; and, furthermore, that I am neither a relative or employee of any attorney or counsel employed by the parties hereto, nor financially or otherwise interested in the outcome of this action.

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