And this is a very professional female interviewer who sits with a woman for an hour and asks her about her birth history.

How many children did you have?

are they alive?

How old would you be if you died?

And this is done on a representative sample of thousands of women in the country and compiled into what was once called the Demographic Health Survey report.

However, these studies are expensive and can only be performed at intervals of three to five years.

But they are of good quality.

So this is a limitation.

All the colored lines here are results. Each color is one survey.

But today that's too complicated, so let's keep it simple and give each survey a single average score.

1977, 1988, 1992, 1997, 2002.

and UN experts

stores these surveys in a database and uses advanced formulas to create trend lines. The trend line looks like this:

See here -- this is the best they can get in this regard.

But be careful. They continue the line beyond the last point until there is nothing left.

They then estimated the death rate per child in Kenya to be 128 in 2008.

And I was sad. We saw this reversal in the 90s when child mortality increased in Kenya.

It was so tragic.

But in June, an email arrived in my inbox from the Demographic Health Survey. There was good news from Kenya written there.

I was very happy

This was the estimate of the new research.

It then took another three months for the UN to get it onto their servers. We got a new trendline on Friday. it was here.

Isn't it -- isn't it, is it?

In fact, I was sitting at my computer on Friday and only that morning saw the death rate drop from 128 to 84.

So we celebrated.

But with this trend line, how do you measure progress?

The United Nations does it this way, so here are some details.

Beginning in 1990 and measured through 2009.

They say, "0.9%, no progress."

Unfair.

As a professor, I think I have the right to suggest something different.

Do this at least. Ten years is enough to follow trends.

Two surveys show what's happening now.

They have 2.4 percent.

If I was in the Ministry of Health in Kenya, I might have been involved in these two points.

My point is, we know child mortality.

It tends to be neat.

Some difficult questions arise when measuring the MDGs.

The reason Africa is featured here is particularly important. The 90s were the worst decade, not just for Kenya, but for Africa as a whole.

The HIV epidemic has reached its peak.

Until new drugs were developed, there was resistance to old malaria drugs.

Later, I got a mosquito net.

And there were socio-economic problems, which are now being resolved on a better scale.

Look at the averages here. This is an average across sub-Saharan Africa.

And the United Nations says it's a 1.8 percent reduction.

This sounds a bit theoretical, but it's not very theoretical.

As you know, economists love money, want more money, and want money to grow.

So they calculate the annual growth rate of the economy.

We in public health hate child deaths, and we want more and more children to die.

So we calculate the annual reduction rate and it's about the same percentage.

If the economy grows by 4 percent, we need to reduce child mortality by 4 percent. If it's well leveraged, people are seriously involved, and resources can be used the way they want.

So is it fair now to measure this over 19 years?

An economist would never do that.

I just split it into two parts.

In the 90s it was only 1.2 percent, just 1.2 percent.

It's 2nd gear now, but it's like Africa went from 1st gear to 2nd gear.

But this is not the correct representation of Africa. Because this is the average, the average rate of reduction in Africa.

Look here when explaining bubble graphs.

Again, the number of child deaths per 1,000 on that axis is displayed.

Here are the years.

And I am now giving you a broader picture than the MDGs.

I started 50 years ago when most of Africa celebrated its independence.

Congo was high, but Ghana was low. And Kenya is even lower.

And what has happened in the years since? please.

We see that with independence, literacy improved, vaccinations began, smallpox was eradicated, hygiene improved, and things got better.

But when it comes to the 80's, be careful here.

Congo went into civil war and leveled off here.

Ghana was very fast and ahead.

This was Kenya's backlash and Ghana avoided it, but then Kenya and Ghana fell together, and the stalemate continues in Congo.

That is our situation today.

It turns out that it doesn't make sense to take the average of this zero improvement and this very fast improvement.

It's time to stop thinking of sub-Saharan Africa as one place.

Their countries are very different and we don't talk about Europe as one place, so it deserves to be recognized in the same way.

We can say that the economies of Greece and Sweden are very different, and we all know that.

And it will be judged by how each country is doing.

So let's give the broader picture.

Sweden, my country: In 1800 we were there.

What a strange personality disorder to count children so carefully despite high child mortality.

It's very strange. It's kind of embarrassing.

But, as you know, in Sweden there was a custom to count all child deaths, even if nothing was done.

And you know, these were famine years.

These were bad years and people were fed up with Sweden.

My ancestors immigrated to the United States.

And eventually, soon they started getting better and better here.

And here we have better education, better health care, and lower child mortality.

We have never been to war. Sweden has been peaceful.

But look, Sweden's pullback wasn't fast.

Sweden has achieved low infant mortality because we started early.

The primary school actually started in 1842.

And then a generation later, when we got female literacy, we had that wonderful effect.

We need to recognize that our ongoing investments are long-term investments.

It's a long-term investment, not just five years.

And Sweden never reached the Millennium Development Goal achievement rate of 3.1 percent by my calculations.

So we are off track. That's Sweden.

But you don't talk much about it.

We want others to be better than we are, and they are.

Let me show you Thailand. See how successful Thailand was in the 1960s. See how Thailand got here to reach nearly the same child mortality levels as Sweden.

And let me tell you another story. Egypt is one of the most hidden successes in public health.

In 1960 Egypt was higher than Congo.

The Nile Delta was a miserable place for children with many problems such as diarrheal diseases and malaria.

And they got Aswan Dam. They had electricity in their homes, education, and primary care.

And they went down, you know.

And they got safer water and eradicated malaria.

And isn't that a success story?

Achieving child mortality with the Millennium Development Goals is entirely possible.

And the good news is that Ghana is going as fast today as Egypt was the fastest.

Kenya is picking up speed now.

Now comes the problem.

There are serious problems in the stuck countries.

Now, I would like to present a broader picture of child mortality.

Here we show the relationship with child mortality on this axis. This axis is child mortality. And here is the number of family members.

Relationship between infant mortality and family size.

1, 2, 3, 4 children per woman, 6, 7, 8 children per woman.

This is also 1960, 50 years ago.

You can see that each bubble is a country, i.e. the color is a continent.

The dark blue here is Sub-Saharan Africa.

And the size of the bubble is the population.

And these are the so-called "developing" countries.

They had high or very high infant mortality and family sizes of 6 to 8 members.

And over there were the so-called Western countries.

They had lower infant mortality and fewer families.

What happened?

What I ask you to do now is to see for yourself the relationship between declining child mortality and fewer family sizes.

I want to leave no room for doubt, but see it for yourself.

This is what happened. Now I start the world

Here we are working to eradicate smallpox, improve education and improve health services.

There was the problem - here China joined the Western frame.

And here Brazil is in the Western Box.

India is approaching. The first African countries joined the Western frame, along with many new neighbors.

Welcome to a decent life.

come. I want everyone to be there.

This is our vision, isn't it?

And now here are the first African countries coming in.

I am there today.

There is no such thing as a “Western world” or a “developing world”.

This is a report from the United Nations released on Friday.

Except for this page, "Child Mortality Levels and Trends" is very good.

This page is very malicious. It's a country classification.

It is labeled 'Developing Countries' - read from the list here - Developing Countries: Republic of Korea - South Korea.

teeth?

They got Samsung, but how can they be a developing country?

They have here Singapore.

Singapore has the lowest infant mortality rate in the world.

They evaded Sweden five years ago and are classified as a developing country.

They have Qatar here.

It is the richest country in the world with Al Jazeera.

How can they be developing countries?

this is shit

(Applause) The rest here is good, the rest is good.

You need modern concepts that fit your data.

And we all have to realize that we're going to end up in this situation to this point.

What is important now in the relationship here.

Look, even if you look at Africa, these are African countries.

Even within Africa, we see a clear link between lower child mortality and fewer family sizes.

It's very clear that this is happening.

And on Friday, a pivotal study was released from Seattle's Institute for Health Metrics and Evaluation, showing that almost 50 percent of the decline in child mortality can be attributed to girls' education.

So getting girls into school has an impact 15 to 20 years down the line, and it's a very strong long-term trend.

That's why we need a long-term perspective, but we also need to measure the effect over a 10-year span.

It's entirely possible to bring child mortality down in all these countries, and bring it down in the corners we all want to live with.

And, of course, reducing child mortality is of paramount humanitarian concern.

We say it's a decent life for children.

But because it is about the environment, it is also a strategic investment in the future of all mankind.

Without stabilizing the world population, we will not be able to manage the environment or avert the dreaded climate crisis.

Let me be clear about that.

The way to do this is to reduce child mortality, ensure access to family planning and promote women's education behind it all.

And it is quite possible. let's do it.

thank you very much.

(applause)

Please try to imagine. It's a gift.

I hope you can picture it in your head.

It's not too big, about the size of a golf ball.

Imagine it all put together.

But before we show you what's under the hood, this is going to do wonders for you.

It brings your whole family together.

You'll feel loved and appreciated like never before, and you'll reconnect with friends and acquaintances you haven't heard from in years.

Admiration and admiration will overwhelm you.

It will realign what is most important in your life.

It will redefine your sense of spirituality and faith.

You will gain a new understanding and trust in your body.

You will have unparalleled vitality and energy.

Expand your vocabulary, meet new people, and have a healthier lifestyle.

And get this. You get eight weeks of vacation doing nothing at all.

Eat countless gourmet foods.

The flowers will be delivered on a truck.

People will say to you, "You look very nice. Have you done any work?"

And you can get good quality medicine for the rest of your life.

You will be challenged, inspired, motivated and humbled.

Your life will take on new meaning.

Peace, health, tranquility, happiness, nirvana.

price?

$55,000, that's an incredible deal.

By now, you're probably wondering what it is and where you can get it.

Do you handle Amazon?

Does it have the Apple logo?

Do you have a waiting list?

Unlikely.

This gift arrived to me about 5 months ago.

This is what it all looked like when I put it all together, but it wasn't very pretty.

And this, and this.

It was a rare gem, a brain tumor, an hemangioblastoma, and a gift that keeps on giving.

And although I'm fine now, I'm not going to wish you this gift.

I don't know if you want that.

But I'm not going to change my experience.

It changed my life so much in ways I never expected, in all the ways I shared with you earlier.

So the next time you face something unexpected, undesirable or uncertain, consider that it might just be a gift.

(applause)

Sometimes I browse through very old magazines.

I found an observational test about the ark story.

And the artist who drew this observational test made some mistakes, there were some mistakes - more or less 12 mistakes.

Some of them are very easy.

The ark comes with a funnel, aerial parts, a lamp and a mainspring key.

Some of them are about animals and numbers.

But there's a more fundamental mistake in the overall Ark storyline that isn't reported here.

And the question is, where are the plants?

So now we have a god who is going to submerge the earth forever, or at least for a very long time, and no one is taking care of the plants.

Noah had to take two of every kind of bird, every kind of animal, every kind of moving creature, but he didn't mention plants.

why?

In another part of the same story, all living things are just creatures out of the ark: birds, domestic animals, wild animals.

Plants are not living things - this is important.

It's a point not mentioned in the Bible, but it really accompanies mankind.

Take a look at this wonderful code from the Renaissance book.

Here is an explanation of the natural order.

This is a great explanation. because it starts on the left. there is a stone Immediately after the stone are plants that are only alive.

We have living, sentient animals, and humans are at the top of the pyramid.

This is no ordinary person.

"Homo studiosus" - the one who studies.

For someone like me, I am a professor, it is very reassuring to know that this is the pinnacle of creation.

But it's completely wrong.

You know your professor very well.

But it's also wrong with plants. Because plants can't just live. they can sense.

They have far more sophisticated senses than animals.

To give one example, every root apex can simultaneously and continuously detect and monitor at least 15 different chemical and physical parameters.

And they can also exhibit and exhibit wonderfully complex behaviors that can only be described by the word intelligence.

Well, but here's something - this underestimation of plants will always be with us.

Let's take a look at this short movie.

We have David Attenborough.

Well, David Attenborough really is a plant lover. He made some of the most beautiful films about plant behavior.

Well, when he talks about plants, everything is correct.

When he talks about animals, he tends to ignore the fact that plants exist.

Blue whale, the largest living creature on earth, that's wrong, completely wrong.

It is a dwarf compared to the blue whale, actually the largest creature to exist on earth, this wonderfully majestic Sequoiadendron giganteum.

(Applause) And this is a creature with a mass of at least 2,000 tons.

Now, the story that plants are low-level organisms has been formulated many times by Aristotle, who wrote in De Anima, a highly influential book for Western civilization, that plants are on the verge of life or death.

They kind of have a very low level soul.

They are called plant souls because they are motionless and have no need to feel.

let's see.

Now, some of the plant movements are very familiar.

This is a very fast move.

This is Dionea, a Venus flytrap that hunts snails. Sorry for the snail.

This is something that has been denied for centuries, despite the evidence.

No one can say that plants could eat animals. Because it goes against the law of nature.

But plants can also show a lot of movement.

Some are very well known, such as flowering.

It's just a matter of whether you use techniques such as timelapse.

Some of them are much more sophisticated.

Look at these young beans that move every time they try to catch the light.

And it's really very elegant. Like a dancing angel.

They can also play - they really do.

These are young sunflowers and what they do cannot be described in other words than playing.

They, like many young animals, are training themselves for adulthood, where they are asked to track the sun all day long.

Gravity can of course be reacted to, so sprouts grow against the vector of gravity and roots grow towards the vector of gravity.

But they can sleep too.

This is Mimosa Pudica.

Therefore, at night, the leaves are rolled up to reduce movement, and during the day, the leaves are opened to increase movement.

The interesting thing is that this sleeping machine is perfectly preserved.

The same is true for plants, insects, and animals.

So if we need to study this sleep problem, it is easier and ethically much easier to study plants than, say, animals.

It's a kind of vegetarian experiment.

Plants can even communicate. Plants have an extraordinary ability to communicate.

They communicate with other plants.

They can distinguish between relatives and non-relatives.

They communicate with plants of other species and with animals, for example, by producing chemical volatiles during pollination.

Pollination is a very serious problem for plants. This is because plants can transfer pollen from one flower to another, but they cannot transfer pollen from one flower to another.

So they need vectors. And this vector is usually an animal.

Plants have used many insects as pollinating vectors, but insects are not the only ones. Mammals such as birds, reptiles, bats, and mice are also commonly used for pollen transport.

This is serious business.

Our plants provide animals with a kind of sweet substance that is highly energizing by altering the transport of pollen.

However, some plants are manipulating animals, as in the case of orchids, which promise sexual intercourse and nectar, but provide nothing for pollen transport.

Well, there's a big problem behind all the behavior we've seen so far.

How is this possible without a brain?

We have to wait until 1880 for this great man, Charles Darwin, to publish his revolutionary, wonderful and amazing book.

The title is "The Power of Plant Movement".

Before Charles Darwin, no one was allowed to talk about plant movement.

In his 500-page book, with the help of his son Francis, who became the world's first professor of plant physiology at Cambridge University, every movement is taken into account.

And in the last paragraph of the book, this is a kind of stylistic mark. Because Charles Darwin usually stored the most important message in the last paragraph of his book.

He writes, "It is no exaggeration to say that the tip of the radical acts like the brain of a lower animal."

This is not a metaphor.

He wrote a very interesting letter to one of his friends, J.D. Hooker, then President of the Royal Society and the greatest British scientific authority on plant brains.

Now, this is the apex of the root extending down the slope.

So we see that this kind of movement is the same movement exhibited by earthworms and snakes and all animals that move on the ground without legs.

And it's not an easy move because in order to do this kind of movement you have to move different areas of the root without having a brain and synchronize these different areas.

So we studied the root vertices and found that there is a specific area drawn in blue here. It's called the "transition zone".

This area is a very small area, less than 1 millimeter.

And this small area has the highest plant oxygen consumption, and more importantly, these kinds of signals exist here.

The signals we're looking at here are action potentials, the same signals that neurons in our brain use to exchange information.

Although we now know that the root apex has only a few hundred cells exhibiting this type of characteristic, we do know how large the root apparatus is in small plants such as rye plants.

We have about 14 million roots.

It has 11.5 million root vertices, is over 600 kilometers long, and has a very large surface area.

Now imagine that each single root vertex is working within a network with all other root vertices.

Here we have the Internet on the left and the root device on the right.

They work the same.

These are networks of small computing machines that operate within a network.

And why are they so similar?

Because they evolved for the same reason: to survive predation.

They work the same.

So even if 90 percent of the root apparatus is removed, the plant [continues] to function.

If you remove 90 percent of the internet, the internet will still work.

So here are some suggestions for people working on networks. Plants will give us good suggestions on how to evolve networks.

And another possibility is a technical possibility.

Imagine being able to build robots and robots inspired by plants.

Until now, humans have taken inspiration from humans and animals to create robots.

There are animal robots and regular robots inspired by animals, insect robots, etc.

There are androids inspired by humans.

But why are there no plants?

Well, if you want to fly, it's good to see birds and be inspired by them.

But if you want to explore the soil, or colonize new territories, the best thing to do is take inspiration from the masters of doing this: plants.

Another possibility we are working on in our lab is to build a hybrid.

Building a hybrid is much easier.

Hybrid means half living and half machine.

It is much easier to work with plants than with animals.

They have computing power and they have electrical signals.

Connecting with machines is much easier and much more ethically possible.

These three possibilities are driven by algae and leaves, the strongest part of the plant, the root, and we are working to build a hybrid.

Thank you for your attention.

Finally, I would like to make sure that I am not harming the snails during this presentation.

thank you.

(applause)

One of my favorite things about my job at the Gates Foundation is being able to travel to developing countries, and I do so quite regularly.

And when I meet so many mothers in these remote areas, it really amazes me what we have in common.

They also want what we want for our children: to grow up successful, healthy, and live successful lives.

But I also see a lot of poverty, and it is very disturbing both in its scale and scope.

When I first visited India, I was in a home with no dirt floor, running water or electricity. That's exactly what I see all over the world.

I mean, I'm surprised by everything they don't have.

But I'm amazed at what they have, it's Coca-Cola.

Coke is everywhere.

In fact, when traveling in developing countries, it feels like cola is everywhere.

So when you come back from these trips and you're thinking about development, and you're flying home and you're thinking, 'We're going to get people condoms and vaccines,' you know, Coke's success kind of stops and makes you wonder. "How can you deliver cola to such a far away place?"

If it can be done, why can't governments and NGOs do the same?

And I'm not the first to ask this question.

But as a community, I think we still have a lot to learn.

When you think of Coca-Cola, it's amazing.

They sell 1.5 billion meals every day.

This is the same as every man, woman and child on earth drinking a glass of Coke every week.

So why is this important?

If we want to accelerate progress and move faster towards the Millennium Development Goals we have set for the world at large, we need to learn from the innovators. Innovators come from all fields.

I feel that if we can understand why something like Coca-Cola is ubiquitous, we can apply that lesson to the public good.

Coca-Cola's success is important. Because if we can analyze it and learn from it, we can save lives.

That's why I spent some time learning about cola.

I think there are really three things we can learn from Coca-Cola.

Get real-time data and give instant feedback to your product.

They leverage the talent of local entrepreneurs and do great marketing.

So let's start with the data.

Coke now has very clear earnings. They must report to a series of shareholders and make a profit.

So they get the data and use it to measure their progress.

They have a very continuous feedback loop.

They learn something, put it back into the product, put it back on the market.

They have a whole team called "Knowledge and Insight".

Much like any other consumer facing company.

So if you were running for election in Namibia for Coca-Cola, and you had 107 constituencies, you knew where every can and bottle of Sprite, Fanta and Coke was being sold, whether it was a corner store, a supermarket or a wheelbarrow.

So if sales start to decline, the person can identify the problem and address it.

Let's contrast that a little with development.

In development, evaluation happens at the end of the project.

I have attended many such meetings, but by then it was too late to use the data.

I once had an NGO insider describe it as like bowling in the dark.

They said, "When you roll the ball, you can hear some pins falling.

It's dark, so you won't know which one will fall until the lights come on. After you turn it on, you'll know your impact. ”

Lights turn on with real-time data.

So what's the second thing Coke is good at?

They are good at tapping into the talent of local entrepreneurs.

Coke has been in Africa since 1928, but in most cases has not been able to reach distant markets. That's because they used a system very similar to developed countries where heavy trucks drive on the streets.

And in the remotest parts of Africa, good roads are hard to find.

But Coke noticed something. I noticed that locals pick up on this product, buy it in bulk, and resell it in hard-to-reach places.

And it took them some time to learn about it.

Then, in 1990, they decided they wanted to start training local entrepreneurs with a small loan.

They set it up as what they call a micro-distribution center, where local entrepreneurs hire salespeople with bicycles, wheelbarrows and wheelbarrows to sell their products.

There are now about 3,000 of these centers in Africa, employing about 15,000 people.

Tanzania and Uganda account for 90% of Coca-Cola's sales.

Let's look at the development side.

What can governments and NGOs learn from Coca-Cola?

Governments and NGOs also need to tap into local entrepreneurial talent. Because locals know the hardest-to-reach places and how to reach out to neighbors, they know the motivation to make a difference.

I think a good example of this is the new health promotion program in Ethiopia.

The Ethiopian government has realized that many people are very far from the clinics, and the travel distance to the clinics takes more than a day.

So if you're in an emergency or you're a mother about to give birth to a baby, forget about going to the medical center.

Deciding that this was not enough, they went to India to study the Indian state of Kerala, which had a similar system in place, and adapted it to Ethiopia.

And in 2003, the Ethiopian government launched this new system in their country.

They have trained 35,000 health extension workers to provide direct care to people.

In just five years, that rate has gone from 1 in 30,000 to 1 in 2,500.

So let's see how this can change people's lives.

Health extension workers can help with family planning, prenatal care, child immunizations, advising women to arrive on time for a planned birth, and much more.

This has had a major impact on countries like Ethiopia, which is why child mortality declined by 25% between 2000 and 2008.

Hundreds of thousands of children live in Ethiopia thanks to this medical extension worker programme.

So what are Ethiopia's next steps?

Well, they've already started talking about this.

They're starting to talk about how to get workers in the medical community to come up with their own ideas.

How do you inspire them based on the influence they are having in a remote village? ”

By doing so, we can harness the talent of local entrepreneurs and unlock people's potential.

The third element of Coca-Cola's success is marketing.

Ultimately, Coca-Cola's success hinges on one key fact. People want Coca-Cola.

Now, the reason these micro-entrepreneurs are able to sell and make a profit is because they have to sell every wheelbarrow and every bottle in their wheelbarrow.

So they rely on Coca-Cola for marketing, what's the marketing secret?

Well, it's a wish.

Its products are associated with the lives that people want to live.

So, despite being a global company, we have a very local approach.

Coca-Cola's global campaign slogan is "Open Happiness."

But they localize it.

And they don't just guess what makes people happy. They go to places like Latin America and find that happiness there is tied to family life.

And in South Africa, happiness is associated with cerity, or respect for community.

Well, that's exactly what happened with the World Cup campaign.

Listen to 'Wavin' Flag' by the Somali hip-hop artist Coke wrote for the song.

(Video) k'naan: ♫♫ohohoh o-o-oh inhibition When we lose our inhibitions, there's celebration. it's all around us.

Well, they didn't stop there and localized it into 18 different languages.

and reached number one on the pop charts in 17 countries.

It reminds me of a song I remember from childhood called "I'd Like to Teach the World to Sing," which hit number one on the pop charts.

Both songs have something in common. It is a call to celebration and solidarity alike.

So how does health and development come to market?

Well, it's based on avoidance, not aspiration.

I'm sure you've heard these messages too.

"Use condoms to avoid getting AIDS."

"Wash your hands, and you may not get diarrhea."

To me, this song doesn't bear much resemblance to "Wavin' Flag".

And I think we are making a fundamental mistake. We assume that if people need something, they don't need to want it.

And I think it's wrong.

And there are some signs around the world that this situation is beginning to change.

One example is hygiene.

It is estimated that 1.5 million children die each year from diarrhea, many of which are caused by open defecation.

But there is a solution. to build a toilet.

But what we find all over the world, time and time again, is that if you build a toilet and leave it there, it never gets used.

People reuse it as a slab for their house.

It can also store grain.

I've also seen it used in chicken coops.

(Laughter) But what does it really mean to market sanitary solutions with diarrhea results?

Well, you are working with the community.

You start talking to them about why open defecation shouldn't be allowed in the village, and they agree.

But when we take the toilet, we position it as a modern, trendy convenience.

Some states in northern India have even tried to combine toilets with courtship.

And it works -- see these headlines.

(laughs) I'm not kidding.

Women refuse to marry men without toilets.

No, there is no "yes".

(Laughter) Now, this isn't just a funny headline, it's revolutionary. Innovative marketing campaign.

But more importantly, it saves lives.

Look at this. This is a room full of young men and my husband Bill.

And do you know what young people are waiting for?

They are waiting to be circumcised.

Do you believe that?

Circumcision has been shown to reduce HIV infection in men by 60%.

And I must admit that when we first heard about the results within the Foundation, Bill and I were a little scratched up and said, "But who will be volunteering for this procedure?"

But it turns out that men do. Because I hear from her that they like it, and men also believe it improves their sex life.

So if we can start to understand what people really want in health and development, we can change communities, we can change whole nations.

So why is all this so important?

So let's talk about what happens when all these things come together, when you tie the three things together.

I think polio is one of the most compelling examples.

Polio has decreased by 99 percent in 20 years.

Looking back at 1988, there were about 350,000 polio cases worldwide that year.

By 2009, it had dropped to 1,600.

So how did that happen?

Take a look at a country like India.

Although the country has a population of over a billion people, there are 35,000 local doctors who report paralysis, and a huge reporting system of chemists, clinicians.

They have 2.5 million vaccinated.

But let me be a little more specific.

Let's talk about Shriram, an 18-month-old boy from Bihar, northern India.

This year, he felt paralyzed on August 8th, and his parents took him to the doctor on the 13th.

Stool samples were collected on 14 and 15 August and confirmed to be infected with polio type 1 by 25 August.

By 30 August, genetic testing was done to find out which strain of polio Shri Ram had.

It may have come from one of two places.

It could have come from Nepal just across the border or from Jharkhand just south.

Luckily, genetic testing proved that this chain actually came from the north. For if it had come from the south it would have had a wider impact in terms of propagation.

More people would have been affected.

So what is the endgame?

On September 4, a large-scale mopping-up operation was carried out, as was the case with polio.

They went out and vaccinated two million people where Shriram lives.

So, in less than a month, we moved from one case of paralysis to a targeted vaccination program.

And I'm glad that there was only one other person in the area who contracted polio.

That's how we prevent the spread of massive infectious diseases, and it shows what can happen when locals get their hands on the data. they can save lives.

One of polio's challenges remains marketing, but it may not be what you think it is.

It's not field marketing.

This is not to say to parents, "If you see paralysis, take your child to the doctor or get vaccinated."

I'm having trouble marketing in the donor community.

Over the past two decades, the G8 countries have been incredibly generous to polio, but something called polio fatigue is starting to emerge and donors are no longer willing to fund polio.

As a result, polio funding is expected to be depleted by next summer.

So, we are 99% on target and running out of money.

And I think if the marketing was more ambitious, if we could focus on how far we've come as a community and how great it would be if we could eradicate this disease, we could forget about polio fatigue and polio.

If we can do that, every country in the world will be able to stop polio vaccination.

And this is only the second disease that has been eradicated from the planet.

And we are very close.

And this victory is quite possible.

So if a Coke marketer were to come to me and ask me what my definition of happiness is, I would say that my vision of happiness is a mother holding a healthy baby in her arms.

For me it is a deep happiness.

Therefore, if we can learn lessons from innovators in all fields, then together we can create happiness that is as ubiquitous as Coca-Cola in the future.

thank you.

(applause)

I learned about the Haiti earthquake on Skype.

My wife disappeared for 25 minutes after sending a message saying, "Oh, it's an earthquake."

It was 25 minutes of absolute terror felt by thousands of people across the United States.

I was afraid of the tsunami. What I didn't realize was that there was an even greater fear in Haiti, and that was the collapse of buildings.

We've all seen pictures of collapsed buildings in Haiti.

These are pictures my wife took while I was going through the DR a few days after the earthquake. enter the country.

This is the National Palace and the equivalent of the White House.

This is the largest supermarket in the Caribbean during peak shopping hours.

This is a nursing college. 300 nurses are studying.

The general hospital right next door was almost unharmed.

This is the Ministry of Economy and Finance.

We've all heard about the enormous human loss from the Haiti earthquake, but we haven't heard enough about why all these lives were lost.

I have not heard why the building collapsed.

After all, it was the building, not the earthquake, that killed 220,000 people, injured 330,000, displaced 1.3 million, and cut off food, water and supplies for the entire country.

It was the largest metropolitan disaster in decades and was an engineering rather than a natural disaster.

AIDG has been active in Haiti since 2007, providing engineering and business support to SMEs.

And after the quake, they began to bring in seismologists to figure out why buildings collapsed and to investigate what was safe and what wasn't.

Working with MINUSTAH, the UN mission in Haiti, the Ministry of Public Works and various NGOs, we have inspected over 1,500 buildings.

We visited schools and private homes.

I visited a medical center and a food warehouse.

We inspected government buildings.

Ministry of Justice.

Behind that door is the National Judicial Archives.

Inside the door was André Filitrau, director of the Center for Interdisciplinary Earthquake Engineering Research at the University of Buffalo, who was investigating the archives to see if it was safe to restore them.

Andre told me there was no new research here after seeing these buildings fail the same way over and over again.

There is nothing here that we do not know.

The fault was the same. The walls and slabs were not properly fixed to the pillars, i.e. roof slabs hanging from the building. A cantilever structure, or an asymmetric structure, that shook violently and fell. The building materials were poor, the concrete was inadequate, and the blocks were poorly compacted. The rebar was smooth and the rebar had rusted from the weather.

I found a solution for all these problems.

And we know how to build it properly.

Evidence of this came almost a month later when a magnitude 8.8 earthquake struck Chile.

That's 500 times more powerful than the 7.0 that hit Port-au-Prince, 500 times more powerful, but with less than 1,000 casualties.

After adjusting for population density, we get less than 1% of the impact of the Haiti earthquake.

What was the difference between Chile and Haiti?

Seismic standards and limited masonry. Rather than breaking apart into separate pieces, the building functions as a whole, with walls, columns, roofs, and slabs joined together to support each other.

If you look at this building in Chile, it's torn in half, but it's not a pile of rubble.

Chileans have been building with limited masonry for decades.

AIDG is now working with KPFF Consulting Engineers, Architecture for Humanity, to introduce more limited masonry training to Haiti.

This is Xantus Daniel. He was a mason, not a foreman, just a general construction worker, trained by us.

At his last job he was working with his boss and they started running the wrong column.

He took his boss aside and showed him the materials on the trapped masonry.

He told him, "You know, we don't have to be wrong about this.

It doesn't cost more than this if done the right way. ”

And they rebuilt the building.

They tied the rebars right and injected the columns right, so the building will be safe.

And every building they build from now on is safe.

No policy is required to ensure these buildings are safe. It is necessary to reach out to the masons on site and help them learn the proper techniques.

Many groups are doing this now.

And vest-wearing Craig Toten out there stepped forward to file documents with all the groups doing this.

Through Haiti Rewired, Build Change, Architecture for Humanity and AIDG, we have the potential to reach out to 30,000-40,000 masons across the country and create a movement for good architecture.

Engaging people on the ground in this collaborative way can be very affordable.

Spend billions on rebuilding and you can train stonemasons to make money on every house you'll spend your life building.

Ultimately, there are two ways to rebuild Haiti. The road to the summit is one that Haiti has spent decades building.

The road to the top is a poorly constructed building that will fail.

The bottom road is a confined masonry building, the walls are tied, the building is symmetrical and can withstand earthquakes.

In spite of every disaster, there is an opportunity here to build better homes for future generations, and when the next earthquake strikes, it will be a disaster, but not a tragedy.

(applause)

My title is "Stranger Than We Can Imagine: The Strangeness of Science."

"Qier than we can imagine" comes from J.B.S. The famous biologist Haldan said, "My own suspicion is that the universe is not only stranger than we imagine it is, but stranger than we can imagine.

I suspect there is more in heaven and on earth than can or can be dreamed of in any philosophy. ”

Richard Feynman likened quantum theory, the accuracy of experimental predictions, to determining the width of North America to within a hair's breadth.

This means that quantum theory must be true in some sense.

But the assumptions quantum theory needs to make to realize those predictions are so enigmatic that even Feynman himself was so moved that he said, "If you think you understand quantum theory, you don't understand quantum theory."

It is so strange that physicists resort to interpreting it paradoxically.

David Deutsch, speaking here, embraces the many-worlds interpretation of quantum theory in "The Fabric of Reality." Because the worst thing you can say about quantum theory is that it's an insane waste.

It postulates a vast and rapidly increasing number of parallel universes that are mutually undetectable except through the narrow porthole of a quantum mechanical experiment.

That's Richard Feynman.

Biologist Lewis Wolpert sees the strangeness of modern physics as an extreme example.

Science, in contrast to technology, wields violence against common sense.

He points out that every glass of water you drink likely absorbs at least one molecule that passed through Oliver Cromwell's bladder.

(Laughter) It's just rudimentary probability theory.

(Laughter) There are far more molecules in a glass than there are in a glass or a bladder in the world.

And of course there is nothing special about Cromwell or Bladder. You just breathed in the nitrogen atoms that passed through the right lung of a third iguanodon to the left of a tall cycad tree.

"It's stranger than we can imagine."

What allows us to guess something, and does this tell us anything about what we can guess?

Is there anything about the universe that is forever beyond our comprehension, but not beyond the comprehension of a superior mind?

Is there anything about the universe that no one can understand in principle, no matter how good it is?

The history of science has been a series of violent brainstorms, with generation after generation coming to terms with rising levels of queerness in the universe.

We are so accustomed by now to the idea that the earth was spinning instead of the sun moving across the sky, so it's hard to comprehend just how shocking a spiritual revolution it was.

After all, it seems clear that the Earth is big and stationary, and the Sun is small and mobile.

But it is worth recalling Wittgenstein's remarks on this matter. "Tell me," he asked his friend, "Why do people always say it's natural for humans to think that the sun 'revolves around the earth' rather than that the earth revolves?"

Then my friend replied, "Yes, of course, because the sun seems to revolve around the earth."

Wittgenstein replied, "What then would happen if the earth appeared to rotate?"

(Laughter) Science has taught us that, contrary to all intuition, seemingly solid things like crystals and rocks are actually composed almost entirely of empty space.

And the familiar diagram is that the nucleus is a fly in the middle of the playing field, and the next atom is on the next playing field.

Thus, the hardest, most solid, and densest rocks are actually almost completely empty space, broken only by small particles too widely spaced to be counted.

So why do rocks look and feel hard, hard and impenetrable?

As an evolutionary biologist, I would say this. Our brains have evolved to survive within the orders of magnitude, size, and speed at which our bodies operate.

If so, our brain would probably perceive the rock as being filled with empty space.

In our hands, the rock feels hard and impenetrable. That is precisely because objects such as rocks and hands cannot penetrate each other.

It is therefore beneficial for our brain to construct concepts like 'robustness' and 'transparency'. Because such concepts help us physically navigate the medium-sized world we have to navigate.

Moving on to the other side of the scale, our ancestors didn't have to navigate through space at near the speed of light.

If so, our brain would be able to understand Einstein better.

I would like to name the mid-sized environment in which we have evolved our ability to act, even though it has nothing to do with "Middle-earth".

(Laughter) We're inhabitants of an evolved middle world, and that limits what we can imagine.

We think it's easy to intuitively understand the idea that if a rabbit moves at a moderate speed similar to what rabbits and other middle-world objects move, and hits another middle-world object like a rock, it knocks itself out.

Meet Major General Albert Stablebein III, who served as Commander of Military Intelligence in 1983.

"...[He] stared at the walls of his house in Arlington, Virginia, and decided to do it.

The anticipation was terrifying, but he was on his way to the next office.

He got up and got out from behind his desk.

"What are atoms mainly made of?" he thought, "universe." he started walking. "What am I mostly made of?" Atom. He picked up his pace and was now almost jogging.

"What are the walls mainly made of?" (Laughter) "Atoms!" All I have to do is join the spaces.

Then General Stablebein banged his nose hard against the office wall.

Stablebein, who commanded 16,000 men, continued to be embarrassed by his inability to pass through the walls.

He believes this ability will one day become a common tool in military arsenals.

Who would prank an army that could do that? ”

This is the Playboy article I read the other day.

(Laughter) I have good reason to believe that's true. I was reading Playboy because I had an article in it myself.

(Laughter) Middle-world-educated human intuition finds it hard to believe Galileo's statement that, barring air friction, heavy and light objects hit the ground at the same time.

If we were evolving in a vacuum, we would expect them to hit the ground at the same time.

If we were bacteria constantly plagued by thermal motion of molecules, the situation would be different.

But we middle-worlders are too big to notice Brownian motion.

Similarly, our lives are governed by gravity, but we are largely unaware of surface tension.

In the presence of small insects, these priorities will be reversed.

Steve Grand -- he's on the left, Douglas Adams on the right.

Steve Grand, in his book Creation: Life and How to Make It, actively criticizes our obsession with matter itself.

We tend to think that only solid and material things are real.

Waves of electromagnetic fluctuations in a vacuum seem unreal.

The Victorian era believed that waves must be in some kind of material medium, the waves of the ether.

But we find comfort in real matter only because it has evolved to survive in a middle world where matter is a useful fiction.

For Steve Grand, vortices are as real as rocks.

In the desert plains of Tanzania, in the shadow of the Olu Doinyo Lengai volcano, there are sand dunes made of volcanic ash.

The beautiful thing is that the body moves.

Known professionally as 'ba chan', the entire dune traverses the desert in a westward direction at a speed of about 17 meters per year.

Move in the direction of the corner while keeping the shape of the crescent.

What happens is that the wind blows sand up the shallow slope on the opposite side, and then when the grains of sand hit the top of the ridge, they cascade down inside the crescent, moving the entire horned dune.

Steve Grand points out that you and I are more like waves than eternity.

He invites us, as readers, to think about childhood experiences, things we remember vividly, things we can see, feel, and maybe even smell as if we were actually there.

After all, you were really there then, right?

How else do you remember?

But here is the bomb. you weren't there

The atoms that are now in your body did not exist when the event happened.

Matter flows from place to place, momentarily coming together to become you.

Therefore, whatever you are, you are not made by it.

If the hairs on the back of your neck still don't stand on end, it's important that you read it again until you get back on your feet.

So the word "really" is not a word to be used with simple confidence.

If neutrinos had evolved brains in their neutrino-sized ancestors, we could say that rocks are actually composed of empty space.

Our brains evolved from medium-sized ancestors who couldn't walk between rocks.

For an animal, "really" is anything the brain needs to help it survive.

And because different species live in different worlds, there is an uncomfortably wide variety of 'realities'.

The real world we see is not the world as it is, but a model of the world that is regulated and tuned by sensory data and constructed to help us deal with the real world.

The nature of the model depends on the type of animal.

Flying animals require a different kind of model than walking, climbing, or swimming animals.

A monkey's brain needs software that can simulate a three-dimensional world of branches and trunks.

The software for building a model of the world of moles is customized for underground use.

Water strider brains live on the surface of a pond in Edwin Abbott's plains, so no 3D software is needed at all.

We speculate that bats perceive colors through their ears.

The world model required for bats to navigate 3D and catch insects should be quite similar to the world model required for flying birds (day-flying birds like swallows) to perform the same kind of tasks.

The fact that bats use echoes to input current variables into their models in complete darkness, while swallows use light is a coincidence.

I even suggested that bats use their perceived hues, such as red and blue, as labels and internal labels, and that they use their perceived hues (such as red and blue) to label long and short wavelengths of light in the same way that swallows and indeed us do for useful aspects of echoes, perhaps the acoustic texture of surfaces, fur and smoothness, etc.

There is nothing in red that makes it a long wavelength.

Importantly, the nature of a model is determined by how it is used, not by the sensory modalities involved.

J.B.S. Haldane himself had something to say about animals whose scents rule the world.

Dogs can distinguish between two very similar fatty acids, caprylic and caproic, which are very dilute.

The only difference is the extra pair of carbon atoms in the chain.

Holden speculates that dogs can probably use smell to order acids by molecular weight, much like humans can use musical notes to order large numbers of piano wires.

Now, there's another fatty acid, capric acid. It's just like the other two, except it has two more carbon atoms.

Perhaps a dog who has never encountered capric acid will have no trouble imagining its smell any more than we have trouble imagining playing a trumpet. For example, play a note higher than any trumpet you've ever heard.

Perhaps dogs, rhinos, and other scent-loving animals smell colors.

And the argument would be exactly the same as for bats.

The middle world -- the range of sizes and velocities that we have evolved to feel intuitively comfortable with -- resembles the narrow swaths of the electromagnetic spectrum that we see as different colors of light.

We cannot know all other frequencies without the use of tools.

The middle world is a narrow range of realities that we judge to be normal, as opposed to the oddities of very small, very large, and very fast.

You can also achieve the impossible on a similar scale. Nothing is absolutely impossible.

A miracle is an extremely unlikely event.

Marble statues may wave at us. In any case, the atoms that make up that crystal structure are all vibrating back and forth.

Because of their sheer number, and the lack of agreement among them on their preferred direction of movement, marble remains stable, as is found in the Middle World.

But all the atoms in your hand can happen to move in the same way over and over again at the same time.

In this case, we see the hand moving and waving at us in the middle world.

Of course, the odds are so high that even if we started writing zeros at the origin of the universe, we wouldn't have been able to write enough zeros to this day.

The evolution of the middle world does not equip us with the ability to deal with highly unlikely events. we can't live long enough

In the vastness of astronomical space and geological time, what seemed impossible in the Middle World can turn out to be inevitable.

One way to think about it is by counting the planets.

We don't know how many planets there are in the universe, but it's estimated to be roughly 10-20, or 100 billion.

And it gives us a nice way to express our presumptions about the improbability of life.

You can create some kind of landmark points along the unlikely spectrum. It might look like the electromagnetic spectrum we just looked at.

If life occurs only once on every planet, then life could occur once per planet, it could be very common, or it could occur once per star, once per galaxy, or perhaps once in the entire universe, in which case life would be here.

And somewhere along the line, a frog could turn into a prince, or something magical like that would happen.

If life originated on only one planet in the whole universe, that planet must be our planet, since we are talking about it here.

And that means we are allowed to hypothesize chemical events in the origin of life with a probability as low as 1 in 100 billion if we want to take advantage of it.

I don't think it's necessary to take advantage of it. Because I think that life exists quite normally in the universe.

And when we say it's very common, it's still so rare that it's possible that the Island of Life never encounters another, which is sad.

How do you interpret “queer than you can imagine”?

Stranger than can be in principle, given the limitations of our brain's evolutionary apprenticeship in the middle world, or simply stranger than we can imagine?

Can we, by training and practice, free ourselves from the middle world and achieve some kind of intuitive and mathematical understanding of the very small and the very big?

I wonder if if we raised our children to play computer games from infancy, it would help them understand quantum theory, for example. The game had a pretend world in which a ball passed through two slits on the screen, a world in which the bizarre occurrences of quantum mechanics were magnified by computer pretend play and become familiar in a mid-world scale flow.

And similarly, relativistic computer games, where objects on the screen show things like Lorentz contraction, try to make sense of themselves, that is, to teach kids how to think about it.

Finally, I would like to end by applying middle-world thinking to our perception of each other.

Most scientists today support a mechanistic view of the mind. So, we are where we are because our brains are wired that way and our hormones are that way.

If our neuroanatomy and physiological chemistry were different, we would be different and our personalities would be different as well.

But we scientists are inconsistent.

If we are consistent, our response to someone who misbehaves like a child murderer should be: This unit has defective components. Repair is required.

What we say--and including the most rigorous mechanist among us, which is probably me--is what we say, ``Despicable monster, prison is a waste for you.''

Worse, we seek revenge, which is likely to trigger the next phase of an escalating anti-revenge cycle, and of course we see situations like this all over the world today.

So when we think like academics, we see humans as sophisticated and complex machines like computers and cars.

But when we turn back into humans, we start acting like Basil Fawlty. We remember someone slamming a car to teach it a lesson when it wouldn't start at "Gourmet Night."

(Laughter) The reason we anthropomorphize things like cars and computers is because we live in a social world, just like monkeys live in the treetop world, moles live in the underground world, and water striders live in flatlands where surface tension dominates.

We swim in seas of people. This is the social edition of the Middle Ages.

We have evolved to second-guess the behavior of others by becoming good, intuitive psychologists.

It may be scientifically and philosophically correct to treat humans as machines, but it's a tedious waste of time if you want to guess what this person will do next.

An economically profitable way to model humans is to treat them as goal-seeking subjects with goals that take pleasure and pain, desires and intentions, guilt, and responsibility.

Anthropomorphism and the imposition of purposeful purpose have been such spectacularly successful ways of modeling humans that it is not surprising that the same modeling software often takes control when we are trying to think of entities for which it is not appropriate, like Basil Fawlty with his car, or millions of bewildered people across the universe.

(Laughter) If the universe is stranger than we can imagine, is it simply because we've been naturally chosen to guess only what we need to guess to survive in the Pleistocene of Africa?

Or are our brains so versatile and scalable that we can train ourselves to step out of evolutionary bounds?

Or, finally, are there some things in the universe that are so bizarre that no philosophy of godlike existence can even dream of them?

thank you very much.

This unoriginal cliché of new technology as an opportunity for social change taught me, was my driving force then, and still drives me today.

I wanted to update what I've been doing since then, but the theme song was still the same. And I wanted to introduce you to my lab and my current work, which is the environmental health clinic I run at New York University.

What it is - it's a twist on health.

Because what I'm trying to do now is redefine what it means to be healthy.

The clinic is similar to other college clinics, except that people come to the clinic with environmental health concerns and leave with a prescription for what they can do to improve their environmental health, as opposed to coming into the clinic with a medical concern and leaving with a prescription for medicine.

This is a useful and dandy quote from Hippocrates in the Hippocratic Oath, which states, "The majority of the soul is outside the body, and an inner cure requires an outer cure."

But this suggests that there is an opportunity to redefine the question I am trying to address here: what is health.

For this idea that health is internal and fragmented, personal and medicinal, is mostly false.

And I want to use this study, a recent study by Philip Landrigan, to encourage a different way of looking at health. There, he visited most pediatricians in the Manhattan and New York areas and recorded what they spent their patients' time on.

80-90% of their time was spent doing five things.

First was asthma, second was developmental delay, and third was a 400-fold increase in rare childhood cancers over the past 8-10, 15 years.

Fourth and fifth were childhood obesity and diabetes-related problems.

So what do they all have in common?

Environment has a lot to do with it, yes.

This is not the germ doctors are trained to deal with. This is a different definition of health, and it has great advantages because health is not internal, genetically predetermined and individualized, it is external, shared and we can do something about it.

People who come to the clinic are called impatient people, not patients. Because we can't wait for legislative changes to address community and environmental health issues.

And I met them at university and set up several field offices in different locations so that we could immerse ourselves in some of the environmental issues we face.

I like this photo of the Belgian field office I met at Rotary. In contrast to the top-down control of red light intersections, roundabouts represented headless social movements that brought about many social changes.

In this case, of course, it would be a roundabout where people make micro-decisions on the fly without being told what to do.

But of course, you get more throughput, fewer accidents, and an interesting model of social movement.

Some of those developed by Surveillance Protocol. This is the tadpole bureaucratic protocol, or protocol to watch.

These are tadpole additions named after local bureaucrats who made decisions affecting water quality.

Therefore, an impatient person concerned about water quality would grow tadpoles in water samples of interest.

And we give them a few things to help them use their companion animal devices while blogging and emailing.

A tadpole walker for walking tadpoles in the evening.

And then something interesting happens. Because we are using tadpoles. Because, of course, tadpoles have the most sophisticated biosensory we have. Tadpoles are orders of magnitude more sensitive than some of our senses to sense and respond in biologically meaningful ways to a whole class of industrial pollutants that we call endocrine disruptors or hormone emulators.

But when I take my tadpoles out for a walk in the evening (although there are some action shots), my neighbors will say, "What are you doing?"

And I have to introduce you to the tadpole and how it got its name.

I have to explain what I am doing and of course that developmental events in tadpoles are very observable and that they use the same T3-mediated hormones that we do.

So the next time your neighbors see you, they'll say, "How's that tadpole doing?"

And you can have tadpoles and social networks. Because the environmental health clinic has a social networking site for humans and non-humans, not only for impatient people, but also for humans and non-humans alike.

And, of course, these endocrine disruptors are implicated in the breast cancer epidemic, the obesity epidemic, the two-and-a-half-year decline in the average age at which puberty begins in girls, and other related things.

The culmination of this is, if you have successfully reared a tadpole and observed behavioral or developmental events, introduce the tadpole to its namesake and discuss the evidence you have seen.

Another simple protocol -- I'll briefly describe these, but just to give you a concrete idea of ​​what we're doing here -- instead of asking for a urine sample, we ask for a mouse sample.

Who here is lucky enough to live with a rat, to share a domestic partnership with a rat?

very lucky.

Mice, of course, are the quintessential model organism.

Not only do they have the same mammalian biology, but they also have nearly identical human diets, making them an even better model of environmental hygiene.

They share environmental stressors, asbestos levels, lead levels, and anything else you're exposed to.

And they are more geographically limited than you. Because we don't know if you've been exposed to persistent organic pollutants at home, or in your profession, or as a child.

Rat is a very good representation.

So, of course, it starts with building a better mousetrap.

This is one of them.

Dealing with environmental stressors is difficult.

Anyone here taking antidepressants?

(Laughter) There are a lot of people in Manhattan.

And we were also testing whether mice would self-administer SSRIs.

This was Prozac, this was Zoloft, this was Black Jelly Bean, this was a muscle relaxant, and these were all drugs taken by impatient people.

So do you think the mice self-administered antidepressants?

What is it -- (Audience: Of course. Yes.) How did you know that? They did.

This was vodka and solution, gin and solution.

This man also liked hot water and muscle relaxants.

where are our experts?

Vodka, gin -- (audience: [unintelligible]) Yes. yes. You know a lot about rats, don't you?

that's right.

So they drank as much vodka as plain water. This was interesting.

Then, of course, enter the trap.

There is an old mobile phone there, and it is a good use of the old mobile phone. Call the clinic, so we go get the mouse.

We take blood samples and do mouse blood tests and hair tests.

And I would like to point out the great advantage of looking at health in this external way.

However, there are some prescription products through this.

Very different from the medical model.

Everything we do to improve, understand, or change water and air quality benefits everyone who shares that water and air quality.

And that collective effect, the collective action effect, is really something we can use to our advantage.

So I would like to introduce a product called No Park that is prescribed at the clinic.

Formulated to improve water quality.

Many impatient people are very concerned about water and air quality.

What we do is take fire hydrants, or “no parking” spaces attached to fire hydrants, and direct the removal of asphalt to create an artificial micro-landscape and create opportunities for intrusion.

For, as many of you know, the largest pollution load presently occurring in the ports of New York and New Jersey is no longer a point source, a mass polluter, or a GE, but an extensive network of roads, impermeable surfaces, collecting cadmium neurotoxins from brake liners, and oily hydrocarbon waste that every storm and medieval infrastructure pushes directly into the estuary.

It doesn't do much good.

These are small opportunities to stop pollutants before they enter the harbor, and they are produced in very interesting ways by impatient people in various city blocks.

However, I would like to say that this is something of a rule of thumb, each block has about 2-3 hydrants.

By creating an artificial micro-landscape to penetrate there, it does not prevent it from being used as a parking space for emergency vehicles. Naturally, because fire trucks can come and park there.

They flatten some plants. No big deal, they play.

But if we could do this with every hydrant, we could redefine emergency situations.

Ninety-nine percent of the time when a fire truck isn't parked there, contaminants are getting in.

It also increases the sequestration of carbon dioxide, sequestering some of the pollutants in the atmosphere.

And collectively, these smaller blockages could infiltrate virtually all of the road-borne pollutants currently flowing into estuaries, ranging from up to 7 inches of rainfall to up to once-in-a-hundred-year storms.

So these are small actions, but they can have a big impact on improving the environmental health of your area.

This is one of the more ambitious ones.

What the climate crisis has revealed to us is a secondary, more insidious, more pervasive crisis, a crisis of agency about what to do.

Somehow, buying local lettuce, changing light bulbs, driving within the speed limit, and changing tires regularly doesn't seem to be enough in the face of the climate crisis.

And here's an interesting symbol that happened - you remember these: Fallout Shelter.

What is a haven against the climate crisis?

This was a mobilization of citizens.

Churches, school groups, hospitals, private residents, everyone built one of these in a matter of months.

And they still remain symbols of public response in the face of a shared and uncertain collective threat.

I think the refuge against the climate crisis is something like this or this. This is an intensive urban farming facility that will be built in my lab building at New York University.

What it does is a very simple idea. Eighty to ninety percent of the CO2 produced in Manhattan is associated with buildings. Similar to commercial greenhouses, it extracts CO2 from buildings, pushes CO2-rich air into urban agricultural facilities, and resupplies oxygen-rich air.

You can't actually build a lot on your roof. The roof is not designed that way.

Being on the legs, all loads are concentrated on the masonry walls and columns.

It's built to grow a barn using open source hardware.

This is a quarter scale prototype that was in service in Spain.

New York University will be happy to see how this goes.

And what I want to show you is actually this is one of the components we were testing recently. This is a solar chimney. There are currently 17 installed in New York City that passively draw air.

You can see the solar chimney.

Hot air rises.

Putting a bit of black plastic on the side of the building heats it up and gives it a passive air flow.

What we really do is put a standard HVAC filter on top of it.

This actually removes about 95 percent of the carbon black. Carbon black, along with ozone, is responsible for about half of the global warming impact. This is because carbon black changes, deposits on snow, reflectors change, and the transmission properties of the atmosphere change.

Carbon black is the dirt that clogs your clean pink lungs and is associated with it.

It's not a good thing, it's not due to combustion per se, it's due to inefficient combustion.

Running it through a solar-powered chimney actually removes about 95 percent of it.

Then, in exchange with the students, we actually re-release the carbon black.

And make a pencil by adjusting the length of the dirt taken out from the air.

Here is one of them we currently have.

We'll show you who put it down and who are avid pencil users.

Now, I'd like to show you just two more interfaces. Because I think one of our big challenges is to rethink our relationship with natural systems, not just through this twisted and personalized model of health, but through the animals we live with.

we are not alone. Animals are moving in.

In fact, urban migration now refers to the movement of animals formerly known as wild animals into urban centers.

Coyotes in Central Park, whales in the Gowanus Canal and elk in Westchester County.

This is happening all over the developed world, perhaps not only because of habitat loss, but also because our cities are just a little more livable than they used to be.

And every green space we create is an invitation for non-humans to coexist with us.

But we lacked imagination as to how it could be done well or interestingly.

And to reinvent that relationship, I would like to introduce some of the technical interfaces developed under the name OOZ (Inverted Cageless Zoo).

This is bird communication technology. It is like this.

A sound file will be triggered when the bird perches there.

This was actually in the Whitney Museum of American Art, where there were six works, each with a different claim and different audio files.

They said

(whistling) Audio Recorded: Here's what you have to do.

Go there, buy some health food bars, what they call bird food, bring them here and spread them around.

There's a good person

Natalie Jeremijenko: Okay. (Laughter) There were some of those things.

Birds could jump from one side to the other.

These are just average urban pigeons.

And early tests were done on which arguments elicited cooperative behavior from the people below, and it was determined, by about 100 to 1, that this was the argument that worked best for us.

Recorded voice: tick tick, tick tick.

That's the sound of bird flu genetic mutations becoming deadly human flu.

Do you know what slows you down?

Healthy subpopulations of birds and overall biodiversity will increase.

It is in your interest that I am healthy, happy and well fed.

So instead of monopolizing nutrient resources, we can share them.

That means sharing lunch.

(laughs) NJ: It worked, and it's true.

The last project I would like to show you is a new interface for fish that has just been launched with a great commission from the Architectural League. In fact, it will be officially announced next week.

You may not have known that you needed to communicate with fish, but now the devices exist to do just that.

It looks like this: Floating buoys protrude 3 feet above and 3 feet below.

Lights come on when fish swim below.

It looks like this.

Here is another function.

I apologize for making you seasick, but this top light is actually a water quality indicator that changes from red when there is little dissolved oxygen to blue/green when there is a lot of dissolved oxygen.

And you can also send text messages to fish.

You will find a business card there with contact details.

And they text.

When the buoy receives your message, it will wink at you twice and say it got your message.

But perhaps the most popular one is that the Bronx River is gathering the boys again. It's where the first beaver to move to New York in 250 years and build a lodge—he's crazy—hangs out.

Update from Bieber.

You can subscribe to updates from him. you can talk to him

And I like to think that this is an interface that re-scripts how we interact with natural systems, specifically by changing who has the information, where they have it, who can understand it, and what they can do with it.

In this case, instead of throwing chewing gum, Doritos, or whatever else in your pocket at the fish, the Icelandic water bodies I've been working with are in the middle of cities, where the biggest pollution load is not road-borne pollution, but white bread, actually from people feeding fish and birds.

Instead of actually doing so, we developed a fish stick that allows you to feed the fish.

It's delicious.

It is delicious beyond species, that is, it is delicious for both humans and non-humans.

However, it also contains chelating agents.

Unlike Doritos, they are nutritionally sound.

And the desire to interact with animals is always the same, and it is at least as universal as the "do not feed the animals" sign.

And every park in New York City has about three.

And in Yellowstone National Park, there are more 'please don't feed the animals' signs than there are animals you want to feed.

However, in its behavior, in its interaction, we can increase the nutrient resources we ourselves have depleted to increase fish populations by turning it into an opportunity to provide nutritionally adequate food, and by rescripting it by adding more chelating agents, the chelating agents, like other chelating agents we use medicinally, bind to bioaccumulated heavy metals and PCBs found in fish living in this particular habitat, and are complexed and excreted as harmless salts by the fish. enable Reactive and effectively removed from bioavailability.

But what I meant was to rewrite that interaction into collective action, collective corrective action, which is a very different approach than the one we're dredging PCBs across the Hudson -- after 30 years of legislation and legal battles, GE is paying to dredge the world's largest Superfund site -- we're doing the dredging, and it's probably going to Pennsylvania or the nearest third world country. will be transported. This is where toxic sludge persists.

Forced migration is not the way to deal with environmental problems.

And that's the typical paradigm we've operated in.

By really taking advantage of the opportunity that new technologies, new interactive technologies, are re-scripting our interactions, and scripting them not just as isolated, individual interactions, but as collective collective actions that equate to something, we can really begin to address some of our key environmental challenges.

thank you.

(applause)

All presentations require this slide.

(laughs) Beautiful.

appear?

Every dot, every line, it's incredible.

it's a network. And in my case, networking was important in media because it allowed me to connect with people.

Isn't it amazing?

Through it, we connect with people.

And the way I've been doing it is multifaceted.

For example, have the vacuum cleaner dressed up.

(Laughter) I did a project like Earth Sandwich. It asks people to place two pieces of bread on the globe at the same time, completely facing each other.

And people started offering bread in remembrance, and eventually teams between New Zealand and Spain were able to do it.

It's pretty incredible - the video is online.

For example, connecting with people on projects like YoungmeNowme.

In YoungmeNowme, audience members were asked to find a photo of themselves as a child and retell it as an adult.

(Laughter) It's the same person - top picture, James, bottom picture, [Jennifer].

It's painful.

It was a mother's day present.

(Laughs) Especially creepy.

(Applause.) (Laughter.) My favorite of these pictures, which I couldn't find, is a woman in her 30s with a tiny baby in her lap. Here's a picture of a 220 lb man and a tiny little old lady looking over her shoulder.

But this project changed my way of thinking about connecting with people.

It's a project called Ray.

And what happened was, this audio was sent to me, and I had no idea who created it.

Someone said, "Listen to this."

And this is what came to me.

Recording: Hello, my name is Ray. My daughter called me yesterday. I was stressed because I felt that what was happening at work was very unfair.

Quite upset, she sought comfort, but I really didn't know what to say to her. Because we have too much turmoil in our society to deal with.

So I was guided to write this song for her. To give her encouragement as she copes with the stress and pressure of her work.

We decided to put this information on the Internet so that all stressed employees can better cope with what they are facing at work.

The flow of the song is like this.

♫ I'm about to whip someone's ass ♫ ♫ Oh, I'm about to whip someone's ass ♫ ♫ Oh, if you don't leave me alone ♫ ♫ I've got to go home ♫ ♫ I'm about to whip someone's ass ♫ You may not be able to sing it out loud, but you can sing it in your heart, and you know what the lyrics are.

And give me the strength to tackle the work ahead.

have understood. stay strong. peace.

Ze Frank: So- yeah.

No, no, no, shut up. I have to hurry.

So I was so blown away by this - this is unbelievable. This was connected.

This was about recognizing at a distance that someone feels something, that they want to influence them in a certain way, and that using the media to do so and putting it online has a greater impact.

This was incredible. This is what i wanted to do.

So my first thought was that I should thank him.

And I asked the audience, 'Listen to this audio.

I have to remix it. he has a great voice

It's a B-flat key to be exact.

And you have to do something with it. ”

Hundreds of remixes are back - lots of different attempts.

One person in particular stood out.

It was done by a man named Goose.

Remix: ♫ I'm about to whip someone's ass ♫ ♫ Oh, I'm about to whip someone's ass ♫ ♫ Oh, if you don't leave me alone, ♫ ♫ Send me home ♫ Because I'm about to whip someone's ass ♫ ♫ I'm about to whip someone's ass ♫ -- ZF: Amazing, unbelievable.

That song -- (Applause) Thank you.

Someone told me that the song was sung at a Kansas City baseball game.

Ultimately, it became one of the top downloads on many music streaming services.

So I said, 'Let's put this together in an album.

Then an audience gathered to design the album cover.

And I said, "If you put it all on this, if you know who this person is, I'll give it to him." Because all I had was his name, Ray, and this little voice, and the fact that his daughter was upset.

Two weeks later they found him.

When you get the email, say, "Hello, this is Ray."

I heard you're looking for me ”

(Laughter.) And I said, 'Yes, Ray.

It's been an interesting two weeks. ”

So I flew to St. Louis and met Ray, and he was a preacher—among other things (laughter).

Well, anyway, the problem is this. It reminds me of this sign that you see on every street corner in Amsterdam.

It's like a virtual world metaphor for me.

Looking at this picture, he seems very interested in what the buttons are like, but he doesn't seem very interested in crossing the road.

(Laughter) And that makes me think:

On every street corner, people are looking at their mobile phones, but it's easy to dismiss this as some sort of bad trend in human culture.

But the truth is that life lives there.

When they smile, yes, I've seen people stop, but suddenly, somewhere in that strange, dense network, life begins to live there.

And this is what it is to feel and be felt.

It is the basic power that we all seek.

We can build all sorts of environments to make it a little easier, but ultimately what we're trying to do is actually connect with other people.

And that doesn't always happen in physical space.

It will happen in the virtual space as well, so we need to understand it better.

I don't think many of the people building this technology within their networks are very good at connecting with people.

This is similar to what I did when I was in the third grade of elementary school.

(Laughter.) Here's a series of projects over the last few years that have inspired me in trying to find ways to really foster close connections.

In some cases, it can be very simple.

"Childhood Walks" is a project that asks people to remember many meaningless walks they took as children, such as routes to bus stops and neighbors' houses, and to capture them in Google Street View.

And if you walk through Google Street View, I promise you'll come across a moment when something comes back and hits your face.

And I collected those moments, especially photos and memories within Google Street View.

"Our conversation started with me saying, 'I'm bored,' and she said, 'When I'm bored, I eat pretzels.'" ”

"I remember walking to the convenience store and buying a cherry cola right after he told me and my brother he was going to leave my mom."

"They used some footage of a morbid artist close-up of Chad's shoes in the middle of the highway.

My shoes must have come off when I was hit.

He stayed at my house once and left his pillow.

It had "Chad" written on it in magic.

He passed away long after he left the pillow at my house, and we weren't able to return it. ”

It can be a little more abstract.

This is a pain pack.

Shortly after September 11th of last year, I was thinking about pain and how to distribute it—how to remove it from my body.

So what I did was set up a hotline. A hotline is a hotline where people can voicemail their pain, even if it's not necessarily related to the event.

And people called and left messages like this.

Recording: Okay, here's something.

I am not alone and I am loved.

I am really lucky.

But sometimes I feel really lonely.

When you feel that way, even the smallest act of kindness can bring tears to your eyes.

Just like the people at the convenience store who carelessly look me in the eye and say, "Have a nice day."

ZF: So what I did is I took those voicemails, converted them to MP3s with their permission, and distributed them to sound editors who created short sounds using just those voicemails.

They were then distributed to DJs who created hundreds of songs using the source material.

(music) I don't have much time to play.

You can watch it online.

“From 52 to 48 With Love” was a project around the last election cycle, when both McCain and Obama talked about reconciliation in their post-election speeches, and I was like, “What?”

So I thought, "Okay, let's give it a try."

Let people hold up placards of reconciliation. ”

And some really great stuff came together.

"I voted blue. I voted red.

together for our future. ”

These are very, very cute little things.

Some came from the winning side.

"Dear 48, I promise to hear you, fight for you, and always respect you."

Some came from parties that had just lost.

"From 48 to 52, may your party leader be as elegant as you, but I doubt it."

But the truth is that when this started to become popular, some right-wing blogs and some message boards clearly found it a bit patronizing, and I get it.

And I started receiving an alarming amount of hate mail and even death threats.

And one guy in particular, dressed as Batman, kept writing me pretty bad messages.

And he said, "I dress up as Batman to hide my identity."

Just in case I thought the real Batman was chasing me. It actually made me feel a little better. I was like, "Oh, it's not him."

So what I did was, unfortunately, I was carrying all this terrible experience and pain inside me, and it started to eat away at my psyche.

And then I realized I was keeping the project. I kept it. I didn't want this special little group of photos to be tainted in any way.

So what I did was take all these emails and put them together in an origami template made out of this kind of despicable thing called Angrigami.

And I asked you to send me beautiful things made with Angrigami.

(Laughs) But this was an emotional moment.

One of my viewers' uncles passed away on a particular day and he decided to mourn it with hateful words.

very.

The last thing I want to talk about is a series of projects called "Songs You Already Know". The idea was to address certain types of emotions in a group project.

So one of them was a very simple one.

A man asked if he could write a song for his daughter because she was scared at night.

And I said, "Yeah, I'm going to write a mantra that she can sing to herself to help her fall asleep."

And this was "scary".

(Video) ♫ This is the song I sing when I'm scared of something ♫ ♫ I don't know why but it helps me get over it ♫ ♫ The words in the song move me ♫ ♫ And somehow I get over it ♫ ♫ At least I don't hate life ♫ ♫ I still keep trying ♫ ♫ At least I don't hate life ♫ ♫ I keep trying despite that ♫ This is It's the song I sing when I'm afraid of something ♫ ♫ Okay, so that's why I wrote that song. thank you.

So the good thing is that at one point he walked past my daughter's room and she was actually singing the song to herself.

So I thought, "Wow, this is great."

And then I got this email: And there's a little backstory to this one.

And we don't have much time.

But at some point I wanted to do a project called Facebook Me Equals You and experience what it was like to live as another human being.

So I asked people to send me their usernames and passwords.

I got about 30 of them in 30 minutes.

And I shut that part down.

Then I chose two people to be that person and asked them to send me a description of how I would act as them on Facebook.

Someone sent me a very detailed explanation. others did not.

And those who didn't turned out to have just moved to a new city and got a new job.

So people have been writing to me asking, "How's your new job going?"

I said, "I don't know.

i didn't know i had it. ”

But anyway, this same person, Laura, emailed me shortly after that project.

And I felt sorry that I didn't do a good job.

And she said, "I'm really worried. I just moved to a new town and got a new job and I'm feeling incredibly anxious."

So she saw the song "Scared" and thought if there was anything I could do.

So I asked her, "What does it feel like when you feel this way?"

And she wrote something that describes what it feels like to have this anxiety.

So what I decided to do.

I said, "Okay, I'll think about it."

And I started sending this to people quietly in the background.

(Voice) ♫ Hey ♫ ♫ It's okay ♫ ♫ It's okay ♫ So I asked people if they had basic voice capabilities. So that you can wear headphones and sing along to the song. Then you can get their voices back.

And this is how I came back.

Recording: ♫ Hi ♫ ♫ It's okay ♫ ♫ I'm sure it's okay ♫ ZF: It's really one of the better ones.

But what's amazing is that when we started gathering more and more voices, we suddenly had 30 or 40 voices from all over the world.

And when you put them together, something magical happens, something truly incredible happens, and suddenly you have choirs from all over the world.

And what's really cool is that I'm putting all this work together in the background, and Laura sent me a follow-up email after a good month.

And she said, "I know you forgot about me.

I just want to say thank you for your consideration. ”

And a few days later I sent her this.

(Audio) ♫ Now I feel like I forgot to turn on the light ♫ ♫ What looked so good yesterday ♫ ♫ has turned a shade of gray ♫ ♫ And the world seems to be spinning ♫ ♫ While I'm standing still ♫ ♫ Or you don't know if I'm spinning ♫ ♫ It's alright ♫ ♫ It's alright ♫ ♫ Breathe ♫ ♫ Now everybody sing ♫ ♫ Hey ♫ ♫ It's alright ♫ ♫ It's alright ♫ ♫ Just breathe ♫ ♫ Hey ♫ ♫ It's alright ♫ ♫ It's alright ♫ ♫ Just breathe ♫ ♫ Hey ♫ ♫ It's alright

(applause)

The stories we tell about each other are so important.

The stories we tell ourselves about our lives matter.

And most of all, I think the way we participate in each other's stories is very important.

The first time I heard stories about poor people was when I was six years old.

Now, I did not hear these stories from the poor themselves, but from the Sunday School teacher and Jesus, so to speak, through the Sunday school teacher.

I remember learning that the poor need material things such as food, clothing and shelter that they do not have.

We were also told that it was our job to help this classroom full of 5 and 6 year olds.

This is what Jesus asked of us.

And he said, "What you do for these people, you do for me."

I was pretty excited now.

I think everyone wants to be useful in the world.

Also, it was kind of interesting that God needed help.

It was news to me and felt like it was very important to be a part of it.

But I soon learned that Jesus also said, paraphrasing, that the poor will always be with us.

This made me frustrated and confused. I felt like I was given homework to do, and I was excited to do it, but no matter what I did, I always failed.

That left me confused, a little annoyed, and angry. I thought maybe I misunderstood something here.

And I felt overwhelmed.

And for the first time, I began to be afraid of this group of people and to have negative feelings towards the group as a whole.

In my mind, I imagined a long line of people who were always with us, never going away.

They were always there to help me out and give me things, so I was excited to do it, but I didn't know how it would work.

And I didn't know what would happen when I ran out of things to give, especially if the problem never went away.

Years later, the other stories I heard about growing poor were no longer positive.

For example, I frequently saw pictures and images of grief and suffering.

I've heard about things going wrong in the lives of the poor.

I've heard about sickness, I've heard about war. They always seemed related in some way.

And in general I got the idea that the poor people of the world live a life full of suffering, sorrow, devastation and despair.

And after a while, as I think many of us do, this was a predictable reaction that made me feel sick every time I heard about them.

I have come to feel guilty about my relative wealth. Because, obviously, I wasn't doing more to remedy the situation.

And I felt ashamed of it.

And I naturally distanced myself from it.

I stopped listening to them as seriously as I used to.

And I stopped expecting things to really change.

Even now I still gave. From the outside, I still looked pretty involved.

I've dedicated my time and money to the solution when it's for sale.

A child's life could be saved for the price of a cup of coffee.

I mean, who can dispute that?

What I gave was when I was cornered, when it was hard to avoid, and generally when enough negative emotions had accumulated to alleviate my own suffering rather than the suffering of others.

To tell the truth, I was donating from that place, not from a pure place of desire, excitement and generosity to help.

It became a deal for me, a deal of sorts.

I was buying something I was buying the right to go through my days without necessarily being haunted by this bad news.

And I think the way we experience it has the potential, first of all, to debody groups of people, individuals around the world.

And it can become a commodity, which is very scary.

So when I do this, and I think a lot of us do this, we're buying some kind of distance, we're buying some kind of right to continue the day.

I think exchanges can get in the way of the very thing we want most.

It can interfere with our desire to do something truly meaningful and useful in someone else's life: to love.

Thankfully, a few years ago, I heard this gentleman, Dr. Muhammad Yunus, and my situation changed.

Many in the room probably know exactly who he is, but for those who haven't heard him, Dr. Yunus was awarded the Nobel Peace Prize a few years ago for pioneering modern microfinance.

I heard him talk three years ago.

But basically, think of microfinance, if this is your first time, as a financial service for the poor.

Think of everything you can get in a bank and imagine the products and services that meet the needs of someone living on a few dollars a day.

Dr. Yunus shared his story and explained what it was and what he did at Grameen Bank.

He also talked about microlending, which is a small loan that can specifically help someone start or grow a business.

Well, when I heard him talk, I was excited for many reasons.

First and foremost, I learned about this new way of changing the world. It showed me, perhaps for the first time, how to interact, give and share resources with someone in a way that wasn't weird and didn't make me feel bad. It got me excited.

But more importantly, he told me a story about poor people unlike any I've ever heard.

In fact, it was kind of a digression about the poor people he spoke of.

He was talking about a strong, smart, hardworking entrepreneur who wakes up every day and takes action to make life better for himself and his family.

All it took was a little capital to do it faster and more effectively.

It was an amazing insight for me.

And indeed, I was so deeply moved by this - it's hard to express now how much it affected me - but it was so moving that I actually quit my job after a few weeks and moved to East Africa to see for myself what this was all about.

In fact, for the first time in a long time, I wanted to meet these people, meet the entrepreneurs, and see for myself what their lives are really like.

So I spent three months in Kenya, Uganda, and Tanzania interviewing entrepreneurs who received $100 to start and grow their businesses.

And indeed, through those interactions, for the first time, I began to make friends with some of the large, amorphous groups that were supposed to be far away.

I started making friends and getting to know their personal stories.

And we interviewed them over and over again, hearing life-changing stories and details about the surprisingly small changes they made as we spent our days together.

So we spoke with goat herders who used the money they received to buy a few more goats.

The trajectory of their business will change.

they will make a little more money. Their standard of living will change and improve.

And then you make some very interesting little adjustments in your life, like starting to send your kids to school.

They may be able to buy mosquito nets.

Maybe they can afford to lock the door and feel safe.

Maybe they were proud just because they could serve me tea with sugar when I came as a guest.

But even if I spoke to 20 goat herders in a row, there were these beautiful details, and one day it happened - these beautiful details of life change meant a lot to them.

That was another thing that really touched me.

It was really humbling to know for the first time that even if I could use a magic wand to fix everything, I would probably have made a lot of mistakes.

Because the best way for people to change their lives is to take control and do it in a way they believe is best for them.

So when I saw it, I felt very humbled.

Anyway, another interesting thing happened while I was there.

I was never asked for a donation. That was my mod.

Even in poverty, you give money to help, but no one asked me for a donation.

In fact, I didn't want anyone to offend me.

Rather, they wanted to be able to do more of what they were already doing and to further strengthen their capabilities.

So what I heard from time to time was that people wanted loans. I thought it was very reasonable and really exciting.

By the way, I majored in philosophy and poetry in school, so when I went to East Africa, I didn't see the difference between profits and earnings.

I just had the impression that if you have money, you can manage it.

My introduction to the business was this small capital injection of $100.

I learned all about profit, income and leverage from farmers, seamstresses and goat herders.

This small idea of ​​sharing these new stories of business and hope with friends and family, through which they might be able to obtain some of the funding they need to keep their business running, turned into Kiva.

A few months later I returned to Uganda with a digital camera and a basic website that my partner Matthew and I built, took pictures of my 7 new friends, posted their stories, stories of entrepreneurship on the website, spammed friends and family and said:

I have yet to hear from the SEC with more details, would you be willing to participate and provide the necessary funding?"

The money came in basically overnight.

We sent it to Uganda.

And over the next six months, something amazing happened. Entrepreneurs received money, they received rewards, they actually grew their businesses, they were able to support themselves and change the trajectory of their lives.

In October 2005, after the first seven loans were paid out, Matt and I removed the word beta from the site.

"Our little experiment was a success.

Let's get started in earnest." This was our official start.

And in its first year, October 2005-2006, Kiva facilitated $500,000 in loans.

The second year it totaled 15 million.

By the third year, the number had increased to about 40.

In the fourth year, it did not reach 100 people.

And today, less than five years later, Kiva has raised over $150 million in $25 increments from financiers and entrepreneurs. That includes more than $1 million in funding across 200 countries.

This is where Kiva is today, and we'll cover it to this day.

These numbers and statistics are really fun and interesting to talk about, but for me Kiva is really a story.

It is to retell the story of the poor, to validate their dignity, and to give ourselves the opportunity for engagement that validates partnership relationships rather than the traditional kinds of donor-beneficiary oddities-based relationships that can happen.

But instead, it's a relationship that can foster respect, hope, and optimism that together we can move forward.

So what I want is not just to keep money flowing through Kiva, which is very positive and meaningful, but like I said, I hope Kiva blurs the lines between the traditional rich and poor categories that we've been taught to see in the world, the false dichotomy between us and them, the haves and the have-nots.

I hope Kiva blurs that line.

Because if that happens, we can feel free to interact, engage, and help each other in a more open, fairer, and more creative way.

Imagine how you feel when you see someone begging on the street and try to approach them.

Imagine how you feel. And imagine the difference when someone with a story of entrepreneurship and hard work wants to talk to you about their business.

Maybe they are smiling and want to tell you what they did.

Imagine talking to someone who makes things grow and thrive. People who are using their talents to do something productive, people who have started their own businesses from scratch, people who are surrounded by abundance rather than scarcity and are actually creating it, people who are not empty handed asking for something but have a hand full of things to offer.

Imagine waking up every day to hear the unexpected stories of people working hard to make their lives better.

These stories can change the way we think about each other.

And if by lending a little money we can foster a supportive community to surround these people and participate in their stories, I think we can change the way we believe in each other and in each other's potential.

Well, for me, Kiva is just the beginning.

I'm excited to see what happens next, so it's been helpful to reflect on what I've learned so far.

First, as I said earlier, entrepreneurship was a new idea to me.

Over the last few years, interviewing and getting to know Kiva borrowers has taught me what entrepreneurship is all about.

And I think the crux of it is deciding to make your life better.

You see an opportunity and decide what you will do to seize it.

Simply put, decide that tomorrow could be better than today, and pursue it.

The second thing I learned is that loans are a very interesting tool for making connections.

They are therefore not donations.

Well, it may not sound like much.

But in reality, it's one thing to give someone something and say "thank you," and another to tell them how it went.

When you lend them money and they pay it back slowly over time, you have an excuse for an ongoing dialogue.

This constant attention, this constant attention, is very important in building different kinds of relationships between us.

And third, all other things being equal, given the choice between having money alone to do something, or having money plus the support and encouragement of a global community, people choose community and money.

It's a much more meaningful combination and a stronger one.

With that in mind, this particular incident led me to what I'm working on now.

You see entrepreneurs everywhere because I keep an eye on this.

And one of the things I've seen is that there are already a lot of supportive communities in the world.

Social networks are an amazing way, and we are all rapidly growing the number of people with supportive communities around us.

So I've been thinking about this and wondering how we can engage these collaborative communities to foster more entrepreneurial ideas and be the catalyst for all of us to make tomorrow better than today.

A survey of what's going on in the US yielded some interesting insights.

One, of course, is that, as everyone expected, many small businesses in the U.S. and around the world still need money to grow and do more of what they want to do, or may need it during a tough month.

But there is always a need for familiar resources.

Second, we found that these resources typically came from friends and family, rather than from banks, venture capitalists, and other organizations and support organizations as you might expect.

According to some statistics, over 85 percent of small business funding comes from friends and family.

That's about $130 billion a year, which is huge.

And third, when people are going through this friend and family fundraising process, it's very awkward, even if they have the best intentions and want to thank the people who are supporting them, they don't know exactly what and how to ask and what to promise in return.

So this week, we're actually secretly launching Profounder to harness the power of these supportive communities in new ways and empower entrepreneurs to decide what their financial transactions should be and what's right for them and those around them. Profounder is a crowdfunding platform for small businesses to raise what they need through investments from friends and family.

And it's investments, not donations and loans, that deliver dynamic returns.

So, the mapping of participating in the story actually flows up and down.

So, this is a do-it-yourself tool for small businesses to raise these funds.

And what you can do is visit the site, create a profile and create your investment terms in a very easy way.

I'm trying to make it really, really easy, not just for me, but for anyone else who wants to use this site.

and allows entrepreneurs to share a portion of the profits.

They can raise up to $1 million from an unlimited number of unlicensed and unsophisticated investors (forgive me, ordinary people) and distribute the proceeds over time on whatever terms they set.

Investors choose to participate based on these terms and can pre-determine whether to take the rewards home as cash or donate the profits to a non-profit organization.

Therefore, they can be cash-making investors, or great-cause investors.

I hope that this kind of tool will show someone with an idea a path to do what they want in the world, and bring together the people who are already around them, the people who know them best, love them and want to support them, to make this happen.

That's what I'm working on now.

Last but not least, look, these are tools.

At the moment, pro-founders are just in the early stages of that, and it's very clear. To me it is clear that it is just a vessel, just a tool.

What we need is for people to care about it and use it as much as they care about using Kiva to make connections.

But the good news is that I don't think I need to stand here and convince you to care - I'm not even going to try.

We often hear ethical, moral, and religious reasons, but we don't think, "This is why caring and giving will make you happy."

I don't think you need to be sure of that. I think we know In fact, I think we know so much, and it's so real that we care so deeply. In fact, what always stops us is our fear of trying and screwing up. Because we care so much that we help each other and that each other's lives have meaning.

So what I think I can do today, the best I can offer you, I gave you my story, that's the best I can do.

And I think we can remind ourselves that we care.

I think everyone already knows that.

And I think we know that love is resilient enough to go out and try.

wait a minute.

(Applause.) Thank you.

(Applause.) Thank you.

(Applause.) For me, the best way to inspire a challenge is to stop and listen to other people.

And I'm grateful that we've been able to do that here at TED.

And I'm grateful that every time I do, I'm sure to be inspired. I get inspired by people listening.

And every time I hear a story, it makes me believe in the potential to achieve great things in that person's world, and maybe in my own.

And it's easy to forget about tools and moving resources.

Believing in each other and convincing ourselves that, when the time comes, that each of us can do great things in the world, that can transform our story into a love story and our collective story into a story that will continue to perpetuate hope and goodness for all of us.

I believe that trusting each other, knowing it unquestionably, and putting it into practice every day in whatever we do will change the world and make tomorrow better than today.

thank you.

(applause)

This technology has had a very significant impact on us.

It changed the way our history developed.

But this is a technology so pervasive and so invisible that we have long forgotten to consider it when talking about human evolution.

But we are still seeing the fruits of this technology.

Now let's do a little test.

Now, everyone, please turn your attention to your neighbors.

Turn around and face your neighbor.

You can also use the balcony.

smile. smile. Please open your mouth.

smiling and friendly.

(Laughter) So -- can you see the canines?

(Laughter) Why don't you count the Dracula teeth in your neighbors' mouths?

of course not.

Because our dental anatomy wasn't really made for tearing raw meat off the bone or chewing on fibrous lobes for hours.

Made for a low-fiber, soft, mushy, highly chewable, and easily digestible meal.

Sounds like fast food, doesn't it?

(Laughter) It's for cooked food.

We have the evidence before our eyes that cooking—the change in food—has shaped us.

So I recommend changing the way you classify yourself.

We speak of ourselves as omnivores.

I think we should call ourselves "coquere", "cooks" -- (laughter) from coquere, cooks.

We are animals that eat cooked food.

No, no, no, no. Better yet, live on cooked food.

Cooking is therefore a very important skill.

It's technology.

I don't know how you feel, but I like to cook for entertainment.

And it takes some design to be successful.

So cooking is a very important technology. Because cooking gives us what brought us here: the big brains we have, this amazing cerebral cortex.

Because brains are expensive.

I know people who have to pay tuition.

(Laughter) But from a metabolic standpoint, it's also expensive.

Folks, our brains make up 2-3 percent of our body weight, but they actually consume 25 percent of the total energy we use.

Very expensive.

Where does the energy come from? From food, of course.

Eating raw food doesn't really release energy.

This ingenuity of our ancestors invented this most wonderful technology.

Invisibly, so to speak, all of us do it every day.

Cooking has allowed mutation, natural selection and the environment to develop us.

So, given that unlocking human potential, which is made possible by cooking and food, why do we speak so badly about food?

Why do you always do and don't do things, and are they good or bad for you?

The good news for me is that I wish I could go back in time and talk about the release of human potential, the continuation of the release.

Well, cooking also allowed us to become migratory species.

We have walked out of Africa twice.

We implemented all ecosystems.

If you can cook, nothing should happen. Because whatever we find, we try to change it.

Your brain will continue to work.

A very easy and simple technology developed today actually performs according to this formula.

Taking something resembling food and converting it into energy is very easy and accessible.

This technology affected two organs, the brain and the gut, and it did.

The brain may grow, but the gut actually shrinks.

To be honest, it's not obvious.

(Laughter.) But it shrunk to 60 percent of my body weight primate gut.

Since it's already cooked food, it's easier to digest.

As you know, having a big brain is a big advantage. Because it can actually affect the environment.

You can influence the technology you invent.

You can keep innovating and inventing.

Well, big brains have done this in cooking too.

But how did the show actually operate?

How did you actually interfere?

What criteria did you use?

And this is actually a taste reward and energy.

We have up to 5 taste buds, 3 of which feed us.

Sweet, energetic.

Umami: The umami of meat.

You need protein for muscle and recovery.

It's salty, because you need salt, otherwise the electric body won't work.

And two flavors that protect you - bitter and sour, that counter toxic and rotten substances.

They're wired, of course, but we still use them in sophisticated ways.

Think bittersweet chocolate. Or think about the sourness of yogurt mixed with strawberry fruit. That's excellent.

All this stuff can be mixed and made because we know that in cooking we can turn it into shape.

Reward: This is a more complex and especially integrated form of the brain that combines different factors such as external states, internal states and how we feel.

And although you may not like it, it's really satisfying to eat because you're so hungry.

So satisfaction was a very important part.

And, as I say, I needed energy.

So how was the gut actually involved in this development?

And the gut is the voice of silence - it's more towards emotion.

I use the term "digestive comfort" euphemistically, but in reality this is digestive discomfort involving the intestines.

If your stomach hurts or you feel a little bloated, it could be that the food wasn't right, wasn't cooked right, or something else was wrong.

So my story is a tale of two brains. It may surprise you, but our guts have full-fledged brains.

All the managers in the room say, "You don't tell me anything new, because we know, intuition.

Here's what we use. ”

(Laughs) It's really convenient when you actually use it.

Because our gut is connected to our emotional limbic system, they interact with each other and make decisions.

But having a brain there means not only does the big brain have to talk to the food, but the food has to talk to the brain. Because we have to learn how to actually talk to the brain.

Now, if we have a gut brain, we must also learn to talk to this brain.

150 years ago anatomists explained very carefully. This is a model of the intestinal wall.

I took three elements of the stomach, small intestine, and colon.

Within this structure are two pinkish layers, which are actually muscles.

And between this muscle was found nerve tissue, in fact a lot of nerve tissue penetrating the muscle. It penetrates the submucosa, where all the elements of the immune system are located.

The gut is actually the largest immune system that protects the body.

It penetrates mucous membranes.

This is the layer that actually touches the food you swallow and digest, and is actually the lumen.

Now, if we think about the gut, the length of the gut is 40 meters, which is about the length of a tennis court.

If you can unfold this and remove all the creases, you have a surface area of ​​400 square meters.

And now this brain is taking care of this to work with the muscles, protect the surface and, of course, digest the food we have cooked.

To explain the specs, this brain is autonomous, has 500 million nerve cells and 100 million neurons, and is roughly the size of a cat's brain, with a little cat sleeping on it. Optimize anything you think and digest yourself.

There are 20 different types of neurons.

It has the same diversity as the pig brain, which actually has 100 billion neurons.

There is an autonomously organized microcircuit in which these programs are executed.

It senses food. It knows exactly what to do.

Since food needs to be moved, it senses it by chemical means and, very importantly, by mechanical means. All the various elements required for digestion must be mixed.

Control of this muscle is very important. Because there can be reflections.

If you don't like food, especially if it's a child, it makes you nauseous.

It is this brain that causes this reflex.

And finally, it also controls the secretion of this molecular machinery that actually digests the food we cook.

So how do these two brains work together?

We used a robotics model here. This is called a "subsumption architecture".

What this means is that we have a layered control system.

The lower layer, the gut brain, has its own goal of digestive defense, and the higher brain, whose goal is integration and behavioral generation.

Well, both, this is the blue arrow. Both look to the same food in the lumen and region of the intestine.

The big brain integrates signals coming from the running programs of the lower brains. But inclusion means that higher brains can interfere with lower brains.

You can replace the signal or actually suppress it.

So let's take two kinds of signals, let's say the hunger signal.

When the stomach is empty, it produces a hormone called ghrelin.

That's a very big signal. It sends a message to the brain to go and eat.

There is a stop signal. There are up to 8 stop signals.

At least in my case they didn't listen.

(laughter) So what happens when the big brains in the integration override the signals?

So, disabling hunger signals can lead to a disorder called anorexia.

Despite generating healthy hunger signals, the big brain ignores them and activates different programs in the gut.

A more common case is overeating.

It actually takes a signal, modifies it, and continues despite the fact that the eight signals say "no more, no more".

What is interesting here is that the signal becomes stronger and stronger when there is a possibility of penetration of undigested but digestible material along this lower layer, the gastrointestinal tract.

I learned this from bariatric surgery.

In that case the signal will be very high.

Now back to cooking, back to design.

As you know, we have learned to interact with our big brain: taste and reward.

Now, what do we have to say to tell the gut brain that the signal is so strong that the big brain can't ignore it?

Then there will be a balance of what we all want: hunger and satiety.

Well, here's a very brief claim from our research.

This is fat digestion.

On the left is a droplet of olive oil, which is attacked by enzymes.

This is an in vitro experiment.

It is very difficult to work in the intestine.

Now, anyone would expect that when petroleum degradation occurs and the constituents are liberated, they disappear and disappear because they have been absorbed.

What actually happens is that a very complex structure emerges.

You can see that there are some ring-shaped structures in the central image. This is water.

This whole system creates a huge surface, allowing more enzymes to attack the remaining oil.

And finally, foamy cell-like structures appear on the right side, from which the body absorbs fat.

Now, if we could make this language, which is a language of structure, longer lasting and able to pass through the gut, a stronger signal would be generated.

So, our research, and I think university research is similar, is currently focused on the following points. In fact, how can you change your cooking, even though it may sound trivial to you?

How can we cook if we develop this language?

So what we really have is not the omnivore dilemma.

We have the opportunity to cook. Because over the past two million years, we've learned what tastes and rewards—very sophisticated things to cook—to please and satisfy ourselves.

If you add a matrix, if you add a structural language, you have to learn it, and when you learn it, you can undo it. And when it comes to energy, we can create balance from our most primal activity: cooking.

So, I think that even philosophers have to change, and ultimately realize that food is what made us who we are, in order to make food really a factor.

So I would like to say, "I cook, so I cook."

thank you very much.

(applause)

I'm a visual artist and one of the co-founders of the Plastic Pollution Coalition.

For the last 20 years, I have been working with cut and sewn plastic bags as the main material for my artwork.

They are then turned into two-dimensional and three-dimensional works, sculptures, and installations.

In the first eight years or so of working with plastic, some of my pieces began to crack and break down into tiny pieces of plastic.

And so I thought.

It is as fleeting as we are. ”

After studying a little more about plastics, I realized that this is a bad thing.

It's bad when plastic breaks down into small pieces. Because plastic will always remain plastic.

And what we are discovering is that many of them are present in the marine environment.

And over the last few years, I've learned about the Pacific garbage belt and the gyre.

And my first reaction, and I think this is the first reaction of a lot of people who find out about this, is, "Oh my God!"

We have to get out there and clean this up. ”

So I actually made a proposal to start with a freighter, two decommissioned fishing trawlers, a crane, a chipper, and a cold forming machine.

And my intention was to go out into the gyre, raise awareness about this issue, pick up the plastic, break it into pieces, and start cold molding it into bricks that could potentially be used as building materials in underdeveloped communities.

I actually went out on the gyre and started talking to people working on the plastic problem in the marine environment. In doing so, I realized that cleaning up the plastic problem is just a tiny fraction of a bucket compared to the amount of plastic that the world produces every day, and I really need to back up and see the big picture.

And the bigger problem is that we need to find a way to turn off the faucet.

We need to cut off the single-use plastic faucets that are invading our global marine environment every day.

So when I saw that, I realized that I was really angry too.

My concern is not just about the plastic in the middle of the Pacific that you imagine. We now know there may be 11 turns of plastic in the world's five major oceans.

It's not just the plastic cycle that worries me. It's the plastic cycle in supermarkets.

When you go to the supermarket, all the food is wrapped in plastic.

All my drinks are plastic wrapped, even in the health food market.

I'm also concerned about the plastic in our refrigerators, and about the plastic and the toxins it leaches into us and our bodies.

So I banded together with a group of other people who had an interest in this issue and founded the Plastic Pollution Coalition.

We are working on many initiatives, some of which are very basic.

One, if 80 to 90 percent of what is found in the ocean, or 80 to 90 percent of the marine debris found in the ocean, is plastic, why not call it plastic?

It's plastic pollution.

Recycling -- Everyone seems to end their book on sustainability and green with the idea of ​​recycling.

Throw something in the trash and never have to think about it again.

What is that truth?

Less than 7 percent of plastic in the United States is recycled.

And if you look closely at plastic bottles in particular, most of it is either downcycled, incinerated, or just shipped to China.

A glass bottle can be glass again and can be used again, but a plastic bottle can never be a plastic bottle again.

So this is a big problem for us.

Another thing we notice and want people to think about is that we added a fourth R in front of the three R's: reduce, reuse, recycle. it's waste.

Refuse single-use plastic whenever possible.

Alternatives also exist. Some of them are very old.

I myself am now collecting these cool Pyrex containers and using them to store food instead of Glad or Tupperware containers.

And I know I am serving myself and my family.

If you forget your stainless steel bottle while traveling, it is very easy to pick up a stainless steel or glass bottle and fill it with water or filtered water instead of buying plastic bottled water.

I just want to say to everyone here, and I think you know a lot about this problem, it's a big problem in the ocean, but it's a problem we created as consumers and we can solve it.

Raising awareness of this issue and teaching people to choose alternatives can solve this problem.

Therefore, whenever possible, we should choose alternatives to single-use plastics.

we can cut the trunk. Let this trunk flow into the ocean, and in doing so, save the ocean, save the earth, and save ourselves.

thank you. (applause)

Yes, I am a newspaper cartoonist, a political cartoonist.

I don't know if you've heard of it, maybe a newspaper?

A type of paper-based reader.

(Laughs) It's lighter than the iPad and a little cheaper.

do you know what they say?

They say the print media is dying, but who says that? Well, media.

But this is not news, is it?

You've already read about it, haven't you?

(Laughter) Guys, the world is getting smaller.

I know it's a cliché, but look, look how small it got, how small it got.

And of course you know why.

This is because of technology - yes.

(Laughter) Is there a computer designer in this room?

Well, the trackpad was a round, nice round shape and you guys are making my life miserable.

That's what makes a good comic.

But what about flat trackpads, those square ones?

There's nothing you can do as a cartoonist.

Well, I know the world is flat now.

that's true.

And the Internet has reached every corner, the poorest and the most remote corners of the world.

Every village in Africa now has a cyber cafe.

(laughs) Don't order a Frappuccino there.

So we are bridging the digital divide.

The third world is connected and so are we.

What happens next?

Well, I got an email.

yes.

Well, the Internet has empowered us.

It empowered you, it empowered me, and it empowered some other people.

(laughter) As you know, these last two cartoons were drawn live during a conference in Hanoi.

And they weren't used to it in communist 2.0 Vietnam.

(Laughter) So I was doing a live cartoon on widescreen -- it was quite the sensation -- and this guy came up to me.

He was taking pictures of me and pictures of my sketches and I thought, 'This is great, Vietnam fans.

And when he came on the second day, I thought, "Oh, you really like comics."

And on the third day, I finally understood that the man was actually on duty.

So by now, there should be 100 photos of me laughing while sketching in the files of the Vietnamese police.

(Laughter) No, but it's true. The Internet has changed the world.

It rocked the music industry. It changed the way we consume music.

As some of you may remember, you used to have to go to the store to steal it.

(Laughter) And it's changed how your prospective employer views your application.

So be careful with that Facebook account – your mom told you to be careful.

And technology has set us free. That's free WiFi.

But it certainly freed us from our office desks.

This is your life, enjoy it.

(Laughter) So technology, the Internet, has changed our lifestyle.

Technology guru like the man dubbed the philosopher of the 21st century by German magazines is shaping the way we do things.

They shape the way we consume.

They really shape our aspirations.

(Laughter) (Applause) You won't like it.

And technology has changed even our relationship with God.

(Laughter) We shouldn't go into this anymore.

As you may have heard, religion and political caricature have a difficult relationship. It's been going on since that day in 2005 when Danish cartoonists drew demonstrations, fatwas and violence that inspired caricatures around the world. People died in violence.

This was very frustrating. People died because of cartoons.

In other words, at the time I felt that the manga was being used by both parties.

They were first used by a Danish newspaper that wanted to make a point about Islam.

A Danish cartoonist said he was one of 24 people who were asked to draw the prophet, but 12 declined. Did you know that?

He told me, "No one should tell me what to draw.

This doesn't work like that. ”

And of course they were exploited by extremists and politicians on the other side.

They wanted to stir up controversy.

You know the story.

We know comics can be used as weapons.

According to history, they have been used by the Nazis to attack Jews.

And we are here now.

At the United Nations, half the world is pushing to punish crimes against religion – which they call religious defamation – while the other half is fighting back to defend free speech.

Does that mean a clash of civilizations is here and cartoons are in the middle of it?

This got me thinking.

Now you can see me thinking at the kitchen table. You are in my kitchen, so please meet my wife.

(Laughter) A few months later, in 2006, I went to Ivory Coast, West Africa.

Now, speaking of a divided place, the country was cut in two.

In the north there was rebellion, in the south the government, the capital Abidjan, and in the center the French army.

It looks like a huge hamburger.

I don't want to be the middle ham.

I was there to report on the story in comic form.

I have been doing this for the last 15 years. If you don't mind, that's my side job.

So you can see that the styles are different.

This is probably more serious than editorial comics.

I went to places like Gaza during the 2009 war.

So this is really journalism in comics.

You will be asked more and more.

I think this is the future of journalism.

And of course I went to see the rebels in the north.

They were poor people fighting for their rights.

As is often the case in Africa, the conflict also had an ethnic dimension.

Then I went to see Dozo.

The Dozo are traditional West African hunters.

People are afraid of them - they greatly help the rebellion.

They are believed to have magical powers.

They can disappear and escape bullets.

I went to see the storehouse chief. He told me about his magical powers.

"I can quickly decapitate and bring him back to life," he said.

I said, "Well, maybe I don't have time for that right now."

(laughs) "See you next time."

So, back in Abidjan, I was given the opportunity to lead a workshop with local cartoonists, and I thought, yes, cartoons can actually be used as a weapon against the other side in a situation like this.

So imagine the Côte d'Ivoire press was bitterly divided – compared to Rwandan media before the genocide.

So what can cartoonists do?

Sometimes editors tell cartoonists to draw what they want to see, but cartoonists have to feed their families, right?

So the idea was pretty simple.

We have brought together cartoonists from all quarters of Ivory Coast.

We took them out of the newspaper for three days.

And I asked them to do a project together, to tackle issues affecting their country with comics, yes, comics.

Show the positive power of cartoons.

Good or bad, it's a great communication tool.

And, as we've seen, cartoons can cross boundaries.

And I think humor is a good way to deal with serious issues.

And I'm so proud of what they did.

That is, they disagreed with each other - it didn't matter.

And I didn't ask them to draw great cartoons.

We even yelled at each other on the first day.

But they have published a book that looks back on Ivory Coast's 13-year political crisis.

That's where the idea was born.

In 2009 we did Lebanon, this year in Kenya and in January we did a project like this.

In Lebanon it was not a book.

The idea was that the same principal would bring together cartoonists from all sides in a divided country to do something together.

So in Lebanon, we registered newspaper editors to bring together eight cartoonists from all walks of life on the same page, covering issues that affect Lebanon, such as politics and religion in everyday life.

And it worked.

For three days, nearly every newspaper in Beirut ran in unison with anti-government, pro-government, Christian, Muslim and, of course, English-speaking cartoonists.

This was a great project.

And what we did in Kenya was to address the issue of ethnicity, which is a poison in many parts of Africa.

And we made a video clip - you can watch it by visiting YouTube/Kenyatoons.

So it's easy to preach free speech here, but as we've seen in the context of repression and division, again, what can cartoonists do?

he has to keep working

Well, I believe that no matter what the circumstances, he always has the option of at least not drawing hate-mongering cartoons.

And that's the message I'm trying to get them.

I think we all always have the choice to do no wrong in the end.

But we need to support these independent, critical and responsible voices in Africa, Lebanon, local newspapers, Apple stores and more.

Today, technology companies are the world's largest editors.

They decide what is too aggressive or too provocative for you to see.

So really, this isn't about cartoonist freedom. It's about your freedom.

And the good news for dictators around the world is that cartoonists, journalists and activists are silent.

thank you.

(applause)

(Music) ♫ Standing here ♫ ♫ Like Adam and Eve ♫ ♫ Waterfalls ♫ ♫ The Garden of Eden ♫ ♫ Two fools in love ♫ ♫ So beautiful and strong ♫ ♫ Birds in trees ♫ ♫ Smiling ♫ ♫ From the age of the dinosaurs ♫ ♫ Cars run on gasoline ♫ ♫ Where? where have they gone? ♫ ♫ Now there's only flowers ♫ ♫ This was a factory ♫ ♫ Now there's mountains and rivers ♫ ♫ All right, all right ♫ ♫ I caught a rattlesnake ♫ ♫ I got something for dinner ♫ ♫ All right, all right ♫ ♫ Okay, okay ♫ ♫ This used to be a mall ♫ ♫ Now it's turned into a cornfield ♫ ♫ Okay, okay ♫ ♫ Don't leave me here ♫ ♫ I'm not used to this lifestyle ♫ (Applause) Thomas Dolby: David Byrne.

(applause)

have understood.

♫ A walk in Central Park ♫ ♫ We're all out today ♫ ♫ The daisies and dogwoods are in full bloom ♫ ♫ Oh what a wonderful day ♫ ♫ Picnics, Frisbee and roller-skating, ♫ ♫ Friends, lovers and lonely sunbathing ♫ ♫ Let's all go out to sunny Manhattan in January ♫ (Laughter) (Applause) ♫ I brought you iced tea. ♫ ♫ Did you bring bug spray? ♫ ♫ The fly is as big as your head ♫ ♫ It's next to the palm tree ♫ ♫ Have you seen the alligator ♫ ♫ Does it look full and happy?

(whistling) (laughter) ♫ My preacher said ♫ ♫ Don't worry ♫ ♫ All the scientists are wrong ♫ ♫ So who cares it's winter here? ♫ ♫ And I'm wearing a halter top ♫ ♫ I'm wearing a halter top ♫ ♫ It's January and we're all out in merry Manhattan. ♫ (Applause) Chris Anderson: Gilles Sobule!

Large residuals are always worth the money.

We always try to get value for money.

What we're looking for is value for most people while creating value for money.

Do we care about the 4 billion people at the bottom of the so-called pyramid whose income level is less than $2 a day?

What are the challenges in getting value for money and value for most people?

Here we have discussed the performance and price.

Of course, if you have the money, you get what you pay for.

For a very high price, you get a very capable Mercedes.

But what if there is no money?

Now, you have to put your weight and the weight of others on the bike and earn your sustenance for the day.

Well, poor people don't stay poor. They become the lower middle class.

Then, naturally, the situation will improve and you will start riding your scooter.

But the challenge, again, is that they can't afford to buy anything more than a scooter, so they don't get much value.

The question is, for that price, can it provide additional value?

It seems virtually impossible to be super valuable in terms of the ability to drive, to have dignity, to have safety.

Well, this is what you often see on the streets of India.

But many people see the same thing and think differently. And one of them is here at Ratan Tata.

The great thing about our leaders is that not only do they have passion in their bellies, but they are also very innovative, which almost all leaders have.

An innovator is someone who doesn't know it's impossible.

They believe things can be done.

But great leaders like Ratan have compassion.

And Lakshmi, what you said is completely true. It's not just a Ratan Tata, it's a Tatas home through time.

Let me confirm what she said.

Yes, I was barefoot until I was 12.

I struggled [indistinct] day was a big problem.

And when I completed the 11th criterion, SSC, I was 11th out of 125,000 students.

But my poor mother couldn't afford to go to school, so I was about to quit.

And it was the [unintelligible] Tata Trust that gave me 6 rupees a month, or almost $1 a month, for 6 years.

That's how I stand before you.

That's Tata's house.

(Applause.) Innovation, compassion, and passion.

they combine them all.

And that sympathy haunted them because when he saw -- in fact, eight or nine years ago he told me how he drove himself -- he drives himself, by the way -- and saw in the rain the kind of family I showed you soaking wet with a toddler.

And he said, "Well, I have to give them a car they can afford, a $100,000 car, a $2,000 car."

Of course, when I say something like this, people immediately say that it is impossible, but Mr. Suzuki also said so.

He said, oh, maybe Stepney's going to build a tricycle.

And the cartoon can be seen here.

Well, they didn't build it. They made a decent car. Nano.

Mind you, I'm 6'0.5" tall, my rattan is taller than me, and this car has plenty of room in the front and back.

and an incredible car.

And of course, nothing succeeds like success. Then the cynics turned around and one after another they also started saying, "Well, we want to build a nano-segmented car too.

We manufacture cars in nanosegments. ”

How did this amazing story play out in the making of Nano?

Let's talk about that for a minute.

For example, how we started: Ratan just started with a team of five engineers in their mid-twenties.

And he said, "I'm not going to define the vehicle for you, but I will define the cost for you.

That's 100,000 rupees and you have to manage within that range. ”

And he said to them, "Doubt the undoubted.

Please extend the envelope. ”

And at some point he became so enamored with the whole challenge that he became a member of the team himself.

Can you believe it?

This story about the one wiper design he participated in still haunts me.

Until midnight he would have thought.

Early in the morning he will come back with some solution.

But who was the leader of the team?

The leader of the team was Girish Wag, a 34-year-old boy from [UNKNOWN].

And the average age of the Nano team was just 27.

And they innovated in design and beyond.

It broke many of the norms of standard practice for the first time.

For example, consider a car with a single balancer shaft and a two-cylinder petrol engine.

Glue was used instead of rivets.

Co-creation with vendors and suppliers, co-creation at scale.

Any ideas are welcome.

100 vendors coexisted next to the factory and developed an innovative business model for auto dealers.

For example, imagine someone selling cloth sells Nano.

So it was an incredible innovation.

We are looking for solutions for non-automotive sectors.

It was open innovation, and ideas were welcomed from all sides.

By the way, helicopter seats and window mechanisms are used, and the dashboard is also inspired by motorcycles.

The fuel lines and lamps were the same as the motorcycle.

But the crux of the matter was getting more out of less.

I am always handed an envelope.

You can't go beyond the envelope of 100,000 rupees, or $2,000.

Therefore, each component needed double functionality.

And seat risers, for example, not only serve as attachment points for the seat, but also as structural parts for functional rigidity.

Nano has half the parts count of a typical passenger car.

By the way, the length is about 80% shorter.

However, today's entry-level cars are 8% smaller, but offer 21% more interior space.

And what happened is that you can get more out of less and see how much you get with less.

When the Model T was released -- all these numbers are adjusted to 2007 dollar prices, by the way -- Ford's price for the Model T was $19,700.

There were 11,333 Volkswagons.

And British Motor was around 11,000.

And the Nano was $2,000.

This is why you actually started a new paradigm shift. The same people who had the whole family on their scooters, who never dreamed of riding in a car, started dreaming of riding in a car.

And those dreams are coming true.

Here is a photo of a house near my house, a driver and a car.

The driver's name is Narang.

He bought his own Nano.

And, as you can see, there is a physical space created for him to park that car with the owner's car, but more importantly, they created a space in their mind that said, "Yes, my driver is going to come and park his car."

That's why I call it a transformational innovation.

We are talking about social innovations, not just technical ones.

So, ladies and gentlemen, this famous theme of getting more from less comes into play.

I remember talking about this for the first time about a year and a half ago when the Academy awarded me a fellowship in Australia.

And, unbelievably, I was the first Indian in 40 years to receive this honor.

Hence the title of my talk was 'Indian Innovations from Gandhi to Gandhian Engineering'.

And for the sake of more people, I titled this "Gandhi Engineering".

In my judgment, Gandhian engineering moves the world forward and makes a difference for everyone, not just the few.

Let's move from car travel to private travel for the unfortunate people who have lost their legs.

This is an American citizen with a prosthetic leg and his son.

What's the price? $20,000.

And of course, this foot is designed to be able to walk only on such perfect pavements and roads.

Unfortunately in India this is not the case.

You can see them walking barefoot on hard-to-walk terrain, and sometimes in wetlands.

More importantly, as seen here, they don't just walk long distances to work, they bike to work.

And they climb to work.

The prosthetic leg must be designed for such situations.

Of course it's a challenge.

Four billion people earn less than $2 a day.

And if you're talking about $20,000 shoes, you're talking about 10,000 days worth of income.

I just don't have it.

Therefore, alternatives should be considered.

Thus, Jaipur Foot was born in India.

It features an innovative prosthesis donning and delivery system, rapid molding and modular components, enabling custom-made on-site limb donning.

By the way, it actually takes an hour compared to a day or so to feel it on the other foot.

An outer socket that uses a heated high-density polyethylene pipe without using a heating sheet.

Unique high ankle design, human-like looks, and "obscure" functions.

And I like to show you what it looks like and how it works.

(music) Look, he jumps. I can see how stressful it is.

(Text: ... anyone with limbs below the knee can do this.

...on a limb, yes, it would be difficult...

"It was painful?"

"No... not at all."

...he can run a kilometer in 4 minutes and 30 seconds ...) he can run a kilometer in 4 minutes and 30 seconds.

(Applause) That's all.

So basically Time magazine focused on this $28.

(Applause) That's incredible.

Let's move on to something else.

I've been talking about getting more out of less.

Let's move on to health.

We've talked about mobility and other things, let's talk about health.

What is happening in the field of health?

New diseases require new drugs.

And when you look back at drug development 10 years ago and now, what happened?

Ten years ago it cost about 250 million.

It currently costs $1.5 billion.

It took 10 years to bring a molecule to market through human and animal experiments, now it's been 15 years.

Are you getting more medicine because you are spending more time and more money?

No, sorry.

We used to have 40, but now we have 30.

So, in reality, less people are getting less out of more.

Why is the number of people decreasing? Because it is very expensive, basically few people can afford it.

Let's take an example.

Psoriasis is a very scary skin disease.

$20,000 for treatment.

By the way, subcutaneous antibody injections cost $1,000, 20 of which.

It took about ten years and $700 million to develop.

Let's set some goals, starting in the spirit of getting more and more from less.

For example, I don't want $20,000. we don't have that.

Can you do it for $100?

The development time is not 10 years.

We are in a hurry. 5 years.

The development cost is 300 million dollars.

sorry. You can't use more than 10 million.

It looks totally daring.

It looks utterly ridiculous.

do you know something This has been achieved in India.

These goals have been achieved in India.

And how were they achieved...

Sir Francis Bacon once said: “It is a foolish fantasy to think that when you want to achieve a result that has not been achieved before, you can do it using methods that have been used before.”

Therefore, the standard process of developing a molecule and administering it to mice or humans will not yield the results that billions of dollars have spent.

But the cleverness of the Indians was to take traditional knowledge, validate it scientifically, and make the journey not from molecules to mice to humans, but from humans to mice to humans.

That's how this difference came about.

And you can see the fusion of traditional medicine, modern medicine and modern science.

I started a big program [obscure] CSIR about nine years ago.

He's doing us a favor not just for psoriasis, but for cancer and everything else, changing a whole paradigm.

And it turns out that this Indian psoriasis advance is obtained by the reverse form of [indistinct] by doing things differently.

See before and after treatment.

These are all affordable remedies, so more and more people are getting more from less.

Let me remind you what Mahatma Gandhi said.

He said, "Earth provides enough to meet everyone's needs, but not everyone's desires."

So the message he was giving us was that we need to get more out of less and be able to share it with more people, not just the current generation, but future generations.

And he also said, "I appreciate every invention of science that has been made for the benefit of all."

So he was giving you a message that you should get it out to more people than just a few people.

So, ladies and gentlemen, this is the theme, getting more from less.

Let me tell you, just because it's a little cheaper doesn't mean it's a little more.

It's not about low cost.

Talk about super low cost.

I can't say it's just $10,000 for treatment, but you're poor, so I'll give you 9,000 yen.

Sorry, it doesn't work. I have to sell it for $100 or $200.

Could you? By the way, this was made possible for other specific reasons.

So we're not talking about low cost, we're talking about ultra-low cost.

You're not talking about affordability, you're talking about extreme affordability.

Because there are 4 billion people who earn less than $2 a day.

You are not talking about exclusive innovation.

You are talking about inclusive innovation.

So you're not talking about incremental innovation, you're talking about disruptive innovation.

Ideas should be such that you think about them from a completely different perspective.

And I'd like to add that it's not just getting more for less, with more and more people, but the whole world is working for it.

I was very impressed when I saw the breakthrough the other day.

For example, infant incubators.

Not available in Africa.

You can't buy it in Indian villages.

and infants die.

And an incubator costs $2,000.

And then there's the $25 incubator created to provide that performance.

and by whom?

A very affordable project by a young student at Stanford University.

Like Ratan Tata, their hearts are in the right place.

It's not just innovation, compassion and passion. There is compassion in the heart and passion in the stomach.

That is the new world we want to create.

That is why the message is the message of Gandhian engineering.

Ladies and gentlemen, I want to finish in time.

I was scared for those 18 minutes too.

I still have an hour and a half.

Message, the last message is this. India has given the world a wonderful gift.

What?

In the 20th century we gave the world Gandhi.

The gifts of the 21st century are very, very important to the whole world, whether it is a global economic meltdown or climate change. Any problem you speak of is getting more from less. Not only for the current generation, but also for future generations.

And that's what you get only from Gandhian engineering.

So, ladies and gentlemen, I am very pleased to present the 21st century gift from India to the world: Gandhian Engineering.

(Applause) Lakshmi Prathuri: Thank you, Dr. Masherkar. (R.A. Machelker: Thank you.) LP: Just a quick question.

Now, when you were a boy in this school, what were you thinking, what did you think you could be?

What do you think drives you?

Did you have a vision? What drives you?

RAM: Let me tell you the story that moved me and changed my life.

I remember going to a poor school. Because the mother was unable to collect the required 500,000 rupees of 21 rupees within the stipulated time.

It was [unintelligible] high school.

But let's be honest, it was a poor school with wealthy teachers.

And one of them was [unintelligible] who taught us physics.

One day he took us out into the sun and tried to teach us how to find the focal length of a convex lens.

The lens was here. There was a piece of paper there. He moved it up and down.

And there was a bright spot there.

And he said, "This is the focal length."

But then he put up with it for a little while, Lakshmi.

and the paper burned.

When the paper burned, for some reason he turned to me and said, "Masherkar, if you focus your energy this way instead of diffusing it, you can achieve anything in this world."

It gave me a great message that focus can be achieved.

I said, "Oh, science is so wonderful. You have to be a scientist."

But more importantly, you can achieve it if you focus.

And that message, frankly, is valuable for today's society.

What does that focal length do?

There are parallel lines that are the rays of the sun.

And a property of parallel lines is that they never intersect.

What does that convex lens do?

That's what makes them meet.

This is convex lens leadership.

Do you know what today's leaders are doing? concave length.

They split them further.

That's where I learned the lesson of lenticular leadership.

And when I was at the National Chemical Laboratory [UNKNOWN].

When I was at the Scientific and Industrial Research Council -- 40 laboratories -- it was [indistinct] when two laboratories weren't talking to each other.

And now, I am President of the Global Research Alliance, which has 60,000 scientists in nine counties from India to the United States.

I am building a global team to consider the grand global challenges facing the world.

That was the lesson. It was an emotional moment.

LP: Thank you. (Ram: Thank you.) (Applause)

I'm talking about power in this 21st century.

Basically, what I want to tell you is that power is changing and there are two types of change that I want to discuss.

One is power transitions, the exchange of power between nations.

And the simple version of the message is that it's moving from west to east.

The other is the diffusion of power, the way power moves from all states in the West or the East to non-state actors.

These two are the big shifts in power in this century.

And I'd like to explain each of them individually, how they interact, and why there might be good news in the end.

When we talk about power transitions, we often talk about the rise of Asia.

This is exactly what we should call the revival and return of Asia.

If you look at the world in 1800, you can see that more than half the world's population lived in Asia, and more than half of the world's goods were produced in Asia.

Fast forward to 1900 here. Half of the world's population, or more than half, still lives in Asia, but only one-fifth of the world's products are produced in Asia.

what happened? The Industrial Revolution meant that suddenly Europe and America became the dominant centers of the world.

What we see in the 21st century is Asia's gradual return to being home to more than half the world's population and more than half of the world's output.

It's important, it's an important change.

But let me say a few words about the other change I'm talking about, the diffusion of power.

To understand power diffusion, keep in mind the following: Computing and communication costs fell by a factor of 1,000 between 1970 and the turn of the century.

This is a very abstract number.

But more realistically, if car prices fell as fast as computing power, you could buy a car today for $5.

Now, when the price of any technology falls dramatically, the barriers to entry will drop.

Anyone can join the game.

So, in 1970, if you wanted to communicate from Oxford to Johannesburg, New Delhi, Brasilia, or anywhere else at the same time, you could.

The technology was there.

But to be able to do that, they had to be very wealthy: governments, multinational corporations, possibly the Catholic Church.

Anyone can now have that ability, which was previously limited to just a few actors due to price.

If you have internet cafe entry (it was around £1 an hour when I last checked), it's free if you have Skype.

So what was once limited functionality is now available to everyone.

And that does not mean that the age of the nation is over.

Nation still matters.

However, the stage was very crowded.

Not just nations. There are many actors.

There are some positives as well. Oxfam is a great non-governmental organization.

There's also the downside: Al-Qaeda, another non-governmental organization.

But consider how it affects our way of thinking in traditional terms and concepts.

We think in terms of wars and wars between nations.

And remember when the Japanese government attacked the United States at Pearl Harbor in 1941.

It is worth noting that nonstate actors attacked the United States in 2001 and killed more Americans than the Japanese government killed in 1941.

You might think of it as the privatization of war.

So there is a big shift in terms of the diffusion of power.

The problem is that we don't think of it in a very innovative way.

So let's step back and ask. What is power?

Power is the simple ability to influence others to get the results you want, and there are three ways to do it.

You can do it with the threat of coercion "sticks", you can do it by paying with "carrots", you can do it by making others want what you want.

And the ability to make others want what you want, and get the results you want without being forced or paid, is what I call soft power.

And that soft power has been so neglected and misunderstood, yet so important.

In fact, if you can learn how to use more soft power, you can save a lot of carrots and sticks.

Traditionally, people have thought of power primarily in terms of military might.

For example, the great Oxford historian A.J.P. Taylor, who taught at the university, defined a great power as one that could win a war.

But understanding power in the 21st century requires a new narrative.

War is still going on, but it's not just prevalent during war.

It doesn't matter whose army wins. It's also about whose story wins.

And we have to think more in terms of stories and whose stories are going to be effective.

Now let's get back to the issue of power transfers between states and what's going on there.

The stories we use today tend to depict the rise and fall of great powers.

And the current narrative is all about China's rise and America's decline.

In fact, during the 2008 financial crisis, many said this was the beginning of the end of American power.

A crustal shift in world politics was taking place.

And Russian President Medvedev, for example, declared in 2008 that this was the beginning of the end of US power.

In practice, however, this trope of decline is often very misleading.

If you look at history, if you look at recent history, you'll find that the belief in America's decline repeats itself every 10 or 15 years.

In 1958, after the Soviets installed Sputnik, it became "that's the end of America."

America came to an end in 1973 with the oil embargo and the closing of the gold window.

In the 1980s, during the Reagan administration, America went through a period of transition from the Rust Belt economy of the Midwest to the Silicon Valley economy of California, and that was the end of America.

But what we've seen is none of that is true.

In fact, in the early 2000s, people were overenthusiastic that America could do anything, which led us to a disastrous foreign policy adventure that is now back in decline.

The moral of this story is that all these stories of rise and fall and decline tell us more about psychology than about reality.

If we're going to focus on reality, we need to focus on what's really going on with China and the US.

Goldman Sachs predicts China's economy will surpass the US economy.

By 2027.

That means it will be another 17 years or so before China becomes even bigger.

Now, someday, billion point 3 people will be wealthier and they will be bigger than the United States.

But be very careful with predictions like those of Goldman Sachs, as if they could pinpoint the shift in power in this century.

Here are three reasons why it's too simplistic.

First of all, it's a linear projection.

You know, this is China's growth rate, this is the US growth rate, which is a straight line.

History is not linear.

There are often bumps along the road and accidents along the way.

The second is that the Chinese economy will overtake, say, the U.S. economy in 2030, but that might be a measure of total economic size, but not of per capita income—we don't know what the economy is made up of.

Many regions of China are still underdeveloped, and per capita income is a better measure of economic sophistication.

And it won't be until the second half of the century, after 2050, that the Chinese will catch up or overtake the Americans.

Another point worth noting is how this projection is one-dimensional.

You know, it looks at economic power as measured by GDP.

Much less is said about military power, less is said about soft power.

It's all very one-dimensional.

Also, when thinking about the rise of Asia, or the return of what I called Asia earlier, it's worth remembering that Asia is not one thing.

If you are sitting in Japan, New Delhi or Hanoi, your view of China's rise is a little different than if you were sitting in Beijing.

In fact, one of the advantages Americans have in terms of power in Asia is that countries want American insurance against China's rise.

As if Mexico and Canada were hostile neighbors of the United States, they are not.

So these simple Goldman-Sachs-style predictions don't tell us what we need to know about power transitions.

But then you might wonder what the heck is going on?

Why does it matter? Who cares?

Is this just a game played by diplomats and academics?

The answer is that it is very important.

Because if you believe in decline and get the answer wrong about this thing—facts, not myths—you could be making a very risky policy.

Let's take an example from history.

The Peloponnesian War was the great war in which the Greek city-state system tore itself apart 2500 years ago.

What could be the cause?

Thucydides, the great historian of the Peloponnesian War, said it was the rise of Athens' power and the terror it created in Sparta.

Notice both parts of this description.

Many argue that the 21st century will be a repeat of World War I, the twentieth century in which the European state system tore itself apart and the conflagration that destroyed the centrality of the world, caused by the rise of German power and the fear it created in Britain.

So there are those who are saying that this will be repeated today, that this is what we will see in this century.

No, I think it's wrong.

Bad history.

For one thing, Germany surpassed Britain in industrial power by 1900.

And, as I said earlier, China has not overtaken the United States.

But there is also this belief, and when it creates a sense of fear, it leads to overreaction.

And the greatest danger we have in managing this transition of power to the East is fear.

To paraphrase Franklin Roosevelt in another context, the greatest thing we have to fear is fear itself.

We need not fear the rise of China or the return of Asia.

And having policies that look at it from a larger historical perspective will help manage this process.

Now let's put these two types together after saying a few words about the distribution of power and how it relates to the diffusion of power.

The way power is distributed in today's world is like a three-dimensional chess game.

Top plate: Military power between nations.

The United States is the only superpower and will remain so for the next 20 to 30 years.

China does not intend to replace the United States in this military commission.

The central board of this three-dimensional chess game: economic power between nations.

Power is multipolar.

A balancer exists. The United States, Europe, China and Japan can balance each other.

This bottom board of the third dimension, the board of cross-border relationships, cross-border out of government control, climate change, drug trafficking, financial flows, pandemics, all cross-border out of government control, there is no one in charge.

It makes no sense to call it unipolar or multipolar.

Power is chaotically dispersed.

And the only way these problems can be solved, and this is where many of the greatest challenges of this century come, is through cooperation, working together. So soft power will become more important, and the ability to organize networks that can address these kinds of issues and gain cooperation.

Put another way, when we think about power in the 21st century, we want to escape the idea that power is always zero-sum, that my gain is your loss and vice versa.

Power can also be a positive sum, in which case your benefit can be mine.

It will be good for us, good for China and good for the rest of the world, if China strengthens its energy security and becomes more capable of coping with the problem of carbon emissions.

So empowering China to deal with its own carbon problem is good for everyone, and it's not a zero-sum, I win and you lose.

That's what we can all get.

So when I think about power in this century, I want to move away from the view that it's all I win and you lose.

Now, I'm not going to be Pollyan about this.

War continues. Power lasts.

Military power is important.

It's important to keep the balance.

All this is still going on.

Hard power is there and it remains.

But unless we learn how to incorporate hard and soft power into what I call smart power, we will not be able to address the new kinds of problems we face.

So the key question we need to consider when looking at this is how we work together to create a global public good, one that we can all benefit from.

How can we define national interest to be positive sum rather than just zero sum?

In that sense, for example, defining US interests as Britain defined its own interests in the 19th century, maintaining an open trading system, maintaining currency stability, and maintaining maritime freedom were good for Britain and good for others.

And in the 21st century, we must do something similar.

How do we create global public goods that are not only good for us, but good for everyone at the same time?

And that would be the good news aspect of what we should be thinking about when we think about power in the 21st century.

There are ways to define our interests. In that way, we can protect ourselves with hard power while networking with others to create ways to strengthen not only the public good, but also soft power.

So, looking at the remarks made on this, it is striking that Hillary Clinton, when describing the Obama administration's foreign policy, said that the Obama administration's foreign policy would be, in her words, "smart power that uses every tool in its foreign policy toolbox."

And if we are to address these two major power shifts I have described, power shifts typified by transitions between states, power shifts typified by the diffusion of power from all states, we will need to develop a new power narrative that combines hard and soft power into a smart power strategy.

That's the good news for me. we can do that.

thank you very much.

(applause)

Sustainability is about what, where and how it is harvested.

The who and why are important to me.

I would love to know the people behind my dinner choices.

I want to know what effect I have on them.

I would like to know what effect they have on me.

I want to know why I fish.

I would like to know how they depend on the blessings of water to live.

Understanding all of this can transform the perception of seafood from a commodity into an opportunity to restore ecosystems.

This allows us to celebrate the seafood we are so lucky to eat as well.

So what do we call this?

I would call it recovery seafood.

Restorative is the ability to replenish and progress, whereas sustainability is the ability to endure and maintain.

Resilient seafood enables dynamic systems to evolve, recognizes our relationship with the ocean as a resource, and suggests that we work to replenish the ocean and promote its resilience.

It's more hopeful, more human, and a more useful way to make sense of our environment.

Wallet guides, which are standard publications in the marine conservation world, are very useful. they are great tools.

List of green, yellow and red seafood.

This association is very easy. Buy green, don't buy red, think twice about yellow.

But in my opinion, eating the Green List is not enough.

We cannot sustain this without our measure of success actually changing the fate of the yellow and red seeds.

But what if you only ate greenlist?

Here you will find pole and line yellowfin tuna from sustainable sources.

Pole caught -- no bycatch.

Great for fishermen. a lot of money. Support the local economy.

But it's a sea lion. Best predator.

What is the background of this diet?

Am I going to sit in a steakhouse and eat 16 ounces of this?

Do this 3 times a week?

I may still be on the Green List, but I am not doing myself, you or the ocean any good.

Importantly, in all of this we must have a context, a yardstick, by which to judge our actions.

Example: I heard that red wine is great for my health, including antioxidants, minerals, and heart health.

That is wonderful! I love red wine!

You drink so much. You will be very healthy.

Well, how many bottles do you have to drink to say you have a problem?

Guys, I have a protein problem.

We have lost this sensitivity when it comes to food and we are paying the price.

The problem is hiding that cost under the waves.

We hide that cost behind the social acceptance of expanding our waistlines.

And we hide that cost behind huge profits.

So first and foremost with this recovery seafood idea is that it really takes our needs into consideration.

Revitalizing seafood may best be described not by Jaws, Flipper or the Gordon fishermen, but rather by the cheerful green giant.

Vegetables: They may still save the ocean.

Sylvia often says that blue is the new green.

Well, I would like to respectfully suggest that the green of broccoli may become the new blue.

We must continue to eat the best seafood we can.

However, it must be eaten with a lot of vegetables.

But the best thing about Recovery Seafood is that bottles of Tabasco and lemon wedges are served on the half shell.

It has 5 ounces of tilapia with Dijon mustard and crisp breadcrumbs, a piping hot heap of pecan quinoa pilaf, and crispy broccoli, so tender and sweet, charred and smoky on the outside with just a touch of chili flakes.

Wow!

This sells easily.

And the best part is that all of these ingredients are available at your local Walmart for the whole family.

Jamie Oliver is campaigning to save America from our diet.

Sylvia is campaigning to save the oceans from our diet.

There is a pattern here.

Forget the nuclear holocaust. All we have to worry about is the fork.

We have destroyed the planet and used the food we procured to handicap ourselves in many ways.

Therefore, we think that this eating itself is wrong.

So I think it's time to change what we expect from food.

Sustainability is complicated, but dinner is a reality we all understand.

So let's start there.

Recently, there has been a movement to green the food system.

Dan Barber and Alice Waters are passionate leaders of the Green Food Delicious Revolution.

But green food often represents the way we ignore our responsibilities as eaters.

Just because it's made from green sauce doesn't mean you can ignore it.

We have eco-friendly shrimp.

we can make it we have the technology.

But an eco-friendly all-you-can-eat shrimp buffet will never come to fruition.

it doesn't work.

A heart-healthy dinner is a very important part of restorative seafood.

While we try to deal with a declining marine population, the media recommends increasing seafood consumption.

Research suggests that tens of thousands of American grandmothers, grandfathers, mothers and fathers could have another birthday if they included more seafood.

It's a reward I don't want to miss.

But it's not all about seafood.

It's about how we look at the dish.

As a chef, I recognize that the easiest thing for me to do is reduce the amount of food on my plate.

A few things happened.

I got more money.

People knew that appetizers alone wouldn't fill them up, so they started buying appetizers and salads.

People spent more time eating and interacting with each other while eating.

In other words, people could get more of what they came for, even if their protein intake was reduced.

They consumed more calories through a diverse diet.

they are healthier. I got more money.

This is fantastic.

Consideration for the environment goes into every dish, but so does consideration for the human interest.

Another thing we did was start diversifying the fish species we offer. Small silverfish, anchovies, mackerel, sardines etc were rare.

Shellfish, mussels, oysters, clams, tilapia, char - these were common species.

We were turning our tastes towards options that were more resilient and more resilient.

This is what we need to uphold.

The Green List says:

But this is also how we actually start restoring the environment.

But what about those big predators, the fashionable species, the Green List tuna we talked about earlier?

Well, if you need it, I have the recipe for you.

I can handle most of the big fish in the sea, so I'll try it.

Start with a large 16 ounce fish.

get a knife Cut it into quarters.

Arrange on four plates.

Serve these four plates with veggies, open your bottle of the finest Burgundy on hand, light a candle and celebrate.

Celebrate the opportunity to eat this.

Repeat perhaps once a year by inviting friends and neighbors to your home.

I expect a lot from my food.

I wish you health and joy, family and community.

I expect that producing ingredients, preparing food, and eating meals are all part of the communion of good for mankind.

Luckily my father was a great cook.

And he taught me early on about the privilege of eating.

I remember my childhood meals very well.

They were a moderate amount of protein, with a large amount of vegetables and a small amount of starch, usually served with rice.

This is still how I mainly eat.

I feel sick when I go to steakhouses.

Meat sweats.

It's like a protein hangover.

It's disgusting.

But of all the dire news you will hear, and you have heard about the state of our oceans, I am unfortunately burdened with perhaps the worst news to bring to you, and that your mother was right all along.

Let's eat vegetables.

It's very easy.

So what do we want in our diet?

For my health, I am looking for healthy ingredients that are good for my body.

For pleasure, I'm looking for butter and salt and sexy things that don't make things feel like penance.

I'm looking for recipes that reflect my own personal history for my family.

But for communities, we start from the beginning.

We cannot escape the fact that everything we eat affects the world.

So learn as much as you can about what its impact is like and take the first steps to minimize it.

We have seen images of the blue planet, the World Bank.

But it's not just a repository of resources. It is also the global geography of the sacrament we call the supper.

So when we all receive what we need, we can share the rest, start celebrating, and start rebuilding.

Vegetables must be tasted.

We need to taste seafood in small portions.

And I have to save dinner.

thank you.

(applause)

I'm a scientist and a big fan of Star Trek, especially Mr. Spock.

Mr. Spock is a scientist as well as the first [officer] of the starship Enterprise, and in the adventures of the crew of the Enterprise, he and his colleagues deal a lot with Mr. Spock's emotionlessness.

Mr. Spock is half-human, half-Vulcan, an alien race who learn to control and suppress their emotions and act purely on logic.

Because Mr. Spock is half Vulcan, he thinks he's always in conflict between logic and emotion. Because he's part of the team, the entire crew struggles, analyzes, and makes fun of this conflict.

And Star Trek fans have been watching this seemingly contradictory act with amazement.

They find it very attractive.

And this issue is the golden thread that runs through the entire Star Trek series and movies from the 60s to today.

That's what I want to talk about today: the role of emotion in science.

We tend to think that science is all about facts and logic, and that human emotions are often ignored or considered an obstacle to be removed.

I would suggest that emotions are as important in science as they are in other parts of life.

Science is man-made, and as long as we are human, we cannot get rid of our emotions no matter how hard we try.

Therefore, I believe that in science too, emotions should be used instead of fighting them. Because emotions are as important to breakthroughs and innovation as facts and logic.

Before I get back to Mr. Spock, let me share my experience with the role of emotion in science. One story in particular has kept me thinking about it for the last few years.

I am working on research on organic light-emitting diodes, so-called OLEDs.

This is how it is perceived as a new generation of displays.

OLEDs are increasingly being used in smartphone displays and TV screens.

They look bright, really colorful and bendable.

This is what my colleague physicist looks like in his lab.

And this is what I, as a chemist, have in mind when I think about them.

I've loved it ever since I started making it.

That's why I didn't really like the news when the company I worked for, my former employer, announced they wanted to stop OLED research.

At the time, management had reasons for this decision, and the company actually handled it quite well.

No one lost their jobs and everyone was rewarded for their work.

What I want to show you today is what happened to my fellow scientists and myself between the announcement and the final working day of the project.

Think of this as a small case study on emotions in science.

By 2015, our research team had grown to over 80 people, and even after the cancellation of the project was announced, we couldn't stop our daily work.

It took several months for all activities to come to a healthy end and for everyone to find new jobs within the company.

I will explain what happened.

We knew we were working on a project that should have been scrapped, but we hit a ceiling during those months.

In fact, we were working on two different OLED projects. One is the development of materials for OLEDs that emit blue light, which started in 2001. The second is green OLED materials launched in 2014.

The results shown here are for the green OLED project.

The graph shows how lifetime, a key measure of device durability, has changed over time.

In 2015, just six months into the project, we were told to scale back, stop working on the project as soon as possible, and start over with something else.

Nevertheless, from this point on our performance continued to improve rapidly.

How did this happen?

Soon after this announcement, colleagues started leaving the team and soon we were left in small groups, all sharing the same "I'm going to be the last to leave the ship" attitude.

My point is that while the number of scientists working on this project has decreased, the dedication of those who remain has increased dramatically.

And also a new and stronger team spirit was formed.

We all share the same passion for what we do, and while we were sad that it was coming to an end, we wanted to show that we can bring our ideas to life.

We felt we belonged to something bigger.

In addition, management started thinking about new projects, restructuring, etc., so our projects became less and less important.

As a result, we have more freedom and can take some things into our own hands.

Of course, with more freedom comes more responsibility, but we believed in our work and were happy to take it.

We felt empowered.

And these three pillars of dedication, belonging, and empowerment worked together in a sort of self-reinforcing cycle, and the closer we got to shutting down, the better our performance was.

So we were personally working on a project that had already been sentenced to death. Because I felt connected to something meaningful.

Of course, it was hard and frustrating at times, but we sat together in the lab, sometimes at the cafe, sharing the sadness of the end of the project and the joy of the work.

All in all we had a very intense and enchantingly exciting time.

The lifetime of the material finally obtained was at the same level as the material for green OLEDs that had already been commercialized at that time, and this was achieved in just one year.

And those results have helped our employer sell patents at their real value.

Now let's tell the same story with different characters and slightly different actions.

This story is part of Star Trek.

And, sorry for those who haven't seen the movie, here are the spoilers.

After Mr. Spock sacrifices himself to save the starship Enterprise at the end of Star Trek II, Captain Kirk and his core team are determined to explore the universe in search of Spock, even though the odds of finding him alive seemed slim.

And Starfleet Command didn't give them permission or spaceships to do so, so they took it upon themselves to set out on a journey to find Spock with great enthusiasm.

And after dealing with a big challenge, they finally find Spock, and he happily and gratefully rejoins the team.

He felt the team's dedication and connection to the project to save himself and try to bring the staff together.

And over the years, episodes of the story, Mr. Spock has come to realize that the combination of both logic and emotion is crucial to meeting challenges and exploring new worlds, and contradictions no longer exist.

So the storylines here for both OLED stories and Star Trek are actually the basic setting for many groundbreaking stories both in and out of science.

All the main characters are part of a great team.

All team members show great dedication to achieve their goals.

They strive for all the freedom they can afford and take responsibility for what they have to do.

As I was nearing the end of my OLED project, I was given a piece of advice several times.

"Don't take it to heart.

You can work on something else. ”

If I had followed it, I would have had a few dark nights and many tears, but at the same time, I would not have achieved much in my personal growth and happiness.

And the same goes for my colleagues and the project as a whole, so we would have achieved much less.

So, naturally, science must be based on fact and logic.

When I say that emotions should be used in science, I am not saying that emotions should be used instead of facts.

But I say we should not be afraid to use our emotions to implement and promote fact-based science and innovation.

Emotion and logic do not conflict.

They complement and reinforce each other.

Dedicated to something meaningful, belonging to something greater, and feeling empowered are crucial to creativity and innovation.

Whatever you're working on, make sure it's important and take it to heart as much as you like.

thank you.

(applause)

I myself love bugs. By the way, not from childhood, but rather from late.

When I got my bachelor's degree in zoology from Tel Aviv University, I fell in love with some kind of insect.

And in zoology, I took a course in entomology, the science of insects.

So I thought, how can I practice entomology or help entomology?

And so I moved into the world of plant protection, the world of protecting plants from insects and bad bugs.

And in the field of plant protection, we entered the field of biological pest control. Biological pest control is actually defined as the use of organisms to reduce the population of harmful pests on plants.

So this is the whole field of plant protection aimed at chemical reduction.

By the way, biological pest control, or “good worms” as we speak, has been around the world for thousands, thousands, and many years.

However, it is only in the last 120 years that people have begun to learn how to harness or use this biological, indeed natural, control phenomenon to suit their needs.

Because biological control phenomena can be seen in your backyard too.

Take a magnifying glass. Can you see what I have here?

It's a magnifier, 10x.

Simply open it and twist the leaf to reveal a whole new world of tiny insects and tiny spiders 1mm, 1.5mm and 2mm long, and distinguish the good from the bad.

So this phenomenon of natural control is literally everywhere.

Here, in front of this building, surely.

Let's take a look at plants.

So it's everywhere and you need to know how to exploit it.

Now let's step through some examples.

What are pests?

What kind of damage does it actually do to plants?

And what are natural enemies, biological control agents, or the “good bugs” as we speak?

In general, I am talking about insects and spiders, or mites.

Insects are six-legged creatures, while spiders and mites are eight-legged creatures.

Let's see it.

Here we have the devastating pest, the spider mite. Like a spider, it has many webs.

You can see the mother in between, perhaps two daughters to the left and right, and an egg to the right.

And you can see what damage it can do.

You can see a cucumber leaf on the right, a cotton leaf in the middle, and a tomato leaf with tiny dots on the left.

Those spiders can literally go from green to white because of their sucking and piercing mouthparts.

But here nature comes and gives us good spiders.

This is a predatory tick, as small as a spider mite. One or two millimeters or less in length, they run fast, hunt, and chase spider mites.

And here you see this woman in action on your left side. Just stick it on the left side of the pest tick and suck the fluid.

And after 5 minutes, this is what you see: just a typical carcass - a wrinkled and sucked-out carcass of a spider mite, and next to it are two satiated individuals, predatory mites, a mother on the left and a young nymph on the right.

By the way, their 24-hour diet consists of about 5 spider mites and malignant mites, and about 15-20 eggs for pest mites.

By the way, they are always hungry.

(Laughter) Another example is aphids.

It's spring in Israel.

When temperatures rise sharply, bad aphids can start to appear everywhere on plants, including young, fresh leaves of hibiscus and lantana, the so-called springflash.

By the way, in the case of aphids, there are only females like the Amazon.

Females give birth to females, which give birth to other females.

No men at all.

so-called parthenogenesis.

And apparently they are very happy with it.

(Laughter) You can see the damage here.

These aphids secrete a sticky, sweet liquid called honeydew, which only clogs the top of the plant.

Here you can see a typical cucumber leaf turning from green to black as it is covered with sooty mold, a black fungus.

And salvation comes through this parasitic wasp.

We are not talking about predators here.

Here we are talking about parasites. Of course, it is not a two-legged parasite, but an eight-legged parasite.

It is also a parasitic wasp, two millimeters long, slender, and flies very quickly and sharply.

And here you can see this parasite in action like an acrobatic maneuver.

She stands right in front of her victim, bends her abdomen, and inserts one egg into the aphid's fluid.

By the way, aphids try to escape.

She kicks and bites and secretes various fluids, but nothing really happens. The parasite eggs are simply inserted into the aphid's bodily fluids.

And after a few days, depending on the temperature, the eggs hatch and the larvae of this parasite eat the aphids from the inside.

(Laughter) This is very natural. All this is natural.

This is not fiction, it is nothing at all.

In your backyard again. in your backyard.

(Laughter.) (Applause.) But here's the end result, a mummy.

This is a visual representation of the aphid carcass encircling the inside, and after a few minutes the parasites have developed and half are out.

Birth is almost complete.

By the way, watching different movies, etc. takes only a few minutes.

And if this is a female, she will quickly mate with the male and leave, because her time is very short.

This female lives only 3-4 days and has to lay about 400 eggs.

That means there are 400 bad aphids to lay their eggs in her bodily fluids.

Of course, this is not the end.

There are many other natural enemies, but this is just the last example.

Again, start with the pest, the thrips.

By the way, all these weird names -- I didn't care about the Latin names for these creatures. just a generic name.

But this is a nice, thin and very bad pest.

If you see this: peppers.

This is more than just an exotic ornamental pepper.

This is a pepper that cannot be consumed because it suffers from a viral disease transmitted by adult thrips.

And here comes the nemesis, the mini-pybug--the "minute", because it's pretty small.

Here we see an adult black and two juveniles.

And again, in action.

The adult worm burrows into the thrips, sucks it within just a few minutes, and then heads to other prey to continue its behavior here and there.

And if you sow those little pirate bugs, good bugs, for example, in a field of peppers, they go to the flowers.

And look, this flower is inundated with predatory bugs, including good bugs, after clearing out the bad bugs, thrips.

So this is a very positive situation.

The developing fruit is not harmed. There is no harm in fruiting.

All is well under these circumstances.

But even here the problem is that we looked at them one-on-one, the pests, the natural enemies.

What we are doing is actually this.

Kibbutz Sude Eliyahu, in the northeastern part of Israel, has a facility that mass-produces its natural enemies.

In other words, what we are doing there is amplifying natural or biological control phenomena.

And in our 30,000-square-meter state-of-the-art greenhouse, we mass-produce predatory mites, microscopic pirate bugs, parasitic wasps and more.

Lots of different parts.

By the way, they have a very nice landscape. With the Jordan Mountains on one side and the Jordan Valley on the other, with warm, mild winters and comfortable, hot summers, the conditions are perfect for mass-producing those creatures.

By the way, mass production is not genetic manipulation.

There are no GMOs (Genetically Modified Organisms).

We take them from nature and the only thing we do is give them the optimum conditions in a greenhouse or climate chamber for them to grow, multiply and reproduce.

And that's what we got.

You can see it under a microscope.

Can you see it in the upper left corner? You can see one predatory tick.

And this is the whole predatory tick.

You can see this ampoule. You can see this.

I have 1 gram of that predatory tick.

1 gram is equivalent to 80,000 people.

80,000 individuals are enough to control spider mites in one acre (4,000 square meters) of strawberry patch for almost the entire season.

And believe me, we can produce tens of kilograms per year from it.

This is what I call amplification of the phenomenon.

No, you won't lose your balance.

On the contrary, it brings it into every cultural compartment already out of balance with chemicals.

Here we reverse the direction of the wheel a bit and work with these natural enemies to bring a more natural balance to the farmland by reducing these chemicals.

And what are the implications?

In this table you can really see what the impact of successful biological control with a good bug is.

In Israel, for example, more than 1,000 hectares (10,000 dunums in Israeli equivalent) are using biopest control to control green peppers under protection, effectively reducing pesticide use by 75 percent.

And Israeli strawberries are even more so, with 80 percent of the pesticides used, especially those aimed at killing strawberry pests and mites.

Therefore, the impact is very strong.

And especially when we ask growers and farmers, the question arises: "Why do we have biological controls?"

Why is it a good bug?

By the way, the number of answers you get is the same as the number of people asking the question.

But if you go, for example, to this place, the Arava region above the Great Rift Valley in southeastern Israel, it is the pearl of Israeli agriculture, especially under greenhouse or screen house conditions. If you drive to Eilat you will see this right in the middle of the desert.

If you zoom in, you can be sure to see grandparents handing out their natural enemies, the good insects, with their grandchildren instead of wearing special clothing, respirators, or applying chemicals.

Therefore, the number one answer we get from growers to the question "why do we have biological controls?" is safety in terms of use.

Second, in fact, many producers are frightened by the concept of resistance, in which pests become resistant to chemicals in the same way bacteria become resistant to antibiotics.

It's the same, and it could happen soon.

Fortunately, both biological and natural controls, resistance is extremely rare.

It almost never happens.

Since this is an evolution, it is a natural ratio, unlike the resistance that occurs in the case of chemicals.

And the third is public demand.

The more the public demands chemical reduction, the more producers become aware of the fact that wherever possible chemical controls should be replaced with biological controls.

Again, as you can see, we have another grower. I am very interested in both bad and good bugs and am already walking safely through my crops with this magnifying glass on my head.

Finally, I want to reach my vision, my dream in reality.

Because, as you know, this is the reality.

look at the gap

If you look at the total sales of the biocontrol industry worldwide, that's $250 million.

And look at the entire agrochemical industry in every crop around the world.

I think it's about 100 times.

25 billion.

So there is a big gap that needs to be filled.

So what do we actually do?

How can this gap be bridged or narrowed over the years?

First of all, we need to find more robust, better and more reliable biological solutions, better bugs that can be mass produced or actually stored in the field.

Second, to create more focused and stringent public demands for chemical reduction in fresh produce.

And thirdly, it also aims to raise awareness among producers of the potential of this industry.

And the gap really narrows.

Step by step, it gets narrower.

So I think my final slide is: All that we say -- we can actually sing it -- give nature a chance.

On behalf of all biocontrol practitioners and implementers in Israel and abroad, I want to give nature a chance.

thank you.

(applause)

(Music: Anna Oxygen) (Music: "Seashells": Mila) ♪ You've learned how to be a diver ♪ ♪ Put on your mask and believe ♪ ♪ Collect a dinner of shells for me ♪ ♪ Lower the tank so I can breathe ♪ ♪ Down ♪ ♪ You move slowly ♪ ♪ You're an island ♪ ♪ All the secrets so far Until I do (music) (music by Caroline Lufkin) music by Anna Oxygen ♪ I'll find you a dream time ♪ ♪ You're in the shade, you're new (Applause) [Excerpt from "Myths and Infrastructure"] Bruno Giussani: Come back.

Miwa Matreek!

(applause)

i love video games.

I am a little in awe of them too.

I am in awe of their imagination, their technology, their power of concept.

But I think, more than anything else, I am in awe of their power to motivate, force, and peg us in ways that we have never been able to invent before.

And I think we can learn some pretty amazing things by seeing how they do this.

And especially, I think we can learn about learning.

Today, the video game industry is by far the fastest growing media of our time.

Worth about $10 billion in 1990, it is now worth $50 billion worldwide and shows no sign of slowing down.

It is estimated to be worth more than $80 billion in four years.

That's about three times as much as the recorded music industry.

This is very surprising, but I doubt that this is the most compelling stat of all.

What really amazes me is that people are currently spending about $8 billion a year buying virtual items that exist only in video games.

This is a screenshot of the virtual game world Entropia Universe.

Earlier this year, one of the virtual asteroids was sold for R$330,000.

This is a Titan-class ship that appears in the space game EVE Online.

And building this virtual object takes 200 real people about 56 days of real-time time, plus countless thousands of hours of effort before that.

Still, many of these are built.

At the other end of the spectrum is the game you've all heard of, Farmville, which has 70 million players worldwide, most of whom play it almost every day.

This may sound very alarming to some, an indicator of something worrying or wrong in society.

But we are here for good news. And the good news is, I think we can explore why this very real human effort, this very intense production of value, is happening.

And I think that answering that question gives us something very powerful.

And I think the most interesting way to think about how this is happening is in terms of rewards.

And specifically, the fact that playing games brings tremendous emotional rewards to people, both individually and collectively.

Now, if you look at what's going on in your head when someone is involved, there are two very different processes going on.

On the one hand, there are processes required.

This is similar to ambition and drive. I'm going to do it do one's best.

On the other hand, there is the process of liking, fun, affection, joy, and a giant flying beast with orcs on its back.

Really great image. It's so cool.

This is from the game World of Warcraft, which has over 10 million players worldwide, one of which is me and the other is my wife.

And this kind of world, this sprawling flying beast to drive around, shows why games are so good at fulfilling both desires and tastes.

Because it is very powerful. Pretty amazing, isn't it?

It gives you great power.

Your ambition is fulfilled, it's so beautiful.

Flying around is so much fun.

And these combine to form a very intense emotional engagement.

But it's not this that's really interesting.

What's really interesting about virtuality is what you can measure with it.

Because it's all about what you can measure in virtual space.

You can measure everything that everyone who has ever played the game has ever done.

Today, the world's largest game measures over 1 billion points of data about the behavior of players and everyone. This is far more detailed than you can get from any website.

This makes things very special happen in the game.

It's called a reward schedule.

What I mean here is look at what millions of people have done and spend an astonishing amount of time and effort to keep them hooked by carefully adjusting the rate, nature, type and intensity of rewards in your game.

Now, to explain this in practical terms, I would like to talk about some kind of task that many games can give you.

I'm going to get a certain amount of a little game-like item.

For the sake of discussion, let's say my mission is to get 15 pies, and I can get 15 pies by killing these cute little monsters.

A simple game quest.

Now, if you like, you can think of this as a problem with the box.

You have to keep opening boxes.

You don't know what's inside until you open it.

Then open box after box until you have 15 pies.

Now, taking a game like Warcraft for example, you can think of it as a great box-opening effort if you like.

The game is just trying to get people to open about a million boxes and fill them with better and better stuff.

This seems very tedious, but games can make this process incredibly compelling.

And the way they do this is a combination of probability and data.

Think about probability.

If you want to involve someone in the process of opening the box trying to find the pie, you want the pie to be neither too easy nor too hard.

So what do you do? Well, if you look at 1,000,000,000,000,000,000,000,000,000,000 box openers, you can calculate the pie rate to be about 25 percent. It's neither too frustrating nor too easy.

It keeps people engaged.

But, of course, that's not all. There are 15 pies.

Well, you can make a game called pie craft. There, all you have to do is get a million or a thousand pies.

It would be very boring.

15 is a pretty good number.

We find that between 5 and 20 is about a good number to get people moving forward.

But pies aren't the only thing in the box.

100 percent here.

And what we do is, every time we open a box, we make sure there's something in it: a little reward to keep people progressing and engaged.

In most adventure games, it's a bit of in-game currency, a bit of experience.

But we are so much more.

There are also many more items to come of varying quality and excitement levels.

It seems that there is a 10% chance of getting a pretty good product.

You have a 0.1% chance of getting a great item.

And each of these rewards are carefully tailored to the item.

We also say, "So how many monsters are there? Should the world be filled with a billion monsters?"

No, I would like to have 1 or 2 monsters on screen at a time.

That's why I'm drawn to it. Not too easy, not too difficult.

So all these things are very powerful.

But we are in virtual space. These are not real boxes.

So we can do some pretty amazing things.

As I watched the people opening the boxes, I noticed that when I got to about 13 out of 15 pies, my perception changed and it started to get a little boring and a little spicy.

They are not rational about probabilities.

They think this game is unfair.

You won't even give me the last two pies. I am going to give up.

If it's a real box, I can't do anything about it, but if it's a game, I can just say "yes".

Once you have 13 pies, you have a 75% chance of winning a pie. ”

Stay involved. Watch people act and adjust the world to their expectations.

Our game doesn't always do this.

And one of the things they do for sure at the moment is if you get a 0.1 percent awesome item, they don't spawn another item for a period of time to maintain its value and keep it special.

And the point is that we evolved to please the world in a certain way.

Over tens of thousands and hundreds of thousands of years, we have evolved to be inspired by certain things. As highly intelligent and civilized beings, we are greatly inspired by problem-solving and learning.

But now we can reverse engineer it and build a world that explicitly ticks the evolution box.

So what does this actually mean?

Well, I've learned these lessons from games and came up with 7 things that show how they can be applied outside of games.

The first is very simple. An experience bar that measures your progress. This was brilliantly talked about by people like Jesse Shell earlier this year.

It has already been implemented at Indiana University in the United States.

It's a simple idea of ​​giving people one profile character avatar instead of grading them in small increments and constantly progressing in small, small, small increments so that it feels like it's theirs.

And everything comes towards it and they see it creeping up and own it as it goes.

The second is multiple long-term and short-term goals. 5,000 pies, boring, 15 pies, interesting.

That is, give people a lot of different tasks.

You say it's important to do 10 of these questions, but another task is to finish 20 classes on time, another task is to work with other people, another task is to show that you've done it five times, and another task is to achieve this particular goal.

Things can be broken down into these coordinated slices that people can choose to do in parallel to maintain interest or be used to encourage personally beneficial activities.

Third, reward hard work.

It is 100 percent your own element. The game is great in this regard.

Every time you do something, you get credit. Try it and you'll get the units.

No punishment for failure. A little effort is rewarded with a little money and a little credit. Completed 20 questions. Please check.

It is all supplied as fine reinforcement.

Fourth is feedback.

This is extremely important and virtualization is great at achieving this.

Looking at some of the most intractable problems in the world today, from which we hear amazing stories, it's very difficult for people to learn if they can't connect consequences to action.

Pollution, global warming, these effects are far away in time and space.

It is very difficult to learn, to feel lessons.

But if you can model things for people, and give people things they can manipulate and play with and get feedback from, they can learn lessons, they can see them, they can move on, they can understand them.

And the fifth is the element of uncertainty.

Well, this is a neurological treasure trove. Because known rewards excite people. But what really excites people is the uncertain reward—the reward that is presented with the right level of uncertainty—because you're not quite sure you'll get it.

25 percent. This activates the brain.

And given its use in testing, simply introducing a controlling element of randomness into any form of testing or training can alter people's levels of engagement by harnessing this very powerful evolutionary mechanism.

When we can't predict something perfectly, we get very excited about it.

I just want to go back and find out more.

As you probably know, the neurotransmitter involved in learning is called dopamine.

It is associated with reward-seeking behavior.

And something very exciting is starting to happen in places like the University of Bristol in the UK, where we are starting to be able to mathematically model dopamine levels in the brain.

What this means is that the learning is predictable, the timeframe in which the learning takes place at the enhanced level, and the enhancement of engagement is predictable.

And two things really come out of this.

The first has to do with memory and allows us to find these moments.

If someone is more likely to remember, you can pass the nugget you have on the window.

And the second is confidence. You'll see how gameplay and reward structures make people braver, more willing to take risks, more willing to tackle challenges, and less likely to give up.

All this may seem very ominous.

But you know, it's kind of like, "Our brains are being manipulated. We're all addicted."

The word “addiction” is thrown around.

There are real concerns there.

But the greatest neurological stimulus for people is other people.

This really excites us.

When it comes to rewards, it's not money. No cash will be given. That is wonderful. They do things with our peers, they watch us, they work with us.

And I want to tell you a little story about 1999. It's a video game called EverQuest.

In this video game, there were two very large dragons that had to team up to defeat them. A maximum of 42 people had to work together to defeat these big dragons.

Dropped two or three decent items, so that's a problem.

Players addressed this issue by spontaneously coming up with a system that motivates each other in a fair and transparent manner.

What happened is that they paid each other a virtual currency called "Dragon Kill Points".

And every time you took part in a mission, you were rewarded with dragon kill points.

They tracked these on another website.

So they track their own private currency and players can then bid on cool items they want. All organized by the players themselves.

This amazing system not only worked in EverQuest, but today, ten years later, every video game in the world with this kind of task uses a version of this system, and tens of millions of people use this system.

And the success rate is almost 100%.

It is a player-developed, self-enforced, sovereign currency, and the player's behavior is very sophisticated.

I would like to conclude by proposing some of the ways in which these principles can spread across the world.

Let's start with business.

So we're starting to see that some of the big issues with things like business are recycling and energy conservation.

We are beginning to see the emergence of amazing technologies like real-time energy meters.

Looking at this, I think we can certainly take it further, by setting coordinated goals, by using elements of uncertainty, by using these multiple goals, by using grand and underlying reward and incentive systems, by setting people to work together to cooperate and compete from a group perspective, from a street perspective, by using the very sophisticated group and motivational mechanics that we're seeing.

When it comes to education, perhaps the most obvious is that it can change the way people interact.

We can offer people an epic continuation of experience and personal investment.

You can break things down into small, highly coordinated tasks.

You can use computed randomness.

Everything works together so we can consistently reward our efforts.

And we have access to collective behavior that evolves when people are playing together—unprecedented and highly complex cooperation mechanisms.

Governments, well, what comes to mind is that the US government in particular is literally starting to pay people to lose weight.

In other words, financial rewards are being used to tackle the big problem of obesity.

But again, if we can harness our vast expertise in gaming systems to make it even more engaging, take data and observations from millions of hours of human time, and translate that feedback into increased engagement, we can tailor these rewards with great precision.

And the last thing I want to leave you with is this word "engagement".

It is about how individual engagement is altered by psychological and neurological lessons learned from observing people playing games.

But it's also about collective engagement, and an unprecedented laboratory for observing what gets people excited, working, playing, and participating in games at scale.

And if we can look at these things and learn from them and find a way to turn them outward, I really think we have something very revolutionary.

thank you very much.

(applause)

As such, there are some things that unite us humans like elections.

We stand for election. we vote in elections We monitor elections.

Our democracy depends on elections.

We all understand why we have elections and we leave our homes on the same day to vote.

We value the opportunity to speak to determine the future of our country.

The basic idea is that politicians are tasked with speaking for us and making decisions on our behalf that affect us all.

Without that mission, they would be corrupted.

Unfortunately, power corrupts, so people will do all sorts of things to gain and stay in power, including doing bad elections.

Even if the election idea were perfect, running a nationwide election is a big project, and big projects are messy.

Whenever there is an election something seems to go wrong, someone tries to cheat, or something accidentally goes wrong. Here ballot boxes go missing or Chad is left hanging.

We are taking all these steps with regards to the election to make it as trouble-free as possible.

For example, when you walk into a polling place, a poll worker asks for your ID, then gives you your ballot and asks you to enter the polling place and vote.

When you come back, you can cast your vote in the ballot box and mix it with all the other votes, so no one knows how you voted.

Now, what we want you to think about for a second is what happens after you vote in the ballot box.

And most people believe that the electoral system works, so they will go home and be sure their votes were counted.

They trust election officials and election observers to do their jobs right.

Ballot boxes are brought to the counting station.

The seals are broken and the votes are poured out and painstakingly counted.

Most of us have to believe that it happens right with our vote, and we have to believe that it happens right with every vote in an election.

So we have to trust many people.

We have to trust many procedures.

And sometimes you have to trust your computer.

So imagine hundreds of millions of voters casting hundreds of millions of votes, all counted correctly, and every possible issue causing all these bad headlines. And I can't help but feel weary of the idea of ​​trying to make elections better.

In the face of these bad headlines, researchers have taken a step back and considered how elections could be run differently.

They zoomed out to see the big picture.

And importantly, elections should be verifiable.

Voters need to be able to verify that their votes have been counted correctly without violating election secrecy, which is very important.

That's where the difficulty lies.

How can the voting system be fully verifiable while keeping the votes completely secret?

The method we have come up with uses a computer, but is computer independent.

The secret is in the ballot.

And if you look closely at these ballots, you'll notice that the candidate lists are ordered differently.

In other words, if you mark an option and then delete the candidate list, the remaining part will not know what you are voting for.

And each ballot has an encrypted value in the form of a 2D barcode on the right.

There's some complicated encryption going on there, but what's not complicated is voting using one of these forms.

So you can let the computer do all the complicated encryption and then use the paper for verification.

So, I will vote like this.

Receive one of these ballots at random, enter the voting booth, mark your choices, and cut along the perforations.

And shred the candidate list.

And the bits left over, the ones with your mark, this is your encrypted vote.

So, have polling workers scan your encrypted ballots.

And because it's encrypted, it can be sent, stored, aggregated centrally, and displayed on a website for anyone to see, including you.

So, you take this encrypted vote home with you as a receipt.

After the election is over, you can verify that your vote was tallied by comparing your receipt with your vote on the website.

Also, remember that your vote is encrypted from the moment you leave the polling place, so even if election officials want to know how you voted, they can't.

Even if the government wants to know how you voted, they can't.

Hackers cannot break in and know how to vote.

Hackers cannot break in and change your votes. Then the vote will not match your receipt.

Votes cannot be lost. Because I can't find it when I look for the vote.

But the magic of elections doesn't end there.

Instead, we want the entire process to be transparent so that all election data can be downloaded and tallied by anyone who wishes, including news outlets and international observers.

You can check that all votes were counted correctly.

You can check if the announced election results are correct.

And these are elections by the people, for the people.

So the next step for our democracy is transparent and verifiable elections.

thank you.

(applause)

This story probably dates back to the 1960s. When I was seven or eight, I was watching a Jacques Cousteau documentary on my living room floor with a mask and flippers.

Then, after every episode, I had to get up in the tub and swim around it to see the drain. Because that was all there was to see.

And by the time I turned 16, I had pursued a career in marine science, exploration, and diving, spending a total of 30 days living in underwater habitats like this one off the Florida Keys.

Brian Skerry took this shot. Thank you Brian.

And I have dived in deep sea submersibles all over the world.

And this submarine is the world's deepest submarine operated by the Japanese government.

And Sylvia Earle and I were on this submarine expedition to Japan 20 years ago.

The dive then took us down 18,000 feet to what we believe to be a pristine natural area on the ocean floor.

However, when it arrived, it was full of plastic trash and other debris.

And it really was a turning point in my life. I began to realize that science and exploration weren't just for fun.

I had to put it in context.

We had to move towards the goal of conservation.

So I started working with the National Geographic Society and others, leading an expedition to Antarctica.

I have led three diving expeditions to Antarctica.

Ten years ago was an out-of-the-box trip to explore the massive B-15, the largest iceberg ever to break the Ross Ice Shelf.

And we have developed the technology to dive inside and under the iceberg. For example, a heating pad could be attached to the kidney and the battery would be dragged around, slightly warmed as the blood flowed through the kidney, and then returned to the body.

However, after three trips to Antarctica, I decided it might be better to work in warmer waters.

And ten years ago that same year, I headed north to the Phoenix Islands.

I'll tell you that story right here.

Before I do that, I want you to think about this graph for a second.

You may have seen this in other ways, but the top row is the area of ​​global terrestrial protected areas, about 12 percent.

We saw a hockey-like trend in the 1960s and 70s, and now we can see that we are on a good trajectory.

It's probably because it's time for everyone to start recognizing the environment and Earth Day and all that happened with hippies in the '60s. And I think it all really affected the global consciousness.

But Marine Protected Areas, which are basically flat lines for now, seem to be slowly rising.

And we believe we are now at the hockey stick point of a marine reserve.

If we could see what was happening at sea the same way we see what is happening on land, we would have arrived sooner.

But unfortunately the sea is not transparent and you cannot see what is happening.

So our protection is far behind.

But scuba diving, submersibles, and all the work we do here can help fix that.

So where are the Phoenix Islands?

These were the world's largest marine protected areas until the Chagos Islands were declared last week.

It's in the middle of the Pacific Ocean. It takes about 5 days from anywhere.

If you want to go to the Phoenix Islands, it takes 5 days from Fiji, 5 days from Hawaii, and 5 days from Samoa.

It is located in the middle of the Pacific Ocean, very close to the equator.

Ten years ago, I had never heard of these islands or the country that owns them, Kiribati, but I say, "Greg, would you like to lead a scientific expedition to these islands?"

They have never been submerged. ”

And I said, "Yes.

However, please tell me where they are and what country owns them. ”

That was when I first learned about the Islands, but I had no idea what I was interested in.

But I was on an adventure.

Let's take a quick peek into the protected areas of the Phoenix Islands here.

It is a very deep ocean part of our planet.

Average depth is about 12,000 feet.

The Phoenix Islands have many seamounts, especially those that are part of protected areas.

Seamounts are important for biodiversity.

In fact, there are more mountains in the ocean than there are on land.

Interesting fact.

And the Phoenix Islands are very rich in those seamounts.

I mean, it's deep. Think in a big 3D space, a very deep 3D space with shoals of tuna, whales, all sorts of deep-sea marine life like we've seen here before.

That's the ship we got there in the early stages for research, and that's what the islands look like - you can see them in the background.

These are very low to the water and are all uninhabited except for one island with about 35 caretakers.

And for the ancient Polynesian sailors who traversed the Pacific widely, even in ancient times these islands were too far from the bright lights of Fiji, Hawaii and Tahiti, so they remained uninhabited for most of the time.

But we got there and I went to places I'd never dived before, got to an island and had a unique and amazing scientific and personal opportunity of 'Where to dive?

Let's try there." And he fell into the water.

My personal and professional life has changed.

Suddenly, I saw a world in the sea that I had never seen before. Schools of fish so dense that they blunt the penetration of sunlight through the water, continuous solid and colorful coral reefs, big fish everywhere: manta rays.

It was an ecosystem. Parrotfish Spawning -- This is about 5,000 parrotfish spawning at the entrance to one of the Phoenix Islands.

You can see that the fish are rounded. And then there's the little cloudy area, where they're exchanging eggs and sperm for reproduction. This is something the ocean should do, but is currently struggling in many places due to human activity.

The Phoenix Islands and the equatorial region of the earth are very important for tuna fishing, especially the yellowfin tuna found here.

The Phoenix Islands are a major producer of tuna.

and a shark. Early dives had up to 150 sharks at one time. This shows that the system is very healthy and very powerful.

So I thought the endless wilderness scene would last forever, but it finally came to an end.

And we also explored the surface of the island. This is a very important bird nesting area and some of the world's most important bird nesting areas in the Pacific Ocean.

And so we ended our trip.

And it's that area.

You can see islands popping out of the water. There are 8 islands.

A seamount is a peak that does not rise to the surface of the water.

Remember that seamounts turn into islands when they hit the surface.

And what is the background of the Phoenix Islands?

where are these?

Well, they are in the Republic of Kiribati, which is located on three island groups in the central Pacific Ocean.

To the west are the Gilbert Islands.

In the center are the Phoenix Islands and this is the theme I am talking about.

And to the east are the Line Islands.

It is the world's largest atoll country.

About 110,000 people live on 33 islands.

They control 3.4 million cubic miles of ocean, which is 1 to 2 percent of all the water on the planet.

And ten years ago, when I went there for the first time, I barely knew the name of this country, and people asked me, "Why are you going to a place called Kiribati?"

And it reminded me of that old joke about a bank robber coming out of court in handcuffs and a reporter yelling, "Hey Willie, why are you robbing a bank?"

And he said, "Because that's where all the money is."

And I said to people, 'Why am I going to Kiribati?

Because there are all seas. ”

They are basically one country that controls most of the equatorial waters of the central Pacific.

They are also a country in serious danger.

Sea levels are rising, and Kiribati, like 42 other countries in the world, will be under water within 50 to 100 years due to climate change and associated thermal expansion and sea level rise due to the melting of freshwater into the sea.

The islands are just 1-2 meters above the ground.

Some islands are already submerged.

And these countries face real problems.

We are facing problems as a world.

What should we do to the displaced Earthlings who have lost their homes on Earth?

The Maldives president recently held a mock cabinet meeting underwater to highlight the dire situation in these countries.

So that's what we need to focus on.

Now let us return to the subject of this talk, the Phoenix Islands.

After returning, I said: "Okay, this is amazing, what we found."

I would like to go back and share it with the westernmost group, the Kiribati government in Tarawa.

So I started contacting them. Because actually they gave me permission to do this. And I said, "We would like to report what we found."

And for some reason they didn't want me to come, and it took a long time because it was hard to find the time and place, but in the end they said, "Okay, you can come."

But if you come, you have to buy lunch for everyone who comes to the seminar. ”

So I said, "Okay, you can buy me lunch."

Get whatever anyone wants. ”

So, reef biologist David Obra and I traveled to Tarawa for a two-hour presentation on the amazing discovery of the Phoenix Islands.

And the country never knew this. They had no data from this region at all.

They had no information from the Phoenix Islands.

After the lecture, the Minister of Fisheries approached me and said, “Greg, are you aware that you were the first scientist to come back as a scientist and tell us what they did?”

"We often issue these permits to conduct research in the area, but it usually takes two to three years before we receive the permits or reprints," he said.

But you were the first to come back and tell us what you did.

And I really appreciate it. And today I'm going to buy you lunch.

So, are you free for dinner? ”

And since dinner was free, I went out to dinner with Kiribati's fisheries minister.

And over dinner, I learned that Kiribati gets most of the revenue. This country is very poor. However, since Kiribati does not have the capacity to catch fish at home, it earns income by selling access to other countries to bring fish out of its own waters.

And the deal they signed was that mining nations would give Kiribati 5 percent of the landed price.

That means Kiribati would get $50,000 if the US removed $1 million worth of lobsters from the reef.

And you know, it didn't seem like a very good deal to me.

So I asked the minister over dinner and said, "Can you imagine a situation where we get paid? We calculate and figure out the value of resources, but can you think of a situation where we leave fish and sharks and shrimps in the water?"

He stopped and said, "Yes, I would like to do that to address the overfishing problem. I think we call it reverse fishing permits."

He coined the term "reverse fishing license."

So I said, "Yes, it's a 'reverse fishing license'." So we finished this dinner not really knowing where to go at that point.

When I returned to the US, I looked around for any reverse fishing permits issued, and found none existed.

There were no maritime agreements to compensate countries that did not fish.

It occurs on land in the rainforests of South America and Africa, where landowners were paid not to cut down trees.

And Conservation International had closed some of those deals.

So I went to Conservation International and brought them in as partners, went through a process of assessing fish stocks to determine how much Kiribati should be compensated, what the range of the fish was, and brought in a number of other partners including the Australian Government, New Zealand Government and the World Bank.

The Oak Foundation and National Geographic are also significant funders of this.

And we basically founded this park on the idea of ​​a donation that would pay an amount equivalent to the lost fishing license fee to keep the area intact in this very poor country.

Midway through this process, I met the President of Kiribati, Anote Tong.

He was a really important leader, a really visionary, a positive person, and when I approached him, he taught me two things.

He said, "Greg, I want you to do two things.

For one thing, remember that I am a politician. So you have to go out and work with your ministers and convince the people of Kiribati that this is a good idea.

Second, I would like you to create principles that go beyond my own presidency.

I don't want to do this if it goes away after I lose my vote. ”

So we had very strong leadership, very good vision, and a lot of science and a lot of lawyers.

A great many steps have been taken to make this happen.

And that's largely because Kiribati has realized it's in their own interest to do this.

They found this to be a common cause with conservation groups.

And in 2002, when all of this got underway, coral bleaching occurred in the Phoenix Islands.

This is the resource we are trying to conserve, and it turns out that this is the hottest temperature on record.

The ocean heated up as it did from time to time, forming a hotspot that stagnated for six months directly above the Phoenix Islands.

Six months of temperatures above 32 degrees Celsius nearly killed 60 percent of the coral.

So all of a sudden we had this area that we were protecting, but it seemed dead, at least in the coral areas.

Of course, the deep sea area and the open ocean area were fine, but the coral that everyone loves was a challenge.

Well, the good news is that it's recovering, faster than any reef we've seen so far.

This photo was taken by Brian Skerry when we returned to the Phoenix Islands a few months ago and found that the coral was thriving and thriving because it was a protected area and had healthy fish populations that devoured the algae and kept the rest of the reef healthy.

It's about the same as if a person had multiple illnesses, it would be difficult to recover and they could die, but if they only had one illness to deal with, they could recover.

That's the story of heating due to climate change.

It is the only threat and the only impact coral reefs have had to deal with.

With no fishing, no pollution, no coastal development, the reef is in full swing.

Now, I remember having dinner with the Minister of Fisheries when I first raised this issue ten years ago. Then I got very excited over dinner and said, "Well, I think conservation groups might accept this idea, Minister."

He stopped and put his hands together and said, "Yes, Greg, but the devil is in the details," he said.

And indeed it was.

The last ten years have been layered down to the tiniest detail, from legislation to multiple investigative expeditions to, as I said earlier, the communication plan, the team of attorneys, the MOU, and the establishment of the Phoenix Islands Trust Commission.

And we are currently in the process of collecting the full donation.

Kiribati has frozen mining activities as is while we collect donations.

We just had our first PIPA Trust Board meeting three weeks ago.

In other words, it is a fully functioning and operational organization that negotiates reverse fishing permits with the state.

And the PIPA Trust Board holds the license and pays the state for it.

So this is a very solid, very well thought out, very well grounded system, a bottom-up system, and doing it bottom-up to ensure this was very important in this work.

Here are the conditions for success.

You can read it yourself too.

But I can say that the most important thing in my mind was working within the market forces of the situation.

And it ensured that we were able to move this forward, and that it served both Kiribati's self-interest and the world's self-interest.

Leave one slide for the end. So how do you scale this up?

How can Silvia's dream come true?

Where are we going to take this to the end?

This is the Pacific Ocean, with large MPAs and large reserves.

And as you can see, we patchwork across this ocean.

I've just told you one story behind the central rectangular area, the Phoenix Islands, but every other green space above it has its own story.

And what we have to do now is look across the Pacific, build a network of MPAs across the Pacific, protect the world's largest ocean, and make it self-sustaining for the long term.

thank you very much. (applause)

It's four o'clock in the morning.

When you wake up in your Boston hotel room, you can only think of one thing. It's a toothache.

One of the ceramic inlays came off the previous evening.

Five hours later, I'm sitting in the dentist's chair.

But instead of fixing the inlay to take the pain away, the dentist pitched me on the benefits of titanium implant surgery.

Have you heard about it?

(Laughter) It essentially means replacing a damaged tooth with an artificial tooth screwed into the jaw.

Estimated costs for implant surgery can cost up to US$10,000.

It will cost $100 to replace the previously used ceramic inlay.

Was my health the primary concern for my dentist, or was it the money I could make?

After all, my experience was not a special case.

A national newspaper survey estimated that up to 30% of all surgical procedures in the United States, including stent and pacemaker implantation, hip replacements, and hysterectomies, are performed despite other nonsurgical treatment options being underutilized by attending physicians.

Isn't that number shocking?

Figures in other countries may be slightly different, but what this means is that if you see a doctor in the United States, you're more than likely going to get surgical intervention, even if it's not urgently needed.

why is this?

Why are some practitioners motivated to perform such unnecessary procedures?

Perhaps it is because the health care system itself incentivizes in non-ideal ways to apply or not apply certain procedures and treatments.

Because most health care systems reimburse practitioners on a fee-for-service basis, depending on the number and types of treatments performed, this economic incentive may entice some practitioners to pursue more profitable surgical procedures instead of considering other treatment options.

Some countries have begun to introduce outcome-based reimbursement based on quality-effectiveness matrices, but overall, the structure of today's healthcare system does little to broadly encourage healthcare professionals to actively prevent disease onset in the first place and limit the treatments applied to patients to the most effective options.

So how do we fix this?

What it requires is a fundamental redesign of the architecture of the healthcare system, a complete rethink of the incentive structure.

What we need is a healthcare system that doesn't just pay for services after people are already sick, but reimburses practitioners to keep their customers healthy.

What we need may be a change from today's system that primarily cares for the sick to one that cares for the healthy.

To transform the current 'sick care' approach to a true 'health care' approach.

This is a paradigm shift from treating people after they get sick to keeping healthy people healthy before they get sick.

This shift could shift the focus of everyone involved, from doctors to hospitals to pharmaceutical and healthcare companies, to the product the industry ultimately sells: health.

Imagine:

What if we redesigned the health care system to reimburse doctors, hospitals, drug companies, and health care companies for each day that an individual stays healthy and disease-free, instead of reimbursing practitioners for the actual procedures performed on their patients?

As a practical matter, public funds can be used to pay insurance companies, for example, for each day that an individual remains healthy and does not develop disease or require other urgent medical intervention.

If an individual becomes ill, the insurer receives no further financial compensation for medical interventions necessary to treat the individual's illness, but is obligated to pay for all evidence-based treatment options to restore the customer to good health.

If the customer becomes healthy again, the individual's medical expenses will be paid again.

Virtually every player in the system is responsible for keeping their customers healthy, motivated to avoid unnecessary medical interventions only by reducing the number of people who end up getting sick.

The more healthy people there are, the less it costs to treat the sick, and the greater the economic benefits for all parties involved in keeping these people healthy.

This shift in incentive structures is now shifting the focus of the complete health system away from offering isolated, single treatment options to a holistic view of what helps individuals stay healthy and live longer.

Now, effectively staying healthy requires people willing to share their health data on an ongoing basis so that the healthcare system can understand quickly enough if they need any help with their health.

Physical exams, lifetime health data monitoring, genetic sequencing, cardiometabolic profiling and image-based technologies enable customers to work with health coaches and general practitioners to make optimal science-based decisions about diet, medication and physical activity, reducing their unique odds of developing identified and individualized high-risk diseases.

Data analysis powered by artificial intelligence and miniaturization of sensor technology are already beginning to enable monitoring of personal health conditions.

Measuring cardiac metabolic parameters with such devices and detecting circulating tumor DNA in the bloodstream early after cancer development are just two examples of such monitoring techniques.

Let's get cancer.

One of the biggest problems with certain neoplastic diseases is that many patients were diagnosed too late to be treated, even though drugs and treatments now exist that could potentially cure them if the disease was discovered earlier.

New techniques have made it possible to detect the presence of circulating tumor DNA, and thus the presence of cancer, early in a very convenient way, based on a few milliliters of blood.

The impact of this early stage detection can be dramatic.

The 5-year survival rate for those diagnosed with early stage 1 non-small cell lung cancer is 49 percent.

The same is true for those diagnosed at later stages, stage 4, at less than 1 percent.

The potential to prevent many deaths with a simple method like a blood test that looks for circulating tumor DNA could make certain types of cancer a manageable disease by detecting disease onset earlier and likely enhancing better treatment outcomes.

In 2012, 50 percent of all Americans had one chronic disease, resulting in 86 percent of the $3 trillion US health care budget being spent on treating such chronic diseases.

86 percent.

If new technology can reduce this 86%, why has the healthcare system so far failed to react and change?

Now, to redesign today's disease care system into a true health care system focused on prevention and behavior change, all parties within the system must change.

It requires the political will to shift budgets and policies towards prevention and health education in order to design new financial and non-monetary incentives.

This will require creating a rigorous and prudent regulatory framework for the collection, use and sharing of personal health data.

Physicians, hospitals, insurers, pharmaceutical companies and healthcare companies will need to reframe their approach, and most importantly, without the ongoing sharing of health data and the willingness and motivation of individuals to make sustainable lifestyle changes and stay healthy a priority.

This change may not happen overnight.

However, by refocusing the incentives within today's healthcare industry to proactively keep people healthy, not only could more diseases be prevented in the first place, but the onset of certain preventable diseases could be detected earlier than they are today, which would lead to longer, healthier lives for more people.

Most of the technology needed to make that change already exists today.

But this is not a technology issue.

It's primarily a matter of vision and will.

Thank you very much.

(applause)

You may have noticed I'm wearing two different shoes.

It probably looks funny, it definitely feels funny, but I wanted to make a point.

Suppose my left shoe equates to a sustainable footprint. This means that we consume less natural resources than the earth can regenerate and emit less carbon dioxide than forests and oceans can reabsorb.

It is a stable and healthy condition.

Today's situation is similar to my other shoe.

It is quite oversized.

As of August 2nd, 2017, we have already exhausted all the resources the planet can regenerate for this year.

This is like using up all your money by the 18th of the month and needing a loan from the bank for the rest of the period.

Sure, you can do this for months on end, but if you don't change your behavior, sooner or later you'll run into big problems.

We all know the devastating effects of this overexploitation: global warming, rising sea levels, melting glaciers and polar ice, and increasingly extreme weather patterns.

I'm really frustrated by the enormity of this problem.

What's even more frustrating for me is that there is a solution to this, but we keep doing the same thing.

Today I would like to share how new photovoltaic technologies can contribute to a sustainable future for buildings.

Buildings consume about 40 percent of total energy demand, so addressing this consumption will significantly reduce emissions to climate change.

Buildings designed on sustainable principles can produce all their own electricity.

To achieve this, we first need to reduce our consumption as much as possible, for example by using well-insulated walls and windows.

These techniques are commercially available.

Then you need energy for hot water and heating.

This can be obtained in a renewable way from the sun via solar thermal installations or from the ground and air using heat pumps.

All these technologies are available.

Then you will need electricity.

Basically, there are several ways to get renewable electricity, but how many buildings do you know that have windmills on their roofs or hydroelectric power plants in their gardens?

Probably not so much. Because it usually doesn't make sense.

However, the sun provides abundant energy for our roofs and facades.

The possibilities for harvesting this energy on building surfaces are enormous.

Take Europe for example.

If all areas are properly oriented to the sun and not overly shaded, the electricity generated by photovoltaics represents approximately 30 percent of total energy demand.

However, there are some problems with solar power today.

Good value for money, but not very flexible in terms of design and aesthetics are a challenge.

When people think of solar cells in buildings, people often think of a picture like this.

This might work for a solar power plant, but aesthetics are important when thinking about buildings, streets, and architecture.

This is why we don't see many solar cells in buildings today.

just don't match.

Our team is working on a completely different solar cell technology called organic photovoltaics (OPV).

The term organic indicates that the materials used for light absorption and charge transport are based primarily on the elemental carbon rather than metals.

We utilize a mixture of polymers composed of various repeating units, like pearls in a pearl chain, and small football-shaped molecules called fullerenes.

These two compounds are mixed and dissolved to form an ink.

Also, similar to inks, they can be printed in a continuous roll-to-roll process onto flexible substrates using simple printing techniques such as slot die coating.

The resulting thin layer is the active layer and absorbs the sun's energy.

This active layer is very effective.

Only a layer thickness of 0.2 micrometers is required to absorb the sun's energy.

This is 1/100th the thickness of a human hair.

To give you another example, take a kilogram of a basic polymer and use it to formulate an active ink.

With this amount of ink, you can print a solar cell the size of an entire football field.

So OPVs are very material efficient, which I think is very important when talking about sustainability.

Once the printing process is complete, you will have a solar module that looks like this:

It looks a bit like plastic foil, but it actually has many of its functions.

It's light...

It bends...

and translucent.

But as you can see with this tiny lit LED, you can harvest not only the energy of the sun outdoors, but also the energy of indoor lights.

It is available in plastic form and takes advantage of its light weight and flexibility.

The first is important when considering buildings in warm regions.

The roof here is not designed to withstand even heavier loads.

For example, heavy silicon solar cells cannot be used for light harvesting as they are not designed for winter snow, but these lightweight solar foils are very suitable.

Flexibility is important if you want to combine solar cells and membrane structures.

Imagine the sails of the Sydney Opera as a power plant.

Alternatively, solar foils can be combined with traditional building materials such as glass.

In any case, many glass façade elements contain foils to create laminated safety glass.

Adding a second foil in the manufacturing process is not a big deal, but the façade elements contain solar cells and can generate electricity.

In addition to looking great, these integrated solar cells have two additional key benefits.

Remember those roof-mounted solar cells we talked about earlier?

In this case, the roof is installed first, and the solar cells are installed as the second layer.

This adds installation costs.

In the case of monolithic solar cells, only one element is installed at the construction site, which simultaneously constitutes the building envelope and the solar cells.

Two functions are integrated in one element, which not only saves installation costs, but also saves resources.

Earlier, we talked about optics.

I really like this solar panel. Your tastes and design needs may vary...

no problem.

The printing process makes it very easy to change the shape and design of the solar cells.

This gives architects, planners and building owners the flexibility to integrate this power generation technology according to their wishes.

I would like to emphasize that this is not just happening in the lab.

Mass adoption will take a few more years, but we are on the brink of commercialization. This means that there are several companies with production lines.

They are expanding their ink capacity and we are expanding our ink capacity.

(shoes fall off) This smaller footprint is much more comfortable.

(Laughter) Right size, right scale.

We need to get back on the right scale when it comes to energy consumption.

And making the building carbon neutral is an important part here.

Europe has a goal to decarbonize its building stock by 2050.

We hope that organic photovoltaics will be a big part of that.

Here are some examples:

This is the first commercial installation of fully printed organic solar cells.

"Commercial" means that the solar cells were printed on industrial equipment.

The so-called "Solar Tree" was part of the German Pavilion at the 2015 World's Fair in Milan.

It provided shade during the day and electricity for lighting in the evening.

You may wonder why this hexagon was chosen for solar cells.

The answer is simple. The architect wanted a particular shading pattern on the floor, requested it, and it was printed as requested.

Far from being an actual product, this free-form installation captured the imagination of visiting architects more than we expected.

Other applications are closer to the projects and applications we are targeting.

An office building in São Paulo, Brazil, has translucent OPV panels integrated into its glass façade to meet a variety of needs.

First, we provided shade in the back conference room.

Second, the company logo is displayed in an innovative way.

And of course electricity is generated, reducing the building's energy usage.

This represents a future where buildings are no longer energy consumers, but energy suppliers.

I want solar cells to be seamlessly integrated into the building shell, resource efficient and pleasing to look at.

For roofs, silicon solar cells will often continue to be a good solution.

However, I believe that organic photovoltaics can offer a great contribution to exploiting the potential of all facades and other areas such as translucent areas, curved surfaces and shading. Organic photovoltaics can come in any form an architect or planner desires.

thank you.

(applause)

i am a translator

I translate from biology to mathematics and vice versa.

I create mathematical models (in my case systems of differential equations) to describe biological mechanisms such as cell proliferation.

Basically it works like this.

First, we identify key factors that may drive the long-lasting behavior of a particular mechanism.

We then form hypotheses about how these elements interact with each other and with their environment.

It may look like this.

Then, converting these assumptions into an equation, we get:

Finally, we analyze the equations and translate the results into the language of biology.

An important aspect of mathematical modeling is that we, as modelers, do not think about what things are. We consider what they are doing.

We consider the relationships between individuals, such as cells, animals and humans, and how they interact with each other and with the environment.

Let's take an example.

What do foxes and immune cells have in common?

Both are predators, except that foxes feed on rabbits and immune cells feed on invaders such as cancer cells.

But from a mathematical point of view, qualitatively the same predator-prey system of equations describes the interactions between foxes and rabbits, cancers and immune cells.

Predator-prey type systems have been extensively studied in the scientific literature and describe the interaction of two populations where the survival of one depends on the consumption of the other.

And these same equations provide a framework for understanding cancer-immunity interactions, where cancer is the prey and the immune system is the predator.

And prey uses all sorts of tricks to prevent predators from killing them, from disguising themselves to stealing predators' food.

This can have very interesting implications.

For example, despite great success in the field of immunotherapy, efficacy is still somewhat limited with respect to solid tumors.

But ecologically, both cancer cells and immune cells, prey and predators, need nutrients such as glucose to survive.

When cancer cells compete with immune cells for common nutrients within the tumor microenvironment, immune cells are physically unable to do their job.

This predator, prey, shared resource type model is something I've been working on in my own research.

And recently, experiments have shown that by restoring the metabolic balance of the tumor microenvironment, ensuring that immune cells are able to ingest food, predator immune cells can regain their advantage in fighting cancer prey.

If we abstract this a little, we can think of cancer itself as an ecosystem. In ecosystems, heterogeneous cell populations compete for space and nutrients, cooperate, interact with predators, immune systems migrate and metastasize, all within the human ecosystem.

And what do we know about most ecosystems from conservation biology?

One of the best ways to make a species extinct is to target its environment instead of targeting the species directly.

Thus, once we have identified key components of the tumor environment, we can propose hypotheses, simulate scenarios and therapeutic interventions in a completely safe and affordable way, and target different components of the microenvironment in ways that kill cancer without harming hosts like me or you.

So the immediate goal of my research is to advance research and innovation and reduce its cost, but of course the real goal is to save lives.

And that's what I'm trying to do through mathematical modeling applied to biology, especially drug development.

The field was somewhat marginalized until relatively recently, but has matured.

And now there are many very well-developed mathematical methods, pre-programmed tools, some of which are free, and the computational power available to us continues to grow.

The power and beauty of mathematical modeling lies in the fact that what we think we know can be formalized in a very rigorous way.

We make assumptions, turn them into equations, and run simulations. All this to answer the following question: "What would you expect to see in a world where your assumptions are correct?"

This is a very simple conceptual framework.

It's all about asking the right questions.

However, it can create many opportunities for testing biological hypotheses.

If our predictions match our observations, great. -- Now that I've got it right, I can make more predictions by changing certain aspects of the model.

However, if our predictions do not match our observations, it means that some of our assumptions are wrong and thus our understanding of key mechanisms of fundamental biology is still incomplete.

Fortunately, since this is a model, we can control all assumptions.

So you can go through them one by one and identify what is causing the discrepancy.

And both experimental and theoretical approaches can be used to fill this newly identified knowledge gap.

Of course, any ecosystem is very complex, and trying to account for all the moving parts is not only extremely difficult, but also not very informative.

There is also the issue of timescales, as some processes take place on the scale of seconds, minutes, days, months, and years.

It is not always possible to separate these experimentally.

Other things happen too quickly or slowly to be physically measurable.

But as mathematicians, we have the power to zoom in on any subsystem on any timescale and simulate the effects of interventions made on any timescale.

Of course, this is not just a modeler's job.

It must be done in close cooperation with biologists.

And both sides need some translation ability.

However, starting with a theoretical formulation of the problem can create many opportunities for testing hypotheses and simulating scenarios and therapeutic interventions in a completely safe way.

It helps identify gaps in knowledge and logical inconsistencies, showing where to keep looking and where there are dead ends.

In other words, mathematical modeling helps answer questions that directly affect people's health, i.e., actually affect each person's health. Because mathematical modeling is the key to advancing personalized medicine.

And it's all about asking the right questions and turning them into the right equations...

Came back.

thank you.

(applause)

(Music) The sun is shining above It's ten degrees down here I'm on my way to where the road is paved with gold now Two trains are running -- running side by side Some trains are leaving Two trains are running -- running side by side I'm on that fast express train to empty rewards Now there's a lot of room in my father's house -- oh Lord, there's one for you and me Now there's a lot of room in my father's house -- oh, for you and me There is one There is no melancholy, no trouble Lord, sweet Jesus triumph There is one glory from the moon -- Lord, another, oh glory from the sun Oh, glory from the moon and glory from the sun I will leave this earthly body when Jesus, my Lord King, comes Thank you.

(applause)

I have loved math for as long as I can remember.

Actually, it's not 100% true.

I loved math all but two weeks in high school.

(Laughter) I was at the top of my class and was about to start an extended math course.

I was really excited to see a whole new topic: complex numbers.

I like complexes.

The teacher made us understand the concept by asking some questions about square roots.

9 squares -- 3; 256 squares -- 16.

too easy.

Then she asked a trick question. "What about the square root of negative one?"

Of course, we got through it all - "Come on, miss!

We all know that you can't take negative square roots. ”

"It's true in the real world, too," she said.

"But in a complicated world, the square root of negative 1 is the imaginary number i."

(Laughter) My whole math world shook me that day.

(laughs) "Imaginary numbers?

seriously?

But mathematics is the source of truth. Don't be abstract.

If I wanted to play with imaginary numbers, I would have studied art. ”

(Laughter) "This is extended math. Let's get back to programming!"

She didn't, so for the next few weeks I reluctantly performed nonsensical calculations and found an imaginary solution to the quadratic equation (laughs).

(Laughter) But then something amazing happened.

We started in the complex world of imaginary numbers to find sophisticated solutions to hitherto unanswered real-world problems.

So a 500-year-old mathematician decided to invent these imaginary numbers for fun. Thanks to that, we can now derive these amazing identities for real-world applications in fields such as electrical engineering.

oh!

I have attained a whole new level of awareness of mathematics.

And after a moment of disbelief, I am now more enamored with the subject than ever before.

Mathematician Francis Hsu sums this up beautifully: “We study mathematics for play, for beauty, for truth, for justice, and for love.”

But if you ask any student today, you'll probably hear a different story.

You may hear people say, "It's difficult" and "It's boring."

And they may be right about it being difficult.

But certainly not boring.

In fact, I think part of what makes it beautiful is that it's difficult to master.

Because nothing worth doing is easy.

Therefore, students need to endure the difficult part long enough to appreciate the beauty when it all comes together.

Just like I did during my brief few weeks in high school.

Unfortunately, our school system teaches students math in a lockstep process.

Therefore, those who fall behind a little find it nearly impossible to catch up and appreciate its beauty.

But why is this a problem?

Why should you care?

Well, today, more than ever, our world needs every citizen to be proficient in mathematics.

With the advent of artificial intelligence and automation, many of the jobs we see today will either cease to exist or will become less routine and require more analysis and application of expertise.

But we are not producing additional math students to fill these new roles.

This graph shows the number of students taking standard mathematics and advanced mathematics in Australia over 20 years.

It's clear that the demand for math skills is growing rapidly, while the supply is steadily declining.

To put things into perspective, half of current high school graduates in Australia are not prepared to understand the data rate of change argument.

This is very concerning in this digital age where fake news can influence election results.

Let's take a concrete example.

Let's take a closer look at that graph.

Can you guys see what I did there to underscore my point?

If that's not possible, start the vertical axis at 0 to indicate where it should be.

See, you already know, right?

This is the exact same data, but I've manipulated the representation to affect you.

That's great, that's my job here.

(Laughter) But in all seriousness, if we don't do something to significantly improve our students' math engagement, we're not only going to face a major skills shortage crisis, but we're also going to have a capricious population that's easily manipulated by whoever gets the most airtime.

So what is the solution?

I have a lot of work to do.

Curriculum reform is needed.

We need to encourage the best and brightest to become teachers.

We need to stop high-stakes testing and follow a proficiency-based approach to learning instead.

But all this takes time.

And I'm impatient.

See, I've been thinking about this for eight years.

Ever since I quit my job as a derivatives trader and built a web application to help students learn math.

Our app is now used in schools all over the world.

We also see significant improvements for students who take the program regularly.

But the problem is that it is only visible to students who use this program regularly.

And most of them don't.

So we spent years developing and refining the application, but our biggest challenge was not about the product, but about getting students to want to address the gaps in their understanding.

Imagine that in today's attention economy, we're competing with Facebook, Snapchat, and PlayStation for these students' time.

So we went back to the drawing board and started thinking about how students could make a portion of their “focus budget” worth spending on their education.

Playing around with gamification elements like points, badges, and avatars resulted in a brief spike in engagement, but quickly returned to normal once the novelty wore off.

One day, my co-founder Alvin saw a study of Chicago students led by behavioral economist Stephen Levitt. There, students were rewarded for improving their test scores.

He started telling me about some of the things they tested and the interesting findings they made.

For example, we've found that encouraging students to have inputs such as effort is much more effective than encouraging them to have outputs such as test scores.

They discovered that for younger students you can convince them with a trophy, but for older students you really need the cash.

(Laughter) And the amount of cash was important. $10 would have been fine, but $20 would have been fine.

But perhaps most importantly, we realized that rewards need to be delivered immediately, not promised at a later date.

They gave the students $20 and said, "Touch, feel, smell—" (snorting) "It's all yours.

But if it fails, I'll take it back. ”

And it worked really well.

I immediately got excited about the possibility of implementing this in my program.

But after the excitement subsided, there were some concerns creeping into our minds.

First, was this ethical?

(Laughter) Second, how are we going to fund this project?

(Laughter.) And finally, if students weren't paid, would that work be sustained?

Well, let's look at the ethical part first.

I'm kind of a pure mathematician.

So I would be one of the first to say that we should study mathematics for the sake of mathematics.

Remember - for play, for beauty, for truth, for justice, and for love!

Not for the money!

(Laughter) As I struggled with this, I realized that, although that's how I see mathematics now, it's only possible if you've studied mathematics long enough to understand it.

It is very difficult to tell a student who is currently struggling with mathematics to work hard for results in the distant future.

And I work here not so much for bribes, but because I was able to bribe the students by telling them that I got a big bonus in the days of derivatives trading as a reward for being good at math.

But it won't pay off for long.

So practically nothing.

Behavioral economists call this hyperbolic discounting.

And Levitt goes so far as to say that all motivating power disappears when rewards are delayed.

So, from a purely economic standpoint, if we don't use immediate incentives, we are under-investing in student outcomes.

It gave me courage, and I realized that as a society we are quite accustomed to financial incentives.

Whether it's by the government, by your employer, or at home.

For example, many parents pay their children pocket money or pocket money to do household chores.

So it wasn't really that controversial.

As I thought about it, I began to see the answer to the second question, how would you raise the money?

Unsurprisingly, parents are the most invested in their children's education.

So let's charge a weekly subscription fee to use our program. However, if the student achieves their weekly math goal, the subscription amount will be refunded directly to the child's bank account.

We chose 3 exercises completed over a week to get a $10 reward.

That way, in a short enough period of time, you can encourage effort rather than grades while providing enough rewards to keep students on their toes.

I now recall the first time I told my wife about this new business model.

If she had any lingering suspicion that I had gone completely insane, it would have made her almost certain of it.

She said to me, "Mom..."

You realize that if everyone is doing their homework the way you want it, you won't get the income you don't want.

It's a great business model. ”

(Laughter) It's more of an anti-business model, free if you use it, but you pay if you don't.

Now, I knew from experience that not everyone in this country jumps in and tackles math homework every week.

If so, surely we would be bankrupt soon, but well, we would have solved the math skills crisis in this country.

(Laughter) As a company, we've always pursued a dual return, looking to both benefit our investors and improve outcomes for our students.

We understand that improving student achievement is the path to long-term profitability.

Therefore, our two objectives should never be in conflict.

That's why we always make product decisions focused on helping our students reach their weekly math goals, effectively focusing on making sure they get rewarded, not us.

Now you must be wondering. What's going on with this crazy business model?

Nice to know that we are still open for business.

We have been testing this for the past 5 months with only individual home users in Australia before considering rolling it out to schools.

And here are the early results.

Green represents students meeting their weekly math goals and red represents students not.

It turns out that there are far more people doing their homework than not doing it.

In fact, we found that percentage to be fairly stable at around 75% as our user base grew.

So, on average, we receive a weekly subscription fee once every four weeks, and reward students for the remaining three weeks.

Of course, we're going to leave some money here, but what about?

These students were found to be 70% more engaged than those not participating in the reward program.

check.

From a business perspective, users are less likely to churn and more likely to refer friends, so we want to have a larger, more engaged user base at the expense of lower revenue per user.

Check and check.

Now for the last question.

Will they come back again if their salaries are no longer paid?

Mathematics is not just a subject you learn in school.

It is a human effort.

It helps us understand the world around us.

And the more you know, the more you want to know.

Yes, you have triggered your first engagement with a financial reward.

But in the long run, money no longer matters.

Because in the long run, the brilliance of mathematics will be the motivation, and the understanding of it will be the reward.

thank you.

(applause)

At some point in our lives, almost everyone has a broken heart.

My patient Kathy planned her wedding when she was in middle school.

She met her future husband by age 27, got engaged a year later, and married a year later.

But when Cathy turned 27, she had not found a husband.

She found a lump in her breast.

She went through months of grueling chemotherapy and painful surgery, then, just as she was about to get back into the dating world, she found a lump in her other breast and had to start over.

But Kathy hoped to resume her search for a husband as soon as she recovered and her eyebrows grew.

When going on a first date in New York City, you need to be able to express a range of emotions.

(Laughter) Shortly after that, she met and fell in love with Rich.

The relationship was everything she wanted.

Six months later, after a lovely weekend in New England, Rich booked his favorite romantic restaurant.

Cathy knew he was going to propose and couldn't contain her excitement.

However, Rich didn't propose to Cassie that night.

he broke up with her

He cared deeply for Cathy, and he did, but he simply wasn't in love.

Cathy is devastated.

Her heart was truly devastated and she is now in another period of recovery.

But five months after their breakup, Kathy still couldn't stop thinking about Rich.

Her heart was still broken.

The question is why?

What prevented this incredibly strong and determined woman from tapping into the emotional resources she needed to get through four years of cancer treatment?

Why do so many people struggle when trying to recover from a breakup?

Why do the same coping mechanisms that get us through all kinds of hardships in life fail so miserably when our hearts are broken?

In over 20 years of private practice, I have seen people of all ages and backgrounds face heartbreak of all kinds. And what I've learned is that when your heart is heartbroken, the same instincts you normally rely on will lead you astray again and again.

You simply cannot trust what your heart is telling you.

For example, studies of people who have had broken hearts have shown that having a clear understanding of why the relationship ended is critical to moving forward.

But time and time again, when we are asked for a simple, honest explanation like the one Rich offered to Kathy, we refuse it.

Because heartbreak causes such dramatic emotional pain, our minds tell us that the cause must be just as dramatic.

And that intuition is so powerful that even the most rational and thoughtful can come up with non-existent mysteries and conspiracy theories.

Kathy is convinced that something must have happened during her romantic vacation with Rich that has soured her relationship with him, and is obsessed with figuring out what it is.

So she spent every moment of that weekend in her mind countless hours, searching her memory for clues that weren't there.

Cathy's mind tricked her into starting this wild goose chase.

But what drove her to this activity for so many months?

Heartbreak is much more insidious than we think.

There's a reason we keep falling down rabbit hole after rabbit hole, even though we know it makes us sick.

Brain studies show that quitting a relationship activates the same brain mechanisms that are activated when addicts withdraw from substances such as cocaine and opioids.

Cathy was going through a withdrawal.

And since she couldn't get the heroin to actually be with Rich, her subconscious mind chose methadone for her memories with him.

Her instincts felt like she was trying to solve a mystery, but what she was really doing was solving a mystery.

This is what makes heartbreak so difficult to heal.

Addicts know they are addicted.

They know when to explode.

But a heartbroken person is not.

But you are doing it now.

And if your heart is broken, you can't ignore it.

As compelling as the urge is, you need to realize that with every recollection, every text you send, every second you spend stalking your ex on social media, you're only fueling your addiction, deepening your emotional distress, and complicating your recovery.

Getting over a heartbreak is not a journey.

It is a battle and your reason is your greatest weapon.

There is no satisfying farewell explanation.

No amount of logic can take away the pain you feel.

So don't look for questions and don't wait. Either accept the question as presented or come up with your own and stop asking. Because in order to resist addiction, you need to settle it.

And we need something else. You have to be willing to let go and accept that it's over.

Otherwise, your mind will feed on your hopes and hold you back.

Hope can be incredibly destructive when the heart is broken.

Heartbreak is a master manipulator.

It's amazing how easily we do the exact opposite of what we need to do to recover.

One of the common tendencies of broken hearts is to idealize the broken hearted person.

We spend hours remembering their smiles, how wonderful they made us feel, hiking mountains and making love under the stars.

It just makes our loss feel more painful.

we know that

Yet we cycle through our heads one great hit after another, like we're held hostage by our own passive-aggressive Spotify playlists.

(Laughter) When you're heartbroken, those thoughts pop into your head.

To avoid idealization, you have to balance them by remembering not only their smiles but also their frowns, how badly they made you feel, and the fact that you got lost down the mountain after sex, argued like crazy, and didn't speak for two days.

What I tell my patients is to make a list of all the things that person did wrong with you, all the bad things, all the bad things, and keep it on your phone.

(Laughter) Once you have a list, you have to use it.

When I hear a hint of idealization or the slightest hint of nostalgia during a session, I go, "Call me."

(Laughter) Your mind will tell you they were perfect.

But they weren't and neither was the relationship.

And you have to remind yourself of it often if you want to get past them.

None of us are immune to heartbreak.

My patient, Miguel, was a 56-year-old senior executive at a software company.

Five years after his wife died, he finally felt ready to start dating again.

He soon met Sharon and a whirlwind romance began.

They introduced their adult children to each other a month later and began living together two months later.

When middle-aged people date, they don't play around.

It's like "Love Actually" meets "Fast and Furious."

(Laughter) Miguel was happier than he had been in years.

However, on the eve of the first anniversary of his death, Sharon left him.

She had decided to move to the West Coast to live closer to her children and didn't want a long distance relationship.

Miguel is completely blinded and utterly devastated.

For months he could hardly work and nearly lost his job as a result.

Another effect of heartbreak is that feelings of loneliness and pain can significantly impair intellectual functioning, especially when performing complex tasks involving logic and reasoning.

It temporarily lowers our IQ.

But it wasn't just the intensity of Miguel's grief that upset his employers. It was a period.

Miguel was perplexed by this too, really perplexed.

"What's wrong with me? Did I do something wrong?" he asked me during our session.

“Is there any adult who spends nearly a year getting over a year-long relationship?”

In fact, I think many people do.

Heartbreak shares all the traditional hallmarks of loss and grief: insomnia, intrusive thoughts, and a malfunctioning immune system.

40% experience clinically measurable depression.

A broken heart is a complex psychological injury.

It affects us in many ways.

For example, Sharon was very social and very active.

She had dinner at the house every week.

She and Miguel went on a camping trip with another couple.

Miguel was not religious, but he accompanied Sharon to church every Sunday and was welcomed into the congregation.

Miguel didn't just lose his girlfriend. He lost all of his social life and the supportive community of Sharon's church.

He lost his marital identity.

Now, Miguel recognized that this breakup left a huge void in his life, but what he failed to realize was that it left far more than just one.

And it's so important in that it not only explains why heartbreak can be so devastating, but it also teaches us how to heal.

To heal a broken heart, you must identify the void in your life and fill it. That means we have to fill them all.

Your Identity Hollow: You need to re-establish who you are and what your life is about.

Vacant spaces in social life, lost activities, and even empty spaces on walls where photographs used to hang.

But they won't do you any good unless you prevent mistakes that can set you back, unnecessarily seeking explanations, idealizing your ex instead of focusing on how he or she was wrong for you, and indulging in thoughts and actions that shouldn't be superfluous but are still starring in the next chapter of your life.

It's hard to get over a broken heart, but if you refuse to let your heart wander and take steps to heal the wounds, you can greatly minimize your suffering.

And you are not the only one to benefit from it.

Not to mention avoiding billions of dollars in lost productivity at work, you will be more involved with your friends and more involved with your family.

So if you know someone with a broken heart, be compassionate. We know that social support is important for their recovery.

And be patient as it will take longer than you think for them to move on.

And if you're hurt, know this. It's hard, it's a battle in your own mind and you have to be determined to win.

But you have a weapon.

I can fight

and you are healed.

thank you.

(applause)

It is often said that history is written by the victors, but if this is true, what happens to the oppressed, and how can they aspire to greater things if they are not told the stories of their glorious past?

Ostensibly I stand before you as a mere garment manufacturer, but in the folds of ancient and modern textiles I have found a higher mission.

Through my work as a designer, I have discovered the importance of representing marginalized members of society, and of telling the most vulnerable among us that they no longer have to compromise themselves just to fit in with the uncompromising majority.

It turns out that fashion, which many of us consider to be an insignificant field, can actually be a powerful tool for removing prejudices and enhancing the self-image of the underrepresented.

My interest in using design as a vehicle for social change happened to be personal.

As a Nigerian-American, I know how easily the term "African" morphs from an ordinary geographical description into a pejorative term.

For those of us who hail from this beautiful continent, being African means being inspired by culture and filled with endless hope for the future.

So, in an attempt to change the misconceptions many hold about where I come from, I use design as a vehicle to tell stories of joy, stories of victory, and stories of perseverance throughout the African diaspora.

I tell these stories as a collective effort to correct the historical record. Because, regardless of where we come from, each of us has been exposed to a complex history of taking our families to foreign lands.

These histories shape the way we see the world and shape the prejudices we carry on.

To combat these prejudices, my work draws on aesthetics from different parts of the globe to create stories about the importance of fighting for inclusivity.

Reconstructing images of European classical art and merging them with African aesthetics can recast people of color in key roles and give them a degree of dignity that they did not have before.

The approach subverts historically accepted narratives of African inferiority and serves as an inspiration for people of color who are wary of seeing themselves portrayed without sophistication and dignity.

Each of these culture-bending tapestries becomes a tailored garment or silk scarf, like the one I happen to be wearing right now.

(Laughter.) And even when surrounded by the fabric of European classicism, these stories boldly celebrate the merits of African empowerment.

In this way, the master's tools become masterpieces that honor those who were once subject to them.

This metaphor extends beyond the realm of art into the real world.

When people, whether refugees or world-changing entrepreneurs, are allowed the freedom to express themselves in ways that celebrate their own unique identities, something magical happens.

we are standing higher

We have more pride and self-awareness because we are expressing our true, authentic selves.

And those of us around them become more educated, more open, and more tolerant of their different perspectives.

As such, the clothes we wear can be great examples of diplomatic soft power.

The clothes we wear act as bridges between seemingly disparate cultures.

So yeah, ostensibly I'm standing before you all as just a clothing manufacturer.

But my work has always been more than fashion.

It became my purpose to rewrite cultural narratives to see people of color in new, nuanced perspectives, and to enable us, the proud children of Sub-Saharan Africa, to travel the planet with pride.

It is certainly true that the stories of history were told by the winners of the past, but I am of the new generation.

My work is a voice for those who no longer depend on their difficult past for their future.

Today, we are ready to tell our story without compromise, without apology.

But questions still remain. Are you ready for what's to come?

We will come regardless, so I hope you are.

(applause)