Jeffrey sachs age of sustainable development pdf

Jeffrey D. Sachs is a world-renowned economics professor, bestselling author, innovative educator, and global leader in sustainable development. He is widely recognized for bold and effective strategies to address complex challenges including debt crises, hyperinflations, the transition from central planning to market economies, the control of AIDS, malaria, and other diseases, the escape from extreme poverty, and the battle against human-induced climate change. He is Director of the UN Sustainable Development Solutions Network, a commissioner of the UN Broadband Commission for Development, and an SDG Advocate for UN Secretary General Antonio Guterres. From 2001-18, Sachs served as Special Advisor to the UN Secretary General, for Kofi Annan (2001-7), Ban Ki-moon (2008-16), and Antonio Guterres (2017-18). Professor Sachs was the co-recipient of the 2015 Blue Planet Prize, the leading global prize for environmental leadership. He was twice named among Time magazineâ€™s 100 most influential world leaders and has received 28 honorary degrees. The New York Times called Sachs â€œprobably the most important economist in the world,â€ and Time magazine called Sachs â€œthe worldâ€™s best-known economist.â€ A survey by The Economist ranked Sachs as among the three most influential living economists.Professor Sachs serves as the Director of the Center for Sustainable Development at Columbia University. He is University Professor at Columbia University, the universityâ€™s highest academic rank. Sachs was Director of the Earth Institute from 2002 to 2016. Sachs has authored and edited numerous books, including three New York Times bestsellers, The End of Poverty (2005), Common Wealth: Economics for a Crowded Planet (2008), and The Price of Civilization (2011). Other books include To Move the World: JFKâ€™s Quest for Peace (2013), The Age of Sustainable Development (2015), Building the New American Economy: Smart, Fair & Sustainable (2017), and most recently A New Foreign Policy: Beyond American Exceptionalism (2018).Prior to joining Columbia, Sachs spent over twenty years as a professor at Harvard University, most recently as the Galen L. Stone Professor of International Trade. A native of Detroit, Michigan, Sachs received his B.A., M.A., and Ph.D. degrees at Harvard. Jeffrey D. Sachs is one of the world's most perceptive and original analysts of global development. In this major new work he presents a compelling and practical framework for how global citizens can use a holistic way forward to address the seemingly intractable worldwide problems of persistent extreme poverty, environmental degradation, and political-economic injustice: sustainable development.Sachs offers readers, students, activists, environmentalists, and policy makers the tools, metrics, and practical pathways they need to achieve Sustainable Development Goals. Far more than a rhetorical exercise, this book is designed to inform, inspire, and spur action. Based on Sachs's twelve years as director of the Earth Institute at Columbia University, his thirteen years advising the United Nations secretary-general on the Millennium Development Goals, and his recent presentation of these ideas in a popular online course, The Age of Sustainable Development is a landmark publication and clarion call for all who care about our planet and global justice. April 22, 2015 | Jeffrey Sachs, Director of The Earth Institute at Columbia University, argues that attaining sustainability is our highest priority and outlines the best ways to reach that mighty goal. The Age of Sustainable Development-SD [MUSIC PLAYING]strongb> Rimjhim Aggarwal: My name is Rimjhim Aggarwal. And I am an associate professor at the School of Sustainability. And it's my great honor to warmly welcome you to this lecture, which is a special edition of our Earth Day Wrigley Lecture. So first of all, happy Earth Day, everyone. [APPLAUSE] So this is part of our Wrigley Lecture Series. The Wrigley Lectures are funded through the generous support of Julie Ann Wrigley. And it brings together world-renowned thinkers and problem solvers to come to campus and engage with our community in addressing sustainability challenges. The Wrigley speakers are chosen by a committee of sustainability scientists, faculty, graduate, and undergraduate students, and the GIOS staff members. And these visits stimulate our efforts in sustainability research and education to ensure that our programs meet the needs of the changing world. So the Wrigley visitors offer more than just this lecture. These visits also engage our visitors informally with faculty members, students, and community members in a variety of settings. And the way we frame these lectures is that the speakers in these lectures are meant to encapsulate their life's work So while I have your attention, I'd also like to advertise the next event we have in the series, which is going to be-- our speaker is going to be Dr. M. Sanjayan, who is the co-host of the new PBS series called EARTH A New Wild. And so I hope we'll see most of you there as well. So more now on to this particular lecture. For this particular lecture, we would like to thank the Sandra Day College of Law for co-sponsoring today's special night. And after the lecture, we invite you to meet Dr. Sachs at a reception and a book signing in the hall outside the auditorium. And now I'd like to introduce David Gartner, who is the Associate Dean of the Sandra Day O'Connor College of Law. David co-directs the Center for Law and Global Affairs and is a senior sustainability scientist. He was instrumental in bringing Dr. Sachs to our campus and will now introduce our very special guest, Dr. Sachs. David-- [APPLAUSE] David Gartner: Thank you. And thanks, everyone, to coming out. It's terrific to see you here on this Earth Day. it’s really my pleasure to introduce Jeffrey Sachs. He is currently the director of the Earth Institute at Columbia University, where he is also the Quetelet Professor of Sustainable Development, a professor of health policy and management. He is, in addition to all those roles at Columbia University, a special adviser to the United Nations Secretary-General Ban Ki-moon on the Millennium Development Goals and is indeed very involved now in their successors in defining and hopefully achieving the Sustainable Development Goals, which he'll talk about some today. He's the director of the Sustainable Development Solutions Network and a co-founder of the Millennium Promise Alliance. While doing all of those things, he's also managed to write three different New York Times bestsellers in the past number of years, including The End of Poverty, Common Wealth: Economics for a Crowded Planet, and The Price of Civilization. His most recent book is actually available outside. It's this. It's The Age of Sustainable Development. No less an authority than Edward O. Wilson of Harvard University called this book, The Age of Sustainable Development, "my candidate for the most important book in current circulation." Above all, though, Professor Sachs is one of the leading voices in the fight against poverty and disease around the world. And I know directly that his work in making the case for a comprehensive response to AIDS around the world and to other diseases has literally transformed the lives of millions. So please join me in welcoming Professor Sachs to Arizona State University. [APPLAUSE] David Gartner: I just have one housekeeping. [APPLAUSE] One quick piece of housekeeping-- as you see, there is space for questions. If you can, write them, and pass them to the center aisle at the end of Professor Sachs's talks. And that way, will be some back and forth at the end. Jeffrey Sachs: David, thank you very much. And wonderful to be here. I always wanted to be a law professor. So here I am in this great room. Do I get to call on you also? But also with these judicial benches behind us, we feel we're being judged. And that's good, actually, because we should imagine the guardians of the earth sitting up on the bench there, judging our generation. And it isn't moot court. It's real court. It's the real world. And it's a big problem. And that's what I want to talk about-- what we're going to do now, how we can get better organized, how in this complicated world which agrees on very little, maybe we can agree on some basic, important things that we need to do to make the world a little bit more habitable and safe and safe for future generations. And that's, of course, what I like to call sustainable development. That's the main concept that I want to discuss. It's the purpose of this new book to try to emphasize why this is a very useful concept and a very challenging one. It's also, importantly, I hope, going to be the organizing principle for global diplomacy in areas of economics and social and environmental policy for the coming generation. This year, the UN member states are deliberating, as David just mentioned, on a new set of goals, which are tentatively called the Sustainable Development Goals, around the idea of a global consensus that sustainable development is the right organizing principle for what we have to do in the coming generation. And we're almost there to make some progress to have these goals adopted this September. So I want to talk about all of that conceptually and practically and leave enough time for a good, hearty discussion on these issues as well. So what is sustainable development? It's actually a useful starting point to define the term because the term has been around as a piece of our jargon now almost for 30 years. In 1987, Gro Harlem Brundtland, a wonderful leader of our time, who was Prime Minister of Norway-- and then I was very lucky to work with her when she was Director General of the World Health Organization. She chaired a important commission which carries her name-- it became known as the Brundtland Commission-- which really put the idea of sustainable development on the world's map. But at the time in 1987, when the Brundtland Commission issued its report, the idea was stated in a kind of intergenerational sense that sustainable development means the current generation meeting its needs in a way that will allow future generations to meet their needs. And that became the famous definition. Not so easy to use, actually. And it's a definition that didn't exactly catch on. And sustainable development has floated in global diplomacy. But it hasn't grabbed us, I would say-- grabbed at the heart strings. And my hope is that it will do something more in the coming years. It's morphed as an idea. And I want to talk about it in a somewhat different context from this intergenerational context. What's happened over time is that sustainable development has come to mean two different things. One is an analytical approach to global problem solving. And that's the use of the term that we at the Earth Institute, for example, at Columbia University, started by none other than President Michael Crow, importantly to emphasize-- and he hired me, I have to tell you, at Columbia, when I came from Harvard to Columbia in 2002. Then he departed for sunnier climes here. But at the Earth Institute, we use the idea of sustainable development as an analytical concept that says that a proper understanding of the world economy, geopolitics, social dynamics, and environmental and technological dynamics requires an integrated, holistic vision of systems analysis, where we have to understand how natural, technological, and sociopolitical systems interact. So the idea of sustainable development, in that sense, is a method of global analysis that studies the interaction of human, natural, and technology-built systems. At the UN, it is coming to mean something slightly different but also holistic. And that is that sustainable development is coming to mean a framework, an ethical or moral framework that takes a holistic view of economic, social, and environmental objectives. And this is really the sense of the term that will be used this year in adopting sustainable development goals. So sustainable development, in this sense, means that the world as a whole and the member states and the substate units, metropolitan areas and cities, within the UN member states should take a holistic approach to economic, social, and environmental objectives. And actually, an interesting case in point came today. New York City on Earth Day unveiled its new plan for sustainable development, called OneNYC to emphasize what Mayor de Blasio called the "tale of two cities," rich and poor-- that we should have one united city that is socially, economically integrated and one strategy that bridges economic, social, and environmental objectives. And if you look online today, I think it's actually quite an interesting plan that has been put forward. It's a plan that, in the New York City context, actually has four dimensions as they've defined it-- economic development, social inclusion, environmental sustainability, and resiliency. So resiliency has been separated from sustainability. But resiliency to storms, rising sea levels, and other environmental hazards. Well, at the UN, the term is being used as an embracing vision of combining economic, social, and environmental objectives. And that's the sense in which the Sustainable Development Goals are being negotiated this year. So there actually are three big summits-- well, big, aspirationally. Whether they turn out to be big or not remains to be seen. But there are three important meetings this year to try to set a new agenda of sustainable development in the global context. And at the core of them is a meeting in September, September 25 to 27, in which the world's heads of state and government-- probably the largest assemblage of heads of state and government in history, I would guess 170 or more leaders-- will assemble at UN headquarters on the 70th anniversary of the United Nations, actually, which this year it is, to adopt sustainable development goals. And this process has now been a process of negotiation over the last two and a half years. It is not easy to negotiate, by the way, with 193 governments. And we're not done yet. But I'm sure that every hour, minute, and second will be used well until that final moment to reach an agreement on a global framework of sustainable development. And these will be adopted on September 25, which will be a very interesting day, actually. The General Assembly will have almost all of the world's leaders there. And the opening speech will be Pope Francis, which will be quite interesting, speaking to the assembled leaders about their moral responsibility to each other and to future generations. So I think it's going to be quite a notable moment in our modern history. That meeting is going to be bracketed by two other summits. The one that you've probably heard most about will happen about six weeks later in Paris. That will be the 21st attempt to implement the climate treaty. So in 1992, at the Rio Earth Summit, we adopted the UN Framework Convention on Climate Change. And that went into force in 1994. And the first meeting of the parties to that convention, the Conference of the Parties number one, COP 1, was in Berlin in 1995. So now we're entering COP 21 in Paris in December of this year. This is the 21st attempt to reach an operational agreement on how to do what the world agreed to do back in 1992. And that is to stabilize greenhouse gases in order to avoid dangerous anthropogenic interference in the climate system. So the UNFCCC, the UN Framework Convention on Climate Change, is quite a nice treaty, actually. When you read it, it's quite sensible, and it says the right things. And it says that rising greenhouse gas concentrations are threatening human instability through anthropogenic climate change. And we need to stabilize the concentrations of greenhouse gases. And we've been trying to do that for 20 years now. And all eyes are on Paris this year as a special moment, actually. And I would say, not only to be hyperbolic about it or histrionic about it-- I'd say it's our last chance to do what governments said they intend to do, which is to avoid warming above two degrees Celsius. That was a standard that was based on the advice of the Intergovernmental Panel on Climate Change that was adopted at COP 15, which was the meeting in Copenhagen in 2009. And interestingly, in 2009, all eyes were on Copenhagen like will, I hope, occur in Paris. But of course, the Copenhagen Summit, which had huge expectations, failed because strangely enough, there was no good reason for those huge expectations. Everybody just assumed that since President Obama was now the president of the United States, and George W. Bush was gone that something good was going to happen on climate change, good in the terms of reaching an agreement. And when the parties got there, they didn't agree. And there was a famous picture in the last minute of all these heads of state huddled over a table, trying to agree. And basically the meeting broke up. And in the wisdom of the international system, they said, my god, we failed to reach an agreement. This is an utter global emergency. So we absolutely promise we'll reach an agreement in six years. [LAUGHTER] That's what they said. In fact, they said, we will reach an agreement in 2015 that will go into force in 2018 to begin implementation in 2020. That's the path that we're on right now. So the goal is to reach an agreement that really begins operationally January 1, 2020, maybe with a few measures beforehand. This is tough. And I'll describe in a few minutes some of the reasons why, in my experience and in my opinion, it's the hardest issue that humanity has ever grappled with, not because it's intrinsically unsolvable but because it's global and long-term and filled with science and scientific uncertainty and vastly different costs and benefits across the world and a lot of misunderstanding. And so it's not easy to get a global consensus. But you can see if we fail now and say we're really going to do it in 2022 to go into force by 2025, actually, quantitatively we blow the two degrees C limit with any chance at all. Many people say it's already gone. It's close call. But in any event, we're up against the wall. Now, before the September meeting is a third summit. And that is on financing for sustainable development. The idea is that we need-- in order to achieve goals of sustainable development, we need financial system change for a couple of reasons, two huge reasons. One is that the current financial system obviously finances a lot of unsustainable investments. In fact, it's very good at that. And we have a kind of economic juggernaut which does not satisfy the criteria of sustainable development that is well-financed internationally. And part of the challenge is, what kinds of financial system regulatory changes could push the allocation of world savings in a sustainable direction? The second sense of this meeting in July, which will take place in Addis Ababa, Ethiopia, also at the summit level, is to finance the challenges faced by the world's poorest countries because on almost any accounting, if you do the accounting properly, the poorest countries cannot achieve sustainable development in the sense that we're talking about of ending poverty, achieving social inclusion, achieving access to health and education and other critical needs, and moving to safe, sustainable infrastructure. They can't do it on their own. And they can't do it through private financing alone. And so one needs a system of state-to-state financing to help implement that. Well, if there's anything less popular in the world than foreign assistance, I haven't found it yet, especially in our country where this is among the least popular things to do. And therefore, this July summit, which is just basically weeks away, is still hugely uncertain in what it can actually accomplish. I'll say a few more words about that. But before I do, I want to emphasize, why does this matter now? In a sense, sustainable development could have been viewed as the challenge hundreds of years ago or 50 years ago or 25 years ago. But I do want to argue that really our backs are to the wall right now. And that's simply a matter of scale, that a lot of the issues that we confront now we might have foreseen to be coming. And indeed, the first true sustainable development conference, though it wasn't called that, was 43 years ago in Stockholm, which was the first Conference on Environment and Development, which posed the problem of how to reconcile economic development and the environment. And some of you may recall or may have looked at-- a few of us in our generation will recall, and some students may have heard of or read the book Limits to Growth. I will date myself by saying it was the first economics book I was assigned as a freshman in 1972. So it had just come out. It was the year of the Stockholm Conference. I was taking introductory economics. We were given the book Limits to Growth, which said that geometric growth on the planet would reach certain limits that could be overshot and then lead to environmental or resource catastrophes. And I was given the book. And we were then told by my professor, this is nonsense because this was done by a team at MIT, and we were at Harvard. [LAUGHTER] So it was patently nonsense. And I was told, this was done by engineers who don't understand anything about economics because there's no prices in this model. And if there were prices, they'd know that scarcity would raise the price and cause us to shift to something else. And so there can't be overshooting. And this is all wrong, but we wanted to show you what kind of silliness they produce at MIT. That's literally what I was told as a freshman. And I believed it for a long time. And then, over time, I came to question that analysis. And over a longer period of time, I came to really admire the book because it's a terrific book, really a great breakthrough actually. And it got a lot right in that we have had geometric growth, more or less at the rate that it forecast back in 1972. And we are reaching some very important and threatening boundaries, though not exactly the ones that were identified back 1972. So we are here today because 40 years ago or 43 years ago, we said, don't worry about it. And then in 1992, 23 years ago at the Rio Earth Summit, we negotiated three wonderful treaties, actually-- one on climate change, second, the Convention on Biological Diversity, and third, the UN Convention to Combat Desertification. Terrific treaties. Really well done. Good drafting. Adopted by all the world's governments. Signed by President Bush, Sr. at the time. Two of the three were ratified by the US Senate, the climate change treaty and then the one you never heard, of combating desertification. Maybe in Arizona you have heard of it because you have a lot of deserts. But we never heard about it in New York again. And the third treaty, the Convention on Biological Diversity, was turned down by the Senate because Newt Gingrich argued, to the satisfaction of his colleagues, that protecting biodiversity violated property rights and that if you have a private the piece of land, you have every right to destroy whatever species you have on it. And that is the settled view so far of the United States. We're not party to the Convention on Biological Diversity because of that. Well, that was 23 years ago. In 2012, we had another summit. So that's how the UN does it, basically-- on anniversaries. And that was the 20th anniversary of the Rio Summit, so it was called the Rio+20 Summit. And it could have been called the Stockholm+40 Summit. And at that time, it was realized, we haven't implemented any of those treaties. Not one of them has even changed the needle, I would say-- maybe a tiny bit but really not. The biodiversity is being lost at a rate that is considered to be around 1,000 times faster than the background rate of the pre-industrial earth. And the climate change has continued to accelerate. And desertification, or more generally, land degradation in dryland parts of the world, has continued to spread. And so in 2012, Nature magazine, which is one of the two world-leading weekly scientific journals, did a report card of these three treaties-- F, F, and F, three failures. And that's when the government said, this is a bit of a disaster. We need to put sustainable development higher in the public view. And that's when they set 2015 for that date which happened to coincide with the date for the climate agreement. And then finance was added on. That's why we have three summits. Now, if we lose this chance, we're not going to have this again for a long time. The multilateral system is pretty shaky. And the climate convention is semi-moribund, according to a lot of people. And so if we go past the 23 years and we still haven't begun to implement it, we could lose entirely the will to do it. So I believe it's a big deal. Now, scale-- scale is we've lost all this time. But one thing that has happened during this period is that economic growth has continued at its geometric rate. The world economy grows 3% to 4% per year, pretty robustly. Even with the 2008 financial crisis, even with all that you hear about the shaky recovery and so on, the world as a whole has robust economic growth, I would say. I'm not too worried about that because the key to how to achieve economic growth in developing countries has been unlocked, more or less. And that is, roughly a market system, roughly taking foreign direct investment internationally, upgrading technology. There's enough space for catching up to the front-running economies that poorer countries have a lot of momentum right now in relatively fast growth. India grows at about 7% per year. China's growing at about 7% per year. That by itself is 2.7 billion people. That's almost 40% percent of the world's population. Africa these days is growing at about 5 and 1/2% per year. I'd like to see it grow even faster because it's starting from such low levels of income and such high levels of poverty. But this means at 3% to 4% global growth, the world economy is doubling every generation. Something that grows at 3% per year doubles every 23 years. At 4% per year, it doubles every 17 and 1/2 years. And so we're roughly at a 20-year doubling rate. And we've been doing that for a long time now. And this is basically the problem, which is that the human enterprise-- now 7.3 billion people and an average output per person on the planet now of about $13,000 per person, at least tenfold relative to the pre-industrial level and by some measures much more than that-- has become so big that we really are up against the wall in terms of the planetary environmental consequences. So I like to say-- and I think it's true-- it all started with this. If one goes back in the history, before this came along, there was no geometric growth. It wasn't even possible. And then in a workshop in University of Glasgow, James Watt came up with the first efficient steam engine. And all history changed. And the picture of world output as reconstructed by the best macro historians looks something like this, which is that for thousands of years, actually, at a world scale, world output was barely changing. And people lived everywhere uniformly at subsistence levels of income, just near the starvation level. And in bad years, starvation would come with famine. Population didn't grow very much because limits to food production kept the population stable, as Malthus had pointed out in 1798. And so for as long as one could imagine, world output didn't change very much. Then came Mr. Watt and his steam engine. And that unlocked the capacity to do massive amounts of mechanical work. Mode of force was no longer limited to a few water mills or windmills or wind in sails or animal traction. Now fossil fuels could power the world. And we've never looked back. It's been geometric growth since that point. And we've had waves of technology, so-called long waves or Kondratiev technological waves that have built on each other, starting with the steam engine, then rail, then internal combustion, then gas turbines, electrification, aviation, then probably the fifth great technology revolution we're still living in, and that's the computational and digital revolutions that started in the 1930s. And that through Moore's law with semiconductors has taken off from integrated circuits of 1959 till today that has powered this so-called fifth technology wave. And the world output as a whole had that picture of instead of being flat, now we have, in a historical scale, basically just skyrocketing economic output. So we've reached 7.3 billion people on the planet. That's 10 times more than when Watt invented his steam engine. We've reached $13,000 per person per year on average output. That's at least 10 times more than before the steam engine. We've had at least, therefore, two orders of magnitude or a hundredfold increase of human economic activity that's measured in the marketplace. And the size of the planet hasn't increased at all. So that's the problem. You have massive growth that continues on a finite planet. And actually, that was an observation that Thomas Robert Malthus made back in 1798 that all geometric processes-- he was talking about population, but one could say growth in general-- are challenged by the finite ecosystems and finite resources. So we escape from that finitude by technological advances, which allow us to use resources potentially more efficiently or mine resources even more intensively and therefore approach the limits even faster. That's part of the choice. But in our time, we have another one of these geometric curves that's even faster. That's, of course, Moore's law. We went from one transistor on the silicon chip back in 1959 to 5 billion on the chip last year in Intel's most recent microprocessor. That continues to allow economic growth to be at this generational doubling pace. And now growth can be so extraordinary if you're catching up that this is really the image of growth. This is a bucolic village of China, southern China. Some of you may have visited this place. It's just north of Hong Kong. It was 23,000 people in rice paddy farming in 1980. And that's what it is today. That's impressive, isn't it? It's now 25 million people and really exemplifying how China as a whole has had a 30 time increase of output since 1978. So that's the success of economic growth. That's the part I'm supposed to worry about. It's not the biggest worry in the world. We know how to have economic growth. The problem is what its implications are and how to make economic growth compatible with our other needs and objectives. Now, the good news is that rapid economic growth has meant a very, very rapid decline of poverty. And I wrote a book 10 years ago called The End of Poverty, where I said, basically, geometric growth allows you to say with some confidence that extreme poverty can be eliminated in our generation. And I said, the part that got all the notice about that book was that we should give it a little bit of a helping hand with some foreign aid for the places that are really trapped at the bottom. That got an explosion of debate over the next 10 years because I have learned in my life that there is no amount so small that we will not deny to the poorest people. This is just a human reality, unfortunately. But the fact of the matter is we are capable of ending extreme poverty in our generation. And we're on the path, actually, to do it. And the nice thing-- and I'm very happy about it-- SDG number one, that will be adopted in September, will say what I asked it to say 10 years ago-- end extreme poverty by a date, certain by 2030. I said it could be done by 2025. The UN General Assembly will adopt 2030 as the date for ending extreme poverty. What does extreme poverty mean? It means, really-- it's the definition given by the World Bank of living below $1 a day. It's actually $1.25 a day. It's actually $1.25 a day at international prices, in 2005 dollars-- don't worry about it. It means being so poor that you're hungry and that you don't have health care, or your water's not safe. Your house isn't safe. And every day is a struggle for survival. And that's the kind of extreme poverty that could be ended, and economic growth is helping us to do that almost everywhere but not everywhere. And I want to put a thumb on the scale to make sure that it happens every place, even the toughest places on the planet. But economic growth is not sustainable development. That's the main problem we face. It's not sustainable development because sustainable development means combining economic progress, social fairness, and environmental sustainability. So if you buy that concept which I am trying to sell you, then you ask, is the economic growth fair? Is it reaching enough people? Is it excluding large parts of the population? Is inequality rising sharply, like it is in the United States? Should we do something about it? And is it environmentally sustainable? Can we keep this up on our finite planet, more of these doubling, doubling, doublings? And the answer is, no, not the way we're doing it. So we don't have sustainable development. We have the economic growth. That's not entirely surprising because almost every government in the world is oriented towards economic growth, not towards sustainable development right now. What's the purpose of most governments? It's to raise the national income but not necessarily to ensure that's all parts of society benefit, much less to protect the natural environment. So I'm going to hurry to the bottom line of the environmental challenges. Remember that curve of world output, everything flat for 1,800 years from 1 AD to Mr. James Watt? And then the curve turns up. Well, this is another curve that looks almost exactly the same and not by coincidence. This is the curve of carbon dioxide concentrations in the atmosphere. So it was nearly flat at around 275 molecules of carbon dioxide for every million molecules in the atmosphere, 275 parts per million, flat for the 1,800 years shown here-- actually, flat for hundreds of thousands of years or-- that's not quite right-- for tens of thousands of years. And then it turns up. It turns up because of Watt's steam engine. Because once we started burning carbon, which is coal, then the CO2 rises in the atmosphere. The problem with this is that carbon dioxide, like a few other gases, is a greenhouse gas, meaning that it is essentially a heat-trapping gas that warms the planet as the concentration rises. And I was speaking with Professor Lackner here earlier. This, while it's challenged as some new hypothesis or by Senator Inhofe as a hoax science-- the guy that brought the snowball into the Senate-- it is unbelievable, our Senate, by the way, only rivaled by our Supreme Court, I have to say, our current Supreme Court. We're in the Sandra Day O'Connor building-- but our current Supreme Court. Where was I? [LAUGHTER] Yes. This idea of this being a greenhouse gas has been known for at least 150 years because it was recognized already in the middle of the 19th century that carbon dioxide absorbs infrared radiation, which the earth would normally radiate to space and when it's absorbed by the carbon dioxide, warms the planet like a blanket around the planet in some sense, which the atmosphere is. And a very brilliant Swedish chemist, in 1896, with paper and pencil and certainly no computer at the time, worked out by hand what a doubling of CO2 would mean for warming up the planet because it was already possible to do that, knowing that here's what carbon dioxide-- how carbon dioxide absorbs infrared radiation. And then you look at the heat balance of the incoming solar radiation and the outgoing radiation from Earth and Svante Arrhenius, Nobel Laureate, worked out that this would mean something like 3 degrees Celsius rise of temperature of CO2 doubled. Brilliant. Unbelievable genius. But he got one thing wrong, actually, in that article. He said this will take 750 years. Because he got the economics wrong. He got the physics perfectly right. But he didn't factor in Deng Xiaoping, the rise of China, the geometric growth. And what he said would be 750 years is going to turn out to be 150 years. He wrote in 1896. And we're going to have roughly a doubling of CO2 on the current path unless we change course by 2050, by mid-century. That's the problem. And the problem is this is going to lead to a mess. It's going to lead to-- we know now from recent papers, including from my colleagues at the Earth Institute, that you're in the epicenter of mega droughts for the 21st century if this doesn't get under control. But every part of the world potentially is going to experience massive dislocations at some point. And this concept, which I recommend, of planetary boundaries therefore comes into, I think, usefulness. The idea of the ecologists that put forward this concept is that not just in one way but roughly in 10 ways that they identified, we're pressing against earth limits. We're pressing against boundaries in ways that could lead to really sharp, adverse, highly nonlinear responses. Climate change is one of them. We could disrupt a lot of the food systems and water cycle and storm systems and weather patterns in ways that we've never experienced as a species and that could come quite quickly. And going around that circle, they identified many other areas where there are really potential serious dangers. Ocean acidification comes from the same carbon dioxide dissolving in the ocean. And the estimate is that the oceans are now 30% more acidic than in the pre-industrial state. That's a reduction of pH of 0.1 unit. So 10 to the 0.1 or 26% increase of proton concentration. Nitrogen and phosphorus polluting waterways around the world. We put on a lot of fertilizer-- about 150 million metric tons, about 100 million metric tons of nitrogen, approaching 50 million metric tons of phosphorus-- to grow food for 7.3 billion people. And that runs off to the estuaries. And we have dead zones in the Gulf of Mexico that you know about 200 miles long. But now it's been observed that about 130 major estuaries around the world have that kind of poisoning. It's happening everywhere. Today there was a story about the rapid expansion of China's meat consumption as China's gotten richer. So China has dropped its official policy of food self-sufficiency because it's importing massive amounts of feed grains now to grow meat for an increasing meat diet. That, of course, is leading to deforestation halfway around the world. But it's also meaning this massive pressures that agriculture is putting on-- sorry, putting on-- oops! I'm going to stop there. [LAUGHTER] And going around the circle, fresh water depletion, something you know about very well here. Change of land use, meaning deforestation especially. Massive loss of biodiversity. Massive aerosol loadings, small particulate in the atmosphere from burning of biomass and other kinds of combustion. And then chemical pollutants. And we see the damages everywhere now if we notice. And actually, most people are really noticing. We had our super storms, which definitely were exacerbated by a sea level that's already about a third of a meter higher on the East Coast of the United States than 100 years ago. So the storm surges and the flooding was much more severe. And when Klaus was my colleague at the Earth Institute-- we have another Klaus as a colleague, Klaus Jacob, who's a wonderful urban infrastructure engineer. And he was saying to the city for 10 years, we're going to have massive flooding, massive flooding, massive flooding. You should do this, that-- of course, nothing was done because that's how we operate. And he was also petitioning his own city-- please help me raise my house a bit to reinforce it because when floods come, my house is going to get damaged, and indeed, his house got hugely damaged in this flood. Poor man. Because had said everything exactly right of what was going to happen down to which subway stations were going to flood. And New York City-- we like to think of it is semi-sophisticated, but don't be too sure-- they had the backup generators of the hospitals in the basements, honestly. So in the middle of this hurricane, they were evacuating patients from the ICUs. And that, to my mind, is exemplary of our lack of preparedness on all of these fronts. Massive air pollutants out of a window in Beijing. Massive flooding-- because in certain parts of the world, because the atmosphere holds more moisture as it warms, you get a lot more flooding and extreme precipitation. In other places, you get more drying. So the hydrologic cycle is disturbed. But I was in Serbia, actually, the month after this flood. It was their worst flood in 500 years last year. Megafloods in Japan the same way. And droughts all over the world. You know, Sao Paulo is having a massive drought this year. I was in Sao Paulo a year ago. I travel so much for the UN that I sometimes feel when I talk I've been everywhere in the last week, it seems. But it's only just in airports, unfortunately. But I was in Sao Paulo a year ago. And I said, how is this going? They said, we have a megadrought. And I said, what are you going to do about this? They said, shh! I said, what do mean, shh? They said, Jeff, don't say anything. It's the World Cup coming up in June. We can't say anything right now. Don't want to create any unrest. And then as soon as the World Cup ended, then they had their elections in the fall. Don't say anything. And they went actually a whole year with no public policy at all, knowing that the water reservoirs were falling, hoping for rain which never came. Then they put out water cisterns to trap rain. Those became breeding sites for Aedes aegypti mosquitoes. And so they have a dengue fate fever epidemic underway right now, also, on top of all the rest. This is what we call human foresight. This is California, as you know, your neighbor. Actually, there are droughts all over the dryland parts of the world. Arizona's well-represented on this map. And for my concern, the Middle East has been experiencing now 15 years of decreased rainfall. Syria has had its worst droughts in its modern history in the last 10 years. And a couple of my colleagues published a paper showing that the 2006 to 2010 drought was extraordinary on centuries' standard. And that was certainly one of the triggers of hunger and unrest that led to the explosion of violence and then a brutal crackdown by the Assad regime and then a flood of arms coming in from outside, which is what we call a positive feedback, meaning not a good feedback, an amplifying feedback. And now we have a massive war underway. And I wouldn't say that it's only drought that did it. But I would say that drought was one of the conditioning factors that caused this kind of unrest. And Arizona has been in drought, actually, for more than a decade of decreased precipitation. And we know from the historical records and from a paper that-- my colleagues, I mentioned, published another paper in the proceedings of the National Academy of Science-- this region, this state, and the American Southwest are in for megadroughts in the 21st century if we continue on the business as usual climate path, megadroughts meaning decadal droughts because that's what both the tree ring record plus the climate modeling together suggest. And this is a particularly annoying map of the world. This is showing that these are the temperature anomalies for last year, showing that 2014 was the hottest year in the instrument record since 1880. So everywhere where you see yellow or red, it means hotter than usual. I find this especially annoying and worrisome because there was one cold place in the world, which was New York, which is-- we had two miserable winters now, very cold. And all the rest of the world has warm. So anyway, no one quite understands that. But actually, and quite seriously, there is a growing sense that this may actually also be another one of those odd signals. And it's another of our colleagues, Wally Broecker, who's one of the greatest climate scientists and oceanographers of our age, hypothesized already, decades ago, that global warming-- and he coined the phrase, actually, in 1974-- could lead to a slowing down of the ocean circulation system, the thermohaline circulation system, which he also discovered, and that if that happened that that could derange the weather system. And we actually have had a slowing down of the thermohaline. And one theory is that that's leading actually to a high pressure blockage which is now stopping the jet stream from its normal course and causing the jet stream to turn south over the eastern part of the United States. If that's true, it's really annoying because it means we have cold weather for a long time where all the rest of the world is warming even more. So in any event, a lot of climate disruption and a lot of suffering already and a lot of food crises and sociological or societal crises that follow on famines and dislocation. And this is the map from that study that I mentioned. There is one super drought-intensive region forecast for the second half of the century. And that would be just where we are right now, unfortunately. So it really is very worrisome that we have these trends. So to conclude-- what can we do about it? First, probably most importantly, we have to take notice. I have come to the view that our biggest challenge of everything we have is our attention span, which is probably the only truly limited resource we have. And it is really crowded right now. We're bombarded with more bits per second than could have ever been imaginable because we discovered how to transmit more data, probably a billionfold improvement in our capacity to bombard our brains with virtual imagery than ever before. So I think the biggest fight we have is attention, how to get the attention that this is a serious problem and that we have to direct our resources and our technologies to solving the problem. That, to my mind, is the hardest thing of all. So that's why I like the idea of having global goals and anything that says we are agreeing to do something. Because a lot of cynics say, what difference does it make? But my experience is that if we can agree on some bright headline ideas, we can improve our capacity to focus attention on those areas. 15 years ago, the world adopted Millennium Development Goals about fighting poverty. I've been the UN's main adviser on those for the last 14 years. And while we haven't paid too much attention in the US because, thank god, we don't have extreme poverty that way, they played a very big role in other parts of the world. And I'm hoping that sustainable development goals can do the same thing, can at least say, wait a minute. We've got a serious set of challenges. It's our time, our generation, and we have to take this on. So what do we need substantively? And these are the kinds of goals that will be adopted. As I said, number one will be end extreme poverty, health for all, basic health coverage-- absolutely feasible. Educational access-- absolutely feasible because now you can put a solar panel and a monitor and wireless broadband anywhere in the world, in any village in the world, and suddenly you have access to 100,000 free books. You don't need the library. You can have the virtual library. You can have the curriculum and all the rest. So we can do fantastic things if we try. Technically, we have, I believe, four big challenges to become sustainable. The first is to shift to a low carbon energy system and to do that by mid-century. That's not simple because we have grown up-- the whole world economy has grown up on fossil fuels. Without fossil fuels, no modern economy. Period. So between James Watt and Henry Ford and Thomas Edison, we really got on our way. And so we're a fossil fuel world economy. But we can't continue to be and remain safe. But fortunately, we have multiple options for how to address that. We need to move to a low carbon energy system. We need smarter agriculture, again-- information-intensive agriculture-- because agriculture is the number one Earth-changing system. It's the largest single sector for those planetary boundaries. Whether it's fertilizer, water use, deforestation, or greenhouse gas emissions, agriculture comes number one. And a big problem is we're going to add a couple billion people to the planet on our current demographic trajectory. We could probably stabilize at 9 billion. But we're on a trajectory to reach 11 billion right now. And so how to feed a growing planet when agriculture already itself is not sustainable. And that requires massive technological changes. We need smarter cities that are much more efficient in energy use. Again, information technology can allow a revolution in transport, in power, in other urban infrastructure. And then finally, I believe that with information technology, we can make revolutionary changes in health, education, and other social services in ways that can reach everybody in the world and, by the way, dramatically lower our health care costs in the United States as well, if we care to do it. The reason we have the highest cost health care systems is that the health lobby and the health industry wants it that way, not because it has to be that way. So we could make a massive transformation and, just in this country alone, save hundreds of billions of dollars, and ICT could enable us to do that. So that would be my four-point program. And I was going to go through some details of that. But I've really exceeded our time. Except to say that if you look closely at any of these challenges, they're absolutely within reach. And they're not even so costly. It's hard to make the case that getting climate change under control would cost more than 1% of world output per year, maybe 2%. But it's hard to reach even that level. We'll be much better than that. Most estimates say between 0% and 1% of world output. That's a good bargain for saving the planet. And it's consistent with still continuing sharp increases of living standards. So there's nothing about these challenges that stops development, that prevents us from ending poverty. But it does require us to put some resources aside, both to invest in the underlying science and technology and to spend a little bit more upfront for more sustainable energy systems so that we don't bear the cost later on of the explosive changes from climate change and other disruptions. But it's not like 10% or 20% of our GNP, or it's not like the end of the economic progress. It's actually ridiculous how small the costs are compared to the gains in well-being and in safety. And it finally comes back, again, to this question of attention span. And I'll end here. I like very much what Pope Francis said a year ago when he said that the biggest crisis on the planet was what he called the "globalization of indifference," which strikes me as exactly the right definition, which is, we just aren't paying attention. If we paid attention and if the students here and-- because you're going to be the ones leading this-- do the good homework, the careful costing, the research, the systems design, the demonstration projects, and so forth-- if we're given the chance to do this, we're going to find that it's all within reach. My own profession, I think, should be on its way out in the 21st century-- economics-- because basically we don't have an economic problem like we did in 1800 or 1900. We don't have a scarcity of goods, actually. We have a scarcity of good choice. We have enough goods for and enough technology and enough know-how. So if there is a scarcity, it's our attention scarcity. If there is a crisis, it's not an economic crisis. It's a moral crisis. And I do believe-- and I'll end here with one more point-- universities have absolutely a special responsibility in this. And they have a special responsibility for four reasons that I want to conclude on. One is education, of course. That's our business. And education about sustainable development, I think, is absolutely crucial. These are new problems that are not well-understood. The closer you get to Washington, the less understood they are. [LAUGHTER] Once you're in Washington, you're in a veil of complete ignorance, 100%-- actually, just on the Capitol, I would say. Because they're paid to be ignorant. They're really paid by their campaign contributors to be ignorant, which they are, willfully so. Most people kind of understand things, that we're in trouble, but we need good education. Second, we need research and systems design. So we need to find the direct pathways to a low carbon energy system or to a sustainable agriculture. We need to help organize social outreach. So I like universities as hubs for multi-stakeholder brainstorming. Can the university call its congressional delegation. Let's have a conference. Let's meet-- scientists, politicians, civil society-- to discuss these issues because I think that is a unique role that we can play. And the fourth point I'd like to say is that the universities, I believe, have a special-- limited but still special-- capacity to keep a moral purpose because most of our society is taken over by money impulses everywhere. Our politics are completely for sale. Market forces have driven themselves into almost every nook and cranny, including the universities, of course. But the universities have a little bit of buffer, a little bit, where we have a longer perspective and where we say that we're not driven by pure business but actually driven by the common good. And I think that is a stand that we need to take. Thank you very much. [APPLAUSE] Jeffrey Sachs: Great. David Gartner: In the middle aisle-- Jeffrey Sachs: Good. OK, we're going to take-- David Gartner:Whatever you prefer. Jeffrey Sachs: Oh, well, let's sit. David Gartner: Let's sit. Why not? I'll just give you some water. Or no. Jeffrey Sachs: Yeah, yeah. I would take a little bit. Great, thanks. David Gartner: So if people could pass their questions to the middle aisle, they'll collect them and pass them down. And I'll just start with a couple in the meanwhile. David Gartner:First, Jeff, I wanted to ask you about your aspirations for the Sustainable Development Goals. So you were centrally involved in defining and indeed achieving many of the Millennium Development Goals. And by most accounts, they were dramatically more successful than I think most people would have anticipated But I wonder whether those same conditions hold today for the Sustainable Development Goals. So let me offer a few reasons to wonder and then get your reaction. So one is that the Millennium Development Goals were quite specific. And it looks like, at least by the latest iteration, the Sustainable Development Goals will be less specific in terms of their targeting because governments resist binding themselves to very specific targets. A second is they came at a moment of time at which the wealthiest countries in the world, the G8, had a bigger role in the world economy and a bigger sense of themselves as responding to these challenges than perhaps they do today with the G20 ascendant. And lastly, as you mentioned in your talk, the sustainable dimension is in some ways more complex. And certainly, the will around them is more complex and perhaps more limited. So given all of those dimensions, what makes you believe these Sustainable Development Goals can be as powerful or perhaps more powerful than the MDGs? Jeffrey Sachs: When the MDGs were adopted-- these Millennium Development Goals were adopted in September, 2000-- my guess is that almost nobody thought that they would have staying power beyond that photo opportunity of the world leaders standing at the Millennium Summit. And Kofi Annan asked me to advise him on the Millennium Development Goals in 2001. And I remember at the time, many people said, first, what? What are those? And, why would you do that? And, aren't they so arbitrary? Because they were arbitrary to some extent, exactly the way they were stated. And I wouldn't say they changed the world and turned everything upside down, and all problems have been solved. But they did have a certain staying power over a period of 15 years. And they're known today and talked about today. And they're a big motivation for the Sustainable Development Goals. People found them useful. People found them-- actually, the idea of fighting extreme poverty-- interesting, worthwhile. Groups got organized around them. So something took hold that meant that these goals were useful to have as goals. And I think the same thing can happen with the Sustainable Development Goals. For all the reasons I've said, I do believe this is our generation's big challenge-- sustainable development because we reach the boundaries, our generation. Two generations ago, the challenge was saying, you're going to reach the boundaries in 40 years. And here we are. So it's our turn. Most people get it, actually. Most Americans get it, though our politics would never show it. But most Americans-- if you ask, is climate change is a problem? They say, yes. Will it affect how you vote? Yes. If they would vote-- [LAUGHTER] --that would be good. That would also help, actually. But this is, I believe, why this can count because if we get there to these goals, I think people will take notice. Now, I'm not too happy with some of the dynamics of this. There are 17 goals on the list. I think if Moses had come down with three tablets rather than two, they would've said, go back up and renegotiate. 10 is a lot. 17 is really a lot. I pointed out also that 17 is-- the only thing I think I know in nature that has 17 is the locust cycle-- 17 years. So I don't even like the number, actually. But it got locked in in this intergovernmental negotiation. And now they're saying-- and I've tried to show, you could take those 17 and make them 10, fit on the two tablets, by using the word "and," for example. [LAUGHTER] They have one goal, which is, protect marine ecosystems. And the next one is, protect terrestrial ecosystems. Aha! Protect marine and terrestrial ecosystems. Who would notice? But the governments now are running the show, which is right-- not the bureaucracy, not the Secretary General, still less an adviser to this process. So the governments have said, stay out of this. We agreed on 17, and we're not touching them. So that's a downside that is a worrisome thing. It's even more worrisome that each of these goals has roughly 10 targets attached to it. So we have 169 targets on this list. I don't think this is the endpoint of this process. But it's difficult. Negotiating with 193 governments is difficult. I'm not losing hope, though. It's going to be simplified somehow. People are going to say, yeah, that kind of makes sense. And my real dream is that the fifth grade, young girl in Accra, Ghana, and the little boy in Dar es Salaam, Tanzania, and the young person in Jakarta will be writing their school essay, what does sustainable development mean for Indonesia or for Tanzania or for Ghana? and that it will become part of our imagination and part of our idea that we need to solve problems. David Gartner: Thanks. So a fourth dimension in your book that you touched on a little at the end is governance. And it's central to your answer to that last question. And it's actually one of the questions from the audience. What changes to the current global governance system do you believe are necessary to effectively adapt to the challenges of the future? Jeffrey Sachs: First, could people raise their hands that asked the question just so I could see? Thank you. Good. Jeffrey Sachs: I have a plan to get rid of Congress. [LAUGHTER] Jeffrey Sachs: I actually believe-- I do believe that if we were in 1789 but we all had smartphones then, the idea of Congress would not have been the way it is right now, which is that we could represent ourselves much more effectively. And so I do believe information technology can really change governance. I am a technophile, as you can see. But I do like the idea that we would all deliberate online, that we would crowdsource our legislation, that when legislation is being considered, it wouldn't be considered in some back room, but it would be posted online. It would basically be wiki legislation so that we would get that organized. And then we would have columns where experts would write, you know, section 5.2 is really important for the following reasons. And then someone could respond. And we could read the debates also in a very open way. And so I think we do need quite a change of governance. Of course, our country, politics has become utterly unmanageable because of the money involved. It's one of the most corrupt systems I can see in the whole world now. And when you say that this election is going to be $10 billion or $15 billion spent-- And yesterday, there was an article in the Financial Times that each Republican candidate has some billionaire behind them right now. And definitely, Hillary's out to raise $2 billion or 2 and 1/2 billion dollars. It's absolutely mind-boggling. They're so bought by the time they get to the White House, it has nothing to do with us. Absolutely nothing to do with the public. So this is what bothers me about the governance. There are three things. One, attention-- what are we focusing on? That's why I think we need clear goals. Second, expertise-- we need different ways of solving problems because government officials are not the ones that have the technical expertise. So we need ways to have universities, business, civil society, and government engaged in problem solving in more sophisticated ways than we do right now. And third, we need true representation, not money representation, because the money representation is wrecking us. There's nothing wrong with the American people. But there is something wrong with 100 billionaires driving the political process. And that's what we have right now. [APPLAUSE] David Gartner: As a technophile, you'll like this next one. Does technology save us? Jeffrey Sachs: Maybe. So the issue with technology is-- who asked the question? Hi. So the issue with technology is two things. Almost every technology-- three things. [LAUGHTER] Almost every technology can be used for good or for bad. So that really is a problem. When you think of the internet, well, we have the most sophisticated spying imaginable or cyberwarfare. Or we could actually use it for universal access to health and education. So technology by itself doesn't save us. Technology empowers us, but which way it empowers us is still a moral choice. It's an ethical choice. And so that's one problem. Technology could save us. Second, I like the fact-- I think we all should like the fact that the cost of photovoltaics, for example, has fallen a hundredfold relative to 40 years ago. And that's why Arizona can have mega solar fields at this point and why solar rooftop systems and so forth are becoming absolutely economical. That is absolutely great. But the technology of exploring for hydrocarbons has also improved phenomenally. The technology for developing hydrocarbons has also improved phenomenally. I was on a panel recently with the vice president of Shell, who was talking about their floating liquefied natural gas ship, which is a marvel of technology, by the way. It's the largest vessel ever built. We don't know what Noah's Ark's size was, but this is like eight football fields. And it allows you to go over any methane deposit, drop down your pipe, drill for methane. You don't have to bring it back to the shore. And you liquefy it on deck, and a big tanker comes along and sends it to China. It's perfectly terrifying, actually, from a climate point of view. And so technology is in a race, the good stuff and the bad stuff. Our capacity to fish out the ocean is a technological marvel. And so that's the second part of technology. The third part of technology is side effects, constantly side effects, unanticipated consequences. So we're never done with this business. And that's the story of James Watt. The most empowering invention in history since agriculture-- really, the most transformative single invention in human history since agriculture-- but it could actually wreck the planet in the end. And so that's the unanticipated side effect. And so we have to be constantly watching for that. When Freon was invented in the 1920s, chlorofluorocarbons, the invention was viewed as-- god, this is so brilliant. We have this incredibly stable chemistry that can be a great refrigerant. And it was a great breakthrough. And it was only by accident that we discovered 50 years later that it actually dissociated in the stratosphere and destroyed ozone. And so that was unanticipated. Same story with DDT, an absolutely marvelous pesticide. But it's a persistent pesticide, so it accumulates in the food chain. So we have to constantly be watching what we're doing to be careful. But can technology save us? Yes. David Gartner: So I think lastly, we have a number of questions from students seeking advice about how to make a difference. What advice would you give a sustainability student looking to make a difference? What advice would you give to students who aspire to have a successful career in international development? Jeffrey Sachs: Great. Raise your hands if you asked the question. Good. So first, I have a good book to recommend to you. [LAUGHTER] Sustainable development is really a wonderfully exciting opportunity, also. Each generation has its crisis and its challenges and its opportunities. And this is your opportunity. We decided to give you this great gift of this great challenge. And I think that, really, you should pick it up and run with it. And I'd like to say that your homework assignment is, end extreme poverty within 15 years-- sustainably, by the way. And then when my students complain, I say, but it's open book. It's OK. And you can work in groups. And you can get any help you want to do it. You can use the whole generation to do it. So first, it's a great opportunity. Second, you can do it in many, many different ways-- in business, in NGOs, in government. You could do it as a chemist, as a doctor, in public health, even in economics, my field. There's great opportunities. But the main thing is to get interested in it and to stay interested in it and not to get too easily distracted by all the distractions that we have. And what I find important about sustainable development as an analytical challenge is anything you read is related to this. So there's no part of technology, public health, environment, economy that shouldn't interest you. It's all this giant Tetris game or jigsaw puzzle. Every piece-- you have to figure out where does that fit into this complicated challenge. And therefore, I really recommend to read broadly. And whatever field you specialize in, keep a very wide peripheral vision as well. And I recommend to almost everybody, unless you have some really visceral dislike of it, read Nature and Science every week-- the first half of the issue. Because the first half of each week is in English. And it's about the latest scientific discoveries, what's been found, what the challenges are. The second half is basically incomprehensible. And so I can pick and choose a couple of articles in the back half of each issue. But technology and science are changing so fast-- and they really are making our world-- that I do encourage that part of the knowledge base also. So stay broad and interconnected in what you're following to be good at this subject. One other really interesting question here that sort of gets to the impact of the Sustainable Development Goals or what they might have is, should there be penalties for failing to meet Sustainable Development Goals? What could such a penalty system look like? Or more broadly, how do you create incentives and accountability to get the impact you want? There are lots of-- Who asked the question? Hi. I think that there are a couple of things. It's true, and it is one of the values, I think, of economics, if it's done properly, is you need to design incentives so that we are channeling finance and investment and effort in the right direction. But another part of this, I would say, is the moral part of this, which I believe we've really let go in our country too much. Because part of this issue is right and wrong. And part of the solution of right and wrong is praising those who do right and blasting those who do wrong. We don't have enough of that right now. And cynicism is the greatest enemy of moral reasoning, actually. Because cynicism says, oh, they're all bums. There's nothing we can do about it. That's a huge mistake because unless we exercise our moral judgments actively, we do fall into a general collapse, I think, of not only moral reasoning but actually even the ability to choose decent objectives. So I'll tell you a story because I live in New York. And I live near Wall Street. And Wall Street has been a partially criminal organization over the last 10 years. And-- hmm? [INAUDIBLE] Partially, was asked. Yeah, partially. [LAUGHTER] But a lot of criminality went into the 2008 financial crisis-- a lot of deliberate fraud, deceit, selling toxic assets, and so forth. I'm not best buddies with most of them, although I know a lot of them. But funny for me, once a year I'm invited to a gala dinner of hedge fund managers. And a lot of them take home a billion dollars a year paycheck, by the way, whether they even beat the market or not. I won't go into it. But it's bizarre. And it's an abuse of society. But some of them are really criminal. And it doesn't matter in that milieu because you're prized for how rich you are. And if you have made a massive amount of money but basically fraudulently, you're still championed. This is really a moral collapse that's very, very dangerous in my view. And I'll just tell you-- I'll take a two-minute digression. Maybe this will be the last question because I know people have been very patient. But there was a recent study that did the following experiment. They took a major international bank, unnamed. And they divided the workforce into a control group and a treatment group in the following way in this experiment. They had the experiment that everybody was to flip a coin 10 times and report how many heads they got. That was all they were supposed to do. And of course, on average, it's five. And they were supposed to report this. And it was clear that no one was observing the number of coin flips. And they were told in a general way, the more heads you get, the more reward you're going to get from this experiment. That's all they were told. And then before the coin flipping, they were asked to fill out a questionnaire. So in the control group, the questionnaire was, how old are you, your family, what are your favorite hobbies, and so on. In the treatment group, same questionnaire, but they were asked just questions about their role in the bank. And so they were asked, how many years have you been in the bank? What branch do work in? What are you engaged in? So the idea was what's called, framing, psychologically. One group was just given general framing. The other was framed, you're a banker. Then the two groups flipped the coins. The group that just had the general questions reported 50.5% heads. And it was within the margin of error of random distribution of a 50%. The same random sampling of the same employees that were primed by being reminded that they were bankers reported 58% heads, which was, like, six standard deviations away from 50%. They cheated. They cheated. They weren't observed, so they didn't know who cheated. It didn't matter. But simply being reminded, you are a banker, made them cheat. I kid you not. That was the only difference. And then at the end, they were asked to fill out a questionnaire about their values. Now this is a randomized sample of employees. The one key question which showed massive difference was a question, does money affect your social status? And the ones that were just given the normal questions, basically-- I don't remember. It was like 20% said yes. And the ones that were given the banking primes said something like 80%, yes. And so all it took was this very subtle change to remind them, you're in banking, to say, your job is to make money. And this is really my experience with these people, by the way, which is that their goal is to make

money, period. I mean, period. How you do it, not so important. Legal, illegal-- depends on the fines times the probability. That's our problem. And that, coming back to the question of incentives-- we have a sense of impunity right now. And I'll just close with one more example, and then I'll stop because I could go on for hours with the meandering. But last week, a committee reported to the Department of Energy about Arctic drilling. Now, the Department of Energy under law gets an advisory group from the oil industry. That's OK because the oil industry should advise the Department of Energy, and so should others. And this committee was chaired by Rex Tillerson, Exxon Mobil, not my favorite company behavior. And it reported in 500 pages why Arctic drilling was the greatest thing going. And the whole report didn't mention climate change at all. I regard this as willful immorality, reckless, absolutely reckless. That's the report that went to the US government. And it described how great our opportunities are for drilling in the Arctic. We have to call out Exxon Mobil because their behavior is especially atrocious, even relative to the oil industry. A lot of the rest of the oil-- and they're two that are atrocious, atrocious. That's the Koch Industries, David and Charles, and Exxon Mobil. Chevron comes next. And then there are normal companies like Statoil, Total, BP, Shell. They say, oh, this is a problem. We have to find some way to do something, not necessarily as much as should, but they're trying to say, this is an honest problem. But when we have that kind of denialism, which plays in this country, and then they finance the campaigns. They finance the lobbying to-- I can't even tell you how much money-- in Washington. That's how we get into problems. So the incentive, the main incentive I want is call out the bad behavior and praise the good behavior. And let's get our act together. We're human beings acting collectively to make this planet work properly and keep the planet safe for the future. And if we just keep our eye on that and speak out for it, we can actually get there. [APPLAUSE] This presentation is brought you by Arizona State University's Julie Ann Wrigley Global Institute of Sustainability. For educational and noncommercial use only.