That's why I ask about art.

That's why I make exhibitions.

As I said earlier, this exhibition was created by 40 young artists over the course of eight years, and for me it is a way of thinking about its meaning.

We consider the impact this generation will have on us.

I think about what it means for these artists to go out into the world as they travel through their work, and to act within communities as people who see and think about the issues we face.

It is also about thinking about creative spirits and nurturing them, and imagining nurturing them, especially in urban America.

Now, perhaps where does this end up now?

For me, it's about rethinking this cultural discourse in an international context.

So the final iteration of this project was called Flow, with the idea of ​​building a real network of artists around the world. Looking beyond Harlem and the suburbs, Flo turned to artists born on the African continent.

And as many of us think about that continent and what it will be like for all of us in the 21st century, I began to imagine what they would create through artists and works of art in the sense of what they could tell us about the future, what they could tell us about our future, and what they would create in the sense of offering us great possibilities to see that continent emerge as part of our larger dialogue.

What do you discover when you look at the work?

What do I think of when I think of art?

I feel that my privilege as a curator is not limited to the discovery of new and exciting works.

But really, about beauty, about power, about ourselves, talking and talking to each other, is what I discovered about myself and what I can offer in the space of the exhibition.

That's why I wake up every day and want to think about this generation of black artists and artists around the world.

thank you. (applause)

In keeping with Jacques Cousteau's ethos that "people protect what they love," today I would like to share with you what I love most in the sea. It is the incredible number and variety of animals that produce light.

My addiction started with this weird looking diving suit called the Wasp. It's not an acronym, someone just thought it resembled an insect.

In fact, it was developed for use by the offshore oil industry to dive to depths of 2,000 feet on oil rigs.

Shortly after completing my PhD, I was fortunate enough to join a group of scientists who were using it for the first time as a tool for ocean exploration.

We trained in a tank at Port Hueneme and then made our first open sea dive in the Santa Barbara Channel.

It was an evening dive.

I dived to a depth of 880 feet and turned off the lights.

And I turned off the lights because I knew I could see this phenomenon of animals emitting light called bioluminescence.

But I was totally unprepared for how much there was and how spectacular it would be.

I could see a string of jellyfish called a siphonophore, longer than this room, and it gave off so much light that I could read the dials and gauges inside the suit without a flashlight. And what looked like bright blue smoke puffed and billowed. And the explosion of sparks swirling from the thrusters. Throwing a log into a campfire is like when embers swirl out of a campfire, but it was ice-blue embers.

It was a breathtaking sight.

Now, if anyone knows anything about bioluminescence, it's them. It's a firefly.

There are also several other terrestrial organisms that can emit light. Insects, worms, fungi, etc. But in general, it is very rare to emit light on land.

At sea, it's the rule, not the exception.

Almost anywhere in the world, if you go out into the open ocean environment and drag a net from 3,000 feet to the surface, most animals, in fact, in many places 80 to 90 percent of the animals you keep in that net will glow.

This makes for a pretty spectacular light show.

Well, I would like to share with you a small video that I took from the submarine.

I first developed this technology on a small one-person submersible called the Deep Rover, then adapted it for use on the Johnson Sealink. This is here.

Therefore, a 3-foot diameter hoop with a screen is attached in front of the observation sphere.

And inside the sphere I'm in, there's a high-sensitivity camera that's nearly as sensitive as the human eye, which is perfectly adapted to darkness, albeit a little blurry.

So turn on the camera and turn off the lights.

That glow you're seeing isn't luminescence, it's just electronic noise from these ultra-sensitive cameras.

The glow is not visible until the submersible begins to move forward through the water, at which point any animal that hits the screen is stimulated to bioluminesce.

Well, the first time I did this, all I was trying to do was count the number of sauces.

Knowing my forward speed and area, I could figure out how many hundreds of sources per cubic meter.

However, I began to realize that I could actually identify animals by the type of flash they emitted.

So here in the Gulf of Maine at 740 feet elevation, I can list almost everything you see there at the species level.

Like large explosions, sparks come from small comb jellies, as well as from krill and other types of crustaceans, jellyfish.

There was another one of those comb jellyfish.

So I worked with a computer image analysis engineer to develop an automatic recognition system that can identify these animals and extract the XYZ coordinates of the first point of impact.

Then you will be able to do what ecologists do on land: nearest neighbor distances.

But you don't necessarily have to go to deep water to see a light show like this.

You can actually see it in surface water.

This is a photo of dolphins swimming among bioluminescent plankton, taken by Dr. Mike Lutz of the Scripps Research Institute.

This was actually taken in San Diego Harbor, not in an exotic location like Puerto Rico's Bioluminescent Bay.

And sometimes you can see it closer than that. Because, for land-lovers listening, the head of the boat (that's the toilet) is flushed with unfiltered seawater, which often contains bioluminescent plankton.

So if you stagger late at night and forget to turn on the light because you want to go to the bathroom, you might think you're having a religious experience. (Laughter) So how do living things make light?

That was the question 19th-century French physiologist Raphael Dubois asked about this bioluminescent shell.

He pulverized it and managed to extract some chemicals. One was an enzyme, which he called luciferase. He called the substrate luciferin, after the light-carrying lucifer.

Although the term has stuck, it does not really refer to any specific chemical, as these chemicals come in many different shapes and forms.

In fact, most people studying bioluminescence today are looking at chemistry. Because these chemicals have proven very valuable in developing antibacterial and anticancer drugs, testing for life on Mars, detecting contaminants in water, and more.

In 2008, the Nobel Prize in Chemistry was awarded for work on a molecule called green fluorescent protein, isolated from the bioluminescence chemistry of jellyfish.

The other thing that all these molecules tell us is that apparently bioluminescence has evolved at least 40 times, and probably at most 50 times in its evolutionary history. This clearly shows how amazingly important this trait is for survival.

So what makes bioluminescence so important to so many animals?

Well, for animals in the dark trying to avoid predators, light is very useful for the three basic things animals have to do to survive: finding food, attracting mates, and avoiding being eaten.

For example, this fish has headlights built in behind its eyes that can be used to find food and attract mates.

And when not in use, they can actually be rolled up inside the head, much like Lamborghini headlights.

This fish actually has high beams.

And this fish is one of my favourites, it has 3 headlights on each side of its head.

Now, this is blue, which is the most abundant bioluminescent color in the ocean. This is because evolution chose the color that travels the farthest in water to optimize communication.

That is, most animals emit blue light, most animals can only see blue light, but this fish is a very interesting exception. This is because they have two red light organs.

And I don't understand why there are two. I hope to solve it someday. But it can see not only blue light, but also red light.

So you can use the red bioluminescence like a sniper's scope to sneak up on animals that can't see red light and see them without being detected.

Also here is a small barbell with a blue glowing lure that can be used to attract prey from a distance.

And many animals will use its bioluminescence as a lure.

This is also one of my favorite fish.

This is a copperhead, a long fishing rod with a lure at the end that arches in front of the toothed jaws that give it its name.

The teeth of this fish are so long that if the teeth were to close inside the fish's mouth, it would actually pierce its own brain.

Instead, it slides through grooves on the outside of the head.

This is a fish Christmas tree. Everything about this fish lights up, it's not just the lure.

It has a built-in flashlight.

It has a jewel-like light organ in its abdomen that it uses for a kind of camouflage that obscures its own shadow, making itself invisible to predators looking up from below as it swims about.

There is a light organ in the mouth, and light organs in all the scales, fins, mucus layer on the back and abdomen, all of which are used for different purposes. Some of them we know, some of them we don't.

Thanks to Pixar, we are learning more about bioluminescence and I am so grateful to Pixar for sharing a topic I love so much with so many people.

I wish they had the budget to spend just a little more money to pay a poor, starving graduate student a consulting fee to tell them, "That's a fish eye in formalin."

This is the eye of a live monkfish.

There, she carries a lure that sticks out in front of a live mousetrap with needle-sharp teeth to attract unsuspecting prey.

And this comes with lures that have all sorts of little interesting threads on them.

It was thought that the different lure shapes were to attract different types of prey, but an analysis of the stomach contents of these fish, done by scientists, or perhaps graduate students, revealed that they all ate pretty much the same.

Therefore, in the anglerfish world, differences in lure shape are believed to be how males perceive females. This is because most male anglerfish are so-called dwarf males.

This little man has no visible means of subsistence.

He has no temptation to draw food to him, and he has no teeth to eat when food comes to it.

His only hope on this earth is to live as a gigolo. (Laughter) He has to find out he's a baby, and then he has to hang on for the rest of his life.

So this little guy has found himself this babe, and you'll find that he has the decency to cling to himself in a way that doesn't actually require you to look at her.

(Laughs) But he still knows it's good to see it, so he seals the relationship with an eternal kiss.

His body merges with hers, her bloodstream grows into him, and he's just a tiny sperm sac.

(Laughs) Well, this is the deep-sea version of women's ribs.

She always knows where he is, and some of these females may bring more than one male, so they don't have to be monogamous.

As such, they can use it to find food and attract allies.

They often use it in a variety of ways for defense.

Many of them can release luciferin or luferase into the water, much like squid and octopuses release clouds of ink.

The shrimp actually spits light out of its mouth like a fire-breathing dragon to blind and distract the viper, allowing it to escape into the darkness.

And there are many different animals that can do this. There are jellyfish, squid, various crustaceans and even fish that can do this.

This fish is called the Shining Tube Shoulder because it actually has a tube on its shoulder that shoots light.

And I was lucky enough to catch one of these during a trawl expedition to the depths of the 'Blue Planet' off the northwest coast of Africa.

And we were able to raise these animals alive using special trawl nets.

So I captured one of them and brought it into the lab.

So I'm holding it and trying to touch that tube on its shoulder. Then you will see bioluminescence coming out.

But what's shocking to me is not just the amount of light, but the fact that it's not just luciferin and luciferase.

For this fish, it's actually the entire cell, including the nucleus and membrane.

It would be very costly energetically for this fish to do this, but I don't know why it would do such a thing. This is also one of the big mysteries that needs to be solved.

Now, another form of defense is called a burglar alarm. It's the same reason you have a security alarm in your car. Horns and flashing lights are intended to attract the attention of the police who will come and take the thief away. When an animal is caught in the hands of a predator, the animal's only hope for escape may be to attract the attention of something larger and more nasty to attack the attacker, thereby giving the animal a chance to escape.

For example, this jellyfish exhibits spectacular bioluminescence.

This is where we are chasing in our submersible.

It is not luminescence, but reflected light from the gonads.

It can be captured with a very special device on the front of the submarine, pulled up in true condition and brought to the onboard laboratory.

And to generate the display you're about to see, all I did was touch the neural ring once a second with a sharp pick, like the sharp teeth of a fish.

And once this display wakes up, there's nothing more to touch.

This is an incredible light show.

It's this windmill of light, and I calculated that it could be seen from as much as 300 feet away by a predator.

And I thought, "That could actually be a pretty good lure."

Because one of the things that annoys me as a deep-sea explorer is how many animals there are probably ignorant about it because of the way we explore the ocean.

The main way to find out what lives in the sea is to go outside and cast a net behind a boat.

And I can't name any other scientific field that still relies on hundreds of years old technology.

Another primary method is submerging in submersibles and remotely operated vehicles.

I have done hundreds of dives in submersibles.

But sitting in a submersible, I know I'm not all that obscure. I have bright lights and loud thrusters, and any sentient animals are long gone.

So for a long time I wanted to find another way to explore.

So, some time ago, I had an idea for a camera system.

It's not exactly rocket science. We call this "Eye-in-the-Sea".

And scientists have been doing this on land for years. Just use a color that animals can't see and use a camera that can recognize that color.

Infrared rays cannot be used in the sea.

I use far-red light, but even this is problematic because it is quickly absorbed.

I wanted to make this electronic jellyfish and made an enhanced camera.

In science, you basically have to tell the funding agency what you're going to discover before you get funding.

And I didn't know what I was going to find either, so I couldn't get the funding for this.

So I put this together and had the Harvey Mudd Engineering Clinic do it, first as an undergraduate project, and then funded from various sources.

The Monterey Bay Aquarium Laboratory gave me time to test the ROV. Then we could figure out, for example, what color red light we had to use so that we could see animals but they couldn't see us. This is to make the electronic jellyfish work.

We cast these 16 blue LEDs in epoxy and you can see that the word Ziploc is still on the epoxy mold used.

Needless to say, put together like this, there were a lot of trials and tribulations before this worked.

But the moment came when everything came together and everything was fine.

And amazingly, the moment was captured on film by photographer Mark Richards.

On the left is me, Erica Raymond, a graduate student at the time, and Lee Frye, an engineer on the project.

And this photo is posted in a place of honor in our lab with the caption, "Engineer satisfying two women at once." (laughs) And we were very, very happy.

Now you have a system that can actually take you to places like submarine oases where large predators might be patrolling.

So, I took him to this salt water pool in the northern part of the Gulf of Mexico.

It's a magical place.

And I know this image doesn't look like anything to you. We had a poor camera at the time, but I was overjoyed.

We're at the edge of a saltwater pool, and there's a fish swimming towards the camera.

It's clearly not encumbered by us.

And I had a window facing deep water.

For the first time we could see what the animals were doing down there when we weren't disturbing them in any way below.

Four hours after installation, we programmed the electronic jellyfish to light up for the first time.

We recorded this 86 seconds after the windmill appeared. This squid is over 6 feet long and is very new to science and cannot be classified into any known scientific family.

No other proof of concept is better than this.

Based on this, I went back to the National Science Foundation and said, "Here's what we'll find out."

And they gave me enough money to do it right. That included developing the world's first deep-sea webcam. This has been installed in Monterey Canyon for the past year. And more recently, with the modular form of this system, it is much easier to launch and retrieve, and in a more mobile form. I hope I can use this in Sylvia's 'Places of Hope' to help explore and protect these areas, and for me to learn more about the bioluminescence of these 'Places of Hope'.

One of the key messages here is that the ocean still has a lot to explore.

And Sylvia is right when she says we're destroying the oceans before we know what's in them.

So if you ever get the chance to dive in a submersible, say yes a thousand times and turn off the lights.

We think you will love it.

thank you.

(applause)

good morning.

I am happy to meet so many wonderful people and many smiles.

I'm a magician, so I have a very particular background, attitude, and approach to the real world.

Now I prefer that word to magician. Because if I were a magician, I would use spells and spells and strange gestures to accomplish real magic.

No, I won't. I am a magician, someone who pretends to be a real magician. (Laughter) Now, how do you do something like that?

We rely on the fact that viewers like you make a guess.

For example, when I came here and took the mic out of the stand and switched it on, you thought this was the mic, but it's not.

(Laughter) Actually, this is something that about half, more than half of you are unfamiliar with.

Are you a beard trimmer?

And it makes for a very bad mic. I have tried many times. (Laughter) Another assumption you made, and this little lesson is to show that you make assumptions.

Not only can you, but you can do so when properly suggested.

You believe I'm watching you

error. I'm not looking at you i can't see you.

I know you're there, they told me backstage, it's packed, etc.

I know they are there because I can hear their voices, but I usually wear glasses so I can't see them.

This is an empty frame, not glasses. (Laughs) It's a pretty empty frame.

Now, why would an adult appear in front of you with an empty frame over his face?

Ladies and gentlemen, to deceive you, to deceive you, to show that you too can make assumptions.

Never forget it.

Well I have to do something. First, you can switch to real glasses so they can really see you. This is probably convenient. don't know.

I didn't look closely. Well, not so convenient.

(Laughter) As a magician, it seems a little strange, but now I have to do something.

But I will take medicine.

This is a full bottle of Calms Forte.

More on that later.

Ignore the instructions, that's what the government has to put in there to confuse you, I'm sure.

Take enough of these. Mmm.

Exactly the whole container.

Calms Forte 32 Tablets.

Now that I've done that, I have to tell you that I'm an actor.

I am an actor playing a specific role.

I play the role of a magician, a wizard, a real wizard, if you will.

If someone were to appear on this stage in front of me and claim to be in fact an ancient Danish prince named Hamlet, you would be insulted and rightly so.

Why would men think you believe such strange things?

However, there are so many people out there who claim to have psychic or magical powers that allow them to see the future and contact the dead.

Oh, they also sell astrology and other divination methods.

Oh they are happy to sell it, yes.

They also say that they can provide perpetual motion machines and free energy systems.

They will do whatever they can to claim that they are psychic or susceptible.

But the business of talking to the dead has just recently made a big comeback.

Now, to my pure heart, dead means no communication. (Laughter.) You might agree with me on that.

However, these people tend to say that not only can they say hello to the dead, but they can also hear the voice of the dead and pass that information on to the living.

I wonder if it's true

I do not think so. Because people in this subculture use the exact same gimmicks, the exact same, the same physical methods, the same psychological methods as us magicians, effectively and deeply deceiving millions of people around the planet, to their detriment.

They deceive these people, cost them a lot of money, and cause them a lot of emotional pain.

Billions of dollars are spent on these scammers worldwide every year.

Now, I have a couple of questions I'd like to ask them if given the chance.

First question: If you want to ask them to call you, because they hear them through their ears.

They hear the voice of the spirit in this way. I will call on my grandmother's spirit. Because my grandmother had the family will and will hidden somewhere when she died. We don't know where it is, so we ask Grandma, "Where's the suicide note, Grandma?"

what does grandma say? She says, "I'm in heaven, it's great.

I am here with old friends, deceased friends, family and all the puppies and kittens I had when I was little.

And I love you and I will always be with you.

good bye. "

And she didn't answer that damn question!

where is the will?

Now, she could easily say, "Oh, it's on the second shelf in the library, behind the encyclopedia," but she doesn't. No, it's not.

She brings us no useful information.

We paid a lot of money for that information, even though we didn't get it.

The second question is a fairly simple one. For example, let's say you asked to contact the spirit of your deceased father-in-law.

Why do they insist on saying -- remember, they speak into this ear -- why do they say "Does my name start with J or M?"

Is this a hunting game?

hunting and fishing? what is that?

About 20 questions? No, it's about 120 questions.

But that's the cruel, vicious, completely unscrupulous game these people play - I'm fine, keep your seat (laughs) - the game.

And they take advantage of the innocent, the naive, the grieving, the needy.

Now, this is a process called cold reading.

There's a fellow there, Van Praag, whose name is James Van Praag.

He's the first person to do this sort of thing.

John Edward, Sylvia Brown, Rosemary Altair, they are the other operators.

There are hundreds of them on Earth, but in this country, James Van Praag is a very big presence.

and what is he doing? He likes to tell stories about how the deceased died and people talking through their ears.

So what he says very often is something like this: "He told me before he died that he was having trouble breathing."

That's what death is all about, folks!

(Laughter) If you stop breathing, you die.

It's that simple.

And is that the kind of information they will bring back to you?

i don't think so.

Now, these people will make a guess and say something like, "Why am I getting electricity?"

He says "electricity" to me. Was he an electrician? ""no."

"Did he ever have an electric razor?"

It was such a question-hunting game.

This is what they experience.

Now, people at the James Randy Education Foundation often call us and ask, "Mr. Randy, why are you so worried about this?"

It's just so much fun, isn't it? ”

No, it's not fun. It's a cruel farce.

Now, it might bring some comfort, but that comfort only lasts about 20 minutes or so.

And people look in the mirror and say, "I just paid for that reading."

And what did she say to me? He always says "I love you!"

They get no information and get no value for the money spent.

Today, Sylvia Brown is the big business owner.

We call her "The Talons".

Sylvia Brown -- Thank you -- Sylvia Brown is the leading executive in this field at the moment.

Well, Sylvia Brown, just to show you, she actually got $700 for 20 minutes of reading on the phone. She doesn't even go see her in person. Since she booked ahead of that time, she has to wait up to two years.

Pay with a credit card or something and she will call you within 2 years.

I know it's her. "Hello, I'm Sylvia Brown."

That's her, you'll know right away.

Now, Montell Williams is an intelligent man.

We all know who he is on TV.

He's well-educated, smart, knows what Sylvia Brown is doing, but doesn't care.

he just doesn't care

Because, the bottom line is, the sponsor likes it and he will always expose her to TV publicity.

So what does Sylvia Brown give you for that $700?

She will give you the name of your guardian angel first.

Now, how could we function without it? (Laughter) She can tell you your previous life name, who you were in your previous life.

like.

It turned out that all the women she gave readings to were Babylonian princesses or something like that.

And the men were all Greek warriors who fought against Agamemnon.

Nothing is said about Bootblanc, 14, who died of alcohol on the streets of London.

He's clearly not worth bringing back.

And strangely, you guys may have noticed this too.

You see people like this on TV and they never bring anyone back from hell. (Laughter) Everyone comes back from Heaven, but never from Hell.

If they called my friend back, they wouldn't... well, I get the point.

(Laughter) Now, Sylvia Brown is an exception, and in some ways an exception. Because my foundation, the James Randy Educational Foundation, offers a $1 million award in transferable bonds.

I won very simply.

All you have to do is prove any kind of paranormal, occult or supernatural event or force under proper viewing conditions.

It's that easy, win a million dollars.

Sylvia Brown is an exception in that she is the only professional psychic in the entire world who has accepted our challenge.

She did this six and a half years ago on CNN's "Larry King Live" show.

I haven't heard from her since. strange.

She said, first of all, she didn't know how to contact me.

like.

A professional psychic who talks to dead people, is she out of touch with me?

(Laughter) As you may have noticed, I am alive.

Well, it's going pretty well anyway.

She couldn't reach me. Now she says she doesn't want to contact me because she doesn't believe in God.

Don't you think that's why you're getting a million bucks, Sylvia?

Now is the time to seriously stop people like this.

This is a cruel farce and needs to be stopped.

People come to our foundation all the time.

They are ruined financially and spiritually because they gave their money and faith to these people.

Well, I just took a pill.

I have to explain it to you.

Homeopathy, let's find out what it is all about.

Hmm. You've heard it.

It's just another form of healing, right?

Homeopathy is actually made up - this is it.

This is Calms Forte, 32 caplets of sleeping pills! i forgot to say that.

I've just taken six and a half days of sleeping pills.

(Laughter) Six and a half days, that's certainly a lethal dose.

It has the number 800 on the back and says, "In case of overdose, call Poison Control Center immediately."

Hold your seat -- it's okay.

I've been doing this stunt for audiences around the world for the past 8-10 years while taking lethal doses of homeopathic sleeping pills, so I really don't need it.

Why don't they affect me?

(Laughter.) (Applause.) The answer might surprise you.

What is Homeopathy?

Take a drug that really works and dilute it far beyond Avogadro's limits.

It will be diluted until there is nothing left. (Laughter.) Guys, this is not just a metaphor I'm about to tell you, it's real.

This is exactly the same as taking one 325 milligram aspirin tablet, throwing it in the middle of Lake Tahoe, stirring it with an obviously very large stick, and waiting a couple of years for the solution to become homogeneous.

Then take a sip of this water when you have a headache and voila. --It's gone.

(laughs) It's true. That's what homeopathy is all about.

And another claim they make, which you'll love, is that the thinner the potion, the more potent it is.

Hold on, I heard about a guy in Florida.

Unfortunately he was on homeopathic remedies.

He died of an overdose.

He forgot to take his medicine.

(laughs) Good luck. Work on it.

It's outrageous. It's utterly ridiculous.

I don't know what we're doing for years believing this kind of nonsense.

Now, let me tell you, the James Randy Educational Foundation is waving this very big carrot, but I have to say that the fact that no one is responding to this offer does not mean that power does not exist.

Maybe it's somewhere else.

Perhaps these people are just independently wealthy.

Well, Sylvia Brown would think so.

20 minutes of phone reading costs $700. This is more than a lawyer's income.

I mean, that's a lot of money.

These people probably don't need a million bucks, but wouldn't you rather take it just to make me look stupid?

To get rid of this godless man that Sylvia Browne always talks about?

I think something needs to be done about this.

We welcome your suggestions on how to contact federal, state and local governments to get them to do something.

If you knew it—now you know it.

Even today, we see people talking about the AIDS epidemic, children starving all over the world, and impure water supplies that people need to suffer.

These are very important to us and very important.

And we have to do something about those problems.

But at the same time, as Arthur C. Clarke said, about the corruption of the human spirit, the paranormal and the occult, the work of believing in the supernatural, all this sheer nonsense, this medieval thinking, I think something should be done, and it's all in education.

The media are largely to blame for this type of incident.

They shamelessly promote this kind of nonsense just because it pleases their sponsors.

That's the bottom line, the dollar line.

that's what they see.

Something really has to be done about this.

We are happy to accept your suggestions and invite you to visit our web page.

www.randi.org.

If you go in there and look at the archives, you'll understand more of what I said today.

You will see the records we hold.

There's nothing better than sitting in that library and having your family show up and tell you that your mom donated all the family fortune.

She redeemed CDs and handed out shares and certificates.

It's really sad to hear that and it didn't do them any good and didn't solve any problems.

Indeed, if we don't start thinking wisely about these things, the psyche of the American people—and the psyche of the planet as a whole—can rot.

Well, we held out this carrot, as I say, we hung the carrot.

We are waiting for a psychic to appear and attack it.

Oh we get a lot of them, hundreds of them coming each year.

These are dowsers, people who think they can talk to the dead, but they are amateurs. They do not know how to assess their so-called power.

Experts never approach us, except in the case of Sylvia Brown, whom I spoke about earlier.

She accepted, but then backed off.

Ladies and gentlemen, I'm James Randy, and I'm waiting for you.

thank you.

(applause)

The greatest irony in global health is that the poorest countries bear the greatest burden of disease.

If we resize the countries of the globe in proportion to our subject of interest, we find that sub-Saharan Africa is the region most affected by HIV/AIDS.

This is the most devastating epidemic of our time.

We also find that this region has the lowest capacity to cope with the disease.

There are very few doctors and, frankly, these countries do not have the necessary resources to deal with such epidemics.

So what the Western countries, the developed countries, have generously done is that they have actually offered to provide the drugs for free to all people in third world countries who cannot afford these drugs.

And this has already saved millions of lives and prevented an entire economy from collapsing in sub-Saharan Africa.

But there are underlying problems that undermine efforts to fight the disease. Continuing to distribute drugs to people without diagnostic services will eventually lead to drug resistance problems.

This is already happening in sub-Saharan Africa.

The problem is that what started as a tragedy in the Third World can easily become a global problem.

And the last thing we want is the emergence of drug-resistant strains of HIV around the world. Because it not only makes treatment more expensive, but it also has the potential to resurrect the HIV/AIDS carnage of pre-ARV.

I experienced this first hand as a high school student in Uganda.

This was at the peak of the 90s HIV epidemic and before the existence of ARVs in sub-Saharan Africa.

And during that time, I actually lost not only my teacher, but many more relatives to HIV/AIDS.

So helping people find real solutions that can address these kinds of problems has become one of the driving forces in my life.

Everyone knows about the miracle of miniaturization.

Once upon a time, this whole room was filled with computers, and people actually worked inside the computers.

But what the miniaturization of electronics has done is that it has allowed people to miniaturize technology into mobile phones.

And I think everyone here enjoys having a cell phone that actually works in the remotest parts of the world and in third world countries.

The good news is that the same technologies that made electronics smaller are now making biological laboratories smaller.

Therefore, biological and chemical laboratories can now be practically miniaturized on microfluidic chips.

I came to the US right out of high school and was very fortunate to be able to work on this technology and develop some devices.

This is a microfluidic chip I developed.

Let's take a closer look at how this technology works. These channels are about the size of a human hair and integrate valves, pumps, mixers and injectors, allowing the entire diagnostic experiment to be adapted to microfluidic systems.

So what I'm trying to do with this technology is actually take the current state of this technology and build an HIV kit in a microfluidic system.

So one microfluidic chip the size of an iPhone can actually diagnose 100 patients simultaneously.

For each patient, you will be able to run up to 100 different viral loads per patient.

And this will be done in just 4 hours, 50x faster than current state-of-the-art technology, and 5-500x cheaper than current options.

Therefore, this allows us to create personalized medicines in the third world at a cost that is actually achievable, making the world a safer place.

We appreciate your interest and your participation in helping us bring this vision closer to reality.

thank you very much.

(applause)

A few years ago here at TED, Peter Skillman introduced a design challenge called the Marshmallow Challenge.

The idea is very simple. A team of four must build the tallest free-standing structure using 20 spaghetti sticks, 1 yard of tape, 1 yard of string, and marshmallows.

Marshmallow should be on top.

And while this seems like a very easy thing to do, it's actually very difficult because people have to collaborate very quickly.

So, I thought this was an interesting idea and tried to incorporate it into my design workshop.

And it was a huge success.

Since then, I have conducted nearly 70 design workshops around the world with students, designers, architects and even Fortune 50 CTOs. There is something in this exercise that reveals a very deep lesson about the nature of collaboration. I would like to share some of them with you.

So usually most people start by orienting themselves to the task.

They talk about it, figure out what it will be like, and vie for power.

Then take the time to plan, organize, sketch, and lay out the spaghetti.

They spend most of their time building sticks and building ever-growing structures.

And finally, just as time was running out, someone took out a marshmallow, carefully placed it on top, then stood back, and—wow! -- They admire their work.

But what really happens is that most of the time, the weight of the marshmallow bends and collapses the whole structure, so "tada" turns into "umm."

So there are a lot of people out there who have a lot more "uh-oh" moments than most people, and the worst of them are people fresh out of business school.

(Laughter.) They lie, they cheat, they distract, they create really lame structures.

And, of course, there are teams with a more "free" structure, the best of which is the kindergarten freshman team.

(Laughter) And that's pretty cool.

As Peter tells us, not only do they yield the tallest structures, but they are the most interesting of them all.

So what you want to ask is, "Why?" why? what about them?

And Peter likes to say that no kid spends his time trying to be CEO of Spaghetti.

They don't spend their time fighting for power.

But there is another reason too.

The reason is that business students are trained to find a single good plan, right?

And they do it.

And what happens when you put the marshmallow on top and the time runs out?

It's a crisis.

Sound familiar? right.

The difference is that kindergarteners start with a marshmallow and make prototypes, then prototype after prototype, always putting the marshmallow on top, so they have to make many revisions along the way.

Designers recognize that this kind of collaboration is the nature of an iterative process.

And with each version, kids get instant feedback on what works and what doesn't.

So while the ability to play prototypes is very important, let's see how different teams perform.

So the average for most people is about 20 inches. About half of them are business school students. Lawyers are a little better, but not better than that. Kindergarteners are better than most adults.

who does it best?

Thank you architects and engineers.

(Laughter) 39 inches is the tallest structure I've seen.

Why? Because they understand that triangles and self-reinforcing geometric patterns are key to building stable structures.

CEOs are a little better than average, but that's where it gets interesting.

If yes, include the running administrator. In teams, they improve significantly.

(Laughs) That's amazing. I look around and think, "Oh, that team is going to win."

Just let us know in advance. why?

Because they have a special skill of facilitation.

They control the process and they understand the process.

And a team that manages and meticulously manages their work greatly improves team performance.

A combination of professional and facilitation skills leads to great success.

If you have 10 teams performing normally, there will be about 6 teams with a standing structure.

And then I tried something interesting.

I thought I'd raise the price once.

So I offered the winning team a $10,000 software prize.

So what do you think happened to these design students?

What were the results?

What happened was that none of the teams had a standing structure.

If someone had built, say, a 1-inch structure, they would have taken home the bounty.

So isn't it fun? Its high stakes have a strong impact.

I did another exercise with the same students.

What do you think happened then?

So they came to understand the value of prototyping.

So the same team grew from the worst to the best.

They built the tallest structures in the least amount of time.

So there are deep lessons for us about the nature of incentives and success.

So you may be wondering why anyone would actually spend the time writing the Marshmallow Challenge.

That's because I help my team create the digital tools and processes that help build cars, video games, and visual effects.

The Marshmallow Challenge helps you identify hidden assumptions.

Because, frankly, every project has its own marshmallow.

This challenge provides a shared experience, common language, and common stance for building good prototypes.

This is the value of the experience of this very simple exercise.

Interested parties should visit MarshmallowChallenge.com.

A blog about how to make marshmallows.

There is a step-by-step explanation for this.

There are crazy examples of how people tweak and tune systems all over the world.

There is also a world record for this.

And I believe the basic lesson is that design is truly a contact sport.

This requires us to use all five senses to tackle the task, and to do our best in thinking, feeling, and acting to tackle the task at hand.

And sometimes this small prototype of experience is all it takes to move us from an 'eh' moment to a 'tada' moment.

And it can make a big difference.

thank you very much.

(applause)

One of the things that defines TEDster is that he took his passion and turned it into a stewardship responsibility.

Take real action on the issues you care about.

Ultimately, though, it turns out that you may need to get help from an elected official.

So how do you do that?

One thing I probably have to tell you is that I worked for the Discovery Channel early in my career, and that skewed my frame.

So when you start thinking about politicians, you have to realize that they are strange creatures.

Aside from the fact that they can't tell directions and that they have very strange breeding habits, how do they actually go about these things? (Laughter) What we need to understand is what drives political existence.

And there are two things that matter most to politicians. One is reputation and influence.

These are the primary tools politicians use to get their jobs done.

The second is self-preservation, unlike most animals, which is species survival.

Now you might think it's money, but really it's kind of a proxy for what I can do to keep myself.

Now, the challenge in moving forward is that these animals are always on the air.

So what's going wrong in getting your problems to matter?

You can send e-mail.

Unfortunately, I got a lot of Viagra ads, so the email disappeared.

It doesn't matter, it's spam.

What if I answer the phone?

Well, maybe a droid answered the phone and said, "Yes, they called me. They said they didn't like it."

it doesn't move.

Face-to-face might work, but it's hard to set it up.

It's hard to get context and actually make communication work.

Sure, contributions really make a difference and set the context for having conversations, but it takes time to build it.

So what actually works?

And the answer is a rather strange one.

it's a letter.

We live in a digital world, but we are pretty analog creatures.

Letters really work.

Top dog himself spends his time reading 10 letters each day, selected by the staff.

I can say that every official I have ever worked with will tell me about the letters they received and their implications.

So how are you going to write the letter?

First, pick up an analog device, a pen.

I know these are hard, and you might have a hard time bending over (laughs), but this is actually important.

And it's important to actually handwrite the letter.

It's so novel to see someone actually pick up an analogue piece of equipment and write to me.

Second, I encourage you to take a positive stance and write to an elected official at least once a month.

This is my promise to you. If you do this consistently, within three months elected officials will start calling you when the issue comes up and asking, "What do you think?"

Here are four paragraph formats to work with.

Now, when approaching these animals, you need to understand that they have a dangerous end and approach them with a certain amount of respect and a little bit of caution.

So what I want to tell you in paragraph 1 is very simply this. "You thank them."

You may not be grateful to the person, or you may be grateful for other things, but perhaps you are grateful for the fact that the person has a hard job.

When an animal tries to make a claim, make a claim.

They don't spend much time messing around.

Well then, please. (laughter) Paragraph 2: Actually, you may need to be very straight forward and say what you really mean.

Do not attack people at this time. You attack tactics.

Adhominem attacks are useless.

Paragraph 3: Animals will fight to the death when attacked or cornered, so you must give them a way out.

Most of the time, if you have an exit strategy, you should adopt it.

"Sure, you are smart.

If you had the right information, you would have done the right thing. (laughs) Finally, you want to be a training agent.

You are a safe place to come.

So in paragraph 4, you're telling people, "If no one can provide this information, I can help." (Laughter) The animals will have an exhibition. they do two things. One is to warn you or the other is to pull you in and say, "I need to mate."

You will do it by the way you sign the letter.

You're vice president, you're a volunteer, you're doing other things, and so on.

Why is this important?

Because it establishes two main criteria for political creatures. It means that you have far-reaching influence, and that my safety depends on you.

Here's one very easy hack, especially for federal officials in the audience.

Here's how to mail a letter.

First, mail the original to the ward office.

Therefore, send a copy to the head office.

If they're following the procedure, they'll pick up the phone and say, "Hey, do you have the original?"

Then the droid behind puts your name on the tickle and says, "Oh, this is an important letter."

And you actually get into folders that elected officials actually have to read.

So here's what your letter means. Let me tell you, we are all party members and political players are piñatas.

(Laughter.) We are taunted, preached, sold, and pitched, but letters are actually one of the few occasions when we can honestly communicate.

I received this letter when I was first elected, and I still carry it with me every time I go to Congress.

This is an opportunity for true dialogue, and if you are in control and want to communicate, that dialogue is incredibly powerful.

Then I promise you'll be an 800 lb gorilla in the woods.

Let's write.

(applause)

As someone who's spent his entire career trying to be invisible, being in front of an audience is somewhere between an astral projection and a deer caught in headlights. So please forgive me for violating one of TED's commandments by relying on words on paper. And I just hope I don't get struck by lightning before it's over.

First, I would like to talk about some of the ideas that motivated me to become a documentary photographer.

I was a student in the 60s, a time of social upheaval and question, and a sense of idealism awakening on a personal level.

The Vietnam War was raging. The civil rights movement was underway. And photography had a big impact on me.

Our political and military leaders have told us one thing, but our photographers have told us another.

I believed the photographer, and so did millions of other Americans.

Their image fueled resistance to war and racism.

They didn't just record history. They helped change the course of history.

Their pictures became part of our collective consciousness, and as consciousness evolved into shared conscience, change became not only possible, but inevitable.

I have seen that the free flow of information represented by journalism, especially visual journalism, can focus on both the benefits and the costs of political policy.

You can celebrate sound decision making and add momentum to your successes.

When faced with poor political judgment or political inaction, it becomes a form of intervention, assessing the damage and asking us to re-evaluate our actions.

From a distance, the human face is put on abstract, ideological, or monumental issues of global impact.

What happens on the ground, far from the halls of power, continues to happen to ordinary citizens.

And I realized that documentary photography has the ability to interpret events from their perspective.

It gives a voice to those who otherwise could not have a voice.

And the repercussions are that by stoking public opinion and fueling public debate, stakeholders will be unable to control the agenda as fully as they would like.

Adults of the time brought to life the notion that the free flow of information was absolutely essential for the proper functioning of a free and dynamic society.

News outlets are indeed a business, and they must be successful in order to survive, but they must find the right balance between marketing considerations and journalistic responsibilities.

A social problem cannot be solved until it is identified.

At a higher level, the press is a service industry and the service they provide is awareness.

Not every story has to sell something.

It is time to give.

It was a tradition I wanted to keep.

Witnessing war poses an incredible amount of risk for all involved, and I learned that visual journalism can actually be a factor in conflict resolution. I wanted to be a photographer to become a war photographer.

But I was driven by an innate sense that photographs that revealed the true nature of war would almost inevitably be anti-war photographs.

I would like to take you on a visual journey through some of the events and issues I have been involved with over the past 25 years.

In 1981 I went to Northern Ireland.

Ten IRA prisoners were starving to death in protest at prison conditions.

The reaction in the streets was violent confrontation.

I have seen that the front lines of modern warfare are not isolated battlefields, but where people live.

In the early 80s, I spent a lot of time in Central America, embroiled in a civil war that spanned the ideological divisions of the Cold War era.

In Guatemala, the central government, ruled by an oligarchic European minority, was conducting a scorched-earth tactic against indigenous rebellion. There, I saw an image that reflected the history of Latin America, of conquest by a combination of the Bible and the sword.

An anti-Sandinista guerrilla is mortally wounded when Commander Zero attacks a town in southern Nicaragua.

A destroyed tank belonging to the National Guard of Somoza was left as a memorial in a park in Managua, reborn by the energy and spirit of a child.

Around the same time, civil war broke out in El Salvador, and civilians were again drawn into the conflict.

I have been covering the Palestinian-Israeli conflict since 1981.

This was the opening moment of the Second Intifada in 2000, when stones and Molotov cocktails still existed against the military.

In 2001, riots escalated into armed conflict, one of the major incidents being the destruction of a Palestinian refugee camp in the West Bank town of Jenin.

Without the political will to find common ground, the ongoing friction between tactics and counter-tactics will only breed suspicion, hatred and revenge, perpetuating the cycle of violence.

In the 1990s, after the collapse of the Soviet Union, Yugoslavia split along ethnic fault lines and civil wars broke out between Bosnia, Croatia and Serbia.

This is the scene of the battle of Mostar house against house, neighbor against neighbor.

The bedroom, a place where people share intimacy and where life itself takes place, has become a battlefield.

A mosque in northern Bosnia was destroyed by Serbian artillery shelling and used as a temporary morgue.

Dead Serb soldiers were collected after the battle and used as a barter for prisoners of war and returning Bosnian soldiers killed in action.

This used to be a park.

The Bosnian soldier who guided me said that all my friends were already there.

Around the same time in South Africa, the black population began the final stages of liberation from apartheid following the release of Nelson Mandela.

One of the things I had to learn as a journalist was what to do with my anger.

I had to use it, channel that energy, and turn it into something that clarified rather than clouded my vision.

In Transkei, I witnessed a Xhosa rite of passage into adulthood.

Teenage boys lived in isolation, covered in white clay.

After a few weeks, they washed off the white dirt and took on all the responsibilities of being men.

It was a very old ceremony that symbolized the political struggle that was changing the face of South Africa.

Children in Soweto play on a trampoline.

Elsewhere in Africa there was famine.

In Somalia, the central government collapsed and war broke out between clans.

Farmers were displaced, crops and livestock destroyed or stolen.

Hunger has been used as a weapon of mass destruction, primitive but highly effective.

Hundreds of thousands of people were slowly and painfully exterminated.

The international community responded with massive humanitarian relief, saving hundreds of thousands more lives.

American troops were sent to guard relief supplies, but were eventually embroiled in conflict and withdrew after the tragic fighting in Mogadishu.

Another civil war broke out in southern Sudan, similarly using starvation as a tool of genocide.

Here too, international NGOs united under the umbrella of the United Nations to carry out massive relief efforts, saving thousands of lives.

I am a witness and want my testimony to be honest and uncensored.

I also want my photos to be powerful and eloquent, and to represent the experience of the people taking them as accurately as possible.

This man was in an NGO feeding center and was getting all the help he could get.

He literally had nothing. He was a skeleton in effect, but he still had the courage and will to move.

He hadn't given up, and if he hadn't, who in the outside world could dream of losing hope?

In 1994, after three months of covering the South African elections, I watched Nelson Mandela's inauguration and it was the most uplifting sight I have ever seen.

It embodied the best that mankind could offer.

The next day, I left for Rwanda, feeling like I was going to hell on the express elevator.

This man had just been released from a Hutu death camp.

He let me take pictures for quite some time, but also turned his face to the light as if he wanted me to take a closer look.

I think he knew what the scars on his face would tell the world.

This time, embarrassed or dismayed by the military disaster in Somalia, the international community has remained silent, and somewhere around 800,000 people have been massacred by their own countrymen and sometimes neighbors, using agricultural implements as weapons.

Perhaps because lessons were learned from Serbia's weak response to the Bosnian war and its failure in Rwanda when Serbia attacked Kosovo, international action was taken much more decisively.

NATO forces advanced and Serbian forces retreated.

Albanians were killed, farms destroyed and vast numbers deported.

They were accepted into refugee camps set up by Albanian and Macedonian NGOs.

Traces of a man burned at home.

The image reminded me of cave paintings and reflected how primitive we are still in many ways.

In 1995-96 I covered the first two wars in Chechnya from inside Grozny.

This man is a Chechen rebel who is on the front lines with the Russian army.

Russian forces bombarded Grozny incessantly for several weeks, killing mostly civilians still trapped inside.

Found a boy from a local orphanage wandering on the front lines.

My work has moved from being primarily about war to also focusing on important social issues.

After the fall of Ceausescu, I went to Romania and discovered a kind of children's camp where thousands of orphans were held in medieval settings.

Ceausescu imposed a quota on the number of children each family would bear, thereby making the female body an instrument of national economic policy.

Children not supported by families were raised in government orphanages.

Children with birth defects were declared incurable and confined to inhumane conditions for the rest of their lives.

As reports began to surface, international aid came in again.

Digging deeper into the legacy of Eastern European regimes, I spent several months working on a narrative about the effects of industrial pollution, where the environment and the health of workers and the general population were not considered.

At an aluminum plant in Czechoslovakia filled with carcinogenic smoke and dust, four out of five workers got cancer.

After the fall of the Suharto regime in Indonesia, I began to research the poverty situation in this modernizing country.

I lived on a railroad embankment with my family and spent a lot of time with a man who lost an arm and a leg in a train accident.

After the article was published, there was a flood of unsolicited donations.

A trust fund was established and the family now lives in a country house, with all basic necessities covered.

It was a story about not trying to sell anything.

Journalism provided a vehicle for communicating people's natural sense of generosity, and readers responded.

I met homeless children who came to Jakarta from the countryside and ended up living at the train station.

By the time they were 12 or 14, they had become beggars and drug addicts.

The rural poor became the urban poor, and in the process they became invisible.

Detox heroin addicts in Pakistan reminded me of Beckett's play, lonely, waiting in the dark, attracted to the light.

Agent Orange was a defoliant used during the Vietnam War to deny assistance to the Viet Cong and North Vietnamese forces.

The active ingredient was dioxin, a highly toxic chemical that was sprayed in large quantities, and its effects were passed on to the next generation through genes.

In 2000, I started documenting global health issues, initially focusing on AIDS in Africa.

I tried to tell stories through the work of caregivers.

I thought it was important to emphasize that people are being helped, whether it's by international NGOs or local grassroots organizations.

The plague has orphaned so many children, grandmothers have become surrogate parents, and many children have been born with HIV.

hospital in Zambia.

I began documenting the close relationship between HIV/AIDS and tuberculosis.

This is an MSF hospital in Cambodia.

My photography can play a role in supporting the work of NGOs by shedding light on the critical social issues they seek to address.

With MSF, I traveled to Congo to contribute to a book and exhibition focused on a forgotten war that killed millions and used untreated exposure to disease as a weapon.

Malnourished children measured as part of a nutritional supplementation programme.

In the fall of 2004 I went to Darfur.

This time I worked for a magazine, but again I worked closely with MSF.

The international community has yet to find a way to create the necessary pressure to stop this genocide.

An MSF hospital inside a displaced persons camp.

I have been working on a long project on crime and punishment in America.

This is the landscape of New Orleans.

A chain gang prisoner in Alabama was punished by being handcuffed to a pole in the midday sun.

This experience has raised many questions, including questions about race and equality, and who has the opportunities and choices in this country.

In a chain gang yard in Alabama.

Neither plane could be seen colliding. I looked out the window and saw the first tower on fire. I thought it might have been an accident.

A few minutes later, when we looked again and saw the second tower on fire, we knew we were at war.

In the midst of the wreckage of Ground Zero, I realized something.

Since 1981 I have been photographing not only in the Islamic world and the Middle East, but also in Africa, Asia and Europe.

At the time I was photographing these various locations, I thought I was covering separate stories, but 9/11 crystallized history and I found out that I had actually been covering one story for over 20 years, and the attack on New York was the latest manifestation.

Central commercial district of Kabul, Afghanistan. At the end of the civil war, just before the city fell into the hands of the Taliban.

Landmine victims receive assistance at the Red Cross Rehabilitation Center run by Alberto Cairo.

A boy who lost one leg due to a landmine left behind.

I have witnessed immeasurable suffering from political oppression, civil war, foreign invasion, poverty and hunger in the Muslim world.

I could see the Muslim world crying out in its agony. why didn't we listen?

Taliban fighters shot at Northern Alliance forces during the fighting as they entered the city of Kunduz.

When war with Iraq was imminent, American forces decided to cover the invasion from inside Baghdad, realizing that it would be well covered.

Several members of a family were killed when a mortar shell hit the marketplace.

The day after American troops entered Baghdad, a Marine company launched a roundup of bank robbers to the cheers of the crowd, but the hopeful moment did not last long.

For the first time in years, Shiites were allowed to make a pilgrimage to Karbala to observe the Ashura, and I was amazed at the sheer numbers and how enthusiastically they practiced their religion.

A group of men march through the city cutting themselves with knives.

It is clear that the Shiites are a force to be reckoned with and we would do well to understand them and learn how to deal with them.

Last year, I spent months documenting wounded soldiers returning home from the battlefields of Iraq.

This is a helicopter medic who administers cardiopulmonary resuscitation to a soldier who has been shot in the head.

Military medicine has become so efficient that the rate of wounded survivors in this war is much higher than in any other war in history.

The signature weapon of this war is the IED, and the signature wound is severe damage to the leg.

After enduring extreme pain and trauma, the injured face a grueling physical and mental struggle in rehabilitation.

The spirit they displayed was truly amazing.

I tried to imagine myself in their place and was completely humbled by their courage and determination in the face of such a devastating loss.

Good people were put in very bad circumstances for questionable results.

One day, during rehab, when someone started talking about surfing, people who had never surfed before said, "Let's go."

And they went surfing.

Photographers go to the extremes of human experience to show people what's going on.

Sometimes they risk their own lives because they believe that your opinion and influence matter.

They aim at your highest instincts, your generosity, your sense of right and wrong, your ability and willingness to identify with others, your refusal to accept the unacceptable.

My wish for TED: I have an important story to tell, and I hope TED will help me access it and devise innovative and exciting ways to use news photography in the digital age.

thank you very much.

(applause)

Like avid software engineers around the world, I follow Silicon Valley tech companies closely in much the same way that soccer fans follow European teams.

I read articles on tech blogs and listen to podcasts on my phone.

But when you finish reading the article, lock your phone, take off your headphones, and you're back in sub-Saharan Africa. There, the landscape is not quite the same.

There are long and frequent power outages, low computer penetration, slow internet connections, and many patients visiting understaffed hospitals.

Since the HIV epidemic, hospitals have struggled to manage regular HIV treatment records for an increasing number of patients.

In this environment, importing technical systems developed elsewhere did not work, but in 2006 I joined Baobab Health. Baobab Health is a team that employs locally based engineers to develop appropriate interventions to address medical challenges in Malawi.

We have designed an electronic medical record system for healthcare professionals to use during patient visits.

Along the way, I realized that I needed to not only design the software, but also implement the infrastructure.

Because we do not have enough medical staff to comprehensively examine all patients, we embedded clinical guidelines within the software to guide nurses and clerks who help handle some of the workload.

Everyone has a birthday, but not everyone knows their birthday, so I wrote an algorithm that treats an estimated birthday as a full date.

How do you follow up with a patient who lives in a slum with no street number?

I used landmarks to approximate the physical address.

Malawi did not have an ID that uniquely identified patients, so a unique patient ID had to be implemented to link patient records between clinics.

The ID is printed as a barcode on a label affixed to each patient's personal health booklet.

With this barcoded ID, patient records are retrieved instantly with a simple scan with a barcode reader.

No need to rewrite your personal information on a paper register each time you visit.

And suddenly the line got shorter.

This meant that patients, usually mothers with small children on their backs, had to spend less time waiting for assistance.

Also, if you lose the booklet, you can retrieve the record by searching by name.

Well, the way names are pronounced and spelled is very different.

Any combination of R and L, English and local language names.

Even soundex, the standard way of grouping words by their pronunciation similarity, wasn't good enough.

So I had to change it so that existing records can be linked and matched.

Before the iPhone came along, software engineers were developing for personal computers, but we knew from our experience that our power system wasn't reliable enough for personal computers.

So we repurposed a retail touchscreen POS terminal as a clinical workstation.

At that time, our company was importing an Internet appliance called the i-Opener made by a failed US company during the dot-com era.

I changed the screen to add a touch sensor and made the power system work with a rechargeable battery.

When we started our business, we didn't find a reliable network to send data, especially from rural hospitals.

So we built our own tower, built a wireless network and linked clinics in Lilongwe, Malawi's capital.

(Applause.) With teams of engineers working on hospital campuses, we have observed healthcare workers using the system to repeatedly build the information systems that manage HIV records in all of Malawi's major public hospitals.

These hospitals serve more than 2,000 HIV patients at each clinic.

Health workers who used to spend days compiling tabs and quarterly reports can now produce the same reports in minutes, and health professionals from around the world are visiting Malawi to learn how we did it.

(Applause.) It's exciting and fun to follow technology trends around the world, but getting technology to work in a low-resource environment like a public hospital in sub-Saharan Africa required us to become jacks-of-all-trades and build entire systems, including infrastructure, from scratch.

thank you.

(applause)

In March 2017, the mayor of Cape Town formally declared Cape Town a localized disaster as there was less than four months of usable water left.

Residents restricted water intake to 100 liters per person per day.

But what does that mean in practice?

With 100 liters of water per day, you can shower for 5 minutes, wash your face twice, and probably flush the toilet about 5 times.

You haven't brushed your teeth yet, you haven't washed your clothes, and you definitely haven't watered your plants.

Unfortunately, you didn't wash your hands after flushing the toilet five times.

And you didn't take a sip of water.

The mayor said this meant a new relationship with water.

Today, seven months later, I can share with you two things about my second home.

First, Cape Town is not yet running out of water.

However, as of September 3, the 100-liter limit has been lowered to 87 liters.

The mayor has defined the city's new normal as a state of perpetual drought.

Second, what is happening in Cape Town is spilling over into many other cities and countries around the world.

Excluding countries with no data, less than 5 percent of the world's population now live in countries with more water than they did 20 years ago, according to the United Nations Food and Agriculture Organization.

Others today live in countries with little water.

And nearly one in three people live in countries facing water crises.

I grew up in Jordan. Jordan is a water-scarce country that has experienced complete water shortages since 1973.

And still, as of 2017, only 10 countries in the world have less water than Jordan.

So dealing with water scarcity is deeply ingrained in my mind.

As soon as I was old enough to learn how to write my own name, I also learned that I needed to conserve water.

My parents always reminded me and my siblings to turn off the faucet when brushing our teeth.

We used to put flour in balloons instead of water when we played.

But it's just as fun.

(Laughter) And a few years ago, when my friend and I did the Ice Bucket Challenge, we used sand.

(Laughter) And you might think, you know, it's easy, the sand isn't ice cold.

I promise, sand was everywhere and it took a long time to remove it.

But what you probably didn't realize when you played with flour balloons as a kid, or sanded your head as an adult, is that some of the techniques that are familiar to me and others living in arid countries may help us all cope with what is fast becoming a global crisis.

Today, I would like to share three lessons from water-poor countries and how they have survived and even thrived despite water crises.

Lesson 1: Tell people how much water they really have.

To solve the problem, you need to recognize that you have a problem too.

And when it comes to water, it's easy for people to turn a blind eye and assume that just because there's water coming out of the tap, they'll be fine forever.

But some wise drought-affected countries are adopting simple and innovative measures to ensure that their citizens, communities and businesses are aware of how dry their country is.

When I visited Cape Town earlier this year, I saw this electronic billboard on the highway showing how much water was left in the city.

This is believed to be an idea they borrowed from Australia when it faced its worst drought in its history from 1997 to 2009.

Water levels in Melbourne have dropped to a very low reservoir of almost 26%.

But the city didn't yell at the people.

I didn't beg you not to use water.

They used electronic billboards to flash the water levels available to all citizens across the city.

They were honestly telling people the actual amount of water and holding them accountable.

By the time the drought was over, this created not only a sense of community, but a tremendous sense of urgency.

Nearly one in three Melbourne citizens have invested in installing a rainwater harvesting tank for their home.

The actions taken by citizens did not end with the installation of these tanks.

With the city's help, they were able to do even more impact.

Go to Lesson 2. Empower people to save water.

Melbourne wanted people to reduce their water consumption at home.

One way to do that is to spend less time in the shower.

However, interviews revealed that some people, especially women, are not enthusiastic about saving water in such a way.

Some say, "Showers aren't just for cleaning.

It's my sanctuary.

It's a place you go not just to clean up, but to relax. ”

So the city started offering free water-saving shower heads.

And now some people complain that the shower head is ugly or doesn't fit their bathroom.

So what I like to call the "showerhead team" is developing a small water flow regulator that you can attach to your existing showerhead.

The beauty of a shower head is not really important to me, but I love how the team didn't give up and came up with simple and unique solutions to help people save water.

Over 460,000 showerheads replaced in four years.

Over 100,000 orders were placed during the introduction of the small regulator.

Melbourne has successfully reduced per capita water demand by 50%.

In the United Arab Emirates, the world's second water-scarce country, officials designed what they called the "Business Heroes Toolkit" in 2010.

The aim was to motivate and empower companies to reduce their water and energy consumption.

The toolkit consisted of tips that really taught businesses how to measure their existing water consumption levels and help them reduce them.

And it worked.

Hundreds of organizations have downloaded the toolkit.

And some of them have joined what's called the "Corporate Heroes Network," where companies can voluntarily challenge themselves to reduce their water consumption to a pre-set target within a year.

Companies that met this challenge saved an average of 35% of water.

And one company, for example, introduced as many water-saving tips as possible in their office space.

They replaced everything from toilet flush technology, faucets and shower heads.

We replaced water wherever possible, ultimately cutting our employees' water consumption in half.

Empowering individuals and businesses to save water is crucial, but not enough.

Countries need to take action at the national level to save water beyond the status quo.

Go to Lesson 3. Look below the surface.

Saving water can come from unexpected places.

Singapore is the 8th water-shortest country in the world.

Almost 60 percent of its water demand depends on imported water.

It's also a very small island.

So you should utilize as much space as possible to catch the rain.

So in 2008 we built Marina Barrage.

This is the first ever urban reservoir built in the middle of a city-state.

It is the country's largest catchment area, almost one-sixth the size of Singapore.

The marvelous thing about Marina Barrage is its sheer size and its construction to make the most of its unexpected but important location.

This gives the country three valuable benefits. Singapore's water supply increased by 10%. Because it is connected to the sea, it protects the surrounding low-lying areas from flooding. And as you can see, it serves as a beautiful lifestyle attraction, hosting events ranging from art exhibitions to music festivals, attracting joggers, bikers and tourists from all over the area.

Not every effort needs to be amazing or tangible now.

Jordan, my first hometown, has found that agriculture consumes most of its freshwater.

They wanted to encourage farmers to focus on growing crops that consume less water.

To achieve that, local agriculture places an increasing emphasis on date palms and vines.

These two are much more tolerant of drought conditions than many other fruits and vegetables and are at the same time considered high value crops both locally and internationally.

Locals in Namibia, one of the driest countries in southern Africa, have been drinking recycled water since 1968.

Well, you could say that many countries recycle their water.

I think so.

However, few people use it for drinking purposes. The main reason is that I don't like the thought of the water that was in the toilet running down the faucet.

But Namibia had no time to think about such things.

They looked under the surface to save water.

These are now good examples of how countries can alleviate water shortages by purifying wastewater to potable standards, and in the case of Namibia, providing drinking water to more than 300,000 people in the capital.

I say there is no need to reinvent the wheel, as countries that used to have more water are becoming water scarce.

If we look at what water-poor countries have done, the solution is readily available.

Now all that's left is for all of us to actually take action.

thank you.

(applause)

salaam. Install namaskar.

good morning.

From my TED profile, you might expect me to talk about the latest philanthropic trends, trends that are buzzing Wall Street and the World Bank right now, how to invest in women, how to empower women, and how to save women.

not me.

I am interested in how women help us.

They are helping us by redefining and reimagining a future that ignores and obscures accepted polarities that we have long taken for granted, such as between modernity and tradition, first and third world, oppression and opportunity.

In the midst of the difficult challenges we face as a global community, there is something about this third-way raga that excites me.

What intrigues me most is how women do this despite a set of contradictions that are both frustrating and fascinating.

Why are women so severely repressed by cultural conventions on the one hand, but also cultural guardians in most societies?

Do hijabs and scarves symbolize submission or resistance?

When so many women and girls are routinely beaten, raped and maimed in the name of honor, religion, nationality or any other cause, why are women able to replant trees, rebuild societies and lead radical non-violent movements for social change?

Is it another woman who is preserving and radicalizing?

Or are they the same thing?

Are we guilty of assuming, as Chimamanda Adichie reminded us at the TED conference in Oxford, that there are actually many women's struggles when in reality there is only one story of the struggle for women's rights?

And what, if anything, do men have to do with it?

Much of my life has been a quest to find answers to these questions.

It has taken me around the world and introduced me to amazing people.

Along the way, I've collected a few pieces that help me crack this puzzle.

Among those who opened my eyes to the Third Way are devout Muslims in Afghanistan, harmonious lesbian groups in Croatia, and taboo-breakers in Liberia.

I am as grateful to them as I am to my parents for having three daughters in this life despite committing some petty crimes in a previous life.

And likewise, for reasons I don't know, he seems unusually proud of the three of us.

Born and raised here in India, from an early age I developed a deep suspicion of uncles and aunts who would bend down and pat us on the head and say this to our parents without any hesitation.

But you are young and you can try again. ”

My feelings of anger for women's rights boiled over when I was about 11 years old.

My aunt was an incredibly intelligent and intelligent woman who was widowed early.

Crowds of relatives rushed to her.

They took off her colorful saree.

They dressed her in white.

They wiped the bindi from her forehead.

They broke her bracelet.

Her daughter Lani, a few years older than me, sat on her lap, bewildered, not sure what had happened to the confident woman she once knew as her mother.

Later that night, I heard my mother begging my father, "Lamb, do something about it. Can't you intervene?"

And my father muttered in a low voice, "I'm just the youngest brother, there's nothing I can do.

This is tradition. ”

That night I learned the rules of what it means to be a woman in this world.

Women don't make those rules, but they define us, our chances and opportunities.

And men are also affected by that rule.

My father, who participated in three wars, could not save his sister from this suffering.

So by the age of 18, under my mother's excellent guidance, I had become, you guessed it, a rebellious feminist.

On the streets they say, "[Hindi] [Hindi] We are Indian women.

We are not flowers, but sparks of change. ”

By the time I arrived in Beijing in 1995, it was clear to me that the only way to achieve gender equality was to overturn centuries of oppressive traditions.

As soon as I returned from Beijing, I jumped at the chance to work for this wonderful organization founded by women to support women's rights groups around the world.

But just six months into my new job, I met a woman who challenged all my assumptions.

Her name is Sakena Jacobi.

She came to my office at a time when no one knew where Afghanistan was in the United States.

She told me, "It's not about the burqa."

She was the most determined women's rights advocate I've ever heard.

She said women run underground schools in communities inside Afghanistan and that her organization, the Afghan Institute for Learning, has set up schools in Pakistan.

“The first thing any Muslim knows is that the Koran requires and strongly supports literacy,” she said.

The Prophet wanted every believer to be able to read the Qur'an on their own. ”

did i hear correctly?

Were women's rights advocates bringing up religion?

But Sakena ignores labels.

She always wears a scarf and I once walked with her on the beach with her long hair blowing in the wind.

She begins each lecture with a prayer, but in a country where girls marry at the age of 12, she is a healthy, financially independent single woman.

She's also very down-to-earth.

“This scarf and this outfit give me the freedom to do what I need to do to talk to people whose support and support is essential for this work,” she says.

When I had to open a school in a refugee camp, I went to see the Imam.

I told him, 'I am a believer, women and children in this terrible situation need faith to survive,'" she smiled mischievously.

"He was flattering.

Women couldn't go to the mosque, so he started coming to my center twice a week.

And when he leaves, women and girls will remain.

We started with a small literacy class reading the Koran, then a math class, then an English class, then a computer class.

Within a few weeks, everyone in the refugee camp was attending our classes. ”

Sakena is a teacher at a time when educating women in Afghanistan has become a dangerous business.

She is on the Taliban's target list.

I worry about her whenever she travels to that country.

She shrugged when I asked her about safety.

"Kabita Jaan, we cannot afford to be afraid.

Look at the young girls who go back to school after having acid thrown in their faces. ”

And I smiled, nodded, and found myself watching women and girls use their own religious traditions and practices and turn them into instruments of opposition and opportunity.

Their path is their own and they are aiming for a different Afghanistan.

The women of Lesbor in Zagreb, Croatia know that they are different.

Being a lesbian, dyke or gay in most parts of the world, including here in India, means taking a place of immense discomfort and extreme prejudice.

In post-conflict societies such as Croatia, excessive nationalism and religiosity create an intolerable environment for those considered marginalized.

So join the Outdyk group, young women who love old music that once spread from Macedonia to Bosnia, Serbia to Slovenia.

These folk singers met at the university's gender studies program.

Most of them are in their 20s, and some of them are mothers.

Many struggle to come out to the community in families where religious beliefs make it difficult to accept that their daughter is not sick but simply gay.

Leah, one of the group's founders, said: "I love traditional music.

I also like rock and roll.

So Lesbar, we blend the two.

I see traditional music, especially from other parts of the former Yugoslav Republic, as a sort of rebellion where people can actually have their voices heard.

After the war many of these songs were lost, but they are part of our childhood and our history and should not be forgotten. ”

Perhaps this LGBT choir demonstrated that women invest in tradition to create change, like an alchemist turning discord into harmony.

Their repertoire includes Croatian national anthems, Bosnian love songs, Serbian duets, and more.

Then, Ria laughed and added: “Kabita, we are especially proud of your Christmas music because it shows that we are open to religious practices, even though the Catholic Church hates us LGBT.”

Their concerts certainly come from their own community, but also from older generations. A generation that may be skeptical about homosexuality, but nostalgic for their music and the past it represents.

One father said he was initially hesitant about his daughter joining such a choir, but now writes songs for his daughter.

In the Middle Ages, bards traveled across the land singing stories and sharing poems. Lesbor thus travels the Balkans, singing and uniting people divided by religion, nationality and language.

Bosnians, Croats and Serbs have found a rare place in their history where they can share pride, and Lesball reminds them that the songs one group often claims are in fact all of them.

(singing) Yesterday Mallika Sarabhai taught me that music can create a world that is more accepting of differences than what is given to us.

The world given to Leymah Gubowi was a world of war.

Liberia has been torn apart by civil war for decades.

Reima was not an activist, but a mother of three.

But she was worried and fed up. I was worried that my son would be kidnapped and turned into a child soldier, and that my daughters would be raped.

One night she had a dream.

She dreamed that she and thousands of other women ended the bloodshed.

The next morning she asked others at church how they felt.

They were all battle-weary.

We need peace, and we need our leaders to know that we will not rest until peace is achieved.

One of Reima's friends was a Muslim policewoman.

She promised to raise the issue with the community.

At a sermon the following Friday, women sitting in the side rooms of the mosque began sharing their distress over the situation.

"What's the point?" They said, "Bullets make no difference between Muslims and Christians."

This small group of women was determined to end the war and chose to claim their tradition. Liberian women usually wear a lot of jewelry and colorful clothes.

But no, in protest they wore all white without makeup.

"We wore white because we came for peace," Reima said.

They stood on the side of the road that Charles Taylor's convoy passed every day.

They stood for weeks, saying that at first there were only 10, then 20, then 50, then hundreds of women dressed in white, singing and dancing and asking for peace.

Ultimately, the Liberian opposition was urged to hold peace talks in Ghana.

The peace talks dragged on endlessly.

Reima and her sisters are tired of it.

They used the remaining funds to bring small groups of women to the peace talks grounds and surround the building.

In the now-famous CNN clip, they are seen sitting on the ground with their arms crossed.

India knows this. It is called [Hindi].

Then things get tense.

The police are dispatched to physically remove the women.

As the senior officer approached with batons, Reima thoughtfully stood up, stretched her hands above her head, and very slowly began to undo the headdress covering her hair.

I can see the face of the police.

he looks embarrassed he backed away.

And the next thing I knew, the police had disappeared.

Reima told me later, "It's taboo in West Africa.

If an older woman wants to undress in front of a man, that man's family will be cursed. ”

(Laughter) (Applause) She said, "I don't know if he did it because he believed, but he knew we weren't going to leave.

I had no intention of leaving until a peace agreement was signed. ”

A peace agreement was signed.

And Liberian women rallied to support Ellen Johnson Sirleaf. She broke some taboos herself and became the first elected female head of state in Africa in years.

In her presidential address, she paid tribute to the brave Liberian women who allowed soccer stars to win, and that soccer is for Americans.

Women like Sakena, Lia and Reima have humbled and transformed me. And it reminded me not to jump right into any kind of assumptions.

They also saved me from righteous wrath by providing insight into this third method.

A Filipino activist said to me, "How do you make mochi?

Heat from below and heat from above. ”

Protests, marches and the uncompromising stance that women's rights are human rights will come to a complete halt.

It's heat from the bottom.

It's Malcolm X and Suffragettes and the Gay Pride Parade.

But you also need heat from above.

And in most parts of the world, that top is still dominated by men.

To paraphrase Marx, "Women make change, but not in situations of their own choosing."

they have to negotiate.

They must overthrow the traditions that once silenced them in order to give voice to new aspirations.

And they need allies from the community.

A friend like an imam, a friend like a father who is currently writing songs for a Croatian lesbian group, a friend like a police officer who has withdrawn to protect the taboo, and a friend like a father who could not help his sister but has helped his three daughters who are chasing their dreams.

Perhaps this is because feminism, unlike almost all other social movements, is not a struggle against distinct oppressors. Because it's a struggle against a set of deeply ingrained beliefs and assumptions that we women all too often hold, not the ruling class, not the occupiers, not the colonizers.

And perhaps this is feminism's ultimate gift that the personal is actually political.

So what Eleanor Roosevelt once said about human rights, so is gender equality, and it starts in a small place closer to home.

It's the same on the street, in the negotiations at the kitchen table, in the couple's bed, in relationships with lovers, parents, sisters and friends.

And women like Sakena, Ria, and Leima, but also women like Sonia Gandhi here in India, Michelle Bachelet in Chile, and Shirin Ebadi in Iran, find themselves doing something else by incorporating aspects of tradition and community into the struggle.

They challenge the very concept of the Western development model.

They say we don't have to be like you to make a difference.

We can wear sarees, hijabs, pants and buboos, we can be party leaders, presidents, human rights lawyers.

We can use our traditions to overcome change.

We can demilitarize society and instead channel our resources into real security treasuries.

Within these little stories, these individual stories, we find radical epics written by women all over the world.

I find hope in the threads that are woven into the resilient fabric that sustains the community.

And if my heart is singing, it's because in these little pieces I can occasionally glimpse whole, whole new worlds.

And she's definitely on that path.

thank you.

(applause)

Chris Anderson: Okay, Stewart, in the 60's you started this magazine - I think it was '68.

Stewart Brand: Bravo! Original.

It's hard to find.

CA: Yes. Number one, right?

SB: Hmm, hmm.

CA: Why did it have such a big impact?

SB: Counterculture was the main event I was attending at the time and it consisted of hippies and the New Left.

It was sort of my contemporaries, just a little older than me.

And my mode is to see where the interesting flow is and then look in another direction.

CA: (laughter) SB: Partly that's what I've been trained to do as an Army officer, but partly it's just a cheap heuristic to find originality. Instead of looking at what others are looking at, look in the opposite direction.

So the relationship with the counterculture, apart from Sand's very good LSD, the hippies were very romantic and kind of against technology, and the New Left was against technology. Because I thought technology was a power device.

Do not spindle, bend, or mutilate your computer.

fight it.

So the Whole Earth Catalog was kind of counter-countercultural in the sense that I espoused Buckminster Fuller's idea that tools are the essence.

Science and engineering fundamentally define the world in interesting ways.

If all the politicians disappeared in a week...it would be a nuisance.

But if all the scientists and engineers disappeared for a week, it would be more than a nuisance.

CA: I think we still believe that.

SB: So focus on that.

And the New Left started talking to people about power.

And people like Steve Jobs and Steve Wozniak cut it off and said it was a tool that empowers people and actually works.

So what Fuller was saying is don't try to change the human nature, but people have been trying for a long time and they won't even bend, but the tools are very easy to change.

So if you want to make the world a better place, the only thing that is efficient is giving people the tools to go in the right direction, rather than trying to make people behave differently like the New Left.

It was the Whole Earth Catalog.

CA: And Stewart, the middle image. This is one of the first images, the first time humans have seen Earth from space.

It also affected me.

SB: It kind of happened that my LSD experience on a rooftop in San Francisco in the spring of 1966 made me think again about things like Fuller said. Many people think that the earth is flat and infinite in terms of its resources, but once you truly understand that the earth is a sphere and its quantity is finite, you begin to manage your resources and think of the earth as a finite system.

"Spaceship Earth" was his metaphor.

As I wished it was, I realized that the effect of the LSD was increasing on the San Francisco rooftop, and that all the downtown buildings in front of me were fanning out like this instead of being parallel.

because it is on a curved surface.

And if I were higher, it would be even clearer, higher, clearer, stationary, high enough, and it would close and you would see the circle of the Earth from space.

And I, you know, we've been in space for 10 years, and at the time, this was 66 years. And the camera never looked back.

They were always looking out of the Earth, or just part of it.

So I said why haven't we seen a picture of the whole planet yet?

And it went viral, NASA got it, senators and secretaries got it, various people in the Politburo got it, and it went round and round.

And within two and a half years, around the time the Whole Earth Catalog came out, these images began to emerge and really changed everything.

And my idea of ​​hacking civilization is to try to trick the situation by doing something lazy and creative.

So all these pictures you're seeing, and last week's March for Science, they were putting up Whole Earth banners and stuff, and I did it without doing anything.

I sold those buttons for 25 cents each.

I think tweaking the system is not only the most efficient way to move it in interesting directions, but in some ways the safest way. Because if you try to move the whole system in a big way, you can end up in a big mess. But if you tweak the system, it will adapt to the tweaks.

CA: Since then, you've been considered the leading voice of the environmental movement, but you're also a counterculturalist, and lately you've been proclaiming, well, a lot of what many environmental activists believe is almost heresy.

I would like to explore some of them.

I mean, tell me about this image here.

SB: Hahaha!

This is a National Geographic image of what the Arctic, Subarctic and Arctic regions once looked like, the so-called Mammoth Plains.

In fact, the whole world used to look like that.

Many large animals are now found in South Africa and the Serengeti, as well as in this part of Canada, across the United States, across Eurasia, and around the world.

This is the norm and may become so again.

So, in a way, my long-term goal at this point is to bring back those animals and the grasslands they created. It could be a climate stabilization system in the long run, but it's about bringing back even the mammoths in the background that are part of the story.

I think that's probably the goal after 200 years.

Perhaps 100 years from now, by the end of this century, we should be able to reduce the extinction rate to what it was in the background.

It will take time to recover this amount of biological resources, but it is worth it.

CA: Going back to mammoths, can you explain how we should think about extinction?

Clearly, one of the major concerns right now is that extinctions are occurring at a rate never seen before in history.

That's the meme out there.

How should we think about it?

SB: The story there is that we are in the middle of, or perhaps at the beginning of, the sixth extinction.

Because we are in the business of stopping extinction, the business of preventing extinction with Revive &amp; Restoration, we started looking at what's really going on with the extinction.

It turns out that there is a very confusing set of data out there that has been oversimplified to tell the story of where we are going.

Here are the 5 mass extinctions indicated by the yellow triangles, followed by:

The last meteorite on the far right is the meteorite that hit 66 million years ago and also hit the dinosaurs.

And the story is that we are the next meteorite.

Now here is the deal.

I researched this for a paper I wrote and found that a mass extinction would mean the extinction of 75 percent of all species in the world.

Well, there are about 5.5 million species, of which 1.5 million have been identified.

An additional 14,000 are identified each year.

There's a lot of biology going on there.

About 500 species have gone extinct since 1500, and we sometimes see the term "mass extinction" used in strange ways.

So, about a year and a half ago, there was a front-page article in the New York Times titled "Mass Extinctions in the Ocean, Extensive Study Shows" by Carl Zimmer.

And when I read the article, it says that since 1500, 15 species (1 species, 5 species) have become extinct in the ocean, and by the way, not a single species has become extinct in the last 50 years.

And if you read further into the story, it says something terrible is happening: fishermen are overfishing wild fish, and ocean fish populations are plunging by 38 percent.

That's serious.

Perhaps none of these species will become extinct.

So the headline writer hit the panic button at the top of the article.

It's kind of like clickbait, but it's basically saying, "Oh my god, panic, we're going to lose all the species in the ocean."

No such thing is planned.

And in fact, when I started digging a little deeper, the Red List produced by the International Union for Conservation of Nature, the IUCN, lists about 23,000 species that are believed to be at some level endangered.

"If all 23,000 of these animals go extinct in the next century or so, and the rate of extinction continues for centuries and millennia, we may be at the beginning of a sixth extinction," wrote an article in Nature.

Therefore, the exaggeration is too unreasonable.

But environmentalists always exaggerate.

That's a problem.

CA: So they probably feel a moral responsibility. Because they care so much about what they see, and unless you drum, nobody will probably listen.

SB: Every time someone says moral this or moral that or "moral hazard" or "precautionary principle" these are basically words used to say no to things.

CA: So the problem isn't fish extinction or animal extinction, it's fish thriving or animal thriving, and we're congesting them to some extent?

SB: Well, I think we're congested, and the losses continue.

The major losses are caused by agriculture, so do anything to improve agriculture, including GMOs, and basically make agriculture more concentrated and more productive. Everything you learned about growing pots in basements now applies to growing vegetables in containers, even if you want to do vertical farming in town, including on farms. That is wonderful. It's all good. Because saving land is the main thing we can do for nature.

It is good that people move to cities.

Less destruction of the landscape by agriculture is a good thing.

CA: There are people talking about recovering seeds, rewilding...

Well, first of all, about rewilding species. What is the story of these people?

SB: Hahaha! Wolf.

Europe, which leads to the previous point, now we are probably at the peak of agricultural land and, by the way, in terms of population, we have already reached the peak of child survival.

In the future, the number of children will continue to decrease.

We are in the final phase of human population doubling, reaching 900 million, maybe 9.5 billion, and then not only leveling off, but probably starting to decline.

Likewise, agricultural land is now peaking and one of the things that is happening in Europe is that there is a lot of abandoned agricultural land now that will soon be reforested.

We don't have wildlife corridors in Europe.

You don't have to. Because many of these farms are connected, reforesting creates corridors for wildlife, and in this case, wolves, returning to Spain.

They came all the way to Holland.

The bear will return. Lynx is back.

I have a European Jackal. I didn't know there was such a thing.

They are on their way back from Italy to other parts of Europe.

And unlike here, these are all predators, which is kind of an interesting point.

They are welcomed by Europeans. they have been overlooked.

CA: And counterintuitively, reintroducing predators often increases, rather than decreases, the diversity of the underlying ecosystem.

SB: Well, it turns out that predators and megafauna in general, megafauna and megafauna with sharp teeth and claws, are very important to really rich ecosystems.

CA: It probably brings us to this rather dramatic rewilding project in which you yourself were involved.

Why would anyone want to reclaim this terrifying woolly mammoth?

SB: Hmm. The Asian elephant is the closest relative of the woolly mammoth, being about the same size and very close genetically.

They diverged only recently in their evolutionary history.

Asian elephants are more closely related to woolly mammoths than to African elephants, but they are close enough to African elephants that they have successfully interbred.

So we're working with George Church at Harvard University. He has already moved genes for four major traits from the now well-preserved and well-studied genome of the woolly mammoth, thanks to so-called "ancient DNA analysis."

And in the lab, we transfer those genes into a living Asian elephant cell line, where they're in place, thanks to CRISPR.

In other words, unlike genetic engineering, we do not insert genes.

With CRISPR, you're essentially editing one allele and substituting it for another.

So you're basically getting germline cells from Asian elephants that are effective in terms of traits for comfort in the Arctic.

So we go through the process of getting it through a surrogate mother, an Asian elephant mother.

You can get what conservation biologists call the woolly mammoth surrogate. The woolly mammoth is effectively a shaggy, curly-bodied Asian elephant that can comfortably live in the subarctic.

Now, many people say this because it is a fact.

Besides, Asian elephants don't like snow, right? ”

Apparently they like snow.

An Ontario zoo has an animal that made a snowball bigger than a human.

they just love. With a trunk, you can start small, roll, and get bigger.

And people say, 'Yes, but I'm only 22 months pregnant.

Either way, this kind of heterologous cloning is a difficult task.

Are you going to lose some surrogate Asian elephant mothers? ”

Then George Church said, "That's all right.

We create an artificial womb and grow it like that. ”

People say, "Yes, it might be the next century," but news in Nature this week says that artificial wombs are now being developed that can grow lambs to four weeks of age.

That's half the gestation period.

So this thing is on track.

CA: But why should we want a world like this -- imagine a world with thousands of these things roaring across Siberia?

Is it a better world?

SB: It is possible. It's -- (laughter) there are basically three groups that are really serious about woolly mammoths. Restore. we are just in the middle. A group at Harvard University doing genetics in the lab with George Church. And then there's Zimov, an amazing old scientist working in northern Siberia, and his son Nikita, who subscribed to the system. For 25 years, Sergei and Nikita Zimov have been creating a place they call "Pleistocene Park". It is located in a very harsh region of Siberia, pure tundra.

And studies done so far show that there are probably 1/100th of the animals that once existed in the landscape.

As you can see in the image above, we saw a lot of animals.

Now there are very few.

Most of the tundra is moss, followed by boreal forest.

That's right, folks. There are only a few animals there.

There they introduced musk oxen, Yakut horses, bison, and now some more, and grazing animals at the same density as before.

And grasslands are made by herbivores.

So these animals are out there eating grass and doing some things.

First of all, they are returning tundra moss to the steppe.

Grasslands fix carbon.

In a warming world, the tundra is melting, releasing large amounts of carbon dioxide and methane.

So they're already stabilizing the climate on a small 25-square-mile site.

But part of the story is that boreal forests are very absorbent of sunlight, even in winter when it's snowy.

And there used to be a huge grassland all the way around the North Pole, and all the land around the North Pole was this grassland.

And the grasslands were wonderful, probably one of the most productive biomes in the world, the largest biome in the world.

That part of the forest, now Sergei Zimov and Nikita are out in this old military tank they got for free and clearing the trees.

And it's boring and disgusting, as Sergey says, "...and they don't make feces!"

By the way, so are these large animals, including mammoths.

Woolly mammoths thus become what conservation biologists call an "inclusive species."

Whether it's the Chinese panda or anywhere else, this animal is an exciting animal. The excitement of making a good life for the animal creates a habitat or ecosystem that is good for many living things and plants, and ideally reaches a point where it can manage itself. There, conservation biologists can take a step back and say, "All we have to do is keep the destructive intruder out, and this animal just cooks."

CA: I mean, there are a lot of other species that you dream of going extinct one day, but I think what I really want to talk about is this idea you talked about how mammoths can help green Siberia in a way. At least I'm not talking about rainforests, but about the greening of the planet you've been thinking about.

And the traditional story is that deforestation is one of the most terrible curses of our time and a major contributor to climate change.

And you went and sent me this graph or this map.

what is this map

SB: Global greening.

The important thing about the stories you get from headlines and short news stories is to look for what else is going on, for what Marc Andreessen calls "narrative breaches."

So the story – and Al Gore is a master at telling it – is that civilization-threatening climate change is moving very fast.

We must stop the excess production of greenhouse gases, especially CO2, as soon as possible. Otherwise, we will be in serious trouble.

That's all true, but that's not what the story is all about, and the story as a whole is more interesting than these snippets.

Plants love CO2.

Plants are made of water from carbon dioxide and sunlight.

And in many greenhouses, industrialized greenhouses, carbon dioxide is added as plants convert it into plant matter.

Studies have been done with satellites and so on, and what you're seeing here is a graph showing a 14 percent increase in leaf activity over the last 33 years or so.

There is so much biomass.

That's not the only thing ecologists call "primary production."

Much more life is happening because of climate change and because of all our coal-fired power plants.

So -- oops, what's going on here?

By the way, this will also increase the production of agricultural products.

This partially counteracts the increase in CO2. This is because there are far more plants that breathe CO2 into their bodies.

Some of them rot and grow back quickly, while others descend to the roots and enter the soil, where they remain.

So these inverses are some of the things that need to be kept in mind, and the deeper story is that thinking about, dealing with, and designing climate is a very complex process.

It's like medicine.

Again, we'll be fine-tuning the system to see what leads to improvement.

Then run it some more and see it's still getting better, then -- oops! -- that's enough, do a half turn back.

CA: But some might say, ``Not all greens are created equal''.

Perhaps what we are doing is trading the splendor and diversity of the rainforest, I don't know, for green pond dregs, grass, etc.

SB: This particular study found an increase in all forms of plants.

Now, the interesting takeaway from this study is what exactly is going on in the ocean.

Primary production in the ocean, marine biota, mainly microbes, what they do is probably the most important thing.

They are what create the atmosphere we are breathing happily and were not included in this study.

This is one of the things James Lovelock has argued. Fundamentally, our knowledge of the ocean, especially marine life, is basically steam in this sense.

So we're inadvertently discovering that there's a lot of CO2 in the atmosphere through bad geoengineering, and we're trying to figure out what the ocean is doing with it.

Well, the sea is swelling with excess heat.

The main causes of sea level rise are there, and more will come as global warming progresses.

Some coral reefs have been severely damaged, such as off the coast of Australia.

The Great Coral Reef there is bleaching due to overheating.

That's why me and Danny Hillis said this last session on the main stage. “Geoengineering deserves enough experimentation to see if it works, see if we can buy time on all these aspects of warming, and small but useful studies to tune the system and see if we need to do more than tune.

CA: Okay. It's a very important discussion, so I'll talk about it here for the last few minutes.

First of all, this book has just been published by Yuval Harari.

He basically wants to say that man's next evolution is to become a god.

I think it's him -- SB: Well, you talked to him. And you have probably finished reading the book.

It's not over yet.

Where will he come out -- CA: So that's a pretty radical take.

He believes that we will use data and bioengineering to completely remake ourselves and become entirely new creatures with some sort of superpower, which will result in great inequalities.

But we are about to write a whole new chapter of history that is very radical.

that's what he believes.

SB: Is he nervous about it? Forget it.

CA: I think he's nervous, but he also likes to provoke people.

SB: Are you nervous about that?

CA: I'm nervous about that.

But you know, there's a lot going on at TED, and I'm both excited and nervous.

And while the optimist in me is trying hard to lean in the direction of, "This is great and really exciting," the responsible part of me is saying, "But, well, I might have to be a little careful about how I think about it."

SB: That's TED's secret sauce, isn't it?

Stay tense and excited.

CA: It's also what makes it a bit schizophrenic.

But he didn't quote you.

I thought it was an amazing statement you made in the original Whole Earth Catalog, and you ended with this powerful phrase.

And just recently you upgraded that statement.

I want you to talk about this philosophy.

SB: Well, one thing I'm learning is that documenting is much better than memorizing.

And one of the things I learned from someone was actually on Twitter.

It changed my life - still won't forgive me!

And someone will quote this phrase and someone else will say, 'Oh, by the way, that's not what you originally wrote in the original 1968 Whole Earth Catalog.

You wrote, 'We are like God, so maybe we should get used to it.'" I completely forgot about that.

Stories, terrible stories like this, the stories we tell ourselves become lies over time.

So the documentation will help you solve it.

It went on to "We are like God and it might be nice to do it well" and that was The Whole Earth Catalog.

By that time, I had written a book, Whole Earth Discipline: An Ecopragmatist Manifesto, which said that, given climate change, we are basically like God and we have to deal with it.

CA: We are like God, so we have to do it well.

So let's talk about that. Because as soon as you talk about geoengineering, the psychological reaction of so many people is to never believe that humans should be gods. Some of it is for religious reasons, but most of it is for the humble reason that the system is too complicated and we shouldn't mess with it.

SB: Well, it's a Greek story about arrogance.

And when I feel really confident in myself, I end up sleeping with my mother.

(laughs) CA: I didn't expect you to say that.

(laughter) SB: It's the story of Oedipus.

Arrogance is a very important lesson to always keep close at hand.

One of the guidelines I follow for myself is, "Ask yourself how wrong you are each day."

And lately I've become a scientist by training and working with scientists, which is pure joy.

Science is organized skepticism.

So, even if something looks pretty good, you're constantly arguing that it's not just whether it's as good as it looks, but that you're constantly having a series of suspicions: "What else is going on?"

So I think answering this "what else is going on?" question is the way to get away from fake news.

It's not necessarily real news, but it's welcome if it's more complex news that you're trying to tackle.

CA: But back to applying this just for the environment. The philosophy of this seems to be that whether we like it or not, we already control so many aspects of what is happening on Earth, and we do it unintentionally, that we should really start doing it intentionally.

What does it feel like to start improving as a god?

How do I get started?

Are there small experiments or systems that we can tinker with?

How on earth should we think about it?

SB: The mentor who freed me from total allegiance to Buckminster Fuller was Gregory Bateson.

Gregory Bateson was an epistemologist, anthropologist, biologist, psychologist, and many others who studied how systems fundamentally see themselves.

I think that's part of wanting to keep an eye on things all the time.

And what I love about David Keith's approach to geoengineering is that it's not just about carrying and doing.

David Keith's approach, which is what Danny Hillis was talking about before, is that you really, really incrementally do some things to tweak the system and see how it reacts and that tells you something about the system.

It responds to the fact that people say, "What are you talking about here?"

We don't understand how the climate system works.

You can't design a system you don't understand. ”

And David said, "Sure it's true for the human body, but still medicine is progressing and we're glad it's progressing."

When designing a system so large and complex that it is completely incomprehensible, there is a way of coordinating the system, which is a kind of anti-arrogant approach.

That is, try a bit here, withdraw completely if it's a problem, expand if it works, and go other ways in the meantime.

Here's the whole discussion about diversity and dialogue and everything else and what we've heard from Sebastian (Thrun) before.

So the non-hubristic approach is looking for a social license. This is looking for a social license to include society in these interesting and problematic deep issues that have pretty good ideas. Pretty well so far.

The reason Sebastian and I are optimistic is that we have read The Better Angels of Our Nature by people like Stephen Pinker and so far it has been very good.

It can always change, but things can get better, and a lot can be built on that feeling of finding the tools to make it happen and applying them further.

That's the story.

CA: Stewart, with that optimism, I think it's actually the end.

I admire you for always challenging yourself and others.

This recipe for never being too sure of yourself feels very powerful.

I would like to learn more of it myself as well, and in fact it was very insightful and inspiring to hear you speak today.

Stewart Brand, thank you very much.

SB: Thank you.

(applause)

I got into records when I was about 12 years old.

My parents gave me money to eat, but most days instead of eating I would save it and buy myself records at the end of the week.

Here I have a giant Walkman that's half my foot -- (Laughter) actually more like a VTR.

(Laughter) So when I was a teenager, my obsession with buying cassettes, records and CDs only grew.

I worked in record stores for many years, but I was never paid for anything but records.

One day, I realized I had thousands of records, more than I could listen to in my lifetime.

I've come to be called a record junkie, or record digger, like many of us.

Record digging, as the name suggests, means getting your hands dirty.

That means spending hours rummaging through warehouses, church basements, yard sales and record stores to find records that have been forgotten for decades.

A record that has become cultural garbage.

Early record collectors from the 1930s to the 1960s found and preserved so many important records that would have been lost forever.

At that time, most cultural and public institutions had little interest in preserving these treasures.

Most of the time, I just threw it in the trash.

Digging records is a lifestyle.

We are obsessed with obscure records, expensive records, Dolbin records, crazy artwork and sub-sub genres.

And all the little details that go with each release.

When the media talks about the record revival that's happened over the last few years, it's easy to forget to mention this community that has preserved records, traditions and culture for the past 30 years.

It is a very close-knit and competitive society. Because when you're looking for a very rare record, if you miss the opportunity, you may never see that record again.

But I think the only person here who really impresses record collectors is another record collector.

To the outside world, we seem like a very strange and eccentric group of individuals.

And -- (laughter) And they're mostly right.

Every record collector I know is a bigoted maniac.

We all know that we are all crazy in some ways.

But I think we should look a little more like this.

(Laughter) We are music archaeologists.

We are looking for lost artifacts.

We all have a list of records that we've spent years chasing at any cost to get our hands on them. In fact, we call this list the "Holy Grail".

When you're looking for records, you're surrounded by music you don't know.

You are surrounded by mysteries and all these dreams, records that people once believed.

Imagine the thousands of artists who were destined to become legends but have been overlooked for various reasons.

Many of these records only existed in a few copies, and some were never discovered or even heard.

They are literally an endangered species.

Let me tell you a story that kind of sums up the value of a record digger's job for me.

The story of a genius musician and composer from Montreal.

Henri Pierre Noel was born and raised in Haiti, but briefly lived in the United States and Belgium.

He was supposed to stay in Montreal for two weeks, but ended up staying there for 40 years.

When he was young, he learned to play the piano and developed a very specific way of playing the instrument, very fast and close to percussion.

His style combined Haitian influences and folklore with the American influences he grew up listening to.

So he created Compa, a mix of funk and jazz.

In his youth, he played with live bands and toured in the United States and Europe, but never recorded an album or song until he moved to Canada.

It was in Montreal in 1979 that he released his first album, Piano.

Completely independent from Henri Pierre Noel Records.

He only made what he could afford: 2,000 records.

The record had some airplay in Canada and Haiti, and received some support, but the lack of support from major labels made it very difficult.

Back then, if your record wasn't played on mainstream radio, wasn't on the jukebox, or wasn't invited to perform on TV, you had no chance of winning.

Releasing an album as an independent artist was a lot harder than it is now, both in terms of getting people to listen to it and just distributing it.

So, shortly afterward, he released his second album, juggling a hectic schedule playing piano in various clubs around the city, but his records began to slowly accumulate dust.

Over the course of 30 years, 2,000 copies began to disappear, until only a few remained in the world.

And in the mid-2000s, a Montreal record digger known as Koval was just scouring out records every week.

He was at a flea market, surrounded by thousands of dirty, dusty, and moldy records.

There he found the album "Piano".

He wasn't looking for it in particular.

In fact, you might say it's like finding him.

Twenty years of digging records every week gave him a sixth sense for finding gold.

He picked up the record, examined the front, the artwork, the back, the liner notes, and was intrigued by the fact that this Haitian musician made the record in Quebec in the late '70s.

He pulled out a small portable plastic turntable that he always brought with him when he went on excavations and put on a record.

So why don't we do the same?

(Music) He fell in love with the music right away, but he needed to know the backstory behind it.

He didn't know where it came from.

He knew the artist lived in Montreal at the time of recording, and spent several months trying to track him down.

He even found Noel's business card inside the record jacket.

That was Henri Pierre Noel's DIY.

So he found the card inside the record jacket. Of course I tried to call them, but 30 years later the number no longer worked.

Koval was therefore able to find and provide contact information to people who knew the artist personally only in Belgium, where the artist once lived.

So when he finally met with the artist, he promised to find a way to re-release the album someday.

He then arranged for a British label called Wah Wah 45s to reissue the two albums.

And what often happens with these reissue projects is that it becomes very difficult to find the master tapes, which are the original recordings of the sessions.

Art can be destroyed by fire, flood, earthquake, dumped in the garbage, or lost forever.

But thankfully, the Henri Pierre Noel tape was safe and ready for remastering.

The record was finally re-released to acclaim from music critics, DJs and listeners around the world, but it was the accolade it deserved in 1979.

The artist was so inspired that he decided to revive his music career, return to the stage and perform in front of new audiences.

The artist, now in her 60s, told me, "This changed everything for me.

From where I was planning to retire, I went on to perform for BBC Radio in London, Radio Canada, and more. ”

But it also gave him the opportunity to play in front of his three sons for the first time.

For me, this story perfectly illustrates the work of a record digger at its best.

Beyond rarity and dollar value -- we're totally obsessed with it, to be honest -- the real beauty is giving art a second chance. To save art from oblivion.

A good record digger's job is a continuous loop of three phases.

The first thing we do is hunt.

We spend hours, days, and years of our lives scavenging through dirty, dusty record boxes.

Anything we can do to get gold.

Sure, great records can be found online, but to get the deepest treasures, you have to get off the couch and into nature.

That's why we call it record digging instead of record clicking.

(Laughter.) So we're musical archaeologists.

But the next thing we do is get together.

We carefully choose which records to keep and which records are meaningful to us based on our preferences, expertise and personal commitments.

Then I try to find out everything I can about the record: artist, label, and super important information like "Who's playing the trumpet on Track 3?"

Then file them and store them securely in context.

We are music archivists.

And the last thing we do to close the loop is share.

Most record diggers I know have some way of sharing their findings and elevating their artists through album reissues, web articles, radio shows, etc.

We restore records to their rightful place in music history.

We are sense makers and curators.

So for myself and most record collectors I've encountered in the last 20 years, I think we all have some sort of outlet for these discoveries.

I think it's our way to keep our sanity and some kind of sense of purpose in this very insane obsession. Because it can be kind of lonely.

But I think we do it also to meet the human need to pass on cultural knowledge.

When it comes to the need for curation, it's been proven that in an era of overwhelming choice, too many choices actually hinder discovery.

For example, if you're looking to watch something on Netflix, you're really just browsing a catalog of 6,000 titles.

Now let's compare this to Spotify. If you want to pick the song you want to listen to, you're browsing a catalog of 30 million songs.

As you can see, I think the concept of paralysis by choice has more influence in music than in movies, for example.

And there are some studies that are starting to show this effect.

A recent look at the UK music market shows that the top 1 percent of UK artists actually earn 77 percent of the music industry's total revenue.

That was in 2013 and things are getting worse or worse.

Anyway, if I'm in the 1%, I'm sure I'll be happy.

(Laughter) So the takeaway for me is that it's easier than ever for people to listen to music.

People have more music at their disposal than ever before, but people are choosing to listen to the same music more than ever before.

And it's sad.

My love of music research, record digging and curation inspired me to launch the website Music Is My Sanctuary in 2007.

Our slogan is always "Future Classics and Forgotten Treasures".

And it shows our love for discovering music and showcasing both old and new music.

From humble beginnings, we have built a global platform with a massive audience of over 100 collaborators.

We have created over 10,000 pieces of content and over 500 hours of audio content.

Our audience consists of people who want more than what mainstream music channels offer.

They want to do it -- they want to dig deeper, but like us geeks we can't always work 20 hours a week, so they trust us to do it for them.

Curation is at the heart of everything we do.

We believe in human recommendations more than algorithms.

I could talk for days about my passion for finding records, but let me conclude with this.

Doing so for years, the record collector's collection becomes a kind of autobiography.

Last year I was DJing in Poland and the people who were hosting me had a great record collection and of course I was intrigued and asked 'Do you sell this?

They then explained to me that it was the collection of their dear friend Maceo, who passed away a few months ago.

And they were doing a project where they would invite different people to get their collection and then make something new out of it, whether it was a sample or a DJ mix. It was simply to give the collection a second life.

So after a few hours of myself going through the collection and making DJ mixes out of it, I felt like he and I could talk for a few hours about the record, even though we never got the chance to meet him, in a special way.

Therefore, our work as record diggers and our record collection exists to be passed on to the next generation.

Beautiful art deserves to be cherished, shared and rediscovered.

Accept curators. We are the alternative voices of mainstream music channels, digital or otherwise.

Go beyond algorithms.

Whatever type of music you like, there are tons of websites, radio shows, DJs and record stores out there waiting to share their discoveries with you.

we do this work for you.

All you have to do is listen and take risks.

This music will change your life.

thank you.

(applause)

As you know, the creative process is a long one, from the initial idea to the final product.

It's very iterative and takes many refinements, blood, sweat, tears, and years.

And I'm not saying go for a walk and come back with the Sistine Chapel on your left.

So which frame of the creative process did we focus on?

Only this first part.

Just brainstorm and come up with new ideas.

We actually conducted four studies with different people.

You were walking indoors or outdoors.

And all these studies came to the same conclusion.

Today we will talk about only one of them.

One of the tests we used to get creative was alternate use.

The time limit for this test is 4 minutes.

Your job is to come up with as many other ways to use everyday common objects as you can think of.

So, for example, how do you use the key other than to open it?

Obviously, it can be used as a giraffe's third eyeball, right?

perhaps. It's interesting and new. But is it creative?

People came up with as many ideas as they could, but we had to decide if they were creative.

The definition of creativity that many people think is "appropriate novelty".

For something to be relevant it has to be realistic. So, unfortunately, the key cannot be used as a centerpiece.

Boo!

But "novel", the second thing is that no one had to say it.

So for us it first had to be appropriate, and secondly because of the novelty no one else in the entire population surveyed should have been able to say it.

So you might think you can use your keys to scratch someone's car, but if someone else says it, it doesn't take credit for you.

But only one person said so. "If you were dying and it was a murder mystery and you had to carve the killer's name into the ground in your dying words."

One person said:

(Laughter) And it's a creative idea because it's relevant and novel.

You took this test and came up with an idea while sitting or walking on a treadmill.

(Laughter) They did two tests with different objects.

Three groups: The first group sat first and then sat again for the second test.

A second group sat first and performed a second test while walking on a treadmill.

The third group, which is interesting, first walked on the treadmill and then sat down.

The two groups sitting together in the first test were very similar to each other, averaging about 20 creative ideas per person.

The group that walked on the treadmill did almost double the amount of walking.

And they were just walking on treadmills in a windowless room.

Remember, they took the test twice.

Those who took the second test twice did not improve. Practice didn't help.

But those same people who sat down and then started on the treadmill got energy from walking.

Here's where it gets interesting.

The people who walked on the treadmill were still feeling the afterglow of their walk and were still creative afterward.

So what this means is that you should go for a walk and start brainstorming right away before your next big meeting.

Here are five tips for making this the best possible effect.

First, choose a problem or topic to brainstorm.

So this is not a shower effect. A new idea suddenly pops out of a shampoo bottle while you're in the shower.

They intentionally think about brainstorming from a different perspective during their walk.

Secondly, and this is a common question, "Are you okay when you're running?"

Well, the answer for me is that if I was running, the only new idea I could come up with is to stop running.

(Laughter) But if running is a comfortable pace for you, so be it.

After all, it turns out that no matter what kind of physical activity, it does not receive much attention.

So just walking at a comfortable pace is a good choice.

We also want to generate as many ideas as possible.

One of the keys to creativity is not getting stuck on your first idea.

keep going.

Keep coming up with new ones until you pick one or two to pursue.

You may worry that you don't want to write it down, what if you forget it?

So the idea here is to speak them out.

Everyone was talking about new ideas.

So you can put on your headphones, record it on your phone and pretend to have a creative conversation, right?

Because the very act of writing down your ideas is already a filter.

You're probably thinking, "Is this good enough to write down?"

and write it down.

And finally, don't let this go on forever. right?

If the idea doesn't come to you during the walk, come back later at another time.

I think I'm on a break right now, so I have an idea.

thank you.

(applause)

So today I would like to talk about an idea. Great idea.

In fact, I think it will probably end up being considered the single greatest idea to come out in the last century.

It's a computational idea.

Of course, that idea led to all the computer technology we have today and so on.

But there's actually a lot more to the calculation than that.

This is actually a very deep, very powerful, very basic idea, but we are just beginning to see its effects.

I myself have spent the last 30 years of my life working on three major projects that have attempted to take the concept of computation seriously.

So at a young age I started out as a physicist using computers as tools.

Then I started drilling down, thinking about the computations I wanted to perform, trying to understand what primitives I could build from and how I could automate them as much as possible.

In the end, I created a whole structure based on symbolic programming and so on that allowed me to build Mathematica.

Over the past 23 years, we've poured more and more ideas, features, and more into Mathematica. I am happy to say that it has brought a lot of good things to R&D. D, education, and many other areas.

Actually, I have to admit that I also had very selfish reasons for building Mathematica. I wanted to use Mathematica for myself the way Galileo used his telescope 400 years ago.

But what I wanted to see was not the astronomical universe, but the computational universe.

So we usually think of programs as complex things that we build for very specific purposes.

But what about the space of all possible programs?

This is a representation of a very simple program.

So running this program gives the following result:

It's very simple.

So let's change the rules of this program a little.

Here we have another result, which is also very simple.

Try changing it again.

You get something a little more complicated.

But if you keep doing this for a while, you'll find that the patterns you get, though very complex, have a very regular structure.

So the question is, could anything else happen?

Well, let's do a little experiment.

Let's do a little math experiment to find out.

Let's run all possible programs of the particular type we are interested in.

They are called cellular automata.

We see a lot of diversity in behavior here.

Most of them do very simple things, but if you look at all the different diagrams for rule number 30, you can see something interesting going on.

So let's take a closer look at rule number 30 here.

So here it is.

Here we are just following the very simple rules at the bottom and getting all the amazing stuff.

This is not at all what we are used to seeing, and I must say that it struck a chord with my intuition when I first saw it.

And really, understanding it ultimately required creating a whole new kind of science.

(Laughter) This science is different and more general than the math-based science that we've been doing for the last 300 years or so.

You know, it always seemed like a big mystery. How is it possible for nature to create so many things that seem so simple and seem so complicated to us?

Well, I think we've found the secret. It's just sampling what exists in the world of computation, and it frequently gets rule 30 and stuff like this.

And in knowing that, many of the long-standing mysteries in science begin to be explained.

However, it also introduces new problems such as computational irreducibility.

I mean, we're used to being able to predict things with science, but things like this are fundamentally irreducible.

The only way to find out about its results is to simply watch it evolve, in effect.

This is what I connect with the so-called principle of computational equivalence, which shows that even deceptively simple systems can perform computations as sophisticated as others.

It doesn't take a lot of technology or biological evolution to be able to perform arbitrary computations. It's what's happening all over the place naturally.

A simple rule like this can do it.

This has profound implications for the limits of science, the predictability and controllability of biological processes and economics, issues such as cosmic intelligence, free will, the creation of technology, and more.

You see, I've been working on this science for many years, and I've been thinking, "What's that first killer app?"

Well, ever since I was a kid I wanted to organize my knowledge and somehow make it computable.

People like Leibniz wondered about it 300 years ago.

But I've always believed that progress basically required replicating the entire brain.

Well, then I got to thinking. This scientific paradigm of mine suggests something different. And, by the way, I now have enormous computing power in Mathematica. And a CEO who has some of the world's resources to execute a large, seemingly crazy project. So I decided to try and see how much of the world's systematic knowledge could be made computable.

So this was a big, very complicated project, and I had no idea if it would work.

But I'm happy to say that it's actually working very well.

And last year we were able to release the first website version of Wolfram Alpha.

Its purpose is to be a full-fledged knowledge engine that computes answers to questions.

Let's try it.

Let's start with something really simple.

Hope for the best.

very good. have understood.

So far, so good.

(laughs) Let's try something a little more difficult.

Let's do some math. With any luck, you'll find an answer that will tell you something interesting about the math involved.

You can also ask anything about the real world.

For example, I don't know, what is Spain's GDP?

And you should be able to tell us that.

Now we can calculate something related to this. For example, let's say Spain's GDP is divided by -- I don't know.

Let's say Microsoft earnings.

(Laughter) The idea is that we can just type in this kind of question, no matter how we think about it.

Now let's ask some health questions.

Let's say the lab turns out to be...

As you know, a 50 year old male has an LDL level of 140.

Let's enter it. Then Wolfram Alpha uses available public health data to try to figure out what segment of the population you fall into, and so on.

Or, I don't know, let's ask about the International Space Station.

What's happening here is that Wolfram Alpha isn't just looking at something. It calculates in real time where the International Space Station is at the moment and how fast it is moving.

So Wolfram Alpha knows a lot of different things.

Everything in the standard reference library is pretty comprehensive so far.

But the goal is to go further, very broadly, to democratize all this knowledge and strive to become the authoritative source in all areas.

Allowing people to compute answers to specific questions they have by using built-in knowledge to compute new answers to specific questions, rather than looking up what others have previously written down.

Now, of course, Wolfram Alpha is a very large long-term project with many challenges.

First, we have to sift through a myriad of different sources of facts and data, and we've built a sizable pipeline of Mathematica automation and human domain experts to do this.

But that's just the beginning.

To actually answer the question, given raw facts and data, we have to do the math. That means implementing all the methods, models, algorithms, etc. that science and other disciplines have built over the centuries.

Well, even starting with Mathematica, this is still a huge amount of work.

So far, Wolfram Alpha has about 8 million lines of Mathematica code, built by experts in so many different fields.

A key idea of ​​Wolfram Alpha is that you can ask questions using normal human language. That is, it should be able to pick up and understand all the weird utterances people type into input fields.

And I must say that I thought that step might not be possible at all.

Two big things happened. One is a new idea about linguistics born from research in the computational universe. And second, the realization that having real computable knowledge completely changes the way we approach understanding language.

And of course, with Wolfram Alpha out in the wild, we can learn from real-life usage.

And indeed, there is some interesting co-evolution going on between Wolfram Alpha and human users, which is really encouraging.

Currently, when I look at web queries, over 80% of them are successfully processed the first time.

If you look at things like iPhone apps, the percentage is significantly higher.

So I'm pretty happy with everything.

In many ways, however, Wolfram Alpha is still in its early stages.

So everything is scaling up very well and we are more confident.

We can expect Wolfram Alpha technology to appear in more and more places, dealing with both this kind of public data, such as websites, and private knowledge, such as individuals and companies.

As you know, I've found that Wolfram Alpha really offers a whole new kind of computing that we can call knowledge-based computing. In this computing, we can start with vast amounts of built-in knowledge, not just raw computations.

When it does, it will change the economics of delivering computing, whether on the web or elsewhere.

As you know, we are in a very interesting situation right now.

On the one hand, we have Mathematica, with its precise, formal language and huge network of carefully designed features that can do a lot with just a few lines.

Here are some examples.

Here is a brief introduction to Mathematica programming.

Here we are consolidating different functions.

Here, in this line, we create a small user interface that allows us to do something fun there.

Continuing further, this is a slightly more complex program that performs all sorts of algorithmic processing, creates user interfaces, etc.

But it's very precise.

This is a precise specification with a precise formal language, letting Mathematica know what to do here.

On the other hand, we have Wolfram Alpha, which incorporates world chaos, human language, and more.

So what happens when you combine them?

On the contrary, I think it's really wonderful.

Using Wolfram Alpha within Mathematica allows you to write accurate programs that call real-world data, for example.

Here's a really simple example:

You can also give ambiguous input and ask Wolfram Alpha to understand what you are saying.

Let's try this here.

But really, I think the most exciting thing about this is that it actually gives us the opportunity to democratize programming.

In other words, anyone can say what they want to say in plain language.

The idea is that Wolfram Alpha will be able to find the exact pieces of code that do what they're looking for, and provide examples so they can choose what they need to build a larger, more accurate program.

So in some cases Wolfram Alpha can do all the work immediately and return an entire large program that can be computed later.

It's a big website with lots of different types of educational and other demonstrations.

Here is an example.

This is just one example of these computable documents.

This is probably a fairly small piece of Mathematica code that can run here.

have understood. Let's zoom out again.

So given the new kind of science, is there a common way to make technology out of it?

So when it comes to physical materials, we are used to traveling the world and discovering that certain materials serve certain technical purposes.

Well, it turns out that you can do almost the same thing in the computational world.

There are inexhaustible programs in the world.

The challenge is to see how to utilize them for human purposes.

For example, something like rule 30 turned out to be a very good randomness generator.

Other simple programs are excellent models of processes in the natural or social world.

And Wolfram Alpha and Mathematica, for example, are now filled with algorithms discovered by exploring the world of computation.

And, for example, this one, which we'll get back to here, is surprisingly popular among composers who explore the world of computation to find musical forms.

In a way, we can tap into the computational universe for massively customized creativity.

For example, we hope to take advantage of it and have Wolfram Alpha routinely invent and discover on the fly, discovering all sorts of cool things that engineers and gradual evolutionary processes would never come up with.

Well, that brings us to sort of the ultimate question. Is it possible that somewhere in the computational universe we will find our physical universe?

Perhaps our universe has very simple rules and even simple programs.

Well, if you look back at the history of physics, you would think that the laws of the universe must be pretty complicated.

However, in the world of computation, we have found that incredibly simple rules can yield incredibly rich and complex behaviors.

So is that what is happening across our universe?

If the rules of the universe are simple, then in some ways it is inevitable that they have to be very abstract and very low-level. For example, it operates so far below the level of space and time that it makes it difficult to express things.

But at least in the large-scale case, the universe can be thought of as some kind of network, and when it gets big enough, many molecules start behaving like continuous space, just as they behave like continuous fluids.

Now, the universe must evolve by applying small rules that gradually update this network.

And each possible rule corresponds in some way to a candidate universe.

In fact, I've never introduced these before, but here are some of the candidate universes I've considered.

Among these are also completely barren and hopeless universes with other kinds of pathologies, such as no concept of space, no concept of time, and no matter.

But an interesting thing I've discovered over the last few years is that we don't actually have to go very far in the computational universe before finding candidate universes that are clearly not ours.

Here's the problem. The likely candidates for our universe are necessarily full of computational irreducibility.

This means that knowing how it actually works and whether it matches our physical universe is very difficult.

A few years ago, I was very excited to discover that there exists a candidate universe with incredibly simple rules that can successfully reproduce special relativity and even general relativity and gravity, giving at least a hint of quantum mechanics.

So can you find the whole of physics?

I don't know for sure, but at the moment I think it would be a shame not to try it.

It's not an easy project.

We need to build a lot of technology.

We need to build structures that are probably at least as deep as existing physics.

And I'm not sure what the best way to organize the whole thing is.

Build teams, open up, offer prizes, and more.

But what I am here to tell you today is that I am committed to completing this project to see if within the next ten years we will finally have the laws of the universe and know where our universe is in all possible universes...

You can put "Theory of the Universe" into Wolfram Alpha and let it teach you.

(Laughter) So I've been working on computational ideas for over 30 years, building tools and methods, translating intellectual ideas into millions of lines of code and gists for server farms and more.

As I get older, I realize just how powerful the concept of computation actually is.

We've come a long way so far, and there's a lot more to come.

From the foundations of science to the limits of technology to the very definition of the human condition, I believe computation is destined to be the defining concept of our future.

thank you.

(Applause) Chris Anderson: It was amazing.

wait here I have a question.

(Applause.) That was an amazing talk.

Can you explain in a sentence or two how this type of thinking might one day be integrated into string theory and the kind of things people think of as the fundamental explanation of the universe?

Stephen Wolfram: Well, the parts of physics that we know to be true, like the standard model of physics. What I'm trying to do is either better reproduce the standard model of physics, or it's just wrong.

What people have been trying to do for the last 25 years or so with things like string theory has been an interesting quest to get back to the standard model, but we're not there yet.

My guess is that some major simplifications of what I'm doing might actually have quite a resonance with what's done in string theory, but it's a complex mathematical thing and I still don't know how it works.

CA: Benoît Mandelbrot is in the audience.

He also showed how complexity can arise from a simple start.

Is your job related to his?

SW: I think so.

I consider the work of Benoît Mandelbrot to be one of the founding contributions to this kind of field.

Benoit is particularly interested in nesting patterns such as fractals. It is like a tree in structure, with smaller branches and larger branches that make up even smaller branches.

That's one way to achieve true complexity.

I think things like rule 30 cellular automata take us to another level.

In fact, they take us to another level, to be very precise. Because they appear to be capable of ever-increasing complexity...

I could go on and on about this, but I'll stop. (Laughter) (Applause) CA: Thank you, Stephen Wolfram.

(applause)

Hello, my name is Roz Savage. I am crossing the sea in a boat.

Four years ago I completed a solo transatlantic and since then have completed 2 of the 3 transpacific stages from San Francisco to Hawaii and Hawaii to Kiribati.

And tomorrow I will leave this ship and return to Kiribati for the third and final stage of my transpacific journey.

In total, I've paddled over 8,000 miles, made over 3 million oar strokes, and spent over 312 days alone at sea in a 23 foot rowboat.

This created a special relationship between me and the ocean.

It's kind of a love-hate thing going on.

I feel a little like this about the very strict math teacher I once had in school.

I didn't always like her, but I respected her and she taught me a lot.

So today I would like to share with you some of my ocean adventures and tell you a little bit about what they taught me and how those lessons can be taken and applied to the environmental challenges we face today.

Now, some of you are saying, "Wait a minute, she doesn't look like a rower very much.

At this height and this width, shouldn't she probably look a little more like these people? ”

You see, they all have something I don't.

Well, I don't know what you're thinking, but I'm talking about beards. (Laughter.) And no matter how much time I spend at sea, I still haven't grown a decent beard, so I hope it stays that way.

For a long time, I didn't believe I was capable of big adventures.

The story I told myself was what adventurers are like.

I didn't see that part.

They were, and I thought we were, but I wasn't one of them.

So for eleven years I was obedient.

I did what people with similar backgrounds should do.

I was working as a management consultant in our London office.

And I think I knew from day one that it wasn't the right job for me.

But that kind of conditioning kept me there for years until I hit my mid-30s, and I thought, 'I'm not going to do anything.

I feel like this life has a purpose, I don't know what it is, but I'm pretty sure management consultants aren't that.

So let's fast forward a few years.

I have gone through some changes.

Trying to answer the question, "What should I do with my life?"

One day I sat down and wrote two versions of my obituary. One was the adventurous life I wanted and the other was the nice, normal, fun life I was actually heading for, but it wasn't where I wanted to be by the end of my life.

I wanted to live a life that I could be proud of.

And I remember looking at these two versions of my obituary and thinking, 'Oh, I'm totally on the wrong track here.

If you continue to live the way you are now, you won't get where you want to be in five years, ten years, or at the end of your life. ”

I made a few changes, let go of the loose ties of my life, took a few leaps of logic, and decided to paddle across the Atlantic.

(Laughter) The Atlantic Boat Race is about 3,000 miles from the Canary Islands to Antigua, and it turned out to be the hardest race I've ever done.

Sure, I wanted to step outside my comfort zone, but I didn't realize that stepping out of my comfort zone was, by definition, a very uncomfortable thing to do.

And my timing wasn't great either. 2005 was the year of Hurricane Katrina when I tried the Atlantic.

Since records began, the North Atlantic has experienced more tropical cyclones than ever before.

And quite early on, those storms began to make their presence known.

All four oars broke before I reached the halfway point.

Oars shouldn't look like this.

But what can you do? you are in the middle of the sea

Oars are the only means of propulsion.

So I just had to look around the boat and figure out what to use to fix these oars to keep the boat going.

So I found a boat hook and some go-to duct tape and ripped the boat hook into the oars to reinforce it.

So when it broke I sawed an axle out of a spare boat seat and used it.

And when they lost their power, I cannibalized one of the broken oars.

In my old life, I wasn't very good at fixing things, but it's amazing how resourceful I can be in the middle of the ocean when there's only one way to get to the other side.

And oars have become a symbol of how far I've gone beyond what I thought was my limit.

I had tendonitis on my shoulder and a salt water sore on my butt.

I was really tormented mentally and completely overwhelmed by the scale of the challenge and realized that 3,000 miles would take a very long time if I kept going at 2 miles per hour.

There were many times when I thought I was going to hit my limit, but I had no choice but to just keep going and figure out how to get to the other side without driving myself crazy.

After 103 days of sailing, they finally arrived in Antigua.

I don't think I have ever felt so happy in my life.

It was like running a marathon, getting out of a cell, and winning an Oscar all rolled into one.

I was euphoric.

And seeing people come out to greet me, standing on the cliffs clapping and cheering, made me feel like a movie star.

It was really great.

And then I learned that the bigger the challenge, the greater the feeling of accomplishment when you complete it.

So this might be a good time to take a moment to answer some of the ocean rowing FAQs on your mind.

The question I get asked most often is "What do you eat?"

I have some freeze-dried meals, but mostly I try to eat more unprocessed foods.

So I grow my own sprouts.

I eat a lot of fruit and nut bars and nuts.

And it's usually about 30 pounds lighter on the other side.

Question 2: How do you sleep?

keep your eyes closed. Hahaha.

I think what you're probably saying is, "What happens to the boat while I'm sleeping?"

Well, plan your route like you're drifting with the wind and current while you sleep.

On a good night, I think my best so far was 11 miles in the right direction.

Worst ever, 13 miles in the wrong direction.

Worst day at the office.

what do i wear

Mostly a baseball cap, boating gloves, and a smile, or a grimace depending on whether you've gone retrograde overnight, and a ton of sunscreen lotion.

Do you have a tracking boat?

no i don't. I am completely self-sufficient there.

While I'm at sea, I basically don't see anyone.

And finally, am I crazy?

Well, I'll leave that up to you.

So how do you paddle across the Atlantic?

Naturally, you decided to paddle across the Pacific Ocean.

Well, I thought the Atlantic Ocean was big, but the Pacific Ocean is really, really big.

I think we tend to do a little bit worse on normal maps.

I'm not sure if the British invented this particular worldview, but I suspect we probably did too. We were right in the middle, cutting the Pacific in half and flying it to the far corner of the world.

On the other hand, in Google Earth, the Pacific Ocean looks like this.

It covers almost half of the earth.

You can see a little bit of North America above here, and part of Australia below.

It's very large, 65 million square miles. And rowing across it in a straight line is about 8,000 miles.

Unfortunately, ocean rowboats rarely go straight.

By the time you get to Australia, if you get to Australia you'll probably have paddled a total of 9 or 10,000 miles.

So, I decided to divide this very large undertaking into three segments, because no one would have the sane idea to paddle straight past Hawaii without stopping there.

The first attempt didn't go very well.

In 2007, I did three rather involuntary capsize exercises in 24 hours.

It's like being in a washing machine.

The boat got a little dirty and so did I.

I wrote a blog about it. Unfortunately, someone with a bit of a hero complex has decided that this maiden is in pain and needs to be saved.

I first learned of this when a Japan Coast Guard plane appeared overhead.

I tried to tell them to leave.

There was a bit of a battle of wills.

Lost and airlifted.

Awful, really awful.

It was one of the worst feelings of my life as I wondered if I'd ever see her again as I was pulled up by the helicopter on the winch line, overlooking that trusty little boat rolling in six-foot waves.

So we had to start a very expensive salvage operation and wait another nine months before we could go back to sea.

But what do you do?

Roll 9 times and get up 10 times.

So the next year I left and was lucky enough to make it to Hawaii this time.

However, it was not without misfortune.

My water filter broke and only the most important kit I have on my boat broke.

Powered by solar panels, it sucks in seawater and turns it into freshwater.

But it doesn't react much when submerged in the ocean, and that's what happened.

Fortunately, help was just around the corner.

At the same time, another rare boat was out there, doing the same as I did, raising awareness of the North Pacific Garbage Patch. The North Pacific Garbage Patch lies in the North Pacific, about twice the size of Texas, with an estimated 3.5 million tonnes of garbage circulating in the center of the North Pacific Circulation.

So, the bottom line is, they actually built a boat out of plastic waste, and 15,000 empty water bottles were strung together on two pontoons.

they were going very slowly.

Partially, there was a slight delay.

They had to dock at Catalina Island immediately after leaving Long Beach. All the water bottle caps had come off and started to sink.

So they had to pull up and close all the lids.

But as I was nearing the end of the reservoir, luckily our courses began to converge.

They were short of food. I'm out of water.

So we got in touch by satellite phone and made an appointment to meet.

And it took about a week to actually converge gradually.

I was making a pathetically slow speed of about 1.3 knots and they were making slightly less, a pathetic speed of about 1.4 knots. It was like two snails doing a mating dance.

But in the end we managed to meet and Joel jumped off the boat and caught a beautiful big mahi-mahi. It was the best food I've had in at least 3 months.

Luckily, what he caught that day was better than this one he caught a few weeks earlier.

When I opened it, my stomach was full of plastic.

This is really bad news because plastic is not an inert material.

Chemicals leach out of the flesh of the poor creature that eats it, and when we come and eat the poor creature, we also accumulate toxins in our bodies.

It therefore has very real implications for human health.

I survived and made it to Hawaii.

The following year, she embarked on the second stage of the Pacific from Hawaii to Tarawa.

And you will notice something about Tarawa. It's very low.

It's a little green patch on the horizon and they're very nervous about rising sea levels.

This is a big problem for them.

They have no land above about 6 feet above sea level.

In addition, the increase in extreme weather due to climate change is expected to cause waves to surge over surrounding reefs and contaminate freshwater supplies.

I met with the president there and talked about his country's exit strategy.

He estimates that 100,000 people living there will have to move to New Zealand or Australia within the next 50 years.

It made me wonder what I would feel if England disappeared under the waves. If the place where I was born, where I went to school, where I got married, if all the places were gone forever.

Literally what a baseless thing I feel.

Soon I will be leaving for a challenge to Australia. If successful, she will be the first woman to paddle across the Pacific alone.

And I'm using this to raise awareness of environmental issues and bring a human face closer to the ocean.

If the Atlantic Ocean was a journey within oneself, a journey of discovering one's own abilities, then the Pacific Ocean may have been an outward journey of finding out how one's interesting career choices can contribute to the world, and how one can put what one has learned there out into the world and apply it to the situation in which humanity finds itself today.

I think there are probably three important points.

The first is about the stories we tell ourselves.

For a long time, I told myself I wasn't six feet tall, athletic enough, and didn't have a beard to be adventurous.

And then the story changed.

I learned that people paddled across the sea.

I met one of them and she was just as big as me.

So, even if I didn't grow taller or grow a beard, something changed. My inner dialogue changed.

At this point, what we're collectively telling ourselves is, 'We need this much, we need oil.'

But what if we changed the story a little?

We have alternatives, and we have the power of free will to choose those alternatives, sustainable options, to create a greener future.

The second is about the accumulation of small actions.

We may think that everything we do as individuals is just a drop in the ocean and cannot make a big difference.

But it will. In general, we have never been caught in this mess by a major disaster.

Sure, there were Exxon Valdez and Chernobyl, but for the most part it was a series of bad decisions made by billions of individuals every day and every year.

And, likewise, we can turn the tide.

We will be able to make better, smarter and more sustainable decisions.

And when we do that, we are no longer just one person.

Everything we do creates ripples.

If you stand in line at the supermarket and pull out a reusable shopping bag, other people will see you.

Perhaps if we all start doing this, it may become socially unacceptable to say yes to plastic at the cash register.

That's just one example.

This is a worldwide community.

Another point is to take responsibility.

For most of my life, I wanted something else that would make me happy.

I thought that if I had the right house, the right car, or the right man in my life, I would be happy.

But when I wrote that obituary, I realized that I needed to actually grow up a little bit in that moment and create my own future.

I couldn't just passively wait for happiness to come and find me.

And I consider myself a selfish environmentalist.

I plan to live a long time and I want to be happy and healthy when I am 90.

And it is very difficult to be happy on a planet plagued by hunger and drought.

It is very difficult for us to stay healthy on a planet that pollutes the earth, oceans and air.

So, very soon, we will be launching a new initiative called Eco-Heroes.

And the idea here is that every ecohero logs at least one green act each day.

It's going to be a little game.

I will make an iPhone application based on this.

We just want to create that awareness. Because changing a lightbulb won't change the world, but the attitude and awareness of changing a lightbulb or getting a reusable coffee mug can change the world.

We truly believe that we stand at a very important point in history.

we have a choice. We have been blessed or cursed by our free will.

We can choose a greener future, and together we can get there, one step at a time.

thank you.

(applause)

Most of the great talks you've heard in the last few days have been by people with the distinction of having thought about something, being experts and knowing what's going on.

You all know the subject that I am going to talk about.

I mean, I know what simplicity is and what complexity is.

The problem is that I am not.

And what I'm about to do is share my ignorance on this issue with you.

Please read this as we will be back soon.

This quote is from the legendary Potter Stewart opinion on porn.

And let's read the important details here: "A brief description, ["hardcore porn"];

But you can see it. ”

I'll get back to you on this soon.

So what is simplicity?

A few examples are a good place to start.

Coffee Cups -- We're not thinking of coffee cups, but they're much more interesting than one might think -- coffee cups are devices with a container and a handle.

A handle allows you to grip the hot liquid as it fills the container.

Why is that important?

Well, now you can have coffee.

But by the way, the coffee is hot and the liquid is sterile. That way, you are less likely to catch cholera.

In short, coffee cups, or cups with handles, are one of the tools used by society to maintain public health.

Scissors are clothes, glasses are for seeing things, to prevent being eaten by cheetahs or being run over by cars, books are education after all.

But there is another class for simple things that are very important.

Although functionally simple, its construction is far from simple.

The two mentioned here are just examples.

One is the mobile phone that we use every day.

And it's based on complexity, with some very different characteristics than my friend Benoît Mandelbrot discussed, but very interesting.

And the other, of course, is birth control pills. This is a very simple way to change the role of women in society by providing women with the opportunity to make reproductive choices, and to fundamentally change the fabric of society.

So, I think there are two ways of thinking about this word.

Here I broke the Potter Stewart quote by saying that you can think of anything, from scissors to mobile phones to the Internet to birth control pills, they are simple, they are simple in function, and you recognize what that simplicity is when you see it.

Or maybe there is another way. That is, if it is relevant to moral philosophers, it is to base the problem on what is called the teapot problem.

I raise the teapot problem this way.

Suppose you have a teapot and the teapot is filled with hot water.

Then ask the following questions: "Why is the water hot?"

It's a simple question.

It's like, what is simplicity?

One answer would be that water molecules have high kinetic energy and bounce off objects quickly. This is a kind of physical science argument.

A second argument is that it had been placed on a burning stove. This is a historical discussion.

Third, I wanted hot water for my tea. This is a deliberate discussion.

And since this is the term of a moral philosopher, the fourth is that it is part of God's plan for the universe.

These are all possibilities.

The point is, if you ask one question with one box to enter the answer, you'll run into problems. That one question is actually a lot of questions with the same words but with completely different meanings.

Ask, "What is simple?" I think it falls into that category.

What is the current state of science?

And interestingly, the complexity has evolved to a very high degree.

There is a lot of interesting information about what complexity is.

The reasons are a bit obscure, but simplicity is rarely pursued, at least in academia.

We scholars – I am scholars – love complexity.

You can write a thesis about complexity, but the nice thing about complexity is that it's basically unwieldy in so many ways that you don't take responsibility for the consequences. (Laughter) Simplicity -- You guys want to build whatever you can in Waring Blender in the morning, but you don't want to explode or play Beethoven.

You are not interested in these limits.

Therefore, what a person is interested in has a lot to do with the system's rewards.

And there are more benefits to thinking about complexity and emergence than about thinking about simplicity.

One of the things I like to do is help with very important tasks. This is something you might not know is done too often, but figuring out how to sit next to a physicist at a dinner party and have a conversation. (Laughter) And what I want you to notice are the words "complexity" and "emergence." Because with these words you can start a conversation and fantasize about other things.

(Laughter) Now, what is complexity in this way of looking at things, and what is emergence?

In fact, we have a definition of complexity that works pretty well.

It's a system with components, just like transportation.

Components interact with each other.

These are cars and drivers. They dissipate energy.

It turns out that strange things always happen when you use that system. If you live in Los Angeles, you probably know this better than anyone else.

Here is another example. This is because it is a very important example of current science.

It's probably unreadable. This isn't meant for you to read, but it's just a small part of the chemistry going on in each of your cells at any given time.

And it's like the traffic you see.

What's surprising about this cell is that it actually maintains a fairly stable working relationship with other cells, but we don't know why.

Those who say we understand life, go away.

Let's reduce this to the simplest level.

Recently, I was contacted by Bill Gates.

We all study, to some extent, what is called Bill Gates.

very. Learn all you can about it.

Then, sometimes I study other kinds of things, but I study them with all the zeal.

That's Bono, that's Bono.

But knowing all there is to know about these two things, and putting them together, what can we say about this combination?

The answer is, not much.

And that's the complexity.

Now, extending it to cities and societies obviously raises interesting questions.

got it. So let me give you an example of a particular kind of simplicity.

And I'd like to introduce a term that I find very useful is stacking.

And I'm going to use stacking for a kind of simplicity, characterized by being simple and reliable enough that you can build something with it.

Alternatively, I intend to use simple to mean reliable, predictable, and repeatable.

Take the Internet as an example. Because it's a particularly good example of layered simplicity.

We call it a complex system, and it is, but it is something else.

The internet starts with math, it starts with binaries.

And looking at the list at the bottom, we are all familiar with the Arabic numerals from 1 to 10.

In binary, 1 is 0001 and 7 is 0111.

The question is, why is binary easier than Arabic?

The short answer is that if you put up three fingers, you can easily count, but if you put up this, it's hard to say that you've done seven.

The advantage of binary is that it is the easiest way to represent numbers.

Others are more complicated.

It lets you catch errors, is cleaner to read, and binaries have a lot to offer.

So once you learn how to read it, it's very easy.

Now, if we want to represent these 0s and 1s in binary, we need a device.

Think about the dualistic things in your life. One of them is the light switch.

You can turn it on or off. it's binary.

Well, we all know wall switches fail.

But about 50 years ago, our condensed matter physicist friends managed to invent a very good device, the transistor, shown under that bell jar.

A transistor is just a wall switch.

It turns things on and off, but it works with no moving parts and basically doesn't break down for very long periods of time.

So the second layer of simplicity was the transistor of the internet.

Transistors are so simple that they can be combined in many ways.

When you put a lot of them together, you get what is called an integrated circuit.

And today's integrated circuits may contain a billion transistors in each of these chips, all of which must work flawlessly at all times.

This is the next layer of simplicity, and indeed integrated circuits are very simple in the sense that they generally work very well.

Mobile phones can be made using integrated circuits.

You are used to using your mobile phone most of the time.

In Boston... Boston is a bit like Namibia in terms of cell coverage (lol) so we're not used to it all the time, but sometimes it is.

But really, if you have a mobile phone, you can go to this lovely lady in places like Namibia. Even though she doesn't have a master's degree in electrical engineering from MIT, she's very happy with the fact that she can hack cell phones and get power in interesting ways.

And from there the Internet is born.

This is a map of bitflows for the entire continent.

The two bright blobs in the center are the United States and Europe.

And back to simplicity again.

So here's what I think is one of the great ideas. That's Google.

This simple portal claims to give you access to all the information in the world.

But the point is that the singularly simple idea is built on layers of simplicity compounded with the complexity of its own simplicity in the sense that it is wholly reliable.

So I'd like to conclude with four general statements, examples, and two maxims.

I think traits help you think about simple things. First, they are predictable.

Their behavior is predictable.

Now, one of the nice things about simple things is that you generally know what they're doing.

Simplicity and predictability are therefore hallmarks of the simple.

Second, and this is true, it's cheap.

If you have something cheap enough, people will find a use for them, even if it seems very primitive.

For example, stone.

You can build a cathedral out of stone, but you have to know what it does.

Cut them into blocks and stack them to support the weight.

Therefore, it must have functionality, be predictable in that functionality, and have a low cost.

This means that high performance or cost performance is required.

And I suggest these as the last component that works or could work as a building block.

That means they can be stacked.

And the stack can mean this way, or this way, or any n-dimensional space.

But if something with functionality is so cheap, people will find new ways to combine it to make new things.

Cheap, functional and reliable, it unleashes people's creativity to create things they can't even imagine.

There is no way to predict the Internet based on the first transistor.

It is impossible.

These are the components.

Here I would like to give an example from the work we do ourselves.

We are very interested in providing healthcare in developing countries and one of the things we want to do in this particular business is find a way to do medical diagnostics at as close to zero cost as we can manage.

So how do we do that?

This is a world without electricity, money, and medical capabilities.

I'm not going to spend time going into details, but in the bottom right corner you can see an example of what we have to offer.

It's a small piece of paper.

Several have been printed using the same technology used to create comic books, which was the inspiration for this particular idea.

And in this case put a drop of urine on the bottom.

It grows towards these little branches.

As you know, no electricity is required.

Color changes. In this particular case, we read renal function.

And so many medical workers in this part of the world are 18-year-olds with AK-47 who happen to be off work and are willing to go around and do this stuff, so you can take a picture of it with your cell phone and send that picture back to where the doctor is and the doctor can see it.

That is, they took advantage of technology that is available everywhere to create a very cheap device, and they made it in a very reliable way.

If we can achieve this, if we can build more features, it will be stackable.

So if you can get one or two of the underlying techniques to work, it can be applied to a wide variety of human situations and is therefore scalable both vertically and horizontally.

I have to say part of my interest in this is that I want to do this. How would you phrase this politely? --Change or emasculate the capital structure of the US health care system, which I believe is fundamentally broken.

So let's wrap up -- (Applause) I'd like to conclude with my two maxims.

One of them is from Einstein, who said, "Everything should be as simple as possible, but no simpler."

And I think that's a very good way of thinking about the problem.

If you strip too much of something superfluous from something simple, you lose functionality.

You need low cost, but you also need functionality.

So it can't be too simple.

The second is a design issue, not directly related, but a great statement.

This is the work of de Saint-Exupéry.

and he says: “You know a design is perfect not when there is nothing left to add, but when there is nothing left to take away.”

And it's certainly going in the right direction.

So I think you can start with this kind of cut on the word simplicity, but this is not the case with Brancusi, nor does it answer the question of why Mondrian is better or worse than Van Gogh, simpler or less simple, nor does it clearly address the question of whether Mozart is simpler than Bach.

But it is also, in a way, what separates the real world of people who make things from the world of people who think things. So there is an intellectual merit to asking, "How can we make things as simple as possible, as cheap as possible, as functional as possible, and as freely interconnected as possible?"

If we can achieve that kind of simplicity with our technology and give it to you, you can do all sorts of amazing things with it.

thank you very much.

(Applause) Chris Anderson: Easy question.

Can you imagine, then, that the science of simplification could go so far as to look at various systems, say financial systems, legal systems, medical systems, etc., and say, "This has reached a dangerous or dysfunctional stage because, and this is how to simplify it"?

George Whiteside: Yes, I think we can. Because if you look at the components that make up your system and research their vulnerabilities and stability, you can probably build a kind of risk assessment on that basis.

CA: Did you start doing that?

With regard to the healthcare system, we have some kind of radical solution in terms of cost, but what about the system itself?

GW: Right.

What if we put it simply? no.

CA: That was a simple and powerful answer. GW: Yes.

CA: So, in terms of that diagnostic technology you have, where do you think it is and when might it be deployed at scale?

GW: It will be published soon. So the system works and you have to find a way to make it or do this sort of thing, but the basic technology works.

CA: Start a company and…

GW: foundation, foundation. Non-commercial.

CA: Okay. Well, thank you very much for speaking with us. thank you. (applause)

Visit the TED website and you can now find a week's worth of TEDTalk videos, over 1.3 million words of transcripts, and millions of user ratings.

And that's a huge amount of data.

So I wondered. “Once we got all this data and did some statistical analysis, could we reverse engineer a TEDTalk?”

Can you create the ultimate TEDTalk?

(Laughter) (Applause) And can you please make a bad TEDTalk that's still acceptable?

To find this out, I looked at three things. We considered the topic to choose, how it should be presented, and the visuals on stage.

Now for the topic. There are a wide variety of topics to choose from, but choose wisely, as topics are strongly correlated with how users react to your talks.

Now, to make this more concrete, let's take a look at the list of the top 10 words that stood out statistically in the most popular and least popular TEDTalks.

So if you're here to talk about how French coffee spreads euphoria in our brains, so be it.

(Laughter) (Applause) On the other hand, if you want to talk about your projects about oxygen, girls, planes, actually, I'd love to hear about it.

oh well.

To generalize this, the most popular TEDTalks are those on topics that we can easily and deeply relate to, such as happiness, our own bodies, food, and emotions.

And more technical topics such as architecture, materials, and, oddly enough, men are not the right topics to talk about.

How should the talk be delivered?

TED is notorious for keeping watch very tight, so they'll hate me if I expose this. Because, really, you should talk as much as they allow. (Laughter) Because the most popular TEDTalks average over 50% longer than the least popular TEDTalks.

And this is true for all ranking lists on TED.com, unless you want a beautiful, moving, funny talk.

Then I should say it briefly. (laughs) But other than that, talk until you get dragged off the stage.

(Laughter) Well, in the meantime...

(Applause.) There are some rules to follow while tracking time.

I discovered these conventions by comparing statistics for four-word phrases that occur more frequently in the most popular and least popular TEDTalks.

Here are three examples.

First and foremost, as a speaker, I have to serve my audience and talk about what I can give you instead of saying what I can't do.

Second, it is imperative not to quote the New York Times.

(Laughter) And finally, it's okay for speakers to fake their intellectual abilities. This is good news.

If you don't understand something, you can say "and so on."

Please stay with me.

No problem at all.

(Applause) Now let's move on to visuals.

The loudspeakers are the most visible on stage.

Analysis shows that if you want to be your favorite TED speaker, you need to grow your hair a little longer than average, wear glasses all the time, and dress a little better than your average TED speaker.

Slides are fine, but you might consider using props.

And most importantly, the atmosphere on stage.

Color plays a very important role.

The color correlates closely with the talk's rating on the website.

(Applause) For example, engaging talks have a statistically high amount of just this blue color, (Laughter) much more than your average TEDTalk.

Ingenious TEDTalks, plus this green one, and more.

(Laughter) (Applause) Now, personally, I don't think I'm the first to do this analysis, but I'll leave that to your good judgment.

So it's time to put it all together and design the ultimate TEDTalk.

Well, this is TEDActive, and the analysis tells me that it should really have something to offer. So instead of pushing the ultimate or worst TEDTalk, we give you the tools to create your own TEDTalk.

I call this tool TEDPad.

(Laughter) And TEDPad is a matrix of 100 specially selected, highly curated sentences that you can easily piece together to create your own TEDTalk.

Only one decision needs to be made. Will it use the white version for a very good TEDTalk about creativity and human genius?

Or are you going to use the black version where you can make really bad TEDTalks, mostly about blogs, politics, etc.?

Download and enjoy.

Enjoy the session.

We hope you enjoy designing your own ultimate and worst TEDTalk.

And I hope someone will take inspiration to create this next year. I would really like to see that.

thank you very much.

(Applause.) Thank you.

So here it is. You can check: I'm short, I'm French, I have a pretty strong French accent, it will become apparent soon.

Maybe it's a sober thought, and maybe you all know it.

I hope many of you have given something to the people of Haiti this year.

And there is something else I believe in the back of your mind. You know that too.

That means 25,000 children die every day from completely preventable causes.

In Haiti, an earthquake occurs every eight days.

And I suspect many of you have probably done something to that problem as well, but somehow it doesn't happen with the same intensity.

Why?

Now, let's do a thought experiment here.

Imagine you have millions of dollars that you have collected. Perhaps you are a politician in a developing country and have a budget available. You want to use it for the poor, what do you do?

Do you believe people who say all we have to do is money?

Now that we know how to end poverty, do we need to do more?

Or do you believe those who say that aid is useless, may hurt, and exacerbate corruption, dependence, etc.?

After all, we have spent billions of dollars on aid.

A look into the past might help.

Anything good?

And unfortunately we don't know.

And worst of all, we'll never know.

Let's take Africa as an example.

Africans have already received a lot of help.

These are the blue bars.

And Africa's GDP is not very advanced.

Okay then. How do you know what would have happened without your help?

It could have been worse, it could have been better.

we don't know. I don't know what is counterfactual.

There is only one Africa.

So what do you do?

To give help, hope and pray that something will come out of it?

Or do you just focus on your daily routine and let the quakes keep happening every eight days?

The thing is, if we don't know if we're doing something good, we're no better than the Medieval Doctor and his leeches.

Some people get better, others die.

Hill? something else?

I do not understand.

So let me ask you some other questions.

A small question, but not a very small one.

Vaccination is the cheapest way to save a child's life.

And the world has poured a lot of money into it. GAVI and the Gates Foundation each plan to contribute significant sums of money, and the developing countries themselves have made significant efforts.

Nevertheless, at least 25 million children each year do not get the immunizations they deserve.

This is the so-called "last mile problem".

Even though the technology and infrastructure are there, it's not happening.

So you got a million.

How will you spend your million to solve this last mile problem?

Another question is malaria. Malaria kills nearly 900,000 people each year, most of them in sub-Saharan Africa, most of them under the age of five.

In fact, it is the leading cause of under-five mortality.

We already know how to kill malaria, but some people ask, "You have millions of dollars, what about mosquito nets?"

Mosquito nets are very cheap.

For $10, you can manufacture and ship insecticide-treated mosquito nets and teach someone how to use them.

And besides protecting the person sleeping under it, it also has the great advantage of being contagious.

If half the community sleeps under the net, the other half will also benefit as the disease spreads.

Yet only a quarter of at-risk children sleep under nets.

Society should actively subsidize the net, give it away for free, or even pay people to use it because of its contagious benefits.

"It's not that fast," says another.

"If you give the net away for free, people won't appreciate it.

They aren't going to use them, at least not as mosquito nets, and probably not as fishing nets. ”

So what do you do?

Do you offer the net for free for maximum coverage, or do you charge for it to see if it's really worth it?

how do you know?

And the third question is education.

Maybe that's the solution and maybe we should send our kids to school.

But how do we do that?

Are you hiring teachers? Build more schools?

Do you have school lunches?

how do you know?

So here comes the problem.

I can't answer the big question of whether the help was helpful.

But we can answer these three questions.

It's not the Middle Ages anymore, it's the 21st century.

And in the 20th century, randomized controlled trials made it possible to distinguish between drugs that worked and those that didn't, revolutionizing medicine.

And we can do the same randomized controlled trials for social policy.

The same rigorous scientific tests we use for medicines can be applied to social innovation.

In this way, knowing what works, what doesn't and why can take the guesswork out of policymaking.

Here are some examples of these three questions.

So let's start with vaccinations.

This is the Udaipur district of Rajasthan. beautiful.

About 1 percent of the children were fully vaccinated when I started working there.

It's bad, but there are places like that.

Now, it's not because there is no vaccine. A vaccine exists and is free. Nor is it because parents don't care about their children.

If the same children who were not vaccinated against measles contracted measles, their parents would end up spending thousands of rupees to help them.

This results in empty village sub-centers and overcrowded hospitals.

So what's the problem?

Indeed, part of the problem is that people don't fully understand it.

After all, there are all sorts of myths and misconceptions about vaccinations in this country too.

If so, it's hard because persuasion is really hard.

But maybe there is another problem.

It is the transition from intention to action.

Imagine that you are a mother from Udaipur district, Rajasthan.

We have to walk several kilometers to get our children vaccinated.

And perhaps when you get there, you'll find out: The subcenter is closed. Oh, I have to go home, I'm so busy, and I have so many other things to do that I can't help but procrastinate and procrastinate until it's too late.

Well, if that matters, it's a lot easier.

Because A can be done easily, and B may give people a reason to act today instead of waiting until tomorrow.

These are simple ideas, but we didn't know.

Let's try it.

So what we did was conduct a randomized controlled trial in 134 villages in Udaipur district.

Therefore, blue dots are randomly selected.

It was easy. I'll show you how to do that later.

The red dot made it easy and gave people a reason to act now.

White dots are comparisons, nothing has changed.

So we make it easier by organizing monthly camps where people can get their children vaccinated.

And adding a kilo of lentils to each immunization makes it easy and gives you a reason to act now.

Well, a kilo of lentils is small.

You can never persuade someone to do something they don't want to do.

On the other hand, if your problem is that you tend to procrastinate, it might give you reason to act today instead of later.

So what will you find?

Well, in advance, everything is the same.

That's the advantage of randomization.

After that, the camps – just by holding camps – increase vaccination coverage from 6 percent to 17 percent.

That is complete vaccination.

It's not a bad thing, it's a good improvement.

Adding lentils reaches 38 percent.

Now you have the answer.

Simply put, giving 1 kg of lentils increases vaccination rates by a factor of 6.

Now, you might say, "Well, but it's not sustainable.

You can't keep feeding people lentils. ”

Well, it turns out to be the wrong economics because it's cheaper to give lentils than not to give them.

Nurses have to be paid anyway, so incentives cost less per shot than without incentives.

What about mosquito nets?

Should I give it away for free or should I pay for it?

So the answer depends on answering three simple questions.

One, would people buy mosquito nets if they had to pay for them?

Second, if we gave away mosquito nets for free, would people use them?

Third, do free bed nets discourage future purchases?

The third is important. Because if people get used to handouts, it could destroy the market for distributing free bed nets.

Now, this is a discussion that has generated a lot of emotion and angry rhetoric.

This is more ideological than practical, but it turned out to be an easy question.

We know the answer to this question.

just run the experiment.

Many experiments have been done, all with the same result. Therefore, only one experiment is described here.

This was in Kenya, they were handing out vouchers and discounts to people.

So those with vouchers can get mosquito nets from local pharmacies.

And some people get 100 percent off, some people get 20 percent off, some people get 50 percent off.

And now we can see what happens.

What about purchases?

Now, what you can see is that if people had to pay for the mosquito nets, the coverage would actually drop significantly.

So even with partial subsidies, $3 is still not the full net. And now only 20 percent of people have mosquito nets, so they lose health immunity. This is not great.

Second, what are the uses?

The good news is that people who have mosquito nets will use them regardless of how they get them.

If you get it for free, they use it.

If they have to pay, they will use it.

What about the long term?

In the long term, those who received free bed nets were offered the option to purchase bed nets for $2 a year later.

And in fact, people who got the free one were more likely to buy a second one than those who didn't get the free one.

So people don't get used to handouts. They get used to the net.

Perhaps we should give them a little more credit.

That is, it is for mosquito nets. So you think, 'That's great.

You know how to vaccinate children and how to give mosquito nets. ”

But politicians need a wide range of options.

They need to know: Of all the things I can do, what is the best way to reach my goals?

So let's say your goal is to get your kids into school.

There are many things you can do. You can pay for uniforms, abolish fees, build toilets, even give girls sanitary napkins.

So what's the best?

Well, on some level, we think all this should work.

So is that enough? If you think it should work intuitively, should you adopt it?

Well, in business, it never works that way.

For example, consider the transportation of goods.

Until the invention of canals in pre-industrial England, goods were transported in horse-drawn carriages.

And canals were built, and the same horse and the same horse could carry ten times as much load.

Should they, then, have continued to wagon their loads on the ground so that they would eventually get there?

Well, if that were the case, the Industrial Revolution wouldn't have happened.

So why shouldn't social policy do the same?

In technology, we spend so much time experimenting and tweaking and finding absolutely cheap ways to do things, why not do it with social policy?

Now, what the experiment can do is answer a simple question.

Suppose you have $100 available for various interventions.

How many more years of education can $100 get you?

From here, we will introduce what can be obtained by various educational interventions.

So the first one is to hire teachers, school lunches, uniforms and scholarships if you want the usual suspects.

That's not a bad thing. For $100, you can get 1-3 more years of education.

What doesn't work so well is bribing parents. With so many children already in school, you will be spending a lot of money.

And here is the most surprising result.

Tell people about the benefits of education. It can be done very cheaply.

So for every $100 you spend on this, you'll get another 40 years of education.

And where there are intestinal worms, cure your children of them.

And for every $100 you get almost 30 years of additional education.

So this is not your intuition and not what people wanted, but nonetheless, these are programs that work.

We need that kind of information, we need more information, and then we need to guide policy.

Well, I started with a big question, but I couldn't answer it.

And I've split it up into smaller questions and have answers to these smaller questions.

And those are good, scientifically sound answers.

Let's go back to Haiti for a moment.

About 200,000 people died in Haiti, though the latest estimates suggest a little more.

And the world's reaction has been great. Just last month, $2 billion was pledged, so that's about $10,000 per death.

Come to think of it, it doesn't seem so.

But if we spend $10,000 every time a child under the age of five dies, that problem alone will cost us $90 billion a year.

Still it doesn't happen.

So why is that?

Well, I think what part of the problem is that even though the problem is huge in Haiti, somehow we understand it and it's local.

If you give Doctors Without Borders money, if you give Partners in Health money, they'll send doctors, they'll bring in lumber, they'll bring in packages in helicopters.

And the problem of poverty is not like that.

First, it is almost invisible. Second, it's huge. Third, we don't know if we're doing the right thing.

There is no silver bullet.

Helicopters cannot lift people out of poverty.

It's so frustrating.

But look what we did today.

I have given 3 simple answers to 3 questions. Giving lentils to vaccinate people, providing free mosquito nets and deworming children.

Vaccinations and mosquito nets can save lives at $300 for each life saved.

Deworming gives you an extra year of education for $3.

So we can't eradicate poverty yet, but we can start.

And maybe we can start small with what we know works.

Here's an example of how this can be powerful.

Anthelmintic.

Worms have a bit of trouble grabbing headlines.

They aren't beautiful and they don't kill anyone.

Nevertheless, when the young world leaders of the Davos meeting showed the numbers I gave you, they started to deworm the world.

And thanks to the efforts of Deworm the World and governments and foundations in many countries, 20 million school-age children were dewormed in 2009.

So this evidence is strong.

can inspire action.

So you should start now.

It's not easy.

This is a very slow process.

We have to keep experimenting and sometimes practicality has to take precedence over ideology.

And what works in one place may not work in another.

So it slows down the process, but there's no other way around it.

These economics that I am proposing are like 20th century medicine.

It is a slow and deliberate process of discovery.

There is no miracle cure, but modern medicine saves millions of lives each year, and we can do the same.

And now, perhaps, I can get back to the bigger question I started with.

I don't know if the aid we've spent in the past has made a difference, but can we come back here 30 years later and say, 'What we did really spurred change for the better'?

I believe it can be done and I hope it will.

thank you.

(applause)

How do you explain when things don't go as planned?

More to the point, how can you explain when others can accomplish something that defies all assumptions?

For example, why is Apple so innovative?

Year after year, they are more innovative than their competitors.

Still, they're just a computer company.

they are like everyone else.

They have the same access to the same talent, the same agencies, the same consultants and the same media.

So why do they look any different?

Why did Martin Luther King Jr. lead the civil rights movement?

He wasn't the only pre-Civil Rights America to suffer, nor was he the only great orator of his time.

why him

And why were the Wright brothers able to figure out controlled powered flight when there were certainly other teams with better qualifications and funding? And they failed to achieve powered flight, and the Wright brothers defeated them.

Something else is happening here.

About three and a half years ago, I made a discovery.

And this discovery has profoundly changed my view of how the world works, and even the way I act within it.

After all, there are patterns.

After all, all the great and inspirational leaders and organizations in the world, whether it's Apple, Martin Luther King, Jr. or the Wright Brothers, all think, act and communicate in exactly the same way.

And it's quite the opposite for others.

All I did was codify it and it's probably the simplest idea in the world.

I call it the Golden Circle.

why? how? what?

This little idea explains why some organizations and some leaders can inspire where others cannot.

Let's quickly define terms.

Every person and every organization on earth knows 100% what they are doing.

Whether you call it a differentiated value proposition, a unique process, or a USP, some people know how to do it.

But very few people or organizations know why they do what they do.

And "why" does not mean "to make a profit".

That's the result. It's always the result.

By "why" I mean "what is your purpose?"

what is your cause? what are your beliefs

Why does your organization exist?

Why do you get out of bed in the morning?

And why should anyone care?

As a result, it is clear that the way we think, act, and communicate will shift from the outside to the inside.

We proceed from the most obvious to the most obscure.

But inspired leaders and inspired organizations, regardless of size or industry, all think, act, and communicate from the inside out.

Let's take an example.

I use Apple because it's easy to understand and everyone can understand it.

If Apple were like any other company, their marketing message might sound like this: "We make great computers.

Beautifully designed, easy to use and user friendly.

want to buy? ”

That's how most of us communicate.

That's how most marketing and sales are done, and that's how we communicate with people.

We talk about what we do, how we are different and better, and expect some action, purchases, votes, etc.

This is our new law firm. We have the best attorneys with our biggest clients, and we always work for them.

This is our new car. It has good gas mileage and leather seats.

buy our car

Here's how Apple actually communicates:

“We believe that everything we do challenges the status quo.

We believe in thinking differently.

The way we challenge the status quo is to make our products beautifully designed, easy to use, and user-friendly.

We just happen to make great computers.

want to buy? ”

Not at all, right?

I reversed the order of the information.

What this proves to us is that people don't support your actions. People buy why you do it.

This explains why everyone in this room is so comfortable buying a computer from Apple.

But we're also perfectly comfortable buying an MP3 player from Apple, a phone from Apple, or a DVR from Apple.

As I said before, Apple is just a computer company.

Nothing structurally distinguishes it from its competitors.

Competitors are similarly qualified to manufacture all these products.

In fact they tried.

A few years ago Gateway launched a flat screen TV.

They are highly qualified in making flat screen TVs.

They have been making flat screen monitors for years.

nobody bought it.

Dell came out with MP3 players and PDAs, they could make great quality products, they could make perfectly well designed products, but no one would buy them.

In fact, speaking now, I can't even imagine buying an MP3 player from Dell.

Why buy from a computer company?

But we do it every day.

People don't buy your actions. They buy why you do it.

The goal is not to do business with everyone who needs what you have.

The goal is to do business with people who believe what you believe.

Now comes the most important part. None of what I am telling you is my opinion.

It's all based on biology dogma.

It's biology, not psychology.

Looking at a cross-section of the human brain from top to bottom, the human brain is actually divided into three main components that correlate perfectly with the Golden Circle.

Our latest brain, the brain of Homo sapiens, the neocortex, corresponds to the level of "what".

The neocortex is responsible for all of our rational, analytical thinking and language.

The middle two sections make up the limbic brain, which is responsible for all emotions such as trust and loyalty.

They are also responsible for all human actions and decisions, but they are incapable of understanding language.

In other words, communicating from the outside to the inside allows people to comprehend vast amounts of complex information, including features and benefits, facts and figures.

It's not a call to action.

When we can communicate from the inside out, we speak directly to the parts of the brain that control our behavior, allowing people to rationalize what we say and do.

This is where intuitive decisions come from.

Sometimes, when I give all the facts and figures to someone, they say, "I know what the facts and details are saying, but I don't feel so good."

Why use that verb if it doesn't "feel" correctly?

Because the part of the brain that controls decision-making does not control language.

The best we can squeeze out is, "I don't know. I just don't feel like it."

Or you might say that you are leading with your heart and soul.

I hate to say it, but they are not other body parts controlling your behavior.

It's all happening in the limbic system, the part of the brain that controls decision-making, not language.

But if you don't know why you're doing what you do, and people react to it, how do you get them to vote for you, buy something from you, and more importantly, be loyal and want to be a part of what you do?

The goal isn't just to sell what you have to people who need it. The goal is to sell to people who believe what you believe.

The goal is not just to hire people in need of work. It's about hiring people who believe what you believe.

I always say, if you hire people just because they can do the job, they will work for your money, but if they believe what you believe, they will work for you with blood, sweat and tears.

There is no better example than the Wright brothers.

Most people don't know Samuel Pierpont Langley.

In the early 20th century, the pursuit of powered human flight was like the dotcom of its time.

everyone was trying.

And Samuel Pierpont Langley, we're guessing, had a recipe for success.

You still ask people, "Why did your product fail?"

And people always say three things in the same order: lack of capital, wrong people, bad market conditions.

Three things are always the same, so let's examine it.

Samuel Pierpont Langley was given $50,000 by the War Department to develop this flying machine.

Money was fine.

He held a seat at Harvard University, worked at the Smithsonian Institution, and had very good connections. He knew all the thoughts of the great men of his time.

He hired the best people money could find and the market conditions were great.

The New York Times followed Langley everywhere, and everyone cheered him on.

So why have we never heard of Samuel Pierpont Langley?

Hundreds of miles away in Orville and Wilbur Wright, Dayton, Ohio, they had none of what we thought was the recipe for success.

they had no money. They paid for their dreams with the proceeds of their bike shop.

None of the Wright brothers' team, including Orville and Wilbur, had a college education.

And the New York Times followed them everywhere.

The difference is that Orville and Wilbur were driven by cause, purpose, and belief.

They believed that if they could figure out this flying machine, it would change the course of the world.

Samuel Pierpont Langley was different.

He wanted to be rich, he wanted to be famous.

He wanted results.

He sought wealth.

And behold, see what happened.

Those who believed in the Wright brothers' dreams worked with them through blood, sweat and tears.

Others just worked for their paycheck.

They tell the story that every time the Wright brothers went out, they would crash so many times before dinner that they had to take five sets of parts with them each time.

And finally, on December 17, 1903, the Wright brothers took off, and no one even experienced it.

We found out a few days later.

And further evidence that Langley's motives were wrong is that he quit the day the Wright brothers fled.

He could have said, "That's a great find, guys, I'll try to improve your technique," but he didn't.

He wasn't the first, he wasn't rich, he wasn't famous, so he quit.

People don't buy your actions. They buy why you do it.

Talking about what you believe will attract people who believe what you believe.

But why is it important to attract people who believe what you believe?

It's called the Law of Diffusion of Innovation, but even if you don't know the law, you know the term.

The first 2.5% of the population are innovators.

The next 13.5% are early adopters.

The next 34% are early majority, late majority and laggards.

The only reason these people buy touchtone phones is because they can't afford rotary phones anymore.

(Laughter) We're all sitting in different places at different times on this scale, but the law of innovation diffusion tells us that if you want mass market success or mass market acceptance of your ideas, you can't have it until you reach a tipping point between 15% and 18% market penetration and the system tilts.

I love to ask companies, "What's the new business conversion?"

They love to proudly say, "About 10 percent."

Well, it's possible that 10% or more of your customers will stumble.

All of us have about 10% of people who "get it".

That's how you describe them, right?

It's kind of an intuition that says, "Oh, they get it."

The question is, before starting a business, how do you find out who understands it and who doesn't?

So it's this little gap that needs to be filled, as Geoffrey Moore calls "crossing the chasm." Because the early majority won't try something until someone else has tried it first.

And as innovators and early adopters, they are comfortable making intuitive decisions.

They are comfortable making intuitive decisions based on what they believe about the world, not just the products available.

These are the people who stood in line for six hours to buy an iPhone when it first came out and could be purchased in stores next week.

These are the people who spent $40,000 on flat screen TVs when they first came out, even though the technology was subpar.

By the way, they didn't do it because the technology was so good. they did it for themselves.

Because they wanted to be number one.

People don't buy your actions. They believe why you do it and that your actions only prove what you believe.

In fact, people act in ways that prove what they believe.

The reason the person bought an iPhone in the first 6 hours and stood in line for 6 hours was because of what they believed about the world and they wanted everyone to see them. So they were the first.

People don't buy your actions. They buy why you do it.

So here are some famous examples of the Law of Innovation Diffusion, famous failures, and famous successes.

The first is a famous failure.

A commercial example.

As I said before, the key to success is funding, the right people, and the right market environment.

It should succeed.

Look, TiVo.

From its introduction about eight or nine years ago until today, TiVo is arguably the only top quality product on the market.

They had a lot of money.

Market conditions were excellent.

In other words, use TiVo as a verb.

I always watch TiVo on my junk Time Warner DVR.

(Laughter) But TiVo is a commercial failure.

They never made any money.

And when they IPOed, their stock was around $30 or $40, but then plummeted and never traded above $10.

In fact, I don't think it will even trade above $6, barring a few small spikes.

Because when TiVo announced their product, they told us all they had.

They said, "We have a product that pauses live TV, skips commercials, rewinds live TV, and remembers your viewing habits without you asking."

And the cynical majority said, "We don't believe you.

it is not necessary. we don't like it

you're scaring us ”

What if they said, "If you're the type of person who wants total control over every aspect of your life, do we have a product for you?"

Pause live TV, skip commercials, and remember your viewing habits. ”

People don't buy your actions. They buy why you do what you do, and your actions simply serve as proof of what you believe.

Here's a successful example of the law of diffusion of innovation.

In the summer of 1963, 250,000 people gathered in a Washington mall to hear Dr. King speak.

They didn't send out invitations and they didn't have a website to confirm the date.

How do you do that?

Dr. King wasn't the only great orator in America.

He wasn't the only American man to suffer in pre-Civil Rights America.

In fact, some of his ideas were bad.

But he had a gift.

He didn't go around telling people what needed to change in America.

He went around telling people what he believed.

"I believe, believe, believe," he told People.

And those who believed what he believed accepted his cause, made it their own, and passed it on to the people.

And some of those people created structures to get the information to even more people.

And a whopping 250,000 people turned up to hear him on the right day, at the right time.

How many of them showed up for him?

zero.

they appeared themselves.

That's what they believed about America, and they had to stand in the Washington sun for eight hours on a bus in mid-August.

That's what they believed, it wasn't black versus white. 25% of the audience was white.

Dr. King believed that there are two kinds of laws in this world. Laws enacted by higher authorities and laws enacted by humans.

And we cannot live in a just world until all laws enacted by men agree with those enacted by higher authorities.

It just so happened that the civil rights movement was perfect for realizing his cause.

We followed for ourselves, not for him.

By the way, he gave an "I have a dream" speech instead of an "I have a plan" speech.

(Laughter) Listen now to a politician with a comprehensive 12-point plan.

They don't inspire anyone.

Because there are leaders and there are people who lead.

Leaders have power and authority, but leaders inspire us.

We follow those who lead, whether individuals or organizations. Not because I have to, but because I want to.

We follow our leaders, not for them, but for ourselves.

And those who start with the "why" have the ability to inspire others and find others to inspire them.

thank you very much.

(applause)

I've been playing TED for nearly a decade, and I've rarely played a new song of my own.

Mainly because there was nothing.

(Laughter) So I was busy with a few projects and this was one of them. "Nutmeg".

1930s ship lifeboat. Restoration in the garden of a beach house in England.

And now, when the polar ice sheets melt, my recording studio will rise like an ark and I will float like a J.G. character into a drowning world. ballad novel.

During the day, Nutmeg collects energy from solar panels on the wheelhouse roof and a 450-watt turbine on the mast.

So that you have enough power even when it gets dark.

And you can light the nutmeg like a lighthouse.

So I'll be there until the early hours of the morning, working on new songs.

I would love to play for you if you are the first audience to listen.

(Applause) Billie Holiday.

Then, one night in 1947, she left physical space and apparently disappeared all night until reappearing in the morning.

But I know where she was.

She was with me in my lifeboat.

And she was hot.

(music) ♫ Billy sneaked in ♫ ♫ In my waking arms ♫ ♫ It was warm like a sip of sour mash ♫ ♫ Weird fruit ♫ ♫ Sweet lumps of garbage ♫ ♫ Panic at the stage door ♫ ​​♫ Carnegie Hall ♫ ♫ "The Disappearance of a Famous Jazz Singer" ♫ ♫ Must have left the building ♫ ♫ Body and mind ♫ ♫ Squeaking noises On the piano ♫ ♫ Tonight's flight ♫ ♫ Because the moon is mine ♫ ♫ The only witness ♫ ♫ She was breathing ♫ ♫ In my ear ♫ ♫ "Now it's love" ♫ ♫ But love is a loaded pistol ♫ ♫ By dawn she's gone ♫ ♫ Across the frozen river, home ♫ ♫ Stay with me ♫ ♫ Tonight too ♫ ♫ Billy, it's time ♫ ♫ Time's a cunning trickster ♫ ♫ It's still echoing ♫ ♫ In my heart I say ♫ ♫ Now it's love ♫ (Applause)

In fulfilling my wish for TED, I decided to start by thinking objectively about what I was trying to do and how it fit in with what they were trying to do.

We live in a world we all know is interdependent, but we know it falls short in three key ways.

First of all, it is very unequal. Half the world's people still live on less than $2 a day. One billion people do not have access to clean water. 2.5 billion people lack access to sanitation. A billion people go to bed hungry every night. Each year, one in four people die from AIDS, tuberculosis, malaria and various sewage-related infectious diseases, 80% of whom are under the age of five.

Widening inequality is now common, even in wealthy countries.

In the United States, despite five years of economic growth and five years of increased workplace productivity since 2001, median wages have remained stagnant and the share of working households below the poverty line has increased by 4%.

The proportion of working households without medical care increased by 4 percent.

So this interdependent world that has been so good for most of us, which is why we work for a living here in Northern California and enjoy tonight, is so unequal.

It is also unstable.

Unsettled by terrorism, weapons of mass destruction, the global spread of disease, and the feeling that we are more vulnerable to disease than we were a few years ago.

And perhaps most importantly, it is unsustainable due to climate change, resource depletion and species destruction.

When I think about the world I want to leave to my daughters and my hopeful grandchildren, it is a world that moves from unequal, precarious and unsustainable interdependence to an integrated community that shares the hallmarks of all successful communities locally, nationally and globally. It is a broadly shared and accessible set of opportunities, a shared sense of responsibility for the success of our common business, and a true sense of belonging.

All is easier said than done.

When the terrorist attacks happened in Britain a few years ago, it didn't take as many lives as it did in the United States on 9/11, but I think what bothered most of the British people was that the perpetrators were not the aggressors, but citizens of their own country whose religious and political identities were more important than the people they grew up with, went to school with, worked with, shared weekends and ate together.

In other words, they thought their differences were more important than their common humanity.

It is the central psychological plague of mankind in the 21st century.

In these circumstances, those of us who are not in public office have the power to do better than at any time in history. Because more than half of the world's people live under the governments they voted for and are able to vote with their votes.

And even undemocratic governments are more sensitive to public opinion.

Largely because of the power of the internet, people of modest means can band together and raise vast sums of money that, if all agree, can change the world for the common good.

When the tsunami hit South Asia, the US contributed $1.2 billion.

30% of our household donated.

Half of them donated via the Internet.

The median contribution was approximately $57.

And third, because of the rise of non-governmental organizations.

They, businesses and other civic groups have great power to influence the lives of our fellow citizens.

When I became president in 1993, no such organization existed in Russia.

Now there are hundreds of thousands.

Not in India. Currently, at least 500,000 are active.

Not in China. Currently, 250,000 people are registered with the government, probably twice as many as those who are not registered for political reasons.

When forming my foundation, I tried to think about the world as it is and the world I want to leave for future generations, and try to be realistic about what I have held dear throughout my life that I can still make an impact on.

I wanted to focus on activities that help alleviate poverty, fight disease, combat climate change, and bridge the religious, racial and other divides that plague the world, but in a way that leverages the specific skills that can be brought together within our group to change the way some public function is performed and that it spreads more globally.

There was one mention of that in what we could do with AIDS drugs.

And Ira Magazineger, our head of the AIDS response and the main activist of my wish tonight, is here with me and I want to thank him for all he has done.

he is over there

(Applause.) When I left office and was first asked to work in the Caribbean to help address the AIDS crisis, generic drugs were available for about $500 a year per person.

If you buy in bulk, you can get it for just under $400.

The first country we worked in, the Bahamas, paid $3,500 for these drugs.

The market was so confused that they were buying the drug through two agents who were selling it for seven times the price.

So the first week we started working, we lowered the price to $500.

And suddenly, for the same amount of money, you can save seven times as many lives.

We then worked with AIDS drug manufacturers, one of whom was quoted in the film, to negotiate a completely different change in business strategy. Because even at $500, these drugs were sold on a high-margin, low-volume, uncertain payment basis.

So we worked to improve the productivity of our operations and supply chain, moving into a low-margin, high-volume, foolproof payment business.

I joked that the main contribution we made in the fight against AIDS was getting manufacturers to shift their strategies from jewelry stores to grocery stores.

However, the price has gone up from $500 to $140.

And soon the average price was $192.

Now you can buy it for around $100.

Children's medicine was $600 because no one could afford it.

We negotiated up to 190.

Then France imposed a cleverly devised aviation tax to create something called UNITAID, and enlisted the help of many other countries.

The child's drug bill is now $60 per person per year.

The only thing that prevents us from radically saving the lives of all those who need medicine to live is the absence of the systems necessary to diagnose, treat, care for people, and deliver this medicine.

We started working with the American Heart Association to tackle childhood obesity.

We have tried to do the same by negotiating fair trade deals with the soft drink and snack food industries to reduce the calorie and other unsafe content of foods served to school children.

We have just reorganized the market.

And it occurred to me that throughout this non-governmental world, someone needs to think about organizing markets for public goods.

And that's what we're about to do now, working with this group of big cities to fight climate change, negotiating big, big deals that will enable cities that emit 75 percent of the world's greenhouse gases to dramatically and quickly reduce their greenhouse gas emissions in a good economic way.

And this whole argument as if it were some kind of financial burden is a mystery to me.

I think it's a bird's nest on the ground.

When Al Gore won his well-deserved Oscar for the movie An Inconvenient Truth, I was thrilled, but I encouraged him to make a second movie sooner rather than later.

For those of you who read An Inconvenient Truth, the most important slide in Gore's talk is the last slide. This shows where greenhouse gases will and could go if we do nothing.

And there are six different categories of things we can do to change the trajectory.

We need movies about these six categories.

And all of you need to implant it in your brain and organize yourself around it.

So that's what we're trying to do.

So organizing those markets is one of the things we're trying to do.

Well, we're working on the second thing, and this fulfills my wish.

From my experience working in developing countries, all the headlines may be pessimistic headlines about corruption doing one thing or another, but I think in poor countries, incompetence is a far bigger problem than corruption, and it encourages corruption.

Given these low prices, we now have the funds to distribute AIDS medicines to currently unaffordable populations around the world.

These low prices are now available in the 25 countries in which we operate, for a total of 62 countries, benefiting approximately 550,000 people.

But money is there to deliver to others.

The system is not there to reach people.

So what we're trying to do, first in Rwanda, then in Malawi and elsewhere, and I want to talk to you tonight about Rwanda, is to develop a rural health model in very poor areas that can be used to address AIDS, tuberculosis, malaria, other infectious diseases, maternal and child health, and all the health problems that poor people in developing countries are grappling with. This is a model that can first be scaled up across Rwanda and then literally in any other poor country. world.

And the test is: The first is whether it works.

Will they provide quality care?

And second, can we do it at a price that will allow us to maintain the health system without foreign aid in 5-10 years?

Because the longer we work on these issues, the more convinced we have to build a system, whether it's the economy, health, education, or whatever.

And the lack of a functioning system cuts the connection that led you to this seat tonight.

No matter what my life was like, no matter how many obstacles I faced in my life, I always knew that in critical phases there was a predictable relationship between the effort I put in and the results I achieved.

In a chaotic world without systems, everything becomes guerrilla warfare and predictability does not exist.

And it will be nearly impossible to save lives, educate our children, and grow our economy.

In my view, the greatest job in the medical field at building systems in extremely poor neighborhoods has been Dr. Paul Farmer. As many of you know, he started his group, Partners in Health, for 20 years, primarily in Haiti, but has also worked in Russia, Peru and other places around the world.

Haiti is poor, but in the areas where farmers' clinics operate, serving a much wider area than the medical professionals they serve, not a single person has died from tuberculosis since 1988.

They also achieve many other amazing health outcomes.

So when we decided to dramatically increase the country's income in Rwanda and fight AIDS, we wanted to build a health network. Because Rwanda was completely destroyed in the 1994 genocide and the per capita income was still less than $1 a day.

So I called and asked Paul Farmer if he could help me.

Because it seemed to me that if we could prove that we had a model in Haiti and Rwanda, we could spread it across the country, firstly, it would be great for the worst-hit countries on the planet in the last 15 years, and secondly, we would have something that could be applied to other poor countries around the world.

So we set out to implement it.

Well, we started working together 18 months ago.

And we are working in one of the poorest areas of Rwanda, called South Kayonza, originally a group of about 400,000 people.

We are basically doing what Paul Farmer did in Haiti. He seeks to develop and train paid community health workers who can identify health problems, ensure that people with AIDS and tuberculosis are properly diagnosed and regularly medicated, provide health education, clean water and sanitation, provide nutritional supplements, and bring those with critically needed health care to the forefront.

The procedures to make this work, as I mentioned earlier, were perfected by Paul Farmer and his team who have been working in rural Haiti for the past 20 years.

We recently evaluated our first 18 months of work in Rwanda.

And the results have been so positive that the Rwandan government has now agreed to adopt this model nationwide and is strongly supporting it with all of its resources.

Tell us a little bit about our team. Because it shows what we are doing.

There are about 500 people working in AIDS programs around the world, some of whom only provide free transportation, room and board.

And some are working on other related programs.

Our business plan in Rwanda was put together under the leadership of Diana Noble. She is an exceptionally talented woman, not uncommon for the type of people willing to do this kind of work.

She was the youngest partner in her twenties at Schroder Ventures in London.

She is the CEO of a successful electronic venture and founder and founder of Reid Elsevier Ventures. At 45, I decided that I wanted to do something different with my life.

So she is now working full time on this job with very little pay.

She and a team of former businessmen created a business plan that would allow this healthcare system to expand across the country.

And it was worth the kind of work she had done in private equity when she was making more money.

When we came to this rural area, 45 percent of children under the age of five were stunted due to malnutrition.

Twenty-three percent of them died before reaching the age of five.

Mortality at birth was over 2.5 percent.

More than 15% of deaths in adults and children are caused by intestinal parasites and diarrhea due to dirty water and inadequate sanitation, all of which are fully preventable and treatable.

More than 13% of deaths are due to respiratory diseases, and again, all of these are preventable and treatable.

And no one in the area was receiving treatment for AIDS or tuberculosis.

Within the first 18 months the following happened: AIDS treatment went from zero to about 2,000.

This represents 80 percent of the people in need of treatment in the region.

listen to this Of the 1 percent of people receiving treatment, less than four-tenths stopped taking the drug or neglected treatment.

This is lower than the US figure.

Less than 3 in 10 had to move to a more expensive second-line drug.

400,000 pregnant women will receive counseling and give birth for the first time in an organized health care system.

This represents approximately 43 percent of all pregnancies.

About 40 percent of the total population, I said 400,000. It meant 40,000.

About 40 percent of all people who need treatment for tuberculosis now have tuberculosis after just 18 months from zero when it started.

43 percent of children in need of infant nutrition programs to prevent malnutrition and premature death are now receiving the nutritional supplements they need to survive and thrive.

We have launched the first malaria treatment program they have ever run.

Patients were staying in hospitals destroyed by the genocide, but we have renovated them, along with four other clinics, with solar-powered equipment and superior laboratory technology.

Today, we treat 325 people a month, even though nearly 100% of AIDS patients are treated at home.

And most importantly, because we leveraged community health workers to implement Paul Farmer's model, we estimate that the system could be implemented across Rwanda at 5-6 percent of GDP, and the government could sustain it in 5-6 years without relying on foreign aid.

And anyone who understands health economics knows that all wealthy countries spend between 9 and 11 percent of their GDP on health care. Excluding the United States, our country spends 16 percent, but that's another day.

(laughter) We are currently working with Partners in Health, the Ministry of Health of Rwanda, and people at our foundation to expand this system.

Malawi and Lesotho are also starting this.

And we have similar projects in Tanzania, Mozambique, Kenya and Ethiopia and we are working with other partners to achieve the same. It's about saving as many lives as quickly as possible, but doing it in a systematic way that can be implemented nationally, and in a model that can be implemented in any country in the world.

An initial investment is needed to train doctors, nurses, health administrators, community health workers, and install information technology, solar energy, water and sanitation, and transport infrastructure across the country.

However, it will eventually be phased out as the need for external support disappears in five to ten years.

My hope is that TED will support our work and help us build a quality rural health system in poor Rwanda, which can serve as a model for poor countries in Africa and, indeed, all over the world.

My belief is that this will help build a more integrated world with more partners and fewer terrorists, a more productive public and less hatefulness – the place we all want our children and grandchildren to grow up in.

It has been a particular honor for me to work in Rwanda, which also has a major economic development project in collaboration with Scottish philanthropist Sir Tom Hunter, and last year used the same with AIDS medicines to reduce fertilizer costs and microcredit loan interest rates by 30 percent, helping farmers achieve a 300 to 400 percent increase in crop yields.

These people have been through a lot and none of us, especially me, helped them when they were on the verge of destroying each other.

We are canceling it now and they are already over it and on to their future.

We do this in an environmentally responsible way.

I am doing everything in my power to convince the inaccessible 35 percent to use clean energy instead of powering the grid. Interestingly, according to Wilson, Rwandans are very good at preserving topsoil for responsible planting projects.

There are a few men from Southern farming families. When I went out to this place, the first thing I did was get down on all fours and dig the dirt to see what they did to the dirt.

We have a chance here to prove that a nation that has almost wiped itself out can practice reconciliation, reorganize itself, focus on tomorrow, and provide comprehensive, high-quality health care with minimal outside assistance.

I am grateful for this award and will use it carefully for that purpose.

We could use a little more help to make this happen, but think about what it would mean if we could build a world-class healthcare system in Rwanda. This country earns less than $1 per person per day, and if applied to all similarly situated countries on earth, it could save hundreds of millions of lives over the next decade.

It's worth a try and I believe it will work.

Thank you and may God bless you.

(applause)

I'm an ecologist, primarily a coral reef ecologist.

I started out in the Chesapeake Bay, went diving in the winter, and became a tropical ecologist overnight.

And it was really fun for about 10 years.

So someone is paying you to see and travel to some of the most beautiful places on earth.

And that's what I did.

And I ended up in Jamaica in the West Indies. The coral reefs there were some of the most structurally amazing I have ever seen in my life.

This photo is very interesting and shows us two things. First, it is black and white because the water is so clear that you can see far into the distance. Film was very slow in the 1960s and early 70s, so I shot in black and white.

Another thing I know is that despite having this beautiful coral forest, there are no fish in the picture.

Those reefs at Discovery Bay, Jamaica have been the most studied reefs in the world for 20 years.

We were the best and brightest.

People came from Australia to study our reefs, and now we go to their reefs, so this is kind of funny.

And scientists' views of how reefs work and what they should be were based on reefs without fish.

Then in 1980 Hurricane Hurricane Allen occurred.

I put half of my lab at home.

The wind was blowing very hard.

Waves were 25-50 feet high.

And then the reefs disappeared, new islands formed, and we thought, 'Oh, we're really smart'.

We know that hurricanes have always happened in the past. ”

And we published a paper in Science. This is the first description of destruction of coral reefs by a large hurricane.

And we predicted what would happen, and it all came off.

The reason was overfishing and the fact that the last herbivore, the sea urchin, had died.

And within months of the sea urchin dying, seaweed began to grow.

It's the same coral reef. It's the same reef 15 years ago. It is the same reef today.

A few percent of the reefs on Jamaica's north coast are covered by living coral and are rich in seaweed and slime.

And it's more or less the story of Caribbean reefs and, tragically, of reefs around the world.

Well, here's my little melancholy story.

All of us in our 60's and 70's have similar depressing stories.

There are tens of thousands of such stories circulating, but it's really hard to evoke a sense of happiness. Because the situation is only getting worse.

And the reason the situation continues to worsen is that there used to be some kind of continuous recovery after natural disasters like hurricanes, but what is happening now is that overfishing, pollution and climate change are all interacting to prevent it.

So let's take a closer look at these three types of things.

We hear a lot about cod crumbling.

It is hard to imagine that there were two, or even some historians say, three world wars during the colonial period because of the control of Tara.

Most people in Western Europe were fed on cod.

The song "Farewell to Jamaica," which fed slaves brought to the Antilles, "Salted fish on Ackee rice is delicious," symbolizes the importance of salted cod in northeastern Canada.

Everything collapsed in the 80's and 90's and 35,000 people lost their jobs.

And that was the beginning of a continual decline of species, from larger and tastier species to smaller and less tasty species, from species closer to home to those found all over the world.

In America, you can buy cheap fish at Costco, so it's a little confusing.

You have to read the label where it came from, but it's still cheap, so everyone thinks it's fine.

It's hard to tell, but one of the ways I find it really interesting is talking about sport fish. Because people like to go out to catch fish.

That's one of them.

This photo shows a trophy fish. Trophy fish are the biggest fish caught by people who pay big bucks to get on a boat, go off the coast of Key West, Florida, drink lots of beer, throw lots of hooks and lines into the water, and come back with the biggest, best fish. Champion trophy fish are placed on this board and people take pictures there. This guy is obviously really excited about that fish.

Well, that's how it looks now, but this is what it looked like in the 1950s, same boat, same place, same dock, same board.

The trophy fish was so big that I couldn't put a smaller fish on it.

And an average-sized trophy fish weighs 250-300 pounds, so if you want to go out and kill something, you can pretty much expect to catch one of these fish.

And it was so delicious.

And in 1950, people paid less to catch that tiny little fish than they do today.

And it's everywhere.

But it's not just fish that are disappearing.

Industrial fisheries use large materials and large machines.

We use nets that are 20 miles long.

We use longlines with 1,000,000 or 2,000,000 needles.

And we trawl. This means attaching something the size of a tractor-trailer truck and weighing thousands of pounds to a large chain and dragging it across the ocean floor to stir the bottom and catch the fish.

Think of it like bulldozing a city or a forest.

And habitat destruction is incredible.

This is a typical picture of what the world's continental shelf looks like.

You see the rows below in the same way you see rows of fields that have just been plowed for corn planting.

It was a forest of sponges and corals, an important habitat for fish development.

The area of ​​the ocean floor that is now mud and transformed from forest to flat mud to parking lot is equivalent to all the forest areas that have been cleared on earth in human history.

We've done that for the last 100-150 years.

We tend to think about oil spills and mercury, and we hear a lot about plastic these days.

All of that stuff is really nasty, but what's really insidious is the biological pollution caused by the massive changes it causes to whole ecosystems.

Briefly describe two types of biological contamination. One is from introduced species and the other is from nutrients.

This is the infamous Caulerpa Taxfolia, the so-called killer algae.

A book was written about it.

It's a little embarrassing.

It was accidentally released from an aquarium in Monaco and bred to be cold hardy so that it can be kept in people's aquariums.

It's a very beautiful tree, but it's growing rapidly in the northwestern Mediterranean, where biodiversity was once very high.

I don't know how many of you remember the movie Little Shop of Horrors, but this is the plant from Little Shop of Horrors.

But instead of devouring people in the store, it's proliferating abnormally, smothering nearly all benthic life throughout the northwestern Mediterranean.

We know nothing of what it eats. We're studying all kinds of genetics and trying to find something we can do, but as it stands, it's a monster from hell and no one knows what to do about it.

Now, another form of pollution, biological pollution, is caused by excess nutrients.

Green revolution, this artificial nitrogen fertilizer, we are overusing it.

It's subsidized, so that's one of the reasons why I spent too much.

It flows down rivers and feeds on plankton, tiny microscopic plant cells in coastal waters.

However, since they ate all the oysters and all the fish that eat plankton, there was nothing to eat plankton, and they grew more and more and died of old age, which is unprecedented for plankton.

And when it dies it falls to the bottom and rots, which means it is decomposed by bacteria.

And in the process they use up all the oxygen, and by using up all the oxygen they make the environment completely deadly for those who can't swim away.

So it ends up being a microbial menagerie dominated by germs and jellyfish, as you can see on the left in front of you.

And the only remaining fishery, and commercial fishery. Jellyfish fishing grounds on the right. Shrimp used to live here.

Newfoundland, which used to hunt for cod, now also fishes for jellyfish.

And another version of this kind of phenomenon is what is often called red tide or toxic bloom.

The photo on the left is just amazing to me.

I've told it a million times and it's unbelievable.

The top right of the left photo is roughly the Mississippi Delta, and the bottom left of that photo is the border between Texas and Mexico.

Overlooking the entire northwestern Gulf of Mexico. What you're looking at is a potentially fish-killing, poisonous dinoflagellate flower produced by a beautiful little creature on the bottom right.

And in the upper right you can see this black kind of cloud moving to the shore.

it is the same species.

And when we get close to the shore, the wind blows and tiny droplets fly into the air, every hospital emergency room fills with people with acute respiratory distress.

That's a retirement home on the west coast of Florida.

A friend and I used to call this Hollywood Ocean Night in Hollywood, and I was trying to figure out how to explain to the actors what was going on.

And I said, "So imagine you're in a movie called 'Escape from Malibu' because all the beautiful people are moving to clean and safe North Dakota.

And there are only those who can't afford to leave the coast because it's not paradise and it's bad for their health. ”

And this is amazing.

I was on vacation in France early autumn last year.

This was taken on the coast of Brittany, covered in green algae slime.

It is easy to imagine that the reason why it has attracted so much attention is that it has caused scandals, such as seabirds flying above being suffocated by the smell and farmers dying because of it.

And there was a war between farmers and fishermen over all this, with the result that the Brittany coast had to be regularly bulldozed to remove these things.

And, of course, there is climate change. We all know about climate change.

The symbolic figure is the melting of the Arctic sea ice.

Think of the thousands of people who died trying to find the Northwest Passage.

Well, the Northwest Passage is already there.

I think it's kind of funny. Since this is the Siberian coast, the Russians will probably charge a toll.

Governments around the world are taking this issue seriously.

Arctic militaries take this issue seriously.

Despite the denials of climate change by government leaders, the CIA, the Norwegian, US and Canadian navies, from their perspective, they are busy thinking about how to secure their territories in this inevitability.

And, of course, the Arctic community is welcome.

Another kind of impact of climate change -- this is coral bleaching. That's a beautiful picture.

That white coral reef.

Except it's brown.

What's happening is that the corals are in a symbiotic relationship, with tiny algae cells living within them.

The algae then provide sugars to the corals, and the corals provide nutrients and protection to the algae.

But if it's too hot, the algae won't be able to make sugar.

The corals say, "You cheated, you didn't pay the rent."

They kick them out and they die.

Not all of them die. Some of them survived, some more, but this is really bad news.

To get a feel for this, imagine going camping somewhere in Europe or North America in July. When you wake up the next morning and look around you, 80% of the trees are bare and bare as far as the eye can see.

And when I get home, I find that 80% of all trees in North America and Europe have lost their leaves.

And a few weeks later I read in the newspaper, "Oh, by the way, a quarter of them died."

That's what happened in the Indian Ocean during the 1998 El Niño event. The area is much larger than North America and Europe, and 80 percent of all corals have bleached and a quarter of them have died.

And the really scary thing about all of this — overfishing, pollution, climate change — is that each event doesn't happen in isolation.

But what we call positive feedback, their synergy can make the whole much greater than the sum of its parts.

And when you think about all this, the big scientific question for people like me is, do we know how to put Humpty Dumpty back together?

Because, at the moment, we can keep it.

But what does that mean?

I really don't understand.

So what will the ocean look like in 20 or 50 years?

Well, there won't be any fish other than minnows and the water is pretty dirty and full of that stuff and mercury and stuff.

And the dead zones are getting bigger and bigger and they are starting to coalesce, you can imagine a kind of global coastal ocean dead zoning.

Then you definitely don't want to eat the fish raised there, because it becomes a kind of gastronomic Russian roulette.

Sometimes poisonous flowers bloom. You may not.

it won't sell.

But what's really scary is what's happening physically, chemically, and oceanographically.

As the sea surface warms, the water becomes lighter, making it more difficult to turn over.

It is said to be more strongly stratified.

The result would be a collapse of all the nutrients that underpinned the great anchovy fisheries of sardines such as California and Peru.

And at the same time, water from the oxygen-rich surface does not sink down, and the ocean turns into a desert.

So the question is, how do we all react to this?

We can do all sorts of things to fix it, but in the end, it's you who really needs to fix it.

It's not about fish. It's not a matter of contamination. It's not about climate change.

It's about us and our greed, our desire to grow, and our inability to imagine a world different from the selfish world we live in today.

The question then is whether or not to comply with this.

It can be said that the future of life and human dignity depends on whether we do.

thank you. (applause)

I bring you messages from the tens of thousands of people who have solved problems through their own genius, without outside help, in villages, slums and rural outbacks.

He missed the point a few weeks ago when the home minister announced a war that said a third of India, about 200 districts, was out of control.

For the past 21 years, we have stressed that people may be poor financially, but they are not poor in spirit.

In other words, a marginal mind is not a marginal mind.

That's the message we started 31 years ago.

And what did it start with?

I would like to briefly describe my personal journey leading up to this point.

In 1985-86, I was in Bangladesh advising the Bangladesh government and research councils on how to support scientists to work in the lands and fields of the poor, and how to develop people-knowledge-based research techniques.

I'm back in '86.

I was very inspired by the knowledge and creativity I found in the country. The country is 60 percent landless and yet has amazing creativity.

I started looking at my own work. Almost every job I've done in the last ten years has involved knowledge shared by people.

Well, I was paid in dollars as a consultant, and I looked at my income tax return and tried to ask myself. "Is there a line on my return showing how much of this income was donated to those whose knowledge made it possible?"

Is it because I'm smart that I get this reward, or is it because of the revolution?

Does that mean I write very well?

Does that mean I'm very good at expressing myself?

Are you analyzing the data well?

Is it because I am a professor and am entitled to such rewards from society? ”

I tried to convince myself, "No, no, I've been working for policy change.

You know, public policy will be more responsive to the needs of the poor, so I'm fine with that. ”

But my years of dealing with exploitation, exploitation by landlords, moneylenders, and merchants gave me the insight that perhaps I was an exploiter, too. Because there was not a single sentence on my income tax return that this income was due to the excellence of the people. People, people who have shared their knowledge, their honesty and their trust with me. And nothing will come back to them.

Until then, most of my work was done in English.

Most of the people I studied with didn't know English.

So what kind of contributor was I?

I was talking about social justice, and here I was an expert in pursuing the most injustices. You steal knowledge from people, anonymize it, share that knowledge and get paid for consulting, write papers and publish in newspapers, get invited to conferences, get consulted, and do whatever else.

So a dilemma arose in my mind: if I am also an exploiter, this is not right. Life cannot go on like that.

And this was a moment of great pain and trauma because I couldn't stand it any longer.

There, I researched ethical dilemmas, value conflicts, and management research, and wrote and read about 100 papers.

And I've come to the conclusion that while dilemmas are unique, dilemmas aren't unique. The solution had to be proprietary.

Then one day, I don't know what happened, I was walking home from the office and maybe I saw a bee, or a thought popped into my head that life would be great if I could be like a bee.

A bee's work: Pollinate, suck nectar from flowers, pollinate another flower, cross-pollinate.

And when you suck the nectar from a flower, the flower doesn't feel changed.

In fact, bees lure bees through their colors, but bees don't own all the honey.

These are the three basic principles of the Honey Bee Network. So whenever you learn something from people, you should share it in their language.

Do not remain anonymous.

And after 20 years, I must say that I have not made a single percent change in the professional practice of this art.

It is a great tragedy, and one that I still keep in mind, and I hope you do too, is that the profession still legitimizes the disclosure of people's knowledge without attribution through anonymity.

Research guidelines of the National Academy of Sciences or the British Research Council

At the Indian Scientific Research Council, we don't have to share everything we learn from people with them.

We are talking about an accountable society, a fair and just society, but even knowledge markets are not doing justice.

And India wants to become a knowledge society.

What will happen to the knowledge society?

Clearly, therefore, we cannot have two principles of justice. One for yourself and one for others.

It should be the same.

You cannot discriminate.

You cannot stand for your own values ​​apart from the ones you stand for.

So fairness to one and fairness to the other are not divisible.

look at this image.

Can you tell me where it is taken from and what it means? who?

i am a professor I have to give a quiz. (laughs) Who? Any guesses?

forgiveness? (Audience: Rajasthan) Anil Gupta: But what was it used for? What has it been used for?

(Whispering) Excuse me?

That's right. we have to reach out to him. Because this man knows how insensitive our government is.

Look at this. This is the site of the Government of India.

It invites tourists to see our country's shame.

I am very sorry.

Is this a beautiful photo or a terrible photo?

It depends on how people see life.

If this woman has to carry her head over her head for miles and miles, we can't celebrate it.

Something has to be done about it.

And let me tell you that millions of women still have water on their heads despite all the technology we have at our disposal.

And we do not ask this question.

I should have had tea in the morning.

Let's think about it.

Tea leaves plucked from bushes. Do you know what action is? Actions are: The female picks up a few leaves and puts them in a basket on the underside.

Do it only 10 times. You know the pain in my shoulder.

And she does it thousands of times every day.

The rice you ate at lunch, and the rice you eat today, is the rice planted by millions of women every year during the rice paddy season, bent over in a very awkward position, with their feet in the water.

Then, when you put your foot in the water, the fungus develops, causing an infection, and other insects sting the infection, causing pain.

And each year, 99.9 percent of paddy fields are transplanted by hand.

The machine has not been developed.

So the silence of scientists, technologists, public policy makers and change agents has brought to our attention that this is not on, this is not on. This is not how society works.

This is not what our Congress does. As you know, we have a hiring program. In this great country, 125 million people must be put to work for 100 days.

what are you doing breaking stones and digging soil.

So we asked Congress: Do poor people have heads?

Do poor people have legs, mouths and hands but no head?

The Honey Bee Network is therefore built on resources for the poor to become rich.

And what happened?

An anonymous, faceless, nameless person connects to the network and acquires an identity.

This is what the Honey Bee Network is for.

And this network has grown spontaneously and continues to operate spontaneously, attempting to map the minds of millions of creative people in our country and other parts of the world.

They may be educationally creative, culturally creative, institutionally creative. But much of our work is in the field of technological creativity, innovation in terms of modern innovation or traditional knowledge.

And it all starts with curiosity.

It all starts with curiosity.

This man we met, you can see on the website www.sristi.org, this tribesman had a wish.

And he said, "If my wish is granted"--someone was sick and he had to watch--"God, please heal him.

If that cures him, I'll paint the wall. ”

And here is what he drew.

Yesterday someone was talking about Maslow's Hierarchy.

Nothing is more wrong than Maslow's Hierarchy of Needs model, since the poorest people in this country can attain enlightenment.

Kabir, Rahim, the great Sufi saints, they were all poor, but they had great reasons. (Applause.) Please never think that you can think about spiritual needs and enlightenment only after you have met your physiological and other needs.

No matter where we are, only with an inner determination that something must be achieved can anyone reach the highest attainment.

Look at this.

I saw it on Shod Yatra. Every six months we walk through different parts of the country.

I have walked about 4,000 kilometers in the last 12 years.

So I found dung rice cakes on the side of the road that were used as fuel.

Now, this woman is painting on the wall of a pile of dung cakes.

It was the only space where she could express her creativity.

And she is so wonderful.

Look at this woman, Ram Timari Devi, sitting on top of the grain bin. In Champaran we had Shod Yatra and walked the land where Gandhi went to hear about the tragedy, the pain of the indigo growers.

Babi Mahat of Purulia and Bankura.

Let's see what she did.

The entire wall is her canvas. She is sitting there with a broom.

Is she a craftsman or an artist?

Clearly she is an artist. she is a creative person.

If we could create a market for these artists, we wouldn't have to hire them to dig dirt or crush stone.

They get paid for what they are good at, not what they are bad at.

(Applause.) Let's see what Rojadine did.

At Motihari, Champaran, there are many people selling tea in their huts, but apparently the tea market is limited.

Every morning I drink tea as well as coffee.

So he wondered if he could turn the pressure cooker into a coffee machine.

So this is a coffee machine. It costs only a few hundred rupees.

People bring their own cookers, he installed valves and steam pipes and now serves espresso coffee. (Laughter) Well, this is a real affordable coffee percolator that runs on gas.

(Applause.) Look what Sheikh Jahangir did.

Many poor people don't have enough grain to grind.

So this guy has a wheelbarrow with a machine that grinds flour.

If you have 500 grams, 1000 grams, 1 kilogram, he will grind it for you. Mills don't grind such small amounts.

Please understand the problem of the poor.

They have needs that must be met efficiently in terms of energy, cost and quality.

They don't want second standard, second quality deliverables.

But to be able to deliver quality deliverables to them, we need to adapt our technology to their needs.

And that's what Sheikh Jahangir did.

But that's not enough, what he did. Look what he did here.

If you have clothes and don't have time to wash them, they brought a washing machine loaded with two wheels to your doorstep.

Therefore, we will introduce the model of the two-wheel washing machine.

He's washing your clothes and drying them on your doorstep.

(Applause.) You bring water, you bring soap, and I wash your clothes for you. 50 paisa, charging 1 rupee per lot could create a new business model.

What we need now is people who can scale it up.

Look at this.

It looks like a beautiful photo.

But do you know what it is? Can anyone guess what it is?

Of course, if you're from India, you'll know.

It's Tawa.

A hot plate made of clay.

Now what is that beauty?

If you get a non-stick frying pan, you'll probably run around 250 rupees, $5, $6.

It's less than $1 and non-stick. Coated with one of these food grade materials.

And the best part is eating so-called Teflon or Teflon-like material while using expensive non-stick pans. Over time, the material will disappear. Where have you gone?

I'm in my stomach. It wasn't for that. (laughter) Do you know? But this earthenware pot never fills my stomach.

So it's better and safer. Affordable and energy efficient.

In other words, the poor people's solution need not be cheaper, or be a so-called jugaad, or be some kind of stopgap arrangement.

It has to be better, more efficient and affordable.

And that is what Mansk Bai Prajapati did.

He designed this plate with a handle.

And now, for $1, you can have better options than the talent market offers.

This woman developed an herbal insecticide formulation.

We applied for her patent to the National Innovation Foundation.

and who knows? She can make money if someone licenses this technology and develops a marketable product.

Let me mention one thing here. We believe in the need for a multi-centred model of development in which numerous initiatives in different parts of the country, in different parts of the world, solve local needs in a highly efficient and adaptive way.

The higher the local fit, the greater the potential for scale-up.

As you scale, there are inherent shortcomings in matching the needs of local people point-by-point with the supply you provide.

So why are people willing to reconcile that discrepancy?

Things could and did scale up.

For example, mobile phones: There are 400 million mobile phones in this country.

Currently, your mobile phone may only use 2 buttons and your mobile phone may only use 3 options.

You have 300 options, so you pay for 300. I've only used 3, but I'm scaling it up because it still works fine.

But if I had to get one to match, obviously I would need a different design phone.

So what we're saying is that scalability shouldn't be the enemy of sustainability.

The world needs a place that offers solutions that are relevant only to its region, but which can also fund those solutions.

One of the greatest studies we've found is that investors keep asking the question, "What is a scalable model?" --It is as if the needs of a community that exists only in a certain space and time, and whose needs are only there, have no legitimate right to obtain them for free because they are not part of a larger scale.

So either sub-optimize your needs on a larger scale or leave it as is.

Now, the prominent model, the long-tail model, shows that small sales of a large number of books, say only a few copies, can still be a viable model.

And then we have to find a mechanism that allows people to come together in a portfolio, invest in a portfolio, provide different innovations to a few people in a region, and still make the entire model platform viable.

look what he's doing

Saidullah Sahib is a wonderful man.

Now 70 years old, he is very creative.

(music) Saidullah Sahib: I couldn't wait for the boat.

I had to meet my loved one.

My desperation made me an innovator.

Love also needs the help of technology.

Innovation is the light of my wife, Nour.

New inventions are my passion in life.

my technique.

(Applause) AG: Saidul Sahib is in Motihari, also Champaran.

A wonderful human being, but even at his age he still sells honey on his bicycle for a living. Because I haven't been able to convince the water park people and the lake people about the [opaque] activity.

And we couldn't convince firefighters in Mumbai, who had flooded a few years ago and people had to walk 20 kilometers through the water, that they should have this cycle in their office. Because that way you can get to lanes where buses and transport don't pass.

Therefore, the problem of making it available as a rescue and vending device when goods must be delivered to stranded people on various islands during floods in eastern India remains unsolved.

But the idea has its merits. The idea has merit.

what did daddy do? Unfortunately, Apa-chan is no more, but I left a message.

A very powerful message Apachan: I see the world waking up every day.

(music) I didn't come up with this idea because a coconut fell on my head.

Having no money to fund my studies, I climbed to new heights.

Now called the local Spider-Man.

my technique.

(Applause) AG: Many of you may not realize or believe that we sell this product internationally. It's what I call the G2G model, grassroots to global sales.

A professor at the Department of Zoology at the University of Massachusetts bought this climbing equipment because he wanted to study the diversity of insects that live at the top of tree canopies.

And the device has allowed her to take samples from more palm trees than just a few. Otherwise she would have to build a big platform and climb onto it, and then climb onto it.

In short, we are moving the frontiers of science forward.

Developed by Remia Jose...

You can find these videos by going to YouTube and searching for India Innovates.

A washing machine and exercise machine she invented when she was in the 10th grade.

Karai is a disabled person who is only 1.5 feet tall.

However, he modified the motorcycle to gain autonomy, freedom and flexibility.

This innovation was born in the slums of Rio.

And this person, Mr. Uvirajala.

We have been talking with our friends in Brazil about how to expand this model in China and Brazil.

We also have a very active network, especially in China, but we are expanding to Brazil and other parts of the world.

No bike has this stand that stands on the front wheel.

India and China have the highest number of cycles.

But this innovation was born in Brazil.

The point is that none of us should be bigoted or nationalistic enough to believe that all good ideas come only from our own countries.

No, we must have the humility to learn from the knowledge of the financially poor wherever we are.

And look at this series of cycle-based innovations. A cycle that is an atomizer, a cycle that generates energy from road impacts.

You can't change road conditions, but you can make your bike go faster.

That's what Kanak Das did.

And in South Africa, we took innovators there and shared with our South African colleagues how innovation can be a way to free people from the monotony of life.

And this is the donkey car they modified.

We have a 30-40 kg axle here, but it's no good.

Removing it reduces the cart's need for one donkey.

This is China. This girl needed a respirator.

The three villagers sat down and decided to think, "How can we extend the life of this village girl?"

They had nothing to do with her, but tried to find out "how can it be used...". They used cycles and assembled respirators.

And this respirator saved her life, and she was welcomed.

Our innovations are wide-ranging.

A car that runs on compressed air at 6 paisa per kilometer.

Assam, Kanak Gogoi.

And although this car cannot be found in the US or Europe, it is available in India.

Well, it seems that this woman was doing thread winding for Pochanparisari saree.

To produce two sarees, she had to do this winding 18,000 times a day.

This is what her son accomplished after seven years of struggle.

"Change your profession," she said.

He said, "I can't do that. That's all I know. But I'll try to invent a machine that will solve your problem."

Here is what he made, a sewing machine from Uttar Pradesh.

So this is what SRISTI is saying. "Give me a place to stand, and I will move the world."

Just one thing, we also have creativity and all sorts of competitions among kids.

We have sold our products all over the world, from Ethiopia to Turkey to the United States.

Several products are on the market.

These are the knowledgeable people who made this Herbavate cream for eczema possible.

And the company that licensed this herbal pesticide puts a photo of the innovator on its packaging every time you use it, asking you, "You can be an innovator too."

If you have any ideas, please send them back to us. ”

So creativity matters, knowledge matters, innovation transforms and incentives inspire.

And incentives: not only material, but also immaterial incentives.

thank you.

(applause)

For me, this story begins about 15 years ago, when I was a hospice doctor at the University of Chicago.

And I was caring for dying people and their families on the South Side of Chicago.

And I was observing what happened to people and their families during the course of a terminal illness.

In my lab, we were studying the widow effect, a very old idea in the social sciences dating back 150 years, known as "death from broken hearts."

This means that if I die, my wife's risk of death may double in the first year, for example.

And I was going to care for one particular patient, a woman dying of dementia.

And in this case, unlike this couple, she was cared for by her daughter.

And the daughter was exhausted from taking care of her mother.

And my daughter's husband was also sick from his wife's fatigue.

Then one day, as I was driving home, I got a call from a friend of my husband. My husband called me because he was depressed about what happened to his friend.

So here I got this call from this random guy. He has experienced being affected by people with a certain social distance.

I suddenly realized two very simple things. First, the widow effect is not limited to husbands and wives.

And second, it wasn't limited to people in pairs.

And I got to see the world in a whole new way. Like a pair of people connected to each other.

And I noticed that these people connected with other pairs of people who were nearby to form a quadruple.

And indeed, these people were embedded in other kinds of relationships, such as marriage, spouses, friendships, and other types of bonds.

And the fact is that these connections are vast and that we are all embedded in each other in these broad connections.

It made me see the world in a whole new way and I fell in love with it.

I was fascinated by how we are embedded in these social networks and how it impacts our lives.

So social networks are so complex and beautiful, in fact, so sophisticated and complex yet so ubiquitous that you have to think about what purpose they serve.

Why are we embedded in social networks?

So how are they formed? how do they work?

And how do they affect us?

So my first theme on this issue was obesity, not death.

It was fashionable to talk about the "obesity epidemic."

And with my collaborator James Fowler, I started to wonder if obesity is really epidemic, and if it could spread from person to person like the four I just talked about.

Here is a slide of some of the initial results.

In 2000 it is 2,200.

All points are people. We make the dot size proportional to people's body size. So a bigger point is a bigger person.

Additionally, if your body size, BMI, or body mass index is greater than 30, i.e., you are clinically obese, the dots are also colored yellow.

So when you look at this image, you can immediately see that there are obese and non-obese populations in the image.

However, the visual complexity is still very high.

It's not exactly clear what's going on.

In addition, the question immediately arises: How much clustering is there?

Are more clusters occurring than by chance alone?

How big are the clusters? How far do they reach?

And most importantly, what causes clusters?

So I performed some math to study the size of these clusters.

It shows on the Y-axis the increased probability that a person is obese if their social contact is obese, and on the X-axis the degree of separation between the two.

You can see the purple line on the far left.

They found that if your friend is obese, your risk of obesity increases by 45%.

The next bar [red] line shows that if your friend's friend is obese, your risk of obesity is 25% higher.

And the next line says that if your friend's friend's friend, perhaps someone you don't know, is obese, your risk of obesity is 10% higher.

And only when you come to a friend of a friend's friend's friend is there any relation between his size and your own size.

So what is causing this clustering?

There are at least three possibilities. One possibility is that when I gain weight, it causes you to gain weight.

A kind of induction, that is, spreading from person to person.

Another possibility, and very obvious, is homosexuality, the flocking of feathered birds. You and I are similar in body size, so here I bond with you.

And the last possibility is known as confounding because it confuses our ability to understand what is going on.

And the idea here is not that my weight gain is the cause of your weight gain, or that you and I are the same body size so I preferentially connect with you, but rather that we both have a common experience in something like a fitness club where we can both lose weight at the same time.

A study of these data found evidence for all of this, including induction.

And they found that if your friend became obese, your risk of obesity increased by about 57% within the same time period.

There are many possible mechanisms for this effect. One possibility is that your friend tells you something like: That is, they have behaviors that are contagious to you. For example, "Let's go get a muffin and a beer," which is a terrible combination. (Laughter) But when you adopt that combination, you start gaining weight, just like them.

Another, more subtle, possibility is that you start gaining weight and your ideas about acceptable body size change.

Here it is not the behavior that spreads from person to person, but rather the norm. In other words, ideas are spreading.

Well, our headline writer has done a field day on our research.

I think the New York Times headline was "Are you packing your bags?"

Blame it on your fat friend. (Laughter) What was interesting to us was that European headline writers had a different take. You are probably to blame. ”

(Laughter.) And we thought, this is a very interesting comment about America, kind of a selfish, 'not my fault' kind of phenomenon.

Now, let me be very clear: we do not believe that our work should, or could, in any way justify prejudice against people of any body type.

Our next question was, can we really visualize this spread?

Did one person's weight gain actually spill over into another person's weight gain?

And this was complicated by having to take into account the fact that the network structure, the architecture of the connections, was changing over time.

Furthermore, there is no patient zero for the obesity epidemic, as obesity is not a monocentric epidemic. If the man was found, obesity spread from him. It's the epidemic of multicentricity.

Many people are doing things at the same time.

And now I'm going to show you a 30 second video animation that James and I have been working on for 5 years.

So again, the whole point is people.

All connections between them are relationships.

We're going to put this into action now, getting daily cuts through the network for about 30 years.

You'll see the dots grow in size and expand into a sea of ​​yellow.

You will see people born and die. Dots appear and disappear, bonds are formed and broken, marriages and divorces, friendships and dissociations.

A lot has happened in the last 30 years alone, including the obesity epidemic.

And finally, clusters of obese and non-obese people will appear in the network.

Well, when I saw this, my perspective on things changed. Because this network is changing over time, it has memory, it moves, things flow in it, it has a certain consistency. People can die, but they never die. It still exists and has a kind of resilience that allows it to survive over time.

So I came to see this kind of social network as a living creature, one that can be put under a kind of microscope to be studied, analyzed and understood.

And I used different techniques to achieve this.

And we started investigating all sorts of other phenomena.

We investigated smoking and drinking behavior, voting behavior, and potentially widespread divorce and altruism.

And finally, we became interested in emotions.

Now, when we have feelings, we let them out.

Why do we show our emotions?

This means that there are benefits to experiencing inner feelings such as anger and happiness.

But we don't just experience them, we show them.

And not only can you show it, but others can read it too.

And not only can they read it, they can also copy it.

There is emotional contagion that occurs within the human population.

This function of emotions thus suggests that, in addition to the other purposes that emotions serve, it is a kind of primitive form of communication.

And the fact is that if you really want to understand human emotions, you need to think this way.

Now, we are accustomed to thinking about emotions in this simple, sort of brief way.

For example, when I was giving this talk recently in New York City, I said, "When you're on the subway and the person across the street smiles at you, you instinctively smile back, don't you?"

Then they looked at me and said, "You don't do that in New York City." (Laughter.) And I said, "That's normal human behavior anywhere in the world."

As such, we have a very instinctive way of communicating emotions to each other for short periods of time.

And indeed, emotional contagion can be even more widespread.

Anger can also be expressed intermittently, like a riot.

The question we wanted to ask was, could emotion spread through time in a more lasting way than riots and involve more people than just these two smiling at each other on the subway?

Perhaps there is some sort of silent riot beneath the surface that keeps us alive all the time.

Maybe emotions are rippled through social networks.

Perhaps, in reality, emotions are not just individual entities, but collective entities.

This is one of the first images we created to study this phenomenon.

Again, social networks, but now people are color coded yellow if they're happy, blue if they're sad, and green if they're in between.

Looking at this image, we can quickly see that the population of happy and unhappy people is again spread across three stages of separation.

And we may form an intuition that unhappy people occupy different structural positions within the network.

There seems to be a middle and an edge to this network, and the unfortunate people are on the edge.

Invoking another metaphor, if we imagine social networks as a sort of vast fabric of humanity, I am connected to you and you to her, endlessly connected. This cloth is actually like an old-fashioned American quilt, with spots on it. There are happy spots and unhappy spots.

And whether or not you are happy depends, in part, on whether or not you occupy your happy zone.

(Laughter) So when we saw this piece dealing with very basic emotions, it got us thinking: Perhaps the underlying cause of human social networks is somehow encoded in genes.

Because human social networks, when mapped, always look like this: Network photo.

But they never look like that.

Why can't it look like this?

Why not create a human social network like a regular grid?

The striking pattern of human social networks, their ubiquity, and their apparent purpose raises the question of whether humans evolved to have human social networks in the first place, or to form networks of a particular structure.

And, first of all, note that understanding this requires a little analysis of the network structure first. And notice that everyone in this network has exactly the same structural position as everyone else.

But in a real network this is not the case.

For example, this is a real network of undergraduates at an elite university in the Northeast.

And now I'm highlighting some points.

Now to focus on the points, compare node B on the top left with node D on the far right. B has 4 friends and D has 6 friends.

Therefore, the two people have different numbers of friends.

It's very obvious, we all know it.

But other aspects of social network structure are less obvious.

Compare node B in the upper left with node A in the lower left.

Now, both of these people have four friends, but A's friends all know each other, but B's friends don't.

So friends of A's friends are friends of A again, but friends of B's ​​friends are not friends of B and are farther in the network.

This is known as transitivity in networks.

And finally, compare nodes C and D. Both C and D have 6 friends.

If you talk to them and ask them, "What is your social life like?"

They said, "I have six friends.

That's my social experience. ”

But now, when we look at this network from a bird's-eye view, we see that they occupy a very different social world.

And I can feed that intuition of yours just by asking you: "Who would you be if a deadly germ was spreading through your network?"

Which do you prefer, C or D?

You'd rather be D at the edge of the network.

And now, if there were interesting gossip going through the network that wasn't about you, who would you want to be?

Therefore, different structural locations have different effects on your life.

And indeed, in an experiment looking at this, we found that 46% of the variation in friend count is explained by genes.

And this is not surprising. We know that some people are naturally shy, while others have outgoing personalities. It's clear.

However, we also found some things that were not clear.

For example, 47 percent of the variation in whether friends know each other is genetic.

Whether or not your friends know each other has more to do with their genes than just yours.

The reason is that some people like to introduce their friends to each other, while others keep their friends away and don't introduce their friends to each other.

And some people weave a network around them, creating a kind of tight web of connections in which they are comfortably embedded.

And finally, we even found that 30% of the variation in whether people are in the middle or the edge of the network can be attributed to genes.

Therefore, whether you are in the middle or on the edge is also partly hereditary.

Now what does this mean?

How does this help our understanding?

How can this help clarify the issues that are affecting us these days?

My point is that networks have value.

They are a kind of social capital.

New traits emerge as we are embedded in social networks. These characteristics are embedded not only in the individuals within the network, but also in the structure of the network.

So let's think about these two common objects.

Both are made of carbon, but one of them has carbon atoms arranged in a particular way (left). Soft, black graphite is obtained.

But if you interconnect the same carbon atoms in a different way, you get a transparent, hard diamond.

And the properties of softness and hardness, darkness and transparency do not exist in the carbon atom. They exist in, or at least arise from, the interconnections between carbon atoms.

So, similarly, patterns of connections between people endow groups of people with different characteristics.

It is the bond between people that makes the whole greater than the sum of its parts.

So it's not just what's happening to these people that affects us. Weight loss or gain, rich or poor, happy or unhappy. It is also the actual structure of the connections around us.

Our experience of the world depends on the actual structure of the networks we live in and all sorts of things that ripple and flow within them.

Now, I think the reason this happens is because humans collectively form a kind of super-organism.

Now, a super-organism is a collection of individuals that are not reducible to the study of the individual, but refer to the group and exhibit or evidence behaviors and phenomena that must be understood by studying the group.

For example, beehives finding new nesting sites, flocks of birds escaping predators, flocks of birds able to pool their wits to find a small spot on an island in the middle of the Pacific, flocks of wolves capable of taking down larger prey.

Super-living things have properties that cannot be understood just by studying the individual.

I believe that understanding social networks and the mechanics of their formation and operation will help us understand not only health and emotions, but all sorts of other phenomena such as crime and war, economic phenomena such as installations and market crashes, the introduction of innovations and the diffusion of products.

Now look at this.

I think we form social networks because the benefits of a connected life outweigh the costs.

If I were to be constantly violent towards you, misinform you, make you sad, or infect you with deadly germs, you would cut ties with me and the network would collapse.

Therefore, in order to maintain and grow social networks, it is necessary to spread good and valuable things.

Likewise, social networks are needed to spread good and valuable things such as love, kindness, happiness, altruism, and ideas.

In fact, once you realize how valuable social networks are, you'll spend a lot more time growing and maintaining them. Because I think social networks are fundamentally associated with goodness.

And I think what the world needs now is more connections.

thank you.

(applause)

we invent

My company invents all kinds of new technologies in different fields.

We do so for several reasons.

We invent to have fun. Inventing is a lot of fun. And sometimes we invent for profit.

The two are related. Because it actually takes long enough to make a profit, and you don't have time to do it if it's not fun.

So while we invent most of our activities for fun and profit, we also have programs that invent for humanity. They invite some brilliant inventors and ask them, "Do you have any good ideas for solving the world's problems?" -- And solve it the same way we try to solve problems. It's a dramatic, crazy, unconventional solution.

Bill Gates is one of the smartest people among us working on these issues, and he also funds this work. thank you.

So here's a quick rundown of some of the issues we're having and some issues that are in the process of being resolved.

Vaccination is one of the key technologies in public health, and it's great.

But in developing countries, many vaccines spoil before administration. That's because the vaccine needs to be kept cold.

Almost all vaccines should be stored at refrigerator temperature.

If you don't, it will go bad very quickly. Without a stable power grid, none of this would happen and children would die.

It's not just vaccine losses that matter. The fact is that the children have not been vaccinated.

This is one way of delivering the vaccine. These are Styrofoam boxes. These are carried by people, but sometimes they are put on the bed of a pickup truck.

There is another solution.

Well, one of these Styrofoam chests will last about 4 hours with ice in it.

And we decided that wasn't enough.

So we made this.

This lasts for 6 months without power. It loses less than 0.5 watts, so it draws zero power at all.

Well, here is the second generation prototype.

A third-generation prototype is currently being tested in Uganda.

Well, there are two key ideas that allowed us to come up with this. One is that it resembles a cryogenic Dewar (a container that holds liquid nitrogen or liquid helium).

It's got great insulation, so let's put some great insulation in here.

Another interesting idea is that you can't reach inside anymore.

If you open it and put your hand inside, the heat will enter and the game will be over.

So the inside of this thing actually looks like a cola machine.

We sell small individual vials.

We hope this simple idea will change the way vaccines are distributed in Africa and around the world.

Let's move on to malaria.

Malaria is one of the major public health problems.

Esther Duflo talked a little bit about this.

200 million people a year.

A child dies every 43 seconds in Africa. Twenty-seven people will die during my lecture.

And we in this country have no way of really understanding what that means for those involved.

Another comment from Esther was that we react when a tragedy like Haiti happens, but the tragedy continues today.

So what can we do about it?

Well, there are many things that people have tried over the years to solve malaria.

You can also spray it. The problem is that there are environmental problems.

You can try to treat people and raise awareness.

That's great, but those places don't have medical systems, except where malaria is very serious.

Vaccines are great, but they don't work yet.

People have been trying for a long time. There are some interesting candidates.

Making a vaccine is very difficult.

You can distribute mosquito nets, and using mosquito nets is very effective.

I don't always use it for that. People use them to fish.

They don't necessarily reach everyone.

And while mosquito nets affect epidemics, mosquito nets can never eradicate them.

Now, malaria is an incredibly complex disease.

You can spend hours considering this.

There is this kind of melodramatic lifestyle. They have sex, burrow into their livers, tunnel into their blood cells...

It's an incredibly complex disease, but in fact that's one of the things that we find interesting about it and one of the reasons we're working on malaria. There are many potential ways.

One of those methods may be a better diagnosis.

So this year we want to prototype each of these devices.

It will automatically diagnose malaria, just like a blood glucose meter for diabetics. Take a drop of blood, put it in there, and it will be diagnosed automatically.

Today, complex laboratory procedures must be performed and numerous microscope slides prepared and examined by trained personnel.

The other would be even better if there was no need to draw blood.

And if you look through your eyes or observe the blood vessels in the white of your eye, you might actually be able to see them directly without having to draw any blood or go through the nail bed.

You can actually see the blood vessels if you look through the nail. Because if you can see the blood vessels, you can think that you can see malaria.

We can see it thanks to this molecule called hemozoin.

It is produced by the malaria parasite and is a very interesting crystalline substance.

Interesting anyway if you are a solid state physicist.

There are so many great things you can do with this.

This is the femtosecond laser laboratory.

This therefore produces a pulse of light lasting femtoseconds.

It's really, really, really short.

Because this is a pulse of light that is only about one wavelength of light long, a large number of photons all arrive and collide at the same time.

Extremely high peak power is produced and all sorts of interesting things are possible. In particular, you can find hemozoin.

Here is an image of a red blood cell. Now we can actually map the location of hemozoin and malaria parasites in red blood cells.

And we believe that using both this technology and other optical techniques, we can make those diagnoses.

There is also another hemozoin-directed treatment for malaria. This is how the malaria parasite is actually taken up and filtered out of the blood system in acute cases.

It's like dialysis, but to reduce the parasite load.

This is our thousand-core supercomputer.

We are software people, so we want software to solve almost every problem you raise.

One of the problems we face when trying to eradicate or reduce malaria is not knowing what works best.

Well, I heard about mosquito nets earlier.

You pay a certain amount for each mosquito net.

Or you can spray it.

Medication can be administered.

Various interventions exist with varying degrees of effectiveness.

How do I know?

So we used a supercomputer to create the world's best computer model of malaria. I will show you that.

We chose Madagascar.

We have every road, every village, almost every square inch of Madagascar.

We have all the precipitation and temperature data.

This is very important because humidity and precipitation will tell you if there are puddles in which mosquitoes can breed.

This sets the stage for doing this.

Next, we need to introduce a mosquito and model how it and the mosquito enters and exits.

This is what you get in the end.

This is malaria, which is endemic throughout Madagascar.

And now it's the second half of the rainy season.

We are about to enter the dry season.

It almost disappears during the dry season because there is no place for mosquitoes to breed.

And, of course, the next year it will be on the rise again.

By doing these kinds of simulations, we hope to have the software eradicate or control malaria thousands of times before actually eradicating or controlling malaria. To be able to simulate both economic trade-offs, i.e. number of nets and application rate. -- Or social trade-offs -- What happens when anxiety breaks out?

We also try to study the enemy.

This is a mosquito photographed with a high-speed camera.

And soon you will be able to see the airflow.

Here I'm trying to visualize the air flow around a mosquito's wings using small particles that I'm irradiating with a laser.

By understanding how mosquitoes fly, you will know how to keep them from flying.

Well, one way to keep it from flying is DDT.

This is real advertising.

This is one of the hardest things to do.

Once upon a time this was the dominant technology, and in fact many countries have eradicated malaria with DDT.

The United States did.

In 1935, there were 150,000 cases of malaria in the United States annually, but DDT and massive public health action managed to bring it under control.

So we thought: "We've been doing all this focusing on the parasite that's involved, the malaria parasite.

What can be done against mosquitoes?

Let's crush it with a home appliance. ”

As silly as it sounds, each of these devices has interesting features that you might be able to use.

Blu-ray players have very cheap blue lasers.

Laser printers have mirror galvanometers that are used to control the laser beam very precisely. That's what causes the little dots on the page.

And, of course, there's signal processing and a digital camera.

So what if you could combine all this and shoot them out of the sky with lasers?

(Laughter) (Applause) Well, we call this the pinky-sucking moment.

(Laughter.) What if we could do that?

Now, let's pause the disbelief for a moment and consider what would happen if we could do that.

Well, you can protect very high-value targets like clinics.

Clinics are full of malaria patients.

Because they are sick, their ability to protect themselves from mosquitoes is weakened.

you really want to protect them.

Of course, that way you can protect your backyard as well.

And because our photons are 100% organic, farmers can protect the crops they want to sell to Whole Foods. (Laughter) They are completely natural.

Well, it actually gets better than this.

If you're really smart, you can fire non-lethal lasers at insects before attacking them, and even listen to the frequency of their wing beats to gauge their size.

Then you can decide, "Is this a bug I want to kill or a bug I don't want to kill?"

Moore's Law made computing cheap. So cheap that we can weigh the lifespan of individual insects to determine if they are good or bad. (Laughter) Now, it turns out that we're only killing female mosquitoes.

They are the only ones in danger.

Mosquitoes drink blood only to lay eggs.

Mosquitoes are actually alive... their daily nutrition comes from nectar and flowers. In fact, the lab feeds raisins, but females need blood meal.

This is really crazy, don't you think?

do you want to see

Audience: Yes!

Nathan Myhrvold: Okay. Well, our legal department has prepared a disclaimer for you. Here it is.

(Laughter) Well, after thinking about this for a bit, I figured it would probably be easier to do this with a non-lethal laser.

So Eric Johansson, who actually built this device, used parts from eBay. Pavlos Holman is here, he has mosquitoes in his tank.

The device is here.

And instead of a killing laser, which is a very short, instantaneous pulse, it uses a green laser pointer that actually stays on the mosquito for quite some time. Otherwise, it will not look good.

Please take Eric.

Eric Johansson: Here's a tank on the other side of the stage.

And this computer screen actually shows a flying mosquito.

And Pavlos, when he stirs our mosquitoes a little bit, you can see them flying around.

This is a very simple image processing routine and let me explain how it works.

Here you can see the insects tracking as they fly around and it's kind of fun.

Next, let's actually light it with a laser. (Laughter) Now, this is a low power laser that can actually pick up the wing beat frequency.

Therefore, you may hear the sound of flying mosquitoes.

NM: That's the hum of a mosquito.

EJ: Finally, let's see what this looks like.

You can see mosquitoes flying around while being lit up.

It slows down a lot so you can see what's going on.

I'm running in fast mode here.

So this system built for TED is here to show that it's technically possible to deploy such a system in practice. We are very enthusiastic about finding cost-effective ways to use it in places like Africa and other parts of the world.

(Applause) NM: I mean, it wouldn't be fun to show you what would actually happen if we attacked.

(Laughter) (Laughter) This is very satisfying.

(Laughter) This is one of the first things we made.

The energy here is a little higher.

(Laughter) We'll circle here in a moment, so you'll see another location.

There is one more thing. Bang.

The interesting thing is that we end up killing them all the time. It was not possible to actually close the wings in the air.

Wing motors are very resilient.

So here we are blowing the wing, but the wing motor is still down.

So that's what I have. Thank you very much.

(applause)

I will talk about two things today. One is what we have lost and two is how we can get it back.

And let's start with this.

This is my baseline. Here on the Mediterranean coast, there are no fish, rocks are bare, and algae-eating sea urchins abound.

I saw something like this for the first time when I dived for the first time off the coast of the Mediterranean Sea off Spain.

Now, if an alien were to come to Earth -- let's call him Joe -- what would Joe see?

If Joe dives into the reef, the aliens will see many things.

In the most unlikely way, Joe will be diving into pristine reefs, pristine reefs teeming with corals, sharks, crocodiles, manatees, groupers, turtles and more.

So perhaps Joe sees this part, the greenish part of the picture.

Here you'll find dead corals, microbial soups, and jellyfish in extreme conditions.

And where divers are probably where most of the world's coral reefs are today, where there are few corals, corals overgrown with algae, bacteria plentiful, and large animals gone.

And this is what most marine scientists are seeing too.

This is their baseline. This is considered natural to them, as they began modern science with scuba diving long after we started degrading marine ecosystems.

So put us all in the time machine and go left. Let's go back in time and see what the ocean was like.

And let's start with this time machine, the Line Islands. So we went on a series of National Geographic expeditions.

This sea is an archipelago belonging to Kiribati on either side of the equator.

So let's start with the first island. Christmas Island has a population of over 5,000.

Most of the reefs are dead, most of the corals are also dead covered in algae and most of the fish are smaller than the pencils we use to count them.

I did 250 hours of diving here in 2005.

We didn't see a single shark.

It was discovered by Captain Cook in 1777, when he described large numbers of sharks biting the rudders and oars of small boats as he landed.

Let's move the dial back a little.

Fanning Island, population 2,500.

The corals here are fine. lots of small fish.

This is what many divers consider paradise.

This is where you can see most of the Florida Keys National Marine Sanctuary.

And if this is your criteria, many people think this is really, really beautiful.

Back in places like Palmyra Atoll where I was with Jeremy Jackson a few years ago, the corals are in better condition and there are sharks.

You can see sharks on any dive.

This is very unusual for coral reefs today.

But if you turn the dial back 200, 500 years, you reach a point where corals are perfectly healthy and gorgeous, forming spectacular structures and where predators are most prominent. There you can see 25-50 sharks in a single dive.

What have we learned from these places?

This is what we took for granted.

This is what we call the biomass pyramid.

If you collect and weigh all the reef fish, this is the expected result.

Most of the biomass is lower in the food chain, such as algae-eating herbivores, parrotfish, and surgeonfish.

Then there are the plankton feeders, these little damselfish, the little animals that float in the water.

And the biomass of carnivores is reduced, as is the biomass of topheads: sharks, large snappers and large groupers.

But this is the result.

This worldview is the result of studying degraded coral reefs.

When we went to the pristine reef, we found the natural world turned upside down. This pyramid turned upside down.

The apical head accounts for the bulk of the biomass, up to 85 percent in some places, such as the now protected Kingman Reef.

The good news is that in addition to more predators, there will be more of everything.

These boxes are even larger in size.

Shark numbers are increasing, snapper biomass is increasing, and the biomass of herbivores such as the goat-like parrotfish is also increasing.

They clean the reef. Eat anything that visibly grows to keep the reef clean and allow the corals to replenish.

Not only are these sites, ancient and pristine, abundant with fish, but also other important elements of the ecosystem, such as giant clams. The lagoon is paved with giant clams, up to 20-25 per square meter.

They disappear from all inhabited reefs around the world and filter the water. They keep the water clean from microorganisms and pathogens.

However, global warming is still progressing.

If you can't fish because these reefs are protected by law or are so remote, this is great.

However, if the water temperature stays too long, the coral will die.

So how are these fish and predators useful?

Now, what we saw was that during the 1997-1998 El Niño event, water temperatures in this particular region were too warm for too long, causing many corals to bleach and many to die.

At Christmas, even though the food web has been severely curtailed and the large animals gone, the corals have not recovered.

No corals have been recovered from Fanning Island.

But here you can see a large table coral that has withered and collapsed.

And the algae lawn is a little lower because the fish are eating the algae.

Then go to Palmyra Atoll, which has a higher herbivore biomass, and dead corals are being cleaned and corals are returning.

And when going on the primal side, has this ever been bleached?

These places also bleached, but recovered quickly.

The more intact, the more complete, [and] the more complex the food web, the more resilient, [and] the more likely it is that the system will recover from the short-term effects of warming events.

That's good news, so that structure should be restored.

We need to ensure that all parts of the ecosystem are present so that the ecosystem can adapt to the effects of global warming.

So what if the baseline needs to be reset, if the ecosystem has to go back to the left?

Well, there are several ways.

One very obvious way is marine reserves, especially those set aside to allow for the recovery of marine life.

Let's go back to the image of the Mediterranean Sea.

This was my baseline. This is what I saw when I was a child.

And at the same time, I was watching Jacques Cousteau on TV, full of richness, fertility and diversity.

And this richness belongs to the tropical seas, and the Mediterranean was originally thought to be a poor sea.

But little did I know until I dived in the Marine Reserve for the first time.

And here is what I saw, lots of fish.

After a few years, five to seven years, the fish will come back and eat the sea urchins, and then the algae will grow again.

We have this tiny algae forest, where we find over 100 species of algae inside a laptop size, most of which fit hundreds of species of small animals that can be seen under a microscope, and feed the fish to restore the system.

And this special place, the Medes Islands Marine Protected Area, which covers only 94 hectares, brings in 6 million euros to the local economy, 20 times more than the fishing industry, and accounts for 88 percent of the total tourism income.

So these places not only help the ecosystem, they also help the people who benefit from it.

So let's outline what the no-take reserve does.

Securing these sites, when compared to nearby unprotected areas:

The number of species increased by 21%. Therefore, if there are 1,000 species, there are expected to be another 200 species in marine reserves.

This is very important.

The size of the organism increases by a third, so the fish are also this big.

The richness of how many fish there are per square meter increases by almost 170 percent.

And biomass, this is the most amazing change. After just 5-7 years, there was an average 4.5-fold increase in biomass.

Depending on the location, biomass within the reserve can reach up to 10 times.

So what do all these things grow inside the reserve and what do they do?

they breed. That's Population Biology 101.

If you don't kill the fish, it will take longer to die, get bigger, and reproduce a lot.

The same is true for invertebrates. Here is an example.

This is a case of eggs laid by a snail off the coast of Chile, and this many eggs are laid on the bottom.

Outside the reserve, you can't even detect this.

These snails are very abundant and within the marine reserve there are 1.3 million eggs per square meter.

So these creatures will breed and the juveniles of the little larvae will flood, all of them, and people can benefit from it even outdoors.

This is a Nassau grouper in the Bahamas.

Groupers are abundant within the reserve, and the closer you get to the reserve, the more fish there are.

Therefore, fishermen are catching even more.

You can tell where the reserve limits are when you see the boats lined up.

Therefore, spillage occurs. Beyond the boundaries of these reserves are the benefits of helping those around them, while the reserves protect entire habitats. It's about building resilience.

So what we have now, a world without reserves, is like a debit account that you always withdraw and never deposit.

A reserve is like a savings account.

There are principals we haven't touched. It produces social, economic and environmental benefits.

And given the increase in biomass within reserves, this is kind of compounding.

Here are two more examples of how these reserves can help people.

This is the amount that fishermen have caught daily in Kenya over the years in unprotected areas. It's all free.

Once the most degraded fishing gear, the seine, was removed, fishermen caught more.

If you catch less, you can actually catch more.

But even with no-take zones added, fishermen are making more money by catching less around protected areas.

Another example: the Nassau grouper on the Mesoamerican Reef in Belize.

This is grouper sex, and groupers congregate for a week around the full moon in December and January.

In the past, tens of thousands of groupers, even 30,000 per hectare, gathered in one swarm.

Fishermen knew these things. They caught them and exhausted them.

When I first went there in 2000, there were only 3,000 groupers left.

And fishermen were empowered to catch 30 percent of the total spawning population each year.

So we did a quick analysis and found, without the need for rocket science, that if we took 30% each year, the fishery would quickly collapse.

And fishing kills the entire reproductive capacity of the species.

It happened in many places in the Caribbean.

And the whole fishery, and the few boats, make $4,000 a year.

Now, if we do an economic analysis to predict what would happen if we didn't cut up the fish, bringing in 20 divers for just one month of the year would yield over 20x more revenue, sustainable over the long term.

So how long will this be?

If this is so good, if this is so easy, how long have you had this?

And you've already heard that less than 1 percent of the ocean is protected.

Thanks to the protection of the Chagos Islands, it is now closer to 1%, but only a fraction of it is fully protected from fishing.

Scientific studies recommend that at least 20 percent of the ocean should be protected.

Estimated ranges for the set of targets for biodiversity, fisheries enhancement and resilience are 20-50 percent.

Now, is this possible? People will ask: "How much will that cost?"

Now think about how much we are currently paying in fisheries subsidies. $35 billion a year.

Many of these subsidies go to destructive fishing.

Well, there are some estimates of how much it would cost to build a network of protected areas covering 20% ​​of the ocean, but this is only a fraction of what we are currently paying. The government gives a hand to the crumbling fisheries.

People are out of work because the fisheries are collapsing.

Creating a network of reservists would provide direct employment plus all secondary jobs and all secondary benefits for more than one million people.

So how do we do that?

If it is clear that these savings accounts are good for the environment and people, why not own 20-50% of the ocean?

And how can we reach that goal?

Well, there are two ways to get there.

A simple solution is to create very large reserves like the Chagos Islands.

The problem is that such large reserves can only be created in places where there are no people, where there are no social conflicts, where the political costs are very low and the economic costs are very low.

And some of us, some organizations in this room and elsewhere, are working on this.

But what about other coastal areas of the world where people live and fish for their livelihoods?

Well, there are three main reasons why we don't have tens of thousands of small reserves. First, people don't understand what marine reserves do. Also, fishermen tend to be very, very defensive when it comes to regulating or closing an area, even if it's a small area.

Second, most coastal communities around the world do not have the power to oversee resources to create and enforce protected areas, hence poor governance.

It's a top-down hierarchy, people wait for government agencies to come, which is ineffective. And the government does not have enough resources.

This brings us to the third reason, why we don't have more reserves, is the funding model is wrong.

NGOs and governments usually devote a lot of time, energy and resources to a few small areas.

As such, marine and coastal protection has become a sucker for government and philanthropic funding, which is not sustainable.

So the only solution is to solve these three problems.

First, we need to develop a global awareness campaign to encourage communities and governments to create better unmined reserves than we have today.

It is a savings account and a debit account with no deposit.

Second, we need to redesign our governance to allow decentralization of conservation efforts. That way, conservation efforts will not depend on the work of NGOs or government agencies, as is done in the Philippines and some other places, but will be initiated by local communities.

And third, and very importantly, we need to develop new business models.

Charity as the only way to generate buried treasure is not sustainable.

We already know that these marine reserves provide social, ecological and economic benefits, so we need to develop a model, a business model, where coastal conservation is an investment.

I would like to end with one final thought. It means that no single organization can save the ocean.

There has been a lot of competition, but we need to develop new models of truly collaborative partnerships that complement rather than replace.

It's too risky to continue on the path we're on.

So let's do it. thank you very much.

(Applause) Chris Anderson: Thank you, Enric.

Enric Sala: Thank you.

CA: It was a brilliant job of putting things together.

First of all, your pyramid, or inverted pyramid, shows 85 percent of predator biomass, which seems impossible.

How can 85% survive with 15%?

ES: Well, imagine a clock with two cogs, one big and one small.

Large ones move very slowly, small ones move fast.

That's basically it.

Animals lower down the food chain reproduce very quickly. they grow really fast. They lay millions of eggs.

There are sharks and big fish that live 25, 30 years.

They reproduce very slowly. they have a slow metabolism. And basically they just maintain biomass.

So basically, the surplus production of these guys underground is enough to sustain this biomass that doesn't move.

They are like capacitors in the system.

CA: That's very attractive.

So, really, the food pyramid we're describing is just that, and it has to change completely.

ES: At least in the ocean.

What we found in coral reefs is that the inverted pyramid corresponds to the Serengeti, where there are 5 lions for every wildebeest.

And on land, this does not work.

But at least coral reefs have systems in which there is a bottom component with structure.

We believe this is universal.

However, we only recently started studying primitive coral reefs.

CA: So the numbers you presented are really amazing.

They say they're putting $35 billion into subsidies right now.

Setting up 20 percent of the ocean as a marine reserve would cost just 16 billion yen, and would actually give fishermen a new livelihood option.

If the world were a smarter place, minus $19 billion could solve this problem.

You can spend $19 billion on healthcare or something.

ES: And there's a $50 billion fishery slump.

Again, one big solution is for the World Trade Organization to shift subsidies to sustainable practices.

CA: Well, we hear a lot of examples of trying to end this subsidy craziness.

Thank you for those numbers.

The last question is personal.

A lot of the experience of people here who have lived in the sea for a long time is that they have witnessed this deterioration, and the beautiful places they saw have become even worse and depressing.

Tell me about the feelings you must have experienced when you went to these pristine regions and saw things come back.

ES: It's a spiritual experience.

We go there to try to understand ecosystems, to measure and count fish and sharks, to see how those places differ from the places we know.

But the best feeling is this biophilia of E.O. Wilson talks about where humans find such awe and wonder in the face of pristine, untouched nature.

And only there do you truly feel that you are part of something greater or part of a larger global ecosystem.

And I don't think I would have been able to continue this work without this place of hope.

It would be too depressing.

CA: Well Enric, thank you so much for sharing that spiritual experience with all of us. thank you.

ES: Thank you.

Can I remind you of a time when you really loved something, a movie, an album, a song, a book, etc., and sincerely recommended it to someone who also loved it, and waited in anticipation of the reaction, and it came back and the person hated it?

For the record, this is exactly how I've been working every day for the last six years. (Laughter) I teach high school math.

I sell products to markets that don't want it, but are required by law to buy.

So it's just a losing idea.

So I think I have a useful stereotype about my students, and I have a useful stereotype about you too.

If I let you guys take the Algebra 2 final exam, I'd say the pass rate is less than 25 percent.

And both of these facts say less about you and my students than about what we call math education in the United States today.

First, I would like to divide mathematics into two categories.

One is calculation. This is what you forgot.

For example, factorize quadratic functions with leading coefficients greater than 1.

Again, it's easy to relearn if you have a solid foundation in reasoning. Mathematical reasoning -- we call it the application of mathematical processes to the world around us -- is difficult to teach.

This is what I want students to remember, even if they don't go into the field of mathematics.

This is also the way it is taught in the United States.

Just guarantee they won't keep it.

So I want to talk about why it is such a catastrophe for society, what we can do about it, and finally why this is a great time to be a math teacher.

Let's start by discussing five symptoms that indicate that you're doing math reasoning wrong in the classroom.

One is lack of spontaneity. Students do not start on their own.

As soon as the lecture block is over, five people raise their hands and ask them to repeat the whole thing at their desks.

Students lack patience.

They lack holding power. After three months, you find yourself thoroughly restating the concept.

99% of my students hate word problems.

And the remaining 1% are eagerly looking for formulas that apply to their situation.

This is really destructive.

David Milch, creator of "Deadwood" and other great TV shows, has a very apt explanation for this.

He vowed to make a modern drama, a show set in the present day. He said that people, without contempt, fill their minds with watching, say, Two and a Half Men four hours a day, because they saw it forming neural pathways in such a way as to anticipate simple problems.

He called it "impatient indecision."

You get frustrated with things that aren't resolved quickly.

You expect a sitcom-sized issue to end with 22 minutes, three commercial breaks and a laugh track.

And as we all know, the problems worth solving are not so simple.

I am very concerned about this as I will be retiring in a student run world.

Teaching in this way is doing me a disservice to my own future and well-being.

My point here is that the way our textbooks, especially the mass-adopted textbooks, teach mathematical reasoning and patient problem-solving is functionally the same as turning Two and a Half Men on and off.

(laughs) Seriously. Below is an example from a physics textbook.

That applies equally to mathematics.

First of all, notice that there are exactly three pieces of information here, each of which will end up being a formula somewhere and ultimately being calculated by the student.

I believe in real life.

And ask yourself, have you ever solved a problem worth solving if you knew all the information that was given to you in advance? When there wasn't too much information and had to filter it out, or when there wasn't enough information and had to search for it.

I think we all agree that such is not a problem worth solving.

And I think textbooks know how much it holds students back. Because, look at this, it's a practice set.

When it comes time to do the actual problem set, I run into problems like this and just replace the numbers and adjust the context a bit.

It also helps if the student doesn't yet recognize the stamp the stamp came from by explaining which sample question they can go back to to find the formula.

Literally, you can pass this unit without any physics knowledge just by knowing how to decipher the textbook. I'm sorry.

So you can diagnose the problem a little more concretely with mathematics.

You have a really great problem here. i like this.

It's about defining steepness and inclines using ski lifts.

But what we have here is actually 4 separate layers, and I'm curious as to which layer can see 4 separate layers, and how that creates this impatient problem-solving, especially when they're compressed and presented to the student at once.

We define them here. I can see the visuals.

There are also mathematical constructs that talk about grids, measurements, labels, points, axes, etc.

There are substeps and they all lead to what we really want to talk about: which section is the steepest.

I would appreciate it if you could see it.

I hope you understand how we're dealing with compelling questions and compelling answers here, but we're carving a smooth, straight path from one to the other, and congratulations to our students for successfully navigating small cracks along the way.

That's all we do here.

So I would like to tell you that if you can separate these in a different way and build with your students, you have everything we want when it comes to patient problem solving.

So I'm going to start with the visuals here and get straight to the question. Which section is the steepest?

The visuals are made to defend two answers, so the conversation starts.

So people argue with each other, with friends, in pairs, in journals, etc.

And eventually you realize that it's getting tiresome to talk about the skier in the bottom left of the screen or just above the midline.

I also realized how nice it would be if I had some A, B, C, D labels and could talk about them more easily.

And once I started defining what I meant by steep, I realized it would be nice to have a few measurements to really narrow down what that meant.

And only then do we abandon that mathematical structure.

Mathematics helps conversations, but conversations don't help maths.

At that point, 9 out of 10 classes are suitable for full slopes and steep courses.

However, students can develop those substeps together if desired.

Guys, do you see how this and this here compare? Which produces that patient problem-solving and mathematical reasoning?

For me it was clear in practice.

And I'll give Einstein the floor here for a moment, but I believe he paid his dues.

He talked about how problem formulation is very important, but in my practice here in the United States, we simply give the students problems. We do not involve them in shaping the problem.

So 90 percent of what I do in my five hours a week of prep time is taking fairly compelling elements of problems like this from textbooks and reconstructing them in ways that support mathematical reasoning and patient problem-solving.

And this is how it works.

I like this question. About the water tank.

The question is how long it will take to fill it.

First, remove all substeps.

Students should develop and formulate them.

And notice that all the information written there is necessary.

None of it is a distraction, so lose it.

Students have to decide, "Okay, well, does height matter? Do sides matter?"

Does bulb color matter? what is important here? ”

Such questions are underrepresented in the mathematics curriculum.

The water tank is now complete.

How long does it take to fill up? that's all.

And it's the 21st century, and we want to talk about the real world itself, not in terms of line drawings and clip art that we often see in textbooks, so we go out and take pictures.

Now you have the real deal.

How long does it take to fill up?

And even better, someone takes a video of it filling in.

And it fills up slowly, painfully slowly.

Hassle.

The students are wide-eyed, looking at their clocks and wondering, "How long will it take to fill up?"

(laughter) That's how you know you've baited the hook, right?

And this question, apart from here, is really fun for me. Because, like the intro, I'm teaching my kids the most remedial stuff because of my inexperience.

And then there are kids who won't join a conversation about math just because someone knows the formula. Someone else knows how to use the formula better than I do, so I won't talk about it.

But here, all students are on a level playing field of intuition.

Everyone has filled something with water, so let the children answer the question: "How long does it take?"

There are children who are both mathematically and verbally intimidated to participate in conversations.

We wrote a name on the board, tied it to a guess, and the kids agreed here.

And follow the process I described.

And one of the best, or even better, things here is that you don't get the answers from the answer key on the back of the teacher's edition.

Instead, we just watch the end of the movie.

(Laughter) That's scary. Because there is a theoretical model in the answer key behind the teacher's version that always works. That's great, but it's scary to talk about what causes an error when theory doesn't match reality.

But those conversations are very valuable and one of the most valuable.

So I'm here to report some really fun games with students pre-installed with these viruses on the first day of class.

Now that the first semester is over, these kids can put something completely new and completely different on the board, and they'll be talking about it for 3-4 minutes longer than they were at the beginning of the year, and that's a lot of fun.

We no longer hate word problems because we have redefined what word problems are.

We are slowly redefining what mathematics is, so math doesn't scare us anymore.

It was a lot of fun.

I encourage math teachers to use multimedia. Because multimedia brings the real world into the classroom in high definition and full color. Encourage students' intuition for the level playing field. Ask as short a question as possible and let more specific questions come up in the conversation. Make students create problems just because Einstein said so. And finally, all in all, it's just not very useful. Because textbooks are helping you the wrong way. Textbooks don't do much because they buy into your obligations to patient problem-solving and mathematical reasoning.

And the reason that now is a great time to be a math teacher is because we have the tools in our front pockets to create this quality curriculum.

It's ubiquitous and fairly cheap, and tools for free distribution under an open license are cheaper and ubiquitous than ever before.

I posted a video series on my blog a while ago and it has garnered 6,000 views in two weeks.

I still get emails from teachers in countries I've never been to, saying, "Wow, you did a great job talking about that."

Oh, by the way, here's how I could make yours better. ”

I recently blogged about this issue. At the grocery store, would you be in a row with 1 cart and 19 items, or a row with 4 carts and 3, 5, 2, or 1 items?

The linear modeling it contained was good for my classroom, and I ended up appearing on "Good Morning America" ​​a few weeks later. This is strange, isn't it?

With all this, I can only say that people, not just students, are really hungry for this thing.

Mathematics makes sense of the world.

Mathematics is a vocabulary for your own intuition.

So, whatever your position in education, whether you are a student, parent, teacher, or policy maker, I really encourage you to advocate for a better math curriculum.

We need more patient problem solvers. thank you. (applause)

I have a daughter named Mulan.

Last year, when she was eight, she was writing a school report or doing homework about frogs.

And we were at this restaurant and she said, "Basically, frogs lay eggs, and those eggs turn into tadpoles, and tadpoles turn into frogs."

And I said, "Well, I'm not very keen on breeding frogs.

The female lays the eggs, which are fertilized by the male.

And they become tadpoles and frogs. ”

Then she said, "Huh? Only females have eggs?"

And I said, "Yes."

And she said, "So what is this manure?"

So I said, "Oh, it's because of this extra material that I need to make a new frog out of dad and mom frogs." (Laughter.) And she said, "Oh, does that apply to humans as well?"

And I thought, "Okay, let's go."

I didn't expect it to happen so early at 8am.

I tried to remember all the guidebooks, but all I could remember was, "Only answer the questions they ask."

Please don't give me any more information." (Laughter) So I said yes.

And she said, "So where do human females like, where do females lay their eggs?"

And I said, 'Well, it's funny, just ask. (Laughter) We evolved to have our own pond.

We have our own pond in our bodies.

And we lay our eggs there. No need to worry about other eggs etc.

This is our pond. And that's how it happens. ”

And she said, "Then how do you conceive?"

And I said, 'Humans fertilize the egg with the sperm that comes out through the penis.

and pass through the woman's vagina. ”

So as we were just eating, her jaw dropped and she said, "Mom!"

For example, where do you go to the bathroom? ”

And I said, 'I know.

know. "

(laughs) That's how we evolved. It seems strange.

It's like having a landfill right next to an amusement park...

"It's a bad lot, but..." (laughs) She's like, "What?"

So how could that have happened? ”

Then say, "Yes," and put on the Margaret Mead hat.

"Human men and women develop a special bond, and when they're much older than you and they feel very special, they can get naked together."

And she said, "Mom, have you done this before?"

And I said yes.

Then she said, "But mother, you can't have children."

Because she knows I adopted her and I can't have children.

And I said yes.

Then she said, "You don't have to do that anymore."

And I said, "..."

And she said, "But what happens when a man and a woman are together?"

For example, how do they know it's that time of year?

Mom, is he saying, 'Now is the time to take off your pants'? (Laughter) And I said yes.

(Laughter) "Exactly.

That's exactly what happens. ”

So as we were driving home, she was looking out the window and she said, "Mom, what if two people just saw each other on the street, what if they just started doing it like a man and a woman? Will that happen?"

And I said, "Oh no. Humans are very private.

oh ..."

And she says, ``What if we had a party or something, and there were a lot of girls and boys, a lot of men and women, and we started doing it, Mom?''

Will that happen? ”

And I said, 'Oh, no, no.

That's not how we do it. ”

Then I went home and saw a cat. And she said, "Mom, what do cats do?"

And I'm like, "Oh, it's the same. It's basically the same."

And she got entangled in her legs. "But mom, what about your legs?"

I don't know about legs. ”

She said, "Mom, you guys can't split your legs."

And I said, "I know that, but my legs..."

And I would probably say "legs are forged".

And she said, "But I don't understand it at all."

So I said, "Why don't you go to the Internet, and you might be able to see something like Wikipedia." (Laughter) So I went online and added "cat mating."

And unfortunately, YouTube is full of cat mating videos.

We saw it and she said, "Wow! This is really great," so I'm very grateful.

She said, "What about dogs?"

So we had the dog mating and we were watching it and she was totally hooked.

And she said, "Mom, do you think humans can mate on the internet?"

(Laughter) And then I realized that I had taken an eight-year-old by the hand and led him straight into Internet porn. (Laughter.) And I looked into this trusting, loving face and said,

That will never happen. ”

thank you.

(Applause.) Thank you.

(Applause.) Thank you. I am very happy to be here.

(music) (singing) I was walking along the railroad tracks trying to find some inner peace.

Then I met you

You were walking slowly, step by step.

I said, "Listen, stranger, I'm feeling down right now.

I don't know which way to go. ”

I said, "If you're lost right now, maybe I can help you sing a song to get you going."

Sing under the line.

where shall we go where shall we go

"I'm looking for some kind of shelter," she said.

A place I can call mine.

I've been walking around all night and I don't know where to call home. ”

"The only way to find that place is to be close to my heart.

I know I'll get there, but I have to keep walking along that line. ”

In the future.

In the future.

Thank you very much.

(Applause) How are you all feeling today? how are you feeling?

(Cheers) Great. Everyone, can you sing along for just one second?

Can you sing something for me? Can you sing D?

Sing "O".

(audience hums) Oh, louder for me, louder for me.

(singing) Oh.

Come on, sing "Oh oh oh"

Audience: Ohhhh.

Jacob Collier: Ohhhh.

Audience: Ohhhh.

JC: Sing "Wow, oh."

Audience: Whoa.

JC: Oh, yeah.

Audience: Ohhhh.

JC: Sing "Ooooooooo".

Audience: Ohhhh.

JC: Sing "Ooooooooo".

Audience: Ohhhh.

JC: Ohhhh.

Audience: Ohhhh.

JC: Sing "Ooooooooo".

Audience: Ohhhh.

Thank you very much. That's beautiful. thank you.

(Applause.) Thank you.

So do you feel that movement?

Do you feel that you are part of the movement, that which is moving beneath the surface?

The language of musical harmony is therefore quite an extraordinary language.

This is a way to get past your own emotional framework, but you don't have to put things into words. As with many languages, I don't think it matters how much you know about the language.

It doesn't matter how many words you can say or how many phrases you know.

What matters is the emotional choice you make using this language.

Therefore, we encourage you to embrace this idea as a community. This is something that in time may cause us to grow in that direction instead of pushing us away from humanity.

Thank you very much.

(Applause) (music) (singing) Take me anywhere.

You know my love is strong

in my lair.

Find what you've been looking for, like the calm after a storm.

in my lair.

Even with my eyes closed, darling, if you're lost, I'm on my way to my hideout.

In my favorite place, in my hideout, touch me like I've never loved before.

I know there's a place for me to go in my hideout no matter what the wind blows.

my hideout.

Neither sticks nor stones will hide me from you anymore.

And in time, you will find what you were looking for.

I heard your voice calling me

I'm on my way to a place where I can be free.

And if she won't wait for me, do the right thing, don't look back, keep my mind on the future.

On the soles of my shoes are all the places I've been that I've known since I met her.

'Cause it's you, I don't understand why you're making me think you're perfect for me

What I've always wanted to know is that it must be you.

Girl, all I want is you, that's what makes me perfect because you're the one for me.

I want you to know that I belong because of you.

1、2、3、4、5。

(Applause.) Thank you very much. thank you.

(Applause.) Thank you.

thanks so much. Thank you guys

Kelly Stotzel: OK, Jacob. oh.

Yes, I have some questions. JC: Okay.

KS: It was spectacular.

JC: Thank you, Kelly. thank you.

KS: The visualization you saw earlier was happening in real time.

JC: Well, everything visual is inspired by something aural or verbal, so it's all real time.

I give the loop cue and play the instrument. Then, for example, the tree you see growing will make a low, long sound and grow thick, long branches, and then make a high, quiet sound or whatever, and then grow thin and small branches.

And my singing voice is like blowing the wind on a tree.

KS: You're 22. JC: Yes, yes.

Moderator: So you were playing it all by yourself?

How did it start and how did it develop?

JC: I have a magic room in my house in North London, and it's like there.

(Cheers) Thank you. North London representative.

And this room, I mean, this is my parents' house.

I grew up in this room full of musical instruments, but most importantly, I had a family that encouraged me to invest in my imagination. So what I create, what I build is good to build just because I'm making it, and I think that's a very important idea.

But this room was essentially my paradise. And when I came to tour with my album In My Room, I thought I'd take a tour of that room while on tour. It's a pretty weird idea, but it's something I've been working on for a few years, and it's very exciting to be in that circle.

KS: This sounds exactly like your room setup.

JC: It's sort of. It's similar to a room in that you can create something on the spot and be spontaneous. I think that's what music and all the best ideas are all about.

KS: So you won two Grammys for the record you made alone in your room?

And how is that possible? We couldn't do that, and even five years ago it wouldn't have happened.

JC: It's a whole new world.

I think you'll agree that power is now in the hands of the creators, not the big record executives or the big guys.

Someone who has good ideas.

I say this to those of you who already know this at TED, but it's the people with the good ideas who can sow the seeds.

That is who carries the torch to the world.

Yes, I made this album entirely by myself, but I didn't wait for someone to say, 'Hey Jacob, you'd better make your own album.

I just went ahead and made it, and didn't care what people thought, and two Grammys is a huge bonus.

(Applause) KS: Thank you very much, Jacob. JC: Thank you, Kelly. thanks so much.

(applause)

Let's bring care back to healthcare.

I have worked in the healthcare field for the past 15 years. One of the things that drew me to this field was my interest in the care component of the health care system, and more specifically the valuable role that caregivers play.

Now, how many of you in this room consider yourself a caregiver?

This means how many people have ever cared for someone suffering from an illness, injury or disability.

Could you raise your hand in this case?

about half the room.

I would like to thank everyone who raised their hands for the time they spent as caregivers.

What you are doing is very valuable.

I myself am a former caregiver.

As a teenager, he had Lyme disease and was treated with antibiotics for 18 months.

I was misdiagnosed many times with bacterial meningitis, fibromyalgia, etc.

They couldn't understand it.

And if I am standing here in front of you today, it is because my life is due to the stubbornness and dedication of one caregiver.

He did everything he could for me. He drove long distances from one treatment center to another, searched for the best options, and most of all, never gave up despite facing challenges in terms of work and quality of life.

that was my father.

I have recovered, and this is largely due to his dedication.

This experience turned me into a patient advocate.

The more I looked, the more I realized that caregivers provided the same kind of support that my father did and played an important role in the health care system.

I think it's safe to say that without informal caregivers like him, our health care and social systems would collapse.

Nevertheless, they remain largely unrecognized.

I am currently a long distance carer for my mother who suffers from multiple chronic illnesses.

I understand more than ever the demands that caregivers face.

The importance and demand of family caregivers has never been greater due to an aging population, economic instability, stress in the health care system and increased need for long-term chronic care.

Caregivers around the world sacrifice their own physical, financial and psychosocial well-being to provide care for their loved ones.

Caregivers have their own limitations and needs, and without proper support, many may reach a breaking point.

Once seen as a private matter in family life, unpaid care forms the invisible backbone of our health care and social systems around the world.

As we just saw, many of these caregivers are also in this room.

Who are they and how many are they?

What are the challenges they face?

And most of all, how can we make them aware of their value to patients, healthcare systems and society?

Virtually anyone can be a caregiver. A 15-year-old girl caring for a parent with multiple sclerosis. A 40-year-old man juggles a full-time job while caring for family members who live far away. A 60-year-old man caring for his wife with terminal cancer. Or an 80-year-old woman caring for her husband with Alzheimer's disease.

There are many things caregivers do with their patients.

They provide personal care such as dressing someone, feeding them, going to the bathroom, and moving around.

They also provide a significant level of care, as they sometimes know more about the condition and needs of their loved ones than the patient himself, who is paralyzed or confused by the diagnosis.

In such situations, the caregiver is also the patient's advocate.

Also very important is the fact that caregivers also provide emotional support.

They make doctor's appointments, manage the household budget, and do the daily chores.

These challenges are challenges that cannot be ignored.

Over 100 million caregivers across Europe today provide 80% of care.

And even if these numbers are impressive, they are most likely underestimated given the low level of caregiver awareness.

As we have just seen, many of you in this room were unsure if you were qualified to be a caregiver or would be considered a caregiver.

Many people probably thought I was referring to nurses and other medical professionals.

It is also amazing the benefits caregivers bring to our society.

I would like to give just one example from Australia in 2015.

The annual value provided by informal caregivers to those suffering from mental illness is valued at A$13.2 billion.

This is almost double the amount the Australian government spends on mental health services annually.

These figures, among other things, show that if caregivers stop caring tomorrow, our health and social system will collapse.

And while the importance of these millions of silent caregivers is undeniable, they receive little attention from governments, healthcare systems and private organizations.

In addition, caregivers face significant challenges personally.

Many caregivers face higher costs and may face financial hardship given the fact that they are unable to work full-time or remain in full-time work.

Numerous studies show that caregivers often sacrifice their own health and well-being to care for loved ones.

Many caregivers spend a lot of time caring for loved ones, which can interfere with family and relationships.

Many caregivers report that employers often do not have adequate policies in place to support caregivers.

However, caregiver perceptions around the world are improving.

Just a few years ago, an umbrella organization called the International Alliance of Caregivers Organizations (IACO) was established to bring together caregiver organizations around the world, provide strategic direction, facilitate information sharing, and actively advocate for caregivers at the international level.

Private organizations are also beginning to recognize the situation of caregivers.

I am proud that my personal commitment and enthusiasm for this subject on caregivers resonated in my own workplace.

My company is fully committed to this purpose and has developed an unprecedented framework for our employees and society as a whole.

Its purpose is to enable caregivers to improve their own health and well-being and bring about a better balance in their lives.

Nevertheless, much more needs to be done to complement these relatively isolated efforts.

Our societies face increasing pressures on health, including an aging population, rising rates of cancer and chronic diseases, and rising inequalities.

To meet these challenges, policy makers need to look beyond traditional health pathways and employment policies, recognizing that informal care will continue to form the basis of care.

Caring for someone should be a choice, and should be done without weighing your own well-being.

But what is really needed to bring care back to medicine is fundamental social and structural change.

And this can only happen by changing the way you think.

And this can start today.

Today we can sow the seeds of change for millions of caregivers around the world.

My suggestion is to hug your caregiver when you go home today, or when you go to the office tomorrow morning.

Thank them and offer a little help. In some cases, you can even volunteer as a caregiver yourself for a few hours a week.

When caregivers around the world feel better recognized, not only will their own health, well-being and well-being improve, but so will the lives of those they care for.

Be more considerate.

thank you.

(applause)

Hello.

There is a medical revolution happening all around us that will help us overcome some of society's most terrifying diseases, including cancer.

This revolution is called angiogenesis and is based on the process by which our bodies grow blood vessels.

So why should we care about blood vessels?

The human body is literally full of them. Equivalent to 60,000 miles for a typical adult.

End to end, it forms a line that circles the earth twice.

The smallest blood vessels are called capillaries.

There are 19 billion of them in our body.

And while these are vessels of life, they are also vessels of death, as we shall see.

Now, the remarkable thing about blood vessels is that they have the ability to adapt to whatever environment they grow in.

For example, in the liver it forms channels for blood detoxification. In the lungs, they line the air sacs for gas exchange.

The muscles are corkscrewed, allowing them to contract without interrupting blood circulation.

And it flows through the nerves like a wire, keeping them alive.

Most of these blood vessels are obtained when we are actually still in the womb.

What that means is that blood vessels don't normally grow in adults.

Except for some special circumstances.

In women, blood vessels grow each month to build up the endometrium.

During pregnancy, it forms the placenta that connects mother and baby.

And after an injury, blood vessels actually need to grow under the scab for the wound to heal.

This is what it actually looks like, hundreds of blood vessels running toward the center of the wound.

Therefore, the body has the ability to regulate the amount of blood vessels present at any given time.

This is done through an elaborate and elegant system of angiogenesis inhibition and balance, stimulators and inhibitors. So when blood vessels need to burst for a short time, the body can do this by releasing stimulants, proteins called angiogenic factors. Proteins called angiogenic factors act as natural fertilizers and stimulate the sprouting of new blood vessels.

When the extra blood vessels are no longer needed, the body uses naturally occurring anti-angiogenic drugs to bring them back to baseline.

There are situations where you start below baseline and need to grow more blood vessels to get back to normal levels. For example, after an injury. The body can do that too, but only grows to its normal level, its set value.

However, what we now know is that in many diseases the system is defective and the body is unable to cut off excess blood vessels or grow new blood vessels in the right places at the right time and in sufficient quantity.

In such a situation, the balance of angiogenesis is disturbed.

And when the balance of angiogenesis is disturbed, countless diseases are caused.

For example, poor angiogenesis, or inadequate blood vessels, leads to non-healing wounds, heart attacks, legs without blood circulation, death from stroke, and nerve damage.

And on the other hand, excessive angiogenesis, or too many blood vessels, causes disease, such as cancer, blindness, arthritis, obesity, and Alzheimer's disease.

In total, there are more than 70 major diseases that affect more than a billion people worldwide, all superficially different from each other, but in fact they all share abnormal angiogenesis as their common denominator.

And this realization has allowed us to reconceptualize how we can actually approach these diseases by controlling angiogenesis.

Now let's focus on cancer. Because angiogenesis is a hallmark of all types of cancer.

So let's go.

This is a tumor. It's a dark, gray, eerie mass that grows in your brain.

Under a microscope, you can see hundreds of brown-stained blood vessels that nourish cancer cells and carry oxygen and nutrients.

But cancer doesn't start this way. In fact, cancer doesn't start in your blood supply.

They begin as small, microscopic nests of cells and can only grow to a size of 0.5 cubic millimeters.

It's the tip of a ballpoint pen.

After that, the blood supply is gone, and it cannot grow any further because it is not getting enough oxygen and nutrients.

In fact, we probably have these microscopic cancers forming in our bodies all the time.

Autopsy studies of people who died in car accidents show that about 40% of women between the ages of 40 and 50 actually have microscopic cancers in their breasts.

About 50 percent of men in their 50s and 60s have microscopic prostate cancer, and by their 70s, nearly 100 percent will have microscopic cancer growing in their thyroid glands.

But without a blood supply, most of these cancers do not become dangerous.

My mentor and pioneer in the field of angiogenesis, Dr. Judah Folkman, once called this “cancer without the disease.”

Thus, when the body's ability to balance angiogenesis is functioning properly, it prevents blood vessels from feeding the cancer.

And it turns out that this is one of the most important defense mechanisms against cancer.

In fact, if you actually block angiogenesis and block blood vessels from reaching cancer cells, tumors can't grow.

However, once angiogenesis occurs, cancer can grow exponentially.

And this is actually how cancer goes from harmless to deadly.

Cancer cells mutate and acquire the ability to release large amounts of angiogenic factors, or natural fertilizers, that unbalance the invasion of blood vessels into the cancer.

And when these blood vessels invade the cancer, it can expand and invade local tissues, and the same blood vessels that nourish the tumor can push cancer cells into the circulation as metastases.

And unfortunately, this late stage of cancer is when cancer is most likely diagnosed, when angiogenesis has already begun and cancer cells are growing like wild.

Therefore, if angiogenesis is the tipping point between benign and harmful cancers, one of the major parts of the angiogenic revolution will be new approaches to treat cancer by cutting off the blood supply.

We call this anti-angiogenic therapy, but it is quite different from chemotherapy because it selectively targets the blood vessels that feed the cancer.

This is possible because tumor blood vessels are different from normal, healthy blood vessels found elsewhere in the body. Tumor vessels are abnormal and very poorly structured, which makes them highly vulnerable to tumor-vessel-targeted therapies.

In fact, when cancer patients are given anti-angiogenic therapy (here, an experimental drug for glioma, a type of brain tumor), they find dramatic changes when the tumors starve.

Here is a woman with breast cancer who is being treated with an FDA-approved anti-angiogenic drug called Avastin.

And you can see that the blood flow halo has disappeared after the treatment.

Well, I have now shown two very different types of cancer that both respond to anti-angiogenic therapy.

So a few years ago I asked myself, "Can we take this one step further and treat other cancers, even other types of cancer?"

Here is a nine-year-old boxer named Milo. He had a very aggressive tumor growing on his shoulder called a malignant neurofibroma.

It entered his lungs.

His veterinarian gave him three months to live.

So we created a cocktail of anti-angiogenic drugs that can be mixed into his dog's food and an anti-angiogenic cream that can be applied to the surface of the tumor.

And within weeks of treatment, we were able to slow the growth of the cancer, ultimately extending Milo's life six times longer than our veterinarians had originally predicted, all while maintaining a very good quality of life.

Since then, we have treated over 600 dogs.

A response rate of approximately 60% was obtained, and the survival rate of pets that were about to be euthanized improved.

So let's look at some more interesting examples.

This is a 20-year-old dolphin from Florida who had these lesions in her mouth and developed invasive squamous cell carcinoma over 3 years.

So we created an anti-angiogenic paste.

I had it applied over the cancer three times a week.

Over the course of seven months, the cancer was completely gone and the biopsy results returned to normal.

This is cancer on the lip of a quarter horse named Guinness.

It is a very deadly type of cancer called angiosarcoma.

It had already spread to the lymph nodes, so I used an anti-angiogenic skin cream for my lips and an oral cocktail to treat it from the inside as well as the outside.

And within 6 months, he experienced a complete remission.

And here is the Guinness 6 years later and the very happy owner.

(Applause.) It's clear that anti-angiogenic therapy can be used in a wide range of cancers.

And indeed, the first pioneering treatments are already becoming available for humans as well as dogs.

There are 12 types of drugs and 11 types of cancer.

But the real question is how well these actually work.

This is actually survival data for patients with 8 types of cancer.

Bars represent survival times when only chemotherapy, surgery, or radiation were available.

But since 2004, when anti-angiogenic therapy first became available, we've seen a 70-100 percent improvement in survival for patients with kidney cancer, multiple myeloma, colorectal cancer, and gastrointestinal stromal tumors.

That's impressive.

However, other tumors and cancer types showed only modest improvements.

So I started asking myself, "Why couldn't we have done better?"

The answer is clear to me. It is too late to treat cancer when the cancer is already established and often has already metastasized or metastasized.

And as a doctor, I know that once the disease reaches advanced stages, it can be difficult, if not impossible, to achieve cure.

So I went back to the biology of angiogenesis and started thinking: Wouldn't the answer to cancer be to stop angiogenesis and defeat the cancer itself so that it never becomes dangerous?

This could be useful not only for healthy people, but also for those who have already beaten cancer once or twice and want to find ways to prevent it from coming back.

Therefore, in order to find a way to prevent angiogenesis in cancer, we traced back the causes of cancer.

And what really intrigued me was seeing that diet accounted for 30-35 percent of cancers caused by the environment.

Now, the obvious thing is to consider what we can, should or should remove from our diet.

But I actually took the exact opposite approach and started asking: Can we add something to our diet that is naturally anti-angiogenic, strengthens the body's defense system, and may fight off cancer-causing blood vessels?

In other words, can you eat to starve cancer?

(Laughter) The answer is yes. Here's how.

And to explore this we went to markets, farms and spice racks. Because what we have discovered is that Mother Nature has laced many foods, drinks and herbs with natural anti-angiogenic agents.

Here is the test system we developed.

At its center is a ring, from which hundreds of blood vessels extend in a star shape.

This system can then be used to test dietary factors at dietary-derived concentrations.

Let me explain what happens when you add red grape extract.

The active ingredient is resveratrol, which is also found in red wine.

This inhibits abnormal angiogenesis by 60%.

Here's what happens when you add extract from strawberries.

Potent angiogenesis inhibitor.

And an extract extracted from soybeans.

And here is a growing list of anti-angiogenic foods and beverages that we are interested in researching.

We believe that different food types, strains and varieties have different effects.

What we want to measure is when you eat strawberries or drink tea, why not choose the one that is most effective in preventing cancer?

Here are four different teas we tested.

Chinese jasmine, Japanese sencha, Earl Grey, and our special blend - all of them are common, and you can clearly see that the potency of the tea varies from weak to strong.

But what's really cool is that when you combine two not-so-potent teas, the combination, or blend, is stronger than either one alone.

In other words, there is a synergistic effect of food.

Here are some more data from our testing.

Currently, in our lab, we are able to simulate tumor angiogenesis, represented by black bars.

And this system can be used to test the efficacy of anticancer drugs.

So the shorter the bar, the less vascularization, and that's a good thing.

Here are some common drugs that have been associated with reducing cancer risk in people.

Statins, nonsteroidal anti-inflammatory drugs, and some other drugs also inhibit angiogenesis.

And here are the dietary factors that are in direct conflict with these drugs:

They apparently retain their own effects, and in some cases prove to be stronger than the actual drug.

Soybeans, parsley, garlic, grapes, berries.

You can go home and use these ingredients to make delicious meals.

Imagine building the world's first rating system that could score foods according to their anti-angiogenic and cancer-preventing properties.

And that is what we are doing now.

Now, I've shown you a ton of experimental data, but the real question is, what is the evidence in people that eating certain foods reduces angiogenesis in cancer?

The best example I know of is a study that followed 79,000 men for 20 years. The study found that men who ate cooked tomatoes two to three times a week had up to a 50 percent reduced risk of developing prostate cancer.

Tomatoes are now an excellent source of lycopene, which has been shown to inhibit angiogenesis.

But what's even more interesting about the study is that men who developed prostate cancer who ate more tomato sauce had fewer blood vessels that actually fed the cancer.

This human study is therefore a prime example of how anti-angiogenic substances present in food and consumed at practical levels can affect cancer.

And we are now working with UCSF Dean Ornish and Tufts University to explore the role of this healthy diet on markers of angiogenesis found in the bloodstream.

Clearly, what I have shared with you has far-reaching implications beyond cancer research.

Because if we're right, it could impact consumer education, food service, public health, and even the insurance industry.

And indeed, some insurers have already started thinking along these lines.

See this ad by BlueCross BlueShield in Minnesota.

Dietary cancer prevention may be the only viable solution for many people around the world. Not everyone can afford expensive terminal cancer treatments, but everyone can benefit from a healthy diet based on local, sustainable, anti-angiogenic crops.

Now, finally, we've talked about food, and we've talked about cancer, but there's one more disease we have to talk about. It's obesity.

We know that adipose tissue, or fat, is highly dependent on angiogenesis.

And just like tumors, when blood vessels grow, so does fat.

So the question is, can you reduce fat by cutting off the fat's blood supply?

The upper curve shows the weight of a genetically obese mouse that, like this furry tennis ball, continues to eat until it's fat.

(Laughter) And the bottom curve is the weight of a normal mouse.

Administration of angiogenesis inhibitors to obese mice results in weight loss.

Weight returns when treatment is stopped. You will lose weight when you resume treatment.

The weight will return when treatment is stopped.

And in fact, you can gain or lose weight simply by inhibiting angiogenesis.

Therefore, the approach we are taking for cancer prevention may also apply to obesity.

What's really interesting about this is that we can't make these obese mice lose more weight than normal mice.

In other words, you can't make a supermodel mouse.

(Laughter) And this speaks to the role of angiogenesis in regulating healthy setpoints.

Albert St. Gyorgy once said: “Discovery is seeing what everyone has seen and thinking what no one has thought.”

You can see that in the case of cancer, obesity, and other diseases, there may be great forces that attack their common denominator: angiogenesis.

And I think that's what the world needs right now.

thank you.

(Applause) June Cohen: I have a quick question.

JC: So these drugs are not currently the mainstay of cancer treatment?

What would you recommend to people with cancer?

Would you recommend continuing these treatments now for most cancer patients?

William Li: There are FDA-approved antiangiogenic therapies. If you are a cancer patient, work for a cancer patient, work for a cancer patient, or advocate for a cancer patient, you should ask about them.

And many clinical trials are underway.

The Angiogenesis Foundation follows about 300 companies and has about 100 additional medicines in its pipeline.

So while we look at what's been approved and look for clinical trials, we need to start thinking about what we can do ourselves, between what a doctor can do for you.

That's one of the themes I'm talking about. We can do what doctors can't do for us: use our knowledge to take action.

And if Mother Nature has given us some hints, we think there might be a new future for our dietary values. What we eat is actually chemo three times a day.

JC: Yes. Along these lines, for those who may have cancer risk factors, would you recommend continuing treatment prophylactically, or simply sticking to a proper diet with plenty of tomato sauce?

WL: Well, the epidemiological evidence is plentiful, and in the information age, it doesn't take long to go to a reliable source like PubMed, the National Library of Medicine, and look for epidemiological studies on diet and common drug-based cancer risk reduction.

And it's certainly something anyone can look into.

JC: Okay. Thank you very much.

(applause)

On September 10th, the morning of my 7th birthday, I went downstairs to the kitchen and my mother was washing the dishes and my father was reading a newspaper or something, so I showed them at the door and they said, "Happy birthday!" And I said, "I'm seven years old."

Then my father smiled and said, "Well, you know what that means, don't you?"

So I said, "Well, are you going to have a party and cake and get a lot of presents?"

But more importantly, being seven means that you have reached the age of reason and are capable of committing all kinds of sins against God and man. ”

(laughter) Now, I've heard the term "age of reason" before.

Sister Mary Kevin was lashing out at my class in the second year of school.

But when she said it, the phrase seemed caught in the excitement of preparing for our First Communion and First Confession, and everyone knew it was actually about the white dress and white veil.

Anyway, I didn't pay much attention to the term "age of reason."

So I said, "Oh yeah, the Age of Reason. What does that mean again?"

Then my father said, "In the Catholic Church, I believe God knows that little children can't tell right from wrong, but by the time they're seven, they're old enough to know better.

So you have grown up and reached the age of reason, and now God begins to record you, to begin a permanent record of you. ”

(Laughter) And I said, 'Oh...

Does that mean that all along, to this day, I was so good that God didn't notice it? ”

Then my mother said, "I see."

(Laughter.) And I thought, 'How could I not know this before?'

How come it didn't sink in when they told me?

And worst of all, how did I not realize until that day that this very important piece of information was basically useless to me?"

So I said, "Dad, Mom, what about Santa Claus?"

I mean, Santa Claus knows if you're naughty or kind, right? ”

Then my father said, "Yes, but I think it's technically between Thanksgiving and Christmas."

And my mother said, "Oh, Bob, don't. Just tell her. I mean, she's seven."

Julie, there is no Santa Claus. ”

(Laughter) Now, this actually wasn't that upsetting to me.

My parents had this elaborate story about Santa Claus. After talking with Santa Claus himself, my parents agreed that we would give him more time on Christmas Eve instead of giving us presents on Christmas Eve, as he did with other families who open surprises first thing on Christmas morning.

Sometimes Santa came to our house on Christmas morning while we were attending the high Mass at 9am, but only if all of us kids didn't make a fuss.

It made me very suspicious.

It was clear that our parents really gave us presents.

In other words, my father had a very distinctive wrapping style, and my mother's handwriting was very close to Santa's handwriting.

(Laughter) And why does Santa have to go back to our house after going to someone else's house to save time?

There was only one clear conclusion to be drawn from this pile of evidence. Our family was too strange and eccentric to even have a visit from Santa Claus. And our poor parents were trying to protect us from the humiliating embarrassment of being rejected by a merry Santa - but, let's be honest, Santa Claus was also very critical.

So it was actually kind of a relief to know that there is no Santa Claus at all.

I was not shocked by Santa, but rather just left the kitchen dumbfounded how I had missed this age of reason all along.

Too late for me, but maybe I can help someone else who can take advantage of the information.

They had to meet two criteria. You must be old enough to understand the whole concept of the Age of Reason, and you must be under seven years old.

The answer was clear. This is my brother Bill. he was 6 years old.

Well, I finally found Bill on the playground of this public school about a block from my house.

It was Saturday and he was kicking a ball against a wall by himself.

I ran up to him and said, "Bill!"

I just realized that at the age of seven, the Age of Reason begins, after which you can commit all kinds of sins, both against God and against men. ”

So I said, 'So you're six years old.

You can do whatever you want in a year, but God won't notice it. ”

And I said, "So? That's all!"

But when I reached the top of the stairs, I took the plunge and turned around and said, "Oh, by the way, Bill, there's no Santa Claus."

(Laughter.) I didn't know it at the time, but I didn't actually turn seven on September 10th.

For my 13th birthday, I was planning a slumber party with all my girlfriends, but a few weeks ago my mom pulled me aside and said, 'There's something I want to talk to you about privately.

September 10th is not your birthday. It's October 10th. ”

(laughter) And she said...

(Laughter) "So I told them your birthday was September 10th. And I wasn't sure you were going to make a fuss about it all over the place, so I started telling you your birthday was September 10th.

But Julie, you were ready to start school, honey. you were so ready ”

Come to think of it, when I was four, I was already the eldest of four and my mother was going to have another child, so I think what she really wanted to say - of course - was that she was very ready, very ready.

She said, 'Don't worry, Julie.

Every year on October 10th, when you didn't realize it was your birthday, I always made you eat cake on that day. ”

(Laughter.) It was a comfort, but it was also a problem.

My mother celebrated my birthday with me without me.

(Laughter) What's so upsetting about this new information isn't that I had to change the date of my slumber party with all my girlfriends.

Most infuriating was that this meant I wasn't a Virgo.

I had a giant Virgo poster in my bedroom.

And I read my horoscope every day and it was totally me.

(laughter) So I was a Libra?

So I took a bus downtown to pick up the new Libra poster.

The Virgo poster is a picture of a beautiful long-haired woman lounging by the water, but the Libra poster is just huge.

This was around the time I started filling out physically, much more than many other girls did, and frankly, the whole idea of ​​my zodiac sign being Libra seemed eerie and depressing.

(Laughs) But when I got my new Libra poster and started reading the new Libra horoscope, I was surprised to discover that it was totally me.

(Laughter) It's only after many years, looking back at this age of reason, this shift in birthdays, that I realize. When I thought I was seven, I wasn't.

I had another month to do whatever I wanted before God started watching over me.

Oh, life is so cruel.

One day two Mormon missionaries came to my house.

Now that I live on the boulevard in Los Angeles, my city block is a natural start for—well, door-to-door hawkers.

From time to time, the little old ladies of the Seventh-day Adventist Church show me cartoon pictures of Heaven.

And sometimes there are teenagers who promise they won't join gangs, just start robbing, if they just buy a few magazine subscriptions.

That's why I usually ignore the doorbell, but on this day I answered.

And there stood two boys of about nineteen in white short-sleeve shirts glued together, with little name tags indicating that they were official representatives of The Church of Jesus Christ of Latter-day Saints, and said that God had a message for me.

I said, "A message for me? A message from God?" And they said yes.

Now, I grew up in the Pacific Northwest around many Latter-day Saints, worked with them, and even dated them, but I had no idea of ​​the doctrine or what they said to people during their missions. Perhaps I was kind of curious. So I said, "Please come in."

And they looked really happy. Because I don't think this kind of thing happens to them often.

(laughter) And I sat them down and gave them a glass of water. I get it.

Don't touch my hair, that's the problem.

(Laughter) You can't just put a video of yourself in front of me and expect me not to fix my hair.

Ok。

(laughter) So I sat them down and brought them a glass of water. And after kind words, they said, "Do you believe God really loves you?"

And so I thought. "Of course I believe in God, but you know I don't like the word 'mind' because it personifies God. I also don't like the word 'his' because it sexualizes God."

But I didn't want to argue semantics with these boys, so after a very long and uncomfortable silence I said, "Yes, yes, I do. I feel very loved."

The two then looked at each other and smiled as if they were right.

And they said, "Do you think we are all brothers and sisters on this earth?"

And I was relieved that it was a question that could be answered immediately.

And they said, "Well then, I have a story to tell you."

And they told me a story about a man named Lehi who lived in Jerusalem in 600 BC.

Well, it seems that in 600 B.C. Jerusalem, everyone was completely evil and wicked.

Men, women, children, infants and fetuses, respectively.

Then God came to Lehi and said, "Get your family into the boat and I will get you out of here."

He brought them to America.

I said, "America?

And they said yes.

(Laughter.) Then they told me how Lehi and his descendants reproduced and that for 600 years there were two great races: the Nephites and the Lamanites. The Nephites were all good, and so were all of them. The Lamanites, on the other hand, were utterly evil, evil, and all were evil to the bone.

And after Jesus died on the cross for our sins, on his way up to heaven, Jesus stopped in America and visited the Nephites.

(Laughter.) And he said that if they all remained perfectly, utterly good, they would win the battle against the evil Lamanites.

However, the Lamanites were able to kill all the Nephites, so it seems someone blew it up.

All but one man named Mormon managed to survive by hiding in the woods.

He then wrote the entire story in Egyptian hieroglyphs re-engraved on gold plates and buried it near Palmyra, New York.

(Laughter) Well, I was just on the edge of my seat.

(laughter) I said, "What happened to the Lamanites?"

And they said, "They became our Native Americans here in America."

And I said, "So do you think Native Americans descended from a race that was totally evil?"

They then told how a man named Joseph Smith had found the gold plates buried in his backyard, and how he had found this magic stone in his hat with his face buried there, and how he was able to translate the gold plates of the Reformed Egyptians into English.

Well, at this point I just wanted to give these two boys some advice on their pitch.

(Laughter) What I meant to say was -- (Applause) "Okay, don't start with this story."

(Laughter) I mean, even Scientologists know they start with a personality test before they start -- (Applause) Tell people all about the evil Galactic Overlord Zenu.

Then they said, "Do you believe that God speaks to us through righteous prophets?"

And I said, "No, it's not." Because I was kind of pissed off about this Lamanite story and this crazy metal plate story. But to tell you the truth, I didn't give it much thought. So I backpedaled a little and said, "So what exactly does 'righteousness' mean?"

And what does prophet mean? For example, is it possible that the prophet is a woman? ”

And they said "no". And I said, "Why?"

And they said, "That's because God gave women a very wonderful, very wonderful gift. The only gift he gave to men was the gift of prophecy."

I wondered what this wonderful gift God had given women.

Perhaps they are better able to work together and adapt?

(laughs) Do women live longer?

The fact that women tend to be less violent than men?

They said, "That's because of her ability to bear children."

I said, "Oh, come on.

That is, even if a woman tries to have children every year from age 15 to 45, assuming that she does not die of exhaustion, it seems that some women still have time left to hear the word of God. ”

(Laughter) Well, they didn't look so fresh and cute to me anymore, but they had more to say.

they said “We also believe that if you are a Mormon and have a good standing in the church, when you die you can go to heaven and be with your family forever.”

And I said, "Oh, my dear.

(Laughter) It doesn't inspire me that much. ”

(Laughter.) And they said, "Oh.

(laughs) Hi! Now, we also believe that when you go to Heaven, your body will be restored to its original best condition.

For example, if you lose your leg, you will get it back.

Or even if you are blind, you should be able to see. ”

I said, "Oh, I had cancer a few years ago and now I don't have a uterus.

Does that mean that when you go to Heaven, your old womb will come back? ”

And I said, "I don't want it back. I'm happy without it." No.

What do you do if you like your rhinoplasty?

(laughter) Will God force you to get your old nose back?

Then they handed me this Book of Mormon, told me to read this chapter and that chapter, and said they would come back and see how things went, and I think I said something like, 'Please don't rush,' or just 'Please don't. And then they left.

Well, at first I felt really superior to these boys and was smug in my more conventional beliefs.

But the more I thought about it, the more I had to be honest with myself.

If someone were to come to my door and I had heard Catholic theology and doctrine for the first time and said, "We believe God impregnated a very young girl without intercourse, and the fact that she was a virgin is very important to us."

(Laughter) "And she had a baby, and it was a child of God."

I'm so used to the story.

(Laughter.) So I couldn't feel condescending towards these boys.

But the question they asked me when they first arrived really stuck in my mind. Did you believe that God really loves me?

Because I wasn't sure how I felt about that question.

Now, what if they asked me, "Do you feel that God really loves you?"

Well, it would have been different, and I would have responded instantly, "Yes, yes, I feel it all the time.

When I am hurt and confused, I feel God's love, I feel comforted and cared for.

We take refuge in God's love when we do not understand why tragedy happens, and we feel God's love when we look with gratitude at all the beauty we see. ”

But somehow everything was different because they included the word "believe" in the question. Because I wasn't exactly sure if I believed what I clearly felt.

About a year ago, I asked myself: "Knowing what I know, why am I not a vegetarian?"

After all, I am one of those green people. I grew up in a log cabin with hippie parents.

I started a site called TreeHugger -- I'm interested in this.

I knew that eating just one hamburger a day could increase the risk of death by a third.

Cruelty: I knew, hypocritically, that the 10 billion animals we raise for meat each year are raised in factory farm environments where they don't even think about their own cats, dogs, or other pets.

On the environmental side, meat surprisingly causes more emissions than all modes of transport combined: cars, trains, planes, buses and boats.

And beef uses 100 times more water than most vegetables.

Also, I know I'm not alone.

As a society, we eat twice as much meat as we did in the 50's.

So what was once a special little side treat is now the main and more regular.

So really, any of these angles should have been enough to persuade me to become a vegetarian.

Still, I was there—tick, tick, tick—biting into a big, old steak.

So why was I stalling?

I realize what is being suggested is an either/or solution.

I guess it's either you're a meat eater or you're a vegetarian and I wasn't ready yet.

Imagine the last hamburger.

(Laughter.) So my common sense and good intentions contradicted my palate.

And I promised to do it later, which, unsurprisingly, never happened after that.

Sound familiar?

So I thought there might be a third solution.

And when I thought about it, I had an idea.

I've been doing it for the last year and it's been great.

It's called weekday veg.

The name says it all. Nothing is faceless from Monday to Friday.

Your weekend is your choice.

Simple.

If you want to take it to the next level, remember that red and processed meat is the leading cause of environmental damage and health.

Therefore, we want to replace them with sustainably harvested good quality fish.

It's structured, so it's easier to remember in the end, and it's okay to break it here and there.

After all, eating less than 5 days a week means reducing your meat intake by 70 percent.

The program was great, weekday veggies.

Less footprints, less pollution, better feelings for animals, and less money.

Best of all, I'm healthier, I've found I can live longer, and I've lost a little weight.

So, for your health, for your wallet, for the environment, for your animals, ask yourself: What prevents you from eating vegetables on weekdays?

After all, if we all ate half as much meat, half of us would be vegetarians.

thank you.

(applause)

What image do we see from the rest of the world?

We see natural disasters, wars and terrorism.

We see refugees, we see terrible diseases.

right?

We see beautiful beaches, cute animals, beautiful nature, cultural ceremonies and much more.

Then you make connections in your head and build a worldview from there.

And how is that possible?

So the world looks very strange.

And I think not.

Actually, I think the world is not so strange.

I have an idea.

So imagine the world as a street. The poorest live on one end, the richest on the other, and everyone in the world lives on this street.

You live there, I live there, and our neighbors are on the same income.

People who live on the same block as me are from other countries, other cultures, other religions.

The street might look like this

And I was curious.

In Sweden, where I live, I met quite a few students.

And what I wanted to know was, where on a street like this do they think they belong?

So we turned these houses into people.

These are the 7 billion people living in the world.

And just because you live in Sweden, you probably belong to the richest group, Sweden.

But if you ask the students, they think they're somewhere in between.

And how can you make sense of the world when you see terrifying images all over the world and think you're living in the middle of it when you're actually at the top?

Not very easy.

So I sent photographers to 264 homes in 50 countries, and the number is still growing, but in each home they take the same set of photos.

They take away beds, stoves, toys and about 135 other things.

I have about 40,000 images at the moment and it looks something like this:

Here you can see that at the top it says "World Families by Income" and just below that is the street.

And meet some of the families we visited.

As the concept suggests, we have the poor on the left, the rich on the right, and everyone in between.

We can go down and see the different families we have visited so far.

For example, here I have a family in Zimbabwe, one in India, one in Russia, and one in Mexico.

So we can look around the family like this.

But of course you can also choose if you want to look at a specific country or region to compare, or something else.

Now let's go to the front door and see what it looks like.

If you go here, this is the world on your doorstep, ordered by income.

For example, in these examples you can see a big difference with India, Philippines, China and Ukraine.

What happens when you enter the house?

You can see the bed

Your bed will look like this.

It doesn't look like a glossy magazine.

It is different from the scary image in the media.

Remember, Swedish students thought they were in the middle of the world income.

So let's go there.

After filtering and zooming in to the middle of the street like this, ask the students. "What does your bedroom look like?"

And in fact they will not feel very comfortable.

So let's go down and see, could they feel more at home here?

And they will say, "No, this is not what a typical Swedish bedroom looks like."

When we go here, suddenly they kind of feel at home.

In this image, for example, we see bedrooms from China, Holland, South Korea, France, and the United States.

Let's click here.

Family, if you want to know more about the house this bed is in, just click to visit that family and see all the images of that family.

We can go this route too.

And of course, it's free for everyone.

Of course, visit here to add more images.

My personal favorite, which people always try not to show me, is now. It's a toilet. You are not really allowed to see people's toilets. But you can do it now, right?

There are a lot of toilets here (laughs).

They look pretty much like what we're used to seeing, right?

And they are also in China, Holland, USA, Nepal, etc., Ukraine, France.

And they are pretty similar, right?

But remember we are on top.

So why not check all the restrooms?

It looks a little different now, doesn't it?

In this way, you can visually browse categories of images using photos as data.

But not everything works as a photo.

In some cases, video captures snippets of everyday activities such as washing hands, doing laundry, or brushing teeth because it is easier to understand what people are doing.

And I'll show you a short snippet of toothpaste. Let's start from the beginning.

So I see people brushing their teeth.

It's very interesting to see the same kind of plastic toothbrush being used in all these places in the same way, isn't it?

Some people are more serious than others -- (laughter) but the toothbrush is still there.

And when it comes to this poor situation, people start using sticks and sometimes using their fingers to brush their teeth.

When she brushes her teeth, this woman in Malawi scrapes mud off the wall and mixes it with water.

So in our Dollar Street material, we tagged this image not only as her wall (which it is), but also as toothpaste. This is also what she uses toothpaste for.

So you could say that at the poor end of the street use a stick or your finger, come to the middle and start using your toothbrush, then come to the top and start using your toothbrush.

It's so nice not to share a toothbrush with grandma.

Let's also look at some countries.

Here's the income distribution across the United States, with most people in between.

We have a wealthy family who visited the Howards.

You can see their house here.

And we also visited poor families here.

And what we can do now is an instant comparison of what they have in their home.

Let's take a look inside the cutlery drawer.

So observe the Hadley family. They put all their cutlery in green plastic boxes.

They come in a few different types, some of them plastic, but the Howard family has a wooden drawer with a small wooden compartment and a section for each type of cutlery.

You can even add more family members and they will see the kitchen sink and possibly the living room.

Of course, other countries can do the same.

So we go to China and choose three families.

Let us look at their homes, look at their sofas, look at their stoves.

And looking at these stoves, I think it is clear that when we think of other countries, it would be foolish to think that they have a certain way of doing things.

But look at this stove.

It's totally different because it depends on your income level and how you cook your meals.

But it's great when you start making comparisons across countries.

So we have China and the United States here.

Look at these two big overlaps.

So we chose two houses that we have already seen in these countries: the Woos and Howards.

Standing in your bedroom, it's pretty hard to tell which is China and which is the United States, right?

Both have brown leather sofas and have similar play structures.

Probably both are made in China, so it's not that weird lol, but it's similar.

Of course, you can add Nigeria and go to the other side of the street.

Now let's compare two houses in China and Nigeria.

Looking at family photos, it doesn't look like they have much in common.

But their ceiling begins to show.

Comes with a plastic shield and grass.

They have the same kind of sofa, they store grain in a similar way, eat fish for dinner, and boil water in the same way.

So if we were to visit these houses, there is a huge risk of being told that we know something about the specific way things are done in China or Nigeria, but on the other hand, when you look at this, it's very clear - this is the way things are done at this income level.

You can see that in the image of Dollar Street.

So let's go back to the figure of 7 billion people in the world and do a quick recap.

We'll look at comparisons of beds, roofs, dishes, etc. for the poorest groups.

And notice that in all these comparisons their homes are chosen to be in completely different parts of the world.

But what we're seeing is pretty much the same.

So the food for the poorest billion people would look somewhat similar in those two places. You may not have shoes. Eat if you don't have a spoon. The storage of salt would be similar in Asia and Africa. Going to the bathroom will be much the same experience whether you are in Nigeria or Nepal.

There's a huge group of 5 billion people in the middle, and here you can see that there's probably electric light. No more sleeping on the floor. Store the salt in a container. There will be multiple spoons. You may have multiple pens. No more leaks from the ceiling. You will have shoes. There may be phones, toys, garbage.

Come join our group here, similar shoes, Jordans, USA.

Sofas, fruit, hairbrushes, bookshelves, and toilet paper can be found in both Tanzania and Palestine, but it's hard to tell from here whether to sit in the United States, Palestine, or Tanzania.

Vietnam, Kenya: Wardrobe, lamp, black dog, floor, soap, laundry, clock, computer, phone, right?

We have many similarities around the world and the images we see in the media show that the world is a very, very strange place.

But looking at the Dollar Street images, it doesn't look like that.

In other words, with Dollar Street, photos can be used as data, and country stereotypes can easily be broken.

So the person staring back at us from the other side of the world actually looks a lot like you.

And it is both a call to action and a reason for hope.

thank you.

(applause)

Today I would like to talk about penguins.

But first, I'd like to start by saying that we need a new operating system for our oceans and our planet.

When I came to the Galapagos 40 years ago, there were 3,000 people living in the Galapagos.

Now there are over 30,000.

Santa Cruz had two jeeps.

There are currently around 1,000 trucks, buses and cars on the road.

So the fundamental problem we face is overconsumption and overpopulation.

We have the same problem in the Galapagos, but apparently it's worse here in some ways than elsewhere.

Because the Earth's population has only doubled, or just over doubled, since the 1960s, yet there are 6.7 billion people in the world, and everyone loves to consume.

One of the big problems we have is that the operating system doesn't give us good feedback.

We are not paying the true environmental costs of our actions.

And when I came to live in Fernandina at 22, let me just say, I had never camped before.

I've never lived alone and never slept with a snoring sea lion next to me all night.

But I had never lived on a deserted island.

Punta Espinosa, where I lived for over a year, is called a deserted island because there are no people.

But it lives with life. Almost no people.

A lot has happened in the last 40 years. Coming to the Galapagos, I learned the importance of wild places, wild things, certainly wild animals, and the wonderful qualities that penguins have.

Penguins are real athletes. They can swim 173 kilometers in a day.

They can swim at the same speed day and night. That's faster than an Olympic swimmer.

That means they can run and maintain a speed of around 7 kilometers per hour.

But the really cool thing is that this depth allows emperor penguins to dive over 500 meters and hold their breath for 23 minutes.

The Magellanic penguins I study can dive to about 90 meters and remain hidden for about 4.6 minutes.

Human, no fins: 90 meters, 3.5 minutes.

And I doubt anyone in this room could really hold their breath for three and a half minutes.

You have to train yourself to be able to do that.

In short, penguins are great athletes.

The other thing is that I've never met a person who didn't seriously say they like penguins.

They are comical, walk upright, and of course hardworking.

And more importantly, they are neatly dressed.

That is, they have all the criteria that people usually like.

But scientifically, they're amazing because they're lifeguards.

They teach us about our world, especially our oceans, in many different ways.

Here is a photo of a Galapagos Penguin in front of the Little Zodiac right here in the Galapagos.

And that's why I came to study.

I thought I would study the social behavior of Galapagos penguins, but you already know that penguins are rare.

These are the rarest penguins in the world.

I don't know why you thought you could do that.

But the population has changed dramatically compared to when I first came here.

When I first tried to count penguins and do a census, I just counted every individual beak around these islands.

I counted about 2,000, so I don't know how many penguins there actually are, but I think I can count 2,000.

If you go now, there are about 500 national parks.

In other words, there are a quarter as many penguins as there were 40 years ago.

And this applies to most of our life systems.

It's less than it used to be, and most of it is going down pretty quickly.

I would like to explain a little bit why.

(Loudly) This is a penguin cry to tell him that it is important to pay attention to him.

Most importantly, I didn't know what it was when I first heard it.

And imagine sleeping on your first night in Fernandina. And you will hear this lonely, sad cry.

I fell in love with penguins and it definitely changed the rest of my life.

What I learned from my research is that the Galapagos changes differently, that is, the most extreme changes.

You've probably heard of the El Niño phenomenon, which is an extreme condition that penguins around the world have to adapt to.

This is a cold water phenomenon called "La Niña".

Blue and green means the water is very cold.

And this current, in this case the Humboldt Current, flows to the Galapagos Islands, and we find that this deep current is the Cromwell Current, which upwells around the Galapagos.

It brings all the nutrients. When it's cold in the Galapagos, it's plentiful and there's plenty of food for everyone.

During extreme El Niño events, the sky turns bright red and the green disappears around the Galapagos.

So no upwelling, basically no food.

So it's not just for penguins, sea lions and marine iguanas, it's a real desert...

Things die when they run out of food.

But when I went to study penguins, I didn't even know it was affecting the Galapagos.

And you can imagine being on an island expecting to see penguins, but there are no penguins in the middle of El Niño.

they are not breeding. They aren't around either.

I was researching marine iguanas at the time.

But we also know that this is a global phenomenon.

And if you look on the coast of Argentina where I currently work, at about 44 degrees south latitude, at a place called Punta Tombo, the world's largest colony of Magellanic penguins, you can see that there's a lot of variation here.

In some years cold water reaches Brazil, in others it does not in La Niña years.

Therefore, the seas do not always act together. Behavior is different, but penguins have to endure such changes, and it's not easy.

So when I went to study Magellan penguins, I had no problems.

There were many.

Here is a photo of all the penguins along the beach, taken in Punta Tombo in February.

I went there because the Japanese wanted to start harvesting them and processing them into fashionable golf gloves, proteins and oils.

Luckily, no one is hunting penguins, and more than 100,000 tourists visit each year to see them.

However, the population is declining, and the number of active nests has dropped considerably by about 21 percent since 1987 when I began these studies.

Here you can see where the Punta Dragonfly is. Punta dragonflies breed in incredibly dense colonies.

We know this because of long-term science, long-term research.

And science is important in informing decision makers, in changing the way we do things, and in knowing the direction of change we are making.

So this penguin project started. The Wildlife Conservation Society has funded me, along with many individuals, over the past 27 years to create this type of map.

We also know that it's not just the Galapagos penguins that are in trouble, but Magellan and many other species of penguins.

That's why we launched the World Penguin Association to focus on the real plight of penguins.

This is one of the penguin's woes: oil pollution.

Penguins hate oil and don't like swimming in it.

The good news is that looking down here in Argentina, this synthetic map shows no oil pollution on the surface.

However, when I actually went to Argentina, I often found penguins covered in oil.

In other words, they were only thinking of themselves.

They ended up swimming in oily ballast water.

Because when a tanker carries oil, at some point it needs ballast, so when it's empty it has ballast water.

When they come back, they actually dump this oily ballast water into the sea.

why would they do that? Because it's cheaper because you don't pay the actual environmental costs.

Normally they don't, but they want to get their accounting system in place so they can pay their actual costs.

The Argentinean government initially said, "No, it can't be.

You won't find oiled penguins in Argentina.

We have laws and illegal dumping is not possible. it is against the law. ”

So we spent nine years convincing the government that we had a lot of oiled penguins.

In some years, like this year, more than 80 percent of dead adult penguins on shore were covered in oil.

These little blue dots are chicks. This survey is conducted in March of each year. This means that chicks are only present in the environment from January to March. This means that chicks may be covered in oil for up to three months.

And in some years, we find that more than 60 percent of the chicks were anointed.

Eventually the government listened and surprisingly changed the law.

Tanker lanes were moved 40 kilometers from the coast, so people dumped less illegally.

So what we're seeing now is that very few penguins are oiled.

Why are these penguins also oiled?

Because Chubut is like the Argentinean province where Punta Tombo is located, equivalent to about 1,000 kilometers of coastline, but the problem of northern Argentina, Uruguay and Brazil remains unsolved.

So this time, I would like to show you that penguins are affected.

I'm just talking about two things.

This is climate change. I put satellite tags on the backs of these Magellanic penguins, so this turned out to be a really fun study.

Convince donors to donate thousands of dollars to glue satellite tags to the backs of penguins.

But we've been doing this for over a decade to see where they go.

We thought we needed a marine reserve of about 30 kilometers, so we put satellite tags on the penguins' backs.

And what the penguins show us, these are all little dots that show the position of the penguins during hatching in 2003. And what you're seeing is that some of these individuals are going 800 kilometers away from their nests.

This means that while one spouse sits in the nest to warm the eggs, the other is outside foraging, and the longer one has to leave the nest, the worse the situation will be when one mate returns.

And, of course, all this leads to a vicious cycle that prevents you from raising many chicks.

This is what we see in 2003. These are all points where the penguins are. The penguin was raising a chick of just over 1/2.

Here you can see that in 2006 one nest had almost three quarters of the chicks. You can see that it is close to Punta Tombo. they don't go very far.

Last year, in 2009, they were now raising about a quarter of their chicks, some of which were found to be more than 900 kilometers from the nest.

So it's like you were working in Chicago and then transferred to St. Louis. Your spouse is frustrated with this because you are away so long that they have to pay for the airfare.

The same goes for penguins.

And they are now on average 40 kilometers further than they were a decade ago.

We need to be able to provide information to the public.

So because we have reporters who are great writers who actually extract information and make it accessible to the public, we have launched a publication in collaboration with the Conservation Society that presents cutting-edge science in new and novel ways.

So if you're interested in cutting-edge science and smarter conservation, join our 11 partners. Among them are partners such as the Nature Conservancy in this room. Please read this magazine because we need to disseminate conservation information to the public.

Finally, I would like to say that perhaps at some point in your life you have had some kind of relationship with a pet, such as a dog or cat, and realize that they are individuals.

And some of you consider them almost part of the family.

If you had a relationship with a penguin, you would look at them the same way.

They're amazing creatures that really change the way you see the world because they're not that different from us. They are trying to make a living, they are trying to raise offspring, and they are trying to get along and survive in the world.

Penguin turbo.

Turbo has never been fed.

He met us and started standing under my diesel truck, turbo truck, so we named it. So we named him Turbo.

Turbo now knocks on doors with its beak. We let him in and he came in.

I just wanted to show you what happened one day when Turbo brought his friends.

So this is the turbo.

He approaches one of my graduate students and strokes his flippers like he does to a female penguin.

And as you can see, he's not trying to bite.

This man has never been in before and is trying to understand, "What's going on?

what is this guy doing?

This is really pretty weird."

And soon my graduate student will find out...

Turbo is pretty keen on stroking his flippers.

And now he looks at the other guy and says, "You're really weird."

And look at this. Not friendly.

I mean, penguins really have different personalities, just like our dogs and cats.

We collect information and seek to deepen our knowledge of technology.

So we're trying to introduce it to the computers in the field.

And penguins are always involved in helping or not helping us in some way.

This is a radio frequency ID system.

Put a small piece of rice on the barcoded penguin's foot and you'll know who it is.

You'll know who it is when it walks on the pad.

Well, here come some penguins.

Look, it's coming back to the nest.

They all come at this hour and walk across and just walk in.

This is a woman in a hurry. she has food

It's hot, so I rush back to feed the chicks.

And then there are the comrades who come slowly.

Look how fat he is He walked back to feed the chicks.

That's when I realized they were playing King of the Box.

Here is my box and this is the system that works.

You can see this penguin, he goes there and sees those wires and he doesn't like those wires.

he pulls the wire out there is no data.

(Laughter) I mean, they're really amazing creatures.

OK。

Most importantly, only you can change yourself, and only you can change the world for the better, both for people and for penguins.

Thank you very much. (applause)

In the next few minutes we will be talking about energy. It's going to be a bit of a diverse story.

I try to spin a story about energy. Oil is a convenient starting point.

We will be talking about energy, but oil is a good place to start.

One reason is that it's worth noting.

There are about 8 carbon atoms and about 20 hydrogen atoms, and when you combine them exactly, you get this wonderful liquid. It is very energy dense and can be refined very easily to yield many very useful products and fuels.

It's wonderful.

Well, there is a lot of oil in the world.

Here's my little pocket map showing all the locations.

See what's bigger.

But this is it, this is the world's oil.

Geologists are pretty familiar with where the oil is.

This equates to approximately 100 trillion gallons of crude oil currently not yet developed and produced in the world.

Now, this is just one story about oil, and you can end there and say, "Oil will last forever, because there is plenty of it."

But there's actually more to the story.

Oh, by the way, if you think you're far from this piece of oil, 1,000 meters below where you're sitting is one of the world's largest producing oil fields.

Come talk to me about it. Fill in some details if you wish.

So this is one oil story. There are just so many.

But what about oil? Where is it in the energy system?

This is a 150-year snapshot of oil. Oil has been a major part of our energy system for most of its 150 years.

Now let me tell you another little secret. Over the past 25 years, oil has played a smaller and smaller role in the world's energy system.

In 1985, there was some kind of peak oil, when oil accounted for 50 percent of the world's energy supply.

Now it's about 35 percent.

It is on the decline, and I think it will continue to decline.

Gasoline consumption in the United States probably peaked in 2007 and has been declining since.

In other words, the role of oil is getting smaller year by year.

So 25 years ago we had peak oil. Just as coal had its peak in the 1920s. And a hundred years before that, there was Peak Forest.

This is a very important overview of the evolution of energy systems.

And what has been lacking in the last few decades?

First, a lot of natural gas and a little nuclear power.

And what will happen in the future?

Well, I think there will be a peak for gas in a few decades, and after that there will be a peak for renewable energy.

Now, let me tell you another very important story about this photo.

Now, I'm not pretending that total energy usage hasn't increased, in fact that's another part of the story. Come talk to me about it. I'll go into a few details. But there is a very important message here. This is 200 years of history, and over 200 years we have systematically decarbonized our energy system.

The world's energy system is gradually decreasing its carbon footprint year by year, decade by decade, century by century.

And it will continue into the future with the renewable energy we are developing today, perhaps reaching 30 percent of primary energy by mid-century.

This may be the end of the story -- yes, just replace everything with conventional renewable energy -- but I think that's really the story.

And to tell the next part of the story, and this looks to, say, 2100 and beyond.

What is the future of truly sustainable and carbon-free energy?

Well, I have to go a little farther, so I'll start in central Texas.

This is a piece of limestone.

Picked up outside Marble Falls, Texas.

It is about 400 million years old.

It's just limestone, nothing special.

Well, here's the chalk.

I got this at MIT. You're a little younger.

And it turns out that it is different from this limestone.

You wouldn't want to build a building with it, give a lecture or write on a blackboard with it.

Yeah, it's not at all - no, it's not.

Not different, but the same. Calcium carbonate, calcium carbonate.

What is different is the way the molecules are assembled.

Now, if you think this is kind of a good story, this story really works.

Something like this arrived off the coast of California. Abalone shell.

Today, millions of abalones produce this shell each year.

Oh, and by the way, just in case you haven't guessed yet, this is calcium carbonate.

The same as this, the same as this.

But it's not the same thing. wrong.

Thousands, maybe 3,000 times tougher than this.

why? The short abalone is able to lay down layers of calcium carbonate crystals, creating this beautiful iridescent nacre.

It's a very special material that makes millions of abalones self-assemble every day, every year.

This is pretty unbelievable.

Exactly the same, what's the difference?

how molecules are assembled

Now, what does this have to do with energy?

This is coal.

And I think this coal is just as exciting as this chalk.

Now, whether we are talking about fuels and energy carriers, or perhaps new materials for batteries and fuel cells, nature has yet to build these perfect materials because it didn't have to.

Unlike abalone shells, the survival of the species did not depend on the construction of those materials, so perhaps nature has had no need until now when it became important.

So when you think about the future of energy, imagine what if, instead of this, you could build an energy equivalent to this just by rearranging the molecules in a different way.

This is my story.

You will never run out of oil.

Not because there are a lot of them.

Not because it builds billions of windmills.

That's because the Stone Age ended, not because stone was gone, because thousands of years ago people invented ideas and had ideas, innovations, and technology.

(Laughter) It's an idea, an innovation, a technology that will end the oil age long before it runs out.

thank you very much.

(applause)

We are here today to unveil the first synthetic cell. The cells were created by starting with digital code in a computer, constructing a chromosome from four bottles of chemicals, assembling the chromosome in yeast, transplanting it into a recipient bacterial cell, and transforming the cell into a new bacterial species.

So it will be the first computer-parented self-replicating species on Earth.

It's also the first species to have its own website encoded in its genetic code.

But we'll talk more about watermarks later.

This is a project that started 15 years ago, when our team (then called the Institute TIGR) was involved in the sequencing of the first two genomes.

We studied Haemophilus influenzae, and then the genome of Mycoplasma genitalium, the smallest genome of a self-replicating organism.

And as soon as I got those two sequences, I wondered if this was supposed to be the smallest genome of a self-replicating species, then maybe even smaller genomes exist.

Can we understand the basics of cell life at the genetic level?

It took 15 years of quest just to get to the starting point to be able to answer these questions because removing multiple genes from a cell is so difficult.

Only one can run at a time.

We decided early on that we needed to take a synthetic route that no one had taken before, synthesizing bacterial chromosomes to see if we could indeed alter their genetic content to understand the genes essential to life.

That was the beginning of our 15-year quest to get here.

But before we do our first experiment, we actually asked Art Kaplan's team at the University of Pennsylvania to revisit what the risks, challenges, and ethics of creating new species in the lab are. because it hasn't been done before.

They spent about two years studying it independently and published their results in Science in 1999.

Hamm and I took a two-year hiatus from a side project on sequencing the human genome, but as soon as it was completed, we returned to the job at hand.

In 2002 we established a new laboratory, the Institute for Bioenergy Alternatives. So we set two goals. One is to understand the impact of our technology on the environment and how to better understand the environment, and the second is to start the process of creating synthetic life to understand basic life.

In 2003 we announced our first success.

Ham Smith and Clyde Hutchison have therefore developed several new methods for creating error-free DNA on a small scale.

Our first task was a bacteriophage, a 5,000-character code, a virus that only attacks E. coli.

It was the phage phi X174 that was chosen for historical reasons.

This was the first DNA phage, DNA virus, and DNA genome actually sequenced.

So when I found out that I could make 5,000 base pair virus-sized fragments, I figured there was at least a way to make these fragments sequentially in large numbers so that I could eventually assemble them to make this megabase chromosome.

Therefore, it is significantly larger than originally expected.

There were several steps to this. It had two sides. We had to solve the chemistry of making the large DNA molecules, and we had to solve the biology of how this new chemical entity, if present, was activated and activated in the recipient cell.

We had two teams working in parallel. One was the chemistry team, and the other was trying to transplant whole chromosomes so that new cells could be acquired.

When I started doing this, I thought synthesis would be the biggest problem, so I chose the smallest genome.

And some of you may have noticed that we switched from the smallest genome to a much larger one.

I'll walk you through why, but basically it took about a month or two to get results for the smaller cells, but only two days for the larger, fast-growing cells.

Therefore, the number of cycles that can be passed in a year is limited, as 6 weeks per cycle.

And basically you should know that 99, maybe 99 percent or more of our experiments failed.

So this was a debugging and problem-solving scenario from the beginning, because there was no recipe for getting there.

So one of the most important publications we published was in 2007.

Carol Lartigue led the effort to actually transfer bacterial chromosomes from one bacterium to another.

Philosophically, this shows how dynamic life can be, and I think it was one of the most important papers we've ever done.

And if that works, it turns out that if synthetic chromosomes can be made just like them, there's actually a chance.

I didn't know it would take a few more years to get there.

In 2008, we reported the complete synthesis of the Mycoplasma genitalium genome, a genetic code of over 500,000 characters, but have yet to successfully activate its chromosomes.

We believe this is partly because they grow so slowly and partly because the cells have all sorts of unique defense mechanisms to keep these events from happening.

It turned out that the cells we were going to transplant had nucleases, enzymes that chew up the DNA on their surface, and they were happy to eat the synthetic DNA we gave them and never get transplanted.

But at the time, it was the largest molecule with a well-defined structure ever made.

And both were advanced, but some of the synthesis had to be accomplished using yeast, or could be accomplished using yeast, and you put the pieces into yeast, and the yeast assembled these for you.

This is great progress, but it has caused problems because the bacterial chromosome is growing inside the yeast.

Therefore, in addition to performing transplantation, we had to find a way to take the bacterial chromosome from the eukaryotic yeast and put it in a form that could be transplanted into the recipient cell.

So our team has actually developed a new technique for propagating and cloning entire bacterial chromosomes in yeast.

So we took the same Mycoides genome that Carroll originally transplanted and propagated it in yeast as an artificial chromosome.

And I figured this would be a great test bed to learn how to take chromosomes out of yeast and transplant them.

But when I did these experiments, I was able to get the chromosomes out of the yeast, but I couldn't get the cells to start by transplanting them.

It took the team two years to solve this small problem.

It turns out that DNA in bacterial cells is actually methylated, and methylation protects bacterial cells from restriction enzymes and DNA digestion.

So what we discovered was that if we took the chromosomes out of the yeast and methylated them, we could transplant them.

Further progress came when the researchers removed the restriction enzyme gene from the recipient Capricolum cells.

Once that's done, we can now take the naked DNA out of the yeast and transplant it.

So when we published our findings in Science last fall, we were all overconfident and convinced that we would be able to boot chromosomes from yeast in a few weeks.

About a year and a half ago, because of the problem with Mycoplasma genitalium and its slow growth, we decided to synthesize a much larger chromosome, the Mycoides chromosome, believing that the biology for transplantation was established.

Dunn then led the team to synthesize this million-plus-base-pair chromosome.

But in the end it turned out not to be so simple, and one error out of over a million base pairs in that sequence delayed it by three months.

So the team developed new debugging software that can test each synthetic fragment to see if it grows in a background of wild-type DNA.

They found that 10 of the 11 synthesized 100,000-bp fragments were completely correct and compatible with the life-forming sequences.

We've narrowed it down to one piece. We sequenced it and found that only one base pair was missing in the essential gene.

Accuracy is therefore essential.

There are parts of the genome that can't tolerate even a single error, but there are also parts of the genome where large blocks of DNA can be inserted, as we did with watermarks, and can tolerate errors of any kind.

So it took me about 3 months to find and fix that error.

And one early morning, 6:00 am.

I received a text from Dan that the first blue colony existed.

So it's been a long road to get here, it's been 15 years since the beginning.

We felt that one of the tenets of the field was to be able to reliably distinguish between synthetic and natural DNA.

When tackling a new scientific field, you have to think early on about all the pitfalls that can lead you to believe you did something when you didn't, or worse, lead others to believe it.

That led us to believe that the worst problem was single-molecule contamination of native chromosomes, and that we actually created synthetic cells that were supposed to be mere contaminants.

So early on we developed the concept of watermarking DNA to make it clear that it is synthetic.

And in the first chromosome we constructed in 2008, a 500,000-base-pair chromosome, we simply assigned the name of the chromosome's creator to the genetic code, but used only single-letter translations of amino acids, omitting certain letters of the alphabet.

So the team actually developed new code within code within code.

So this is new code for interpreting and writing messages in DNA.

Now, mathematicians have long written hidden messages in the genetic code, but it is clear that they are mathematicians, not biologists. This is because writing long messages with codes developed by mathematicians is likely to synthesize new proteins with unknown functions.

The code developed by Mike Montagu and his team actually places stop codons so frequently that the entire English alphabet, including punctuation and numbers, can be used, although the alphabet is different.

So there are four major watermarks across the 1,000 base pair genetic code.

The first code actually contains the code for interpreting the rest of the genetic code.

Therefore, I believe the rest of the information watermark contains the names of 46 different authors and major contributors that have brought the project to this stage.

I've also included the website address so that if someone cracks the code within the code, I can send an email to that address.

Thus, it contains 46 names and unique web addresses, clearly distinguishing it from other species.

And we added three citations. The original Genome was criticized for not trying to go deeper than simply signing a work.

So I don't show the rest of the code, but I do show the three quotes.

The first is "to live, to make mistakes, to fall, to triumph, and to recreate life from life."

It's a James Joyce quote.

The second quote is, "Do not see things as they are, but see them as they are."

This is a quote from Robert Oppenheimer's book "American Prometheus".

And finally, the words of Richard Feynman. "What I cannot build, I cannot understand."

So we have tried to address both the philosophical and technical aspects, as this is a technological advance in science as well as a philosophical one.

One last thing before moving on to the question is that our extensive efforts to call for ethical review and push the boundaries not only on the technical side, but on the technical side have been widely debated at the highest levels of science, policy, and federal government.

Even with this announcement, the study was funded by the Department of Energy, as it did in 2003, so the study was reviewed at the White House level to try to decide whether to classify the study or make it public.

And they sided with public publication, which was the right approach. We've briefed the White House, we've briefed members of Congress, and we've tried to pick up and push policy issues alongside scientific progress.

First of all, I would like to ask questions from the floor.

Yes, behind.

Reporter: Could you explain in simple terms how important this is?

Craig Venter: Can you explain how important this is?

I'm not sure we should explain how important it is.

it's important to us.

Perhaps it's a big philosophical shift in how we look at life.

In fact, we think of this as baby steps. It took me 15 years to do the experiment I wanted to do 15 years ago, to understand life on a fundamental level.

However, we actually believe this will be a very powerful toolset and have already started various ways to use this tool.

We are currently receiving ongoing funding from the NIH in a program with Novartis to try to use these new synthetic DNA tools to manufacture the flu vaccines that may be available next year.

Because Dan's team went from taking weeks or months to create these to within 24 hours.

So if you look at how long it took for an H1N1 vaccine to come to market, we think that process could be significantly shortened.

In the vaccine space, Synthetic Genomics and Labs are looking to create new vaccine companies. He believes that these tools could have implications for vaccines against previously impossible diseases, such as rapidly evolving viruses like rhinoviruses.

Wouldn't it be nice to have something that actually blocks colds?

Or, more importantly, HIV. Viruses evolve so quickly that current vaccines cannot keep up.

Synthetic Genomics also addresses key environmental issues.

I think the recent Gulf oil spill is a reminder of that.

We cannot see CO2. We rely on scientific measurements of CO2 to see the early consequences of too much CO2. But former CO2 can be seen drifting into the ocean and polluting Gulf coasts.

We need oil substitutes.

We are working with Exxon Mobile on a program to try to develop new algae species that can efficiently capture carbon dioxide from the atmosphere or from concentrated sources and feed it into refineries to produce new hydrocarbons that can be used to make conventional gasoline and diesel fuels from the carbon dioxide.

These are just some of the approaches and directions we are taking.

(applause)

I visited here four years ago and remember that the talks weren't published online then.

Perhaps they were given to the TEDsters in a box, a box set of DVDs, and they put it on the shelf and now it's there.

(Laughter) And in fact, a week after the talk, Chris called me and said,

And I said "of course".

And four years later, the file has been downloaded four million times.

So I guess multiplying this by 20 or something gives you the number of people who have seen it.

And, as Chris puts it, there is my craving for videos.

(Laughter) (Applause) Can't you feel it?

(laughter) This whole event was elaborately put together for me to do another event for you.

(Laughter) Al Gore spoke at the TED conference that I spoke at four years ago, and he talked about the climate crisis.

And I mentioned it at the end of my last talk.

Frankly, we only had 18 minutes, so I'd like to start there.

(Laughter) So, like I said -- (Laughter) See, he's right.

So clearly there is a big climate crisis, and if people don't believe it, I think we should get out more.

(Laughter.) But I believe there is a second climate crisis that is just as serious, has the same origins, and must be addressed with the same urgency.

By the way, you might say, "Look, I'm fine.

I only have one climate crisis, but I really don't need a second one. ”

(Laughter) But this is not a natural resource crisis, I believe it is true, but a human resource crisis.

As many speakers have said over the past few days, I basically believe that we are not making good use of our talents.

Too many people go through their lives never knowing what their talents are or if they have anything to say.

I've met different types of people who don't think they're good at anything.

In fact, I now seem to divide the world into two groups.

Jeremy Bentham, the great utilitarian philosopher, once sprang up on this argument.

"There are two kinds of people in this world. Those who divide the world into two kinds and those who do not."

(laughs) Yes.

(Laughter) I've met different people who don't enjoy what they do.

They just live their lives doing it.

They don't get much pleasure from what they do.

They wait for the weekend with patience rather than enjoyment.

But I also meet people who love what they do and can't imagine doing anything else.

If I said, "Please stop," you would wonder what they were saying.

They say, "But this is me.

It would be foolish to abandon this, because it speaks to my truest self. ”

And that doesn't apply to enough people.

In fact, on the contrary, I think it still applies to a minority of people.

And I think there are many possible explanations for that.

And education is at the top of that list. Because education, in a way, dislocates so many people from their natural talents.

And people are like natural resources. They are often deeply buried.

They aren't just lying on the surface, so you have to go find them.

It is necessary to create situations in which they appear.

And while we might imagine education to be the means to that end, too often it is not.

All education systems around the world are being reformed today, but that alone is not enough.

Reform no longer works because it only improves a broken model.

What we need, as the term has been used over and over again in the last few days, is not evolution, but a revolution in education.

This has to be changed to something else.

(Applause.) One of the real challenges is to radically innovate in education.

Innovation is hard because most of the time it means doing things that people don't think are easy.

It means challenging what we take for granted and what we take for granted.

The biggest problem for reform and change is the tyranny of common sense.

What people think, 'That's the way it's done, you can't do it the other way around'.

I recently found a great Abraham Lincoln quote. A citation would be appreciated at this point.

(Laughter.) In December 1862, at the Second Annual Congress, he said,

I should explain that I have no idea what happened at the time.

We don't teach American history in England.

(Laughter.) We suppress it. As you know, this is our policy.

(Laughter) There was definitely something interesting going on at the time. I think most of us Americans are aware of that.

But he said, "The tenets of the quiet past are inappropriate for the stormy present.

This opportunity is fraught with challenges and we must rise with it. ”

I like that.

"Our case is new, so we must think new and act new.

We must free ourselves from temptation so we can save our country. ”

I love the word "weakness".

do you know what that means?

There is an idea that we are all obsessed with, and that we simply take it for granted as the natural order of things, the way things are.

And many of our ideas have been formed not to fit into the conditions of this century, but to deal with the conditions of the last century.

But our minds are still hypnotized by them and we have to free ourselves from some of them.

Now, doing this is easier said than done.

By the way, it's very difficult to know what you take for granted.

And the reason is that you take it for granted.

(Laughter) Let's ask the obvious.

How many people over the age of 25 are here?

It is not a matter of course. I'm sure you know that too.

Anyone under the age of 25 here?

wonderful. Now, if you're over 25 and have a watch, can you raise your hand?

That's a big deal for us, isn't it?

Ask a room full of teenagers the same thing.

Teenagers don't wear watches.

It doesn't mean they can't, they just often choose not to.

The reason is that those of us over the age of 25 grew up in a pre-digital culture.

So for us, if we want to know the time, we have to wear something to tell it.

Children now live in a digital world and time is everywhere.

They see no reason to do so.

By the way, you don't need either. It's just that you've always done it, and you just keep doing it.

My daughter, Kate, who is 20, never wears a watch.

She doesn't understand.

As she says, "This is a single-function device."

(Laughter) "How lame is that?"

And I said, "No, no, it also shows the date."

(laughs) "It's multi-functional."

(Laughter.) But you know, sometimes we are obsessed with education.

Here are some examples.

One of them is the concept of linearity. So it starts here, goes through a certain trajectory, and if you do everything right, you will eventually be ready for the rest of your life.

Everyone who spoke at TED told us a different story, implicitly or sometimes explicitly. The point is that life is not linear. it's organic.

We symbiotically create our lives, exploring our talents in relation to the environments that create them for us.

But you know, we fell in love with this linear narrative.

And perhaps the pinnacle of education is going to college.

I think we're obsessed with getting people into college.

some sort of university.

It's not that you shouldn't go, but it doesn't mean that everyone should go or that they should go right now.

Maybe not right away, but later.

And I was doing a book signing in San Francisco a while ago.

There was a man buying books. he was in his thirties.

I said, "What are you going to do?"

And he said, "I'm a firefighter."

I asked, "How long have you been a firefighter?"

"Always. I was a firefighter all my life."

"So when did you decide?" he said, "when I was a kid.

As a matter of fact, everyone at school wanted to be a firefighter, so that was a problem for me. ”

(Laughter) He said, "But I wanted to be a firefighter."

And he said, "When I was in the senior year of school, the teachers didn't take it seriously.

This teacher didn't take it seriously.

He said if I wanted to do it, I would throw my life away. You should go to college, you should become a professional, you have great potential and you're wasting your talents on it. ”

“It was humiliating,” he said.

It was in front of the whole class, so I was really scared.

But that's what I wanted, and I applied for the fire brigade right out of school and got hired.

You know, I was thinking about that guy recently, just a few minutes ago, when you were talking, I was thinking about this teacher, because half a year ago, I saved his life. ”

(Laughter) He said, "He was in a car accident, and I pulled him out, gave him CPR, and saved his wife's life."

He said, "I think he thinks better of me now."

(Laughter.) (Applause.) You know, for me, human communities rely on diversity of talent rather than a single concept of competence.

And central to our challenge -- (applause) central to our challenge is reconfiguring our sense of competence and intelligence.

This linearity is the problem.

When I came to Los Angeles about nine years ago, I was met with a very well-meaning policy statement: "College starts in kindergarten."

No, it's not.

(Laughter.) Not at all.

If I had the time, I could touch on this subject, but I don't.

(laughs) Kindergarten starts in kindergarten.

(Laughter.) A friend of mine once said, "A 3-year-old is not half as good as a 6-year-old."

(Laughter) (Applause) There are three of them.

But as we heard in the last session, it's very competitive now to get into kindergarten, to get into the right kindergarten, so much so that people are interviewing at 3 o'clock.

Kids with résumés sitting in front of uninterested panels -- (laughter) flipped through and said, "What's this?"

(Laughter) (Applause) "You've been around for 36 months, are you done?"

(Laughter) "You haven't achieved anything. Commit.

(Laughter) I spent the first six months breastfeeding, you know. ”

(Laughter) See, that's a crazy idea.

Another big issue is compatibility.

We have modeled our education system on fast food.

This is what Jamie Oliver said the other day.

There are two models of quality assurance in catering.

One is fast food, where everything is standardized.

The other is like Zagat or Michelin restaurants where everything is not standardized and customized to local conditions.

And we sell ourselves to the fast food model of education, which exhausts our minds and energies as much as fast food drains our bodies.

(Applause.) We have to recognize a few things here.

People have very different aptitudes.

Recently, I learned that I was given a guitar as a child around the same time that Eric Clapton got his first guitar.

(Laughter) It worked for Eric, that's all I want to say.

(Laughter) In a way, it wasn't for me.

No matter how often or how hard I blew it, I couldn't get this to work.

It doesn't work.

(Laughter) But that's not all.

It's about passion.

People are often good at things they don't really care about.

It is a passion, something that excites our spirit and energy.

And when you're doing what you love to do and what you're good at, the passage of time becomes completely different.

My wife has just finished writing a novel, which I think is great, but she disappears for hours on end.

You know, when you do what you love, an hour feels like 5 minutes.

Five minutes feels like an hour when you're doing something that doesn't resonate with you.

And the reason so many people are quitting education is that it doesn't feed their spirit, their energy, their passion.

Therefore, I think the metaphor needs to be changed.

We must essentially move away from the industrial model of education, a manufacturing model based on linearity and fit and the grouping of people.

We need to move to a model that is more grounded in agricultural principles.

We must recognize that human prosperity is not a mechanical process. It's an organic process.

And the outcome of human development cannot be predicted.

Like a farmer, all you can do is create the conditions for them to start thriving.

So reforming and transforming education is not like duplicating the system.

There are also great ones like KIPP. Great system.

There are many great models.

It's about customizing to your situation and customizing your teaching to the people you're actually teaching.

And I think doing that is the answer for the future. Because it's not about extending a new solution. It is about creating an educational movement in which people develop their own solutions, with external support based on personalized curricula.

Now in this room are people who represent extraordinary resources in the fields of business, multimedia and the Internet.

Combining these technologies with the extraordinary talent of our teachers creates an opportunity to revolutionize education.

And we would like to invite you to participate, because this is extremely important not only for ourselves, but also for the future of our children.

But we must change from an industrial model to an agricultural model where schools can thrive tomorrow.

Children experience life there.

Or they may choose to be educated at home, with family and friends.

There has been a lot of talk about dreams in the last few days.

So, I wanted to do it right away, but last night I remembered an old poem and was so struck by Natalie Merchant's song.

As some of you may know, I wanted to briefly read a very short poem by W. B. Yeats.

He wrote this letter to his beloved Maud Gonne, lamenting the fact that he could not give her what he thought she wanted from him.

And he says, "There are others, but they may not be for you."

“If I were the embroidered cloth of heaven, adorned with gold and silver light, the blue of night and light and half light and the dim and dark cloth, I would spread the cloth under your feet.

And every day, everywhere, under our feet, children unfold their dreams.

And we should walk gently.

thank you.

(Thank you for applause.

(applause)

I've heard great stories about Miuccia Prada.

She is an Italian fashion designer.

She goes to this vintage shop in Paris with her friend.

While cheering, she spotted this Balenciaga jacket. she loves it

she's turning it inside out.

She stares at the seams. She is looking at a construction site.

Her friend says "buy it now".

She said, "I will buy it, but I will also imitate it."

Now, scholars in this audience might think, "Well, that sounds like plagiarism."

But for fashionistas, it's Prada's genius. It means you can go back in time in the history of fashion, choose one jacket that never needs to change, and live in the moment.

You may also wonder if it could be illegal for her to do something like this.

Well, it turns out it's not actually illegal.

Intellectual property protection is almost non-existent in the fashion industry.

It has trademark protection, but no copyright or patent protection.

All they really have is trademark protection, which means anyone can copy any person's clothing in this room and sell it as their own design.

The only thing that cannot be copied is the actual trademark label on the apparel.

This is one of the reasons the logo is sprinkled all over these products.

Because the logo cannot be imitated, it is much more difficult for copycat artists to imitate these designs.

But if you go to Santee Alley, yes.

(laughs) Yes.

Canal Street, I understand.

It's fun sometimes, isn't it?

Now, the reason there is no copyright protection in the fashion industry is that courts long ago decided that apparel was too utilitarian to be subject to copyright protection.

They didn't want a few designers to own the original components of our clothing.

And since it's owned by Joe Blow, anyone else will have to license this cuff or sleeve.

But is it too practical? So, is that how you think about fashion?

It's Vivienne Westwood. no!

We consider it too stupid and too unnecessary.

Now, those who are familiar with the logic behind copyright protection, that without ownership there is no incentive to innovate, may be truly amazed by both the critical successes of the fashion industry and the economic successes of this industry.

What I would like to argue today is that the lack of copyright protection in the fashion industry has allowed fashion designers to actually elevate utilitarian design—that which covers the naked body—to what is considered art.

There is no copyright protection in this industry, so there is a very open and creative ecosystem of creativity.

Unlike their creative brethren – sculptors, photographers, filmmakers, and musicians – fashion designers can sample all of their colleagues' designs.

They can take any element from any garment in fashion history and incorporate it into their designs.

They are also known to reflect the zeitgeist.

And here, I suspect, they're inspired by Avatar costumes.

Maybe just a little.

Costumes are not copyrighted.

Fashion designers now have the widest palette imaginable in this creative industry.

This wedding dress is actually made of spokes and this dress is actually made of aluminum.

I've heard that when this dress is walking, it actually sounds like wind chimes.

So one of the magical side effects of having a culture of copying, which it really is, is the establishment of trends.

People think this is magical. How does that happen?

That's because it's legal for people to copy each other.

Some believe that some people at the top of the fashion food chain kind of dictate what we wear, but when I talk to designers at all levels, including these high-end designers, they always say that the main inspiration comes from the streets, i.e. the streets where people like you and me remix and match their fashion looks.

And because that's where they really get a lot of their creative inspiration, this industry is both top-down and bottom-up kind of industry.

Fast fashion giants are perhaps the biggest beneficiaries of the current lack of copyright protection in the fashion industry.

They are famous for copying high-end designs and selling them at very low prices.

And they face a lot of lawsuits, in which fashion designers usually don't win.

Courts have repeatedly said, "We don't need more intellectual property protection."

Copying like this makes me wonder how luxury brands stay in business.

If you can get it for $200, why should you pay $1000?

That's one of the reasons we had a conference here at USC a few years ago.

We invited Tom Ford for a conference called Ready to Share: Ownership of Fashion and Creativity, and asked him exactly this question.

Here's what he wanted to say:

In case you didn't know, he had just found success as head designer at Gucci.

Tom Ford: And after doing a lot of research, it turns out that it's not really a lot of research, it's a very simple one. The counterfeit customer was not our customer.

Joanna Blakely: Imagine.

The people of Santee Alley are not Gucci shoppers.

(Laughter) This is a very different demographic.

And as you know, a copy is never the same as the original high-end design, at least in terms of materials. Always made from cheap materials.

But in some cases, even the cheaper versions actually have some glamorous sides and can breathe a little life into a fading trend.

Copying has many advantages.

One thing many cultural critics have pointed out is that we now have a much wider range of design options to choose from than we used to, thanks in large part to the fast fashion industry.

And this is good. I need a lot of options.

Fashion helps us project ourselves into the world, whether we like it or not.

Thanks to fast fashion, global trends are actually established much faster than before.

And indeed, this is good news for trendsetters. They want to set trends to move their products.

As a fashionista, you always want to be ahead of the curve.

They don't want to wear what other people wear.

And they want to move on to the next trend as soon as possible.

Let me tell you, there is no rest for fashionable people.

Every season designers have to struggle to come up with new great ideas that everyone will love.

And let me tell you, this is very good for the bottom line.

Of course, this culture of copying influences the creative process in many ways.

And Stuart Weitzman is a very successful shoe designer.

He complained a lot about people imitating him, but in one interview I read, he said it really forced him to try.

He had to come up with new ideas, new things that were hard to imitate.

He came up with this Bowden wedge heel that must be made of steel or titanium. If you make it with cheap materials, it will really break in two.

So he had to be a little more innovative. (music) And it actually reminded me of a jazz great, Charlie Parker.

I don't know if you've heard this anecdote, but I have.

He said one of the reasons he invented bebop was because he was convinced that white musicians wouldn't be able to replicate the sound. (Laughter) He wanted to make it too hard to copy, but that's what fashion designers always do.

They try to put together a signature look, an aesthetic that reflects who they are.

When people knock it out, everyone knows it because they showed that look on the runway, and it's a consistent aesthetic.

I love this Galliano.

Okay, let's move on. (Laughter) This is no different from the world of comedy.

I don't know if you know that jokes can't be copyrighted either.

So when one-liners were so popular, everyone stole it from each other.

But now there are different kinds of cartoons.

They develop a personality, a distinctive style, just like fashion designers.

And their jokes really only work within that aesthetic, much like fashion design by fashion designers.

For example, if someone stole a Larry David joke, it wouldn't be that funny.

Now, another thing fashion designers have done to survive in this copying culture is learning how to copy themselves.

they beat themselves up.

They strike a deal with the fast-fashion giant and figure out a way to sell their products to a whole new demographic: the Santee Alley demographic.

Now, some fashion designers say, "The only country we don't respect is America.

Other countries protect our artistic designs. ”

However, a look at the other two largest markets in the world shows that the protection offered is really ineffective.

For example, Japan, which I think is the third largest market, has design law. It protects the apparel, but the novelty standards are so high that you need to prove that your clothing has never existed before and is completely unique.

And it's like the US patent novelty standard, something a fashion designer could never get, and rarely gets here in the state.

In the European Union they went in the opposite direction.

The standard of novelty is very low and anyone can register anything.

But despite being home to the fast fashion industry and having a plethora of high-end designers, they generally don't register their clothes and there aren't many lawsuits.

It turned out to be due to too low standards of novelty.

A person can come in, put on someone else's gown, cut 3 inches off the hem, and go to the EU. Register as a new original design.

Therefore, the copycat artist cannot be stopped.

If you look at the registry, it actually has many registered in the EU.

Nike tees that are almost identical to each other.

But Diane von Furstenberg didn't stop this.

She is president of the Council of Fashion Designers of America and has told the constituency that she intends to obtain copyright protection for her fashion designs.

However, retailers have kind of dismissed this notion.

I don't think this law is going anywhere because they find it very difficult to tell the difference between pirated designs and those that are just part of a global trend.

Who owns the appearance?

That's a very difficult question to answer.

It took a lot of lawyers and long court hours, and the retailer decided it was too expensive.

The fashion industry isn't the only one without copyright protection.

There are many other industries without copyright protection, including the food industry.

A recipe cannot be copyrighted as it is a set of instructions and a fact. And you can't copyright the look and feel of even the most unique of dishes.

Automobiles are no different.

You can't copyright a sculpture design, no matter how quirky it looks or how cool it looks.

Because it is a practical article.

The furniture is the same, too practical.

I think magic tricks are instructions like recipes. No copyright protection.

Hairstyle, no copyright protection.

Open source software, they decided they didn't want copyright protection.

They thought it would be more innovative without it.

It's very difficult to get a copyright on a database.

Tattoo artists don't want that. it's not cool

They share designs.

Just kidding, there is no copyright protection.

Fireworks displays, game rules, perfume smells, no.

Some of these industries may seem far away to you, but these are low IP gross revenues. There are industries with little copyright protection, and gross sales of movies and books.

(Applause) Not very beautiful.

(Applause.) When I talk to people in the fashion industry, they're like, "Shhh!

Please don't tell anyone that we can actually steal each other's designs.

I'm ashamed. ”

But do you know? It's revolutionary, and a model many other industries may need to consider for this as well, like the one we just saw with a very small bar.

Because today's heavily copyrighted industry operates in an atmosphere as if it has no protection, and I don't know what to do.

When I saw a lot of industries without copyright protection, I thought, "What is the underlying logic?"

I want a picture." But the lawyer wouldn't give me a picture, so I made one.

These are the main types of dichotomy in the logic of copyright law.

It's more complicated than this, but it's good enough.

First, is something an artistic object?

Then it deserves protection.

Is it a utility object?

Then no, it doesn't deserve protection.

This is a difficult and unstable binary.

One more thing, is it an idea?

Is it something that needs to circulate freely in a free society?

No protection.

Or is it a physically fixed representation of an idea, something someone made and has the right to own it for a while and make money off it?

The problem is that digital technology has completely upended the logic of this concept of physically fixed representation versus ideas.

Today, we don't perceive books as things on our shelves and music as physical objects that we can hold in our hands.

It's a digital file.

It has little connection with any kind of physical reality in our minds.

And because these things are so easy for us to copy and transmit, they actually circulate within our culture much more like ideas than physical instantiated objects.

Now, when we talk about creativity and ownership, the conceptual issues are really deep, and let me tell you, we don't want to leave this issue to lawyers alone.

they're smart

I am with one person. He's my boyfriend, okay.

he is clever, clever

But you need a multidisciplinary team to discuss this and try to understand what ownership models lead to the greatest innovations in the digital world.

My suggestion is that fashion could be a very good place to look for models for the creative industries in the future.

For more information on this research project, please visit our website ReadyToShare.org.

And a big thank you to Veronica Jauriqui for creating this very fashionable presentation.

Thank you very much. (applause)

Today, I would like you to look at children who become suicide bombers from a completely different perspective.

In 2009, there were 500 terrorist bombings across Pakistan.

Over the past year, I have worked with children in training to become suicide bombers and Taliban recruiters, trying to understand how the Taliban turn these children into live ammunition and why they are so actively involved.

I invite you to watch a short video from my latest documentary film Children of the Taliban.

(singing) The Taliban now run their own schools.

They target poor families and persuade parents to let their children go.

In return, they provide free food and housing, and in some cases a monthly salary to the family.

I got a propaganda video made by the Taliban.

The boys are taught the legitimacy of suicide bombings and spy executions.

I got in touch with a Swat child who was studying in such a madrassa.

Hazrat Ali comes from a poor farming family in Swat.

He joined the Taliban a year ago when he was 13.

How are the Taliban in your area getting people to join them?

Hazrat Ali: First they call us to the mosque and preach.

Then they take us to a madrasah and tell us about the Quran.

Sharmeen Obaid Chinoy: After that, he told me that the children would go through months of military training.

HA: They teach us how to use machine guns, Kalashnikovs, rocket launchers, grenades and bombs.

They ask us to use them only against infidels.

Then they teach us to do suicide attacks.

SOC: Want to perform a suicide attack?

HA: If God gives me strength.

SOC: In my research, I have seen the Taliban perfecting the way they recruit and train children. I think it's a five step process.

The first step is for the Taliban to prey on large, poor families in rural areas.

They separate parents from their children with the promise of food, clothing and shelter.

They then send students hundreds of miles away to hardline schools aligned with Taliban policy.

Step 2: Teach the children the Koran, the most sacred book of Islam, in Arabic, but they cannot understand or speak Arabic.

They are very dependent on their teachers, and I have personally seen teachers distort their messages to suit their purpose.

These children are expressly forbidden to read newspapers, listen to the radio, or read books not prescribed by teachers.

Any child found violating these rules will be severely reprimanded.

In effect, the Taliban have cut off all other sources of information about these children.

Step 3: The Taliban want children to hate the world they live in now.

So they beat these kids - I saw it. They give dry bread and water twice a day. We rarely allow them to play games. They say you should only read the Koran for eight hours at a time.

Children are effectively prisoners. They cannot leave or go home.

Their parents are so poor that they don't have the means to get them back.

Step 4: Combatants, senior members of the Taliban, begin telling young boys about the glories of martyrdom.

They talk about how when they die they are greeted by lakes of honey and milk, how seventy-two virgins await them in paradise, how there is unlimited food, and how this glory makes them neighborhood heroes.

In effect, this is the brainwashing process that has begun.

Step 5: I believe the Taliban have one of the most effective propaganda tools.

The videos they use are interleaved with photos of men, women and children who died in Iraq, Afghanistan and Pakistan.

And the basic message is that the West doesn't care about civilian deaths, so those who live in the region and support governments that cooperate with the West are on a level playing field.

That's why Pakistani civilians, who have killed more than 6,000 people in the last two years alone, are in the right place.

Now these kids are ready to become suicide bombers.

They are ready to go out and fight because they are told that this is virtually the only way to glorify Islam.

I would like to see another excerpt from the movie.

This boy is called Zenora.

He blew himself up and killed six people.

This boy is called Sadik.

He killed 22 people.

This boy is called Mesud.

He killed 28 people.

The Taliban run suicide schools to prepare a generation of boys for atrocities against civilians.

Want a suicide attack?

Boy: I would love to.

But only with the father's permission.

When I see suicide bombers who are younger than me or my age, I am very inspired by their horrific attacks.

SOC: What blessings do you get from performing a suicide attack?

Boy: On Judgment Day, God will ask me, "Why did you do that?"

I answer, "Lord! Just to make you happy!"

I have dedicated my life to fighting the infidels. ”

Then God will see my intentions.

If my intention was to eradicate the evils of Islam, I would be granted paradise.

Singer: ♫ On the Day of Judgment ♫ ♫ May my God call me ♫ ♫ My body will grow back ♫ ♫ And God will ask me why I did this ♫ SOC: I leave you with this thought: If you were raised in this environment and faced with these choices, would you choose to live in this world or in the glorious beyond?

As one Taliban recruiter told me, "There will always be sacrificial lambs in this war."

thank you.

(applause)

Worried about what will kill you?

Heart disease, cancer, car accidents?

Most of us worry about things that are out of our control, such as war, terrorism, and the tragic earthquake in Haiti.

But what really threatens humanity?

A few years ago, Professor Vaclav Smir tried to calculate the probability of a sudden disaster big enough to change history.

He calls these "extremely lethal discontinuities," meaning that up to 100 million people could die over the next 50 years.

He considered the possibility of another world war, a massive volcanic eruption, and even an asteroid hitting the Earth.

But he said such an event would be nearly 100% more likely than any other event, and that it was a serious flu pandemic.

Well, you might think the flu is just a bad cold, but it can be deadly.

Seasonal influenza kills 36,000 people in the United States each year.

In developing countries, death tolls are almost certainly higher, although data are much more sketchy.

The problem is that if this virus mutates very dramatically from time to time, it is essentially a new virus and then a pandemic.

A new virus emerged in 1918, killing about 50 to 100 million people.

It spread like wildfire, and some died within hours of showing symptoms.

Are you safe today?

Well, we seem to have avoided the deadly pandemic that most people feared this year, but the threat could return at any moment.

The good news is that we are at a moment when science, technology and globalization are converging to create unprecedented possibilities. It is the potential to make history by preventing an epidemic that still accounts for one-fifth of all deaths and countless misery on the planet.

I can do it.

We have already prevented millions of deaths with our existing vaccines, but the more people we can vaccinate, the more lives we can certainly save.

But new or better vaccines against malaria, tuberculosis, HIV, pneumonia, diarrhoea, and influenza could end the age-old suffering of the planet.

So I am here to trumpet the vaccine to you.

But first, we need to explain why vaccines are important. Because the power of a vaccine is really like a whisper.

They can make history when they work, but after a while they become almost inaudible.

Some of us are now old enough to have small circular scars on our arms from childhood vaccinations.

But when was the last time you worried about smallpox? Smallpox is a disease that killed 500 million people in the last century and no longer exists.

Or polio? How many of you remember Iron Lung?

Thanks to the vaccine, this kind of sight is no longer seen.

Interestingly, although there are now more than 30 diseases that can be treated with vaccines, we are still threatened by HIV, influenza, and others.

why is that?

Well, here's a little secret.

Until recently, we didn't need to know exactly how vaccines worked.

We knew they were doing the old fashioned trial and error.

They took a pathogen, modified it, injected it into humans and animals, and watched what happened.

This worked well for most pathogens, worked reasonably well for sly bugs like influenza, but never worked for HIV, to which humans have no natural immunity.

Now let's find out how the vaccine works.

They basically create a cache of weapons for your immune system that can be deployed when needed.

Now, when you do get a viral infection, it usually takes days or weeks for your body to fight back with all its might, but by then it may be too late.

Gaining immunity beforehand pretrains your body's strength to recognize and defeat specific enemies.

This is how vaccines actually work.

Now, let's watch our first-ever TED video on how an effective HIV vaccine works.

(music) Narrator: Vaccines pre-train the body how to recognize and neutralize certain intruders.

After passing through the body's mucosal barrier, HIV infects and replicates in immune cells.

Intruders attract the attention of the frontline forces of the immune system.

Dendritic cells, or macrophages, capture the virus and display its fragments.

Memory cells generated by the HIV vaccine are activated upon learning of HIV's presence from frontline troops.

These memory cells instantly deploy the exact weapon needed.

Memory B cells transform into plasma cells, producing a flurry of specific antibodies that attach to HIV and prevent it from infecting cells, while squadrons of killer T cells seek out and destroy cells already infected with HIV.

Viruses are defeated.

Without a vaccine, these responses would have taken a week or more.

By then, the battle against HIV would have already been lost.

Seth Berkley: That's a really cool video.

The antibodies you just saw in this video are the ones in action, the ones that make most vaccines work.

So the real question is, how do you make sure your body makes what it needs to protect against flu and HIV?

The main challenge with these viruses is that they are constantly changing.

Now let's look at the influenza virus.

In this rendering of the flu virus, these different colored spikes are used for infection.

Antibodies also use essentially a handle to capture and neutralize viruses.

When these mutate, their shape changes and the antibody no longer knows what it is looking at.

That's why you can get a slightly different strain of the flu each year.

That's why in the spring we need to make our best guess as to which three strains will be circulating next year, combine them into a single vaccine, and rush production into the fall.

To make matters worse, influenza A, the most common flu, can also infect animals living in close proximity to humans and recombine within those specific animals.

Additionally, wild waterfowl carry all known influenza strains.

In 2003, the H5N1 virus passed from birds to humans, with several isolated cases and an apparent fatality rate of 70 percent.

Now, fortunately, that particular virus, though very scary at the time, was not easily transmitted from person to person.

This year's H1N1 threat was actually a mix of humans, birds and pigs that originated in Mexico.

It was easily contagious, but fortunately mild.

So, in a way, our luck holds up, but you never know when another bird will fly by.

Now let's look at HIV.

HIV is as volatile as the flu. The flu looks like the rock of Gibraltar.

The virus that causes AIDS is the most vexing pathogen scientists have ever faced.

It mutates violently, has decoys that evade the immune system, attacks the very cells that try to fight it, and quickly hides itself in the genome.

Here's a slide that looks at the genetic variation of influenza and compares it to a more brutal target, HIV.

In the previous video, we saw a swarm of new viruses being launched from an infected cell.

Now realize that there are millions of such ships among those who have been recently infected. Each one is slightly different.

Finding a weapon to recognize and sink them all makes the job even harder.

In the 27 years since HIV was identified as the cause of AIDS, we have developed more drugs to treat HIV than all other viruses combined.

While these drugs are not cures, they represent a major triumph of science as they can remove the automatic death sentence of an HIV diagnosis, at least for those who have access to them.

But tackling vaccines is actually quite different.

Big business stayed away from vaccines because they thought the science was too hard and vaccines were a poor business.

Many thought it would be impossible to create an AIDS vaccine, but today the evidence shows otherwise.

In September, a clinical trial in Thailand yielded surprising but exciting results.

For the first time, we have confirmed that an AIDS vaccine is effective in humans. That particular vaccine was manufactured almost a decade ago, albeit very modestly.

New concepts and early tests have shown even greater potential in the best animal models.

But in the past few months, researchers have isolated several new broadly neutralizing antibodies from the blood of HIV-infected people.

So what does this mean?

HIV is highly variable and we have previously seen that broadly neutralizing antibodies capture and neutralize multiple variations of the virus.

Wearing these on our best Monkey models will give you full protection against infection.

In addition, these researchers discovered new sites on HIV that antibodies can capture. What is very special about this site is that it changes very little as the virus mutates.

It's like the virus is wearing the same socks no matter how many times you change clothes, and now our job is to make the body really hate those socks.

So what we're getting at is the situation.

The Thai study shows that an AIDS vaccine can be produced, and the antibody study shows how it can be done.

This strategy of working backwards from antibodies to create vaccine candidates has never been done in vaccine research to date.

It's called retrovaccinology, and its implications go far beyond just HIV.

So think about it.

We have identified these new antibodies, and we know that they catch so many variations of the virus.

I know they need to stick to certain parts. So if we can figure out the exact structure of that part and present it through a vaccine, we hope that we can encourage the immune system to make these matching antibodies.

And it will produce a universal HIV vaccine.

The actual structure sounds simpler than it actually is, as it resembles a picture of an antibody in blue bound to a binding site in yellow, but as you might imagine, working with these three-dimensional structures is much more difficult.

If you have any ideas to help solve this problem, please let us know.

But, as you know, the research that came out of HIV is actually helping to innovate in other diseases as well.

For example, a biotechnology company discovered broadly neutralizing antibodies against influenza and new antibody targets against influenza viruses.

They are now creating a cocktail—an antibody cocktail—that could be used to treat severe, overwhelming cases of influenza.

Longer term, what they can do is use these retrovaccinology tools to make a preventative flu vaccine.

Now, retrovaccinology is just one method within so-called rational vaccine design.

Let me give you another example.

We talked about before H and N spikes appeared on the surface of the flu virus.

Notice these other little bumps.

These are largely hidden from the immune system.

We now know that these spots do not change much as the virus mutates.

If we can disable these with specific antibodies, we can disable all types of influenza.

Animal studies to date have shown that such vaccines, while potentially mild, may prevent severe disease.

So if this works in humans, what we're talking about is a universal flu vaccine that doesn't need to be changed every year and removes the threat of death.

So you can think of the flu as just a bad cold.

Of course, the best conceivable vaccine is only worth it to the extent that it reaches everyone who needs it.

This will require a combination of smart vaccine design, smart production methods and, of course, smart delivery methods.

So I want you to remember a few months ago.

In June, the World Health Organization declared the first global influenza pandemic in 41 years.

The U.S. government has promised to provide 150 million doses of vaccine by October 15 in preparation for a peak flu season.

A vaccine was promised to developing countries.

Hundreds of millions of dollars have been spent and flowed to accelerate vaccine production.

what happened?

Well, in the early 1940s we first discovered how to make and manufacture the flu vaccine.

It was a slow and laborious process requiring millions of live chicken eggs.

Viruses only multiply in living things, so it turns out that chicken eggs work well against influenza.

Most strains allow one to two vaccinations per egg.

Fortunately, we live in an era of amazing advances in biomedicine.

Well, I got my flu shot today...

Chicken eggs, (laughs) billions of chicken eggs.

Almost nothing has changed.

The system is reliable, but the problem is that you never know how well your stock will grow.

This year's swine flu strain did very poorly early in production, essentially giving 0.6 doses per egg.

So here are some disturbing thoughts.

What would you do if that wild bird flew by again?

Even if an avian strain is found that infects a poultry flock, there may be no eggs for vaccines.

So Dan (Barber), if you want billions of chicken pellets for your farm, I know where you can get them.

So, today, the world can produce about 350 million doses of influenza vaccine against three strains, or about 1.2 billion doses if you want to target a single variant like swine flu.

However, this assumes that the US factories are operating because pollution at one factory cut US supply in half in 2004.

And the process will take more than half a year.

So are we better prepared than we were in 1918?

Well, now that we have new technology, I think we can definitely say yes.

Imagine being able to produce enough flu vaccines for everyone in the world for less than half what the United States is currently spending.

A variety of new technologies make this possible.

An example is shown below. A company I am involved with has discovered a specific portion of the flu H spike that activates the immune system.

Cutting this out and attaching it to the tail of another bacterium triggers a vigorous immune response, creating a very potent flu warrior.

The vaccine is so small that it can grow in the common bacterium E. coli.

Now, as you know, bacteria multiply quickly - it's like making yogurt - so without eggs, enough swine flu for the entire world could be produced in a few factories, in a few weeks, at a fraction of the cost of current methods.

(Applause.) Now let's compare some of these new vaccine technologies.

And look at the time saved aside from the significant increase in production and the significant cost savings (for example, the E. coli method we just talked about). This is a life saved.

Developing countries, largely left behind their current counterparts, are seeing the potential of these alternative technologies and leapfrogging the West.

India, Mexico and others are already producing experimental flu vaccines and may be the first places to see these vaccines used.

These technologies are so efficient and relatively cheap that if we can find a way to deliver them, billions of people will have access to life-saving vaccines.

So let's see where this takes us.

New infections emerge or recur every few years.

Someday, perhaps soon, there will be a virus that threatens us all.

Can we react quickly enough before millions die?

Fortunately, this year's flu was relatively mild.

I say "lucky" also because virtually no one in the developing world was vaccinated.

So if we have the political and financial foresight to sustain our investments, we can master these and new vaccinology tools and use these tools to produce enough vaccines at low cost for everyone to ensure a healthy and productive life.

The flu no longer has to kill half a million people a year.

AIDS no longer has to kill two million people a year.

Poor and vulnerable people no longer need to be threatened by infectious diseases.

Instead of Vaclav Smir's "extremely fatal discontinuity of life", we can ensure the continuity of life.

These new vaccines are what the world needs now and we can make it happen.

thank you very much.

(Applause) Chris Anderson: Thank you.

(Applause.) Thank you.

So science is changing.

Seth, in your mind, I mean, you must be dreaming about this, what kind of timescale do you have in mind until we actually have a revolutionary vaccine that's out there and available? Let's start with HIV.

SB: Transformation can happen at any time. Because the problem we have now is proving that vaccines work in humans. I just need something better.

And we know that humans can make antibodies using this kind of antibody.

So if we can find a way to do that, we can have a vaccine. And what's interesting is that there's already some evidence that we're starting to solve that problem.

So the challenge is going full speed ahead.

CA: Do you have a hunch that it will take at least another five years?

SB: You know, everyone says it's 10 years, but every 10 years it's been 10 years.

So, while I don't like to schedule scientific innovations, the investments made so far are now paying off.

CA: It's the same with the universal flu vaccine, is that the same thing?

SB: I think the flu is different. I think what happened with the flu, we've just introduced some of it, is that we've got a lot of really cool and useful technology that's ready to go.

they often see The problem is, we invested in legacy technology because we were happy with it.

You can also use an adjuvant, which is a chemical that you mix with.

That's what Europe is doing, so they could have diluted the flu supply and made more available, but to go back to Michael Spector's words, the anti-vaccine people really didn't want that to happen.

CA: So is malaria even further behind?

SB: No, it's malaria. There are candidates that have shown real efficacy in previous trials and are currently in Phase 3 trials.

It's probably not a perfect vaccine, but we're making progress.

CA: Seth, most of us have jobs that produce something every month. We get such satisfaction.

You have been immersed in this work for over ten years. I salute you and your colleagues for what you have done.

The world needs people like you. thank you.

SB: Thank you.

(applause)

You know, when Chris first asked me to speak at TED, I said no.

It's a very large conference.

But he explained to me that he was in a pinch and struggled to find the sex appeal and stardom the conference is known for.

So I said okay, Ted, aka Chris.

I go on two conditions.

1: I would like to speak as early as possible.

And second, I would like to choose a theme for TED 2006.

And luckily he agreed.

Two years from now, the theme will be "cute pictures of puppies."

(VIDEO) (MUSIC) [BASIC TOIR RIGHT DANCE] [NEW SCHOOL] [OLD SCHOOL] [Who's your daddy?] ["RIDE THE PONY"] [RIDE THE CROWDS WITH LOVE] [SMAKING THAT ASS] [STIR THE POT OF LOVE] [HANGING OUT ... CASUAL] [WORD.] (Applause) I invented the placebo camera.

(Laughs) You can't actually take pictures, but it's so cheap and you feel like you've been there.

(laughter) (clears throat) (laughter) "Dear Sirs, I would like to offer my compliments for today and wish you and your family the very best.

(inhales) I know this letter comes to you unexpectedly, but don't be surprised. Nature has a way of arriving unannounced and, as the saying goes, originals are very hard to find, but their echoes sound louder.

So, if I need to deposit any amount of money with you, I will personally contact you to ensure safety and honesty.

My name is Michael Bangla. He is the son of the late Thyme Bangla, Sierra Leone's finance minister who was killed during the civil war.

(Laughter) I am writing to you knowing that your country is economical to invest in and that your people are transparent and trustworthy to do business with.

(Laughter) Before he died, my father had a fortune of $23 million, which he kept away from the rebel leaders during the war.

(Laughter) This fund was going to be used to repair reservoirs all over the country before the war started.

When the war broke out, the rebel leaders demanded the money, but his father refused to release it, claiming it was not his property, and was killed.

On the other hand, my father always confides in me, so only my mother and I know about it.

(sighs) I arranged with a Red Cross relief worker who, without knowing the true contents of the box, used an official van to transport the money to Freetown's Lungi Airport.

(Laughter) The money was deposited as family property in a safe and reliable security company in Dakar, Senegal, but I was only granted temporary asylum.

I don't want to invest my money in Senegal because of the unfavorable economic situation in Senegal, which is very close to my country.

The only help I need from you is I am sure you will do it for me. The first is to become a Silent Partner and receive funds in trust in your account. 2. Provide a bank account under your control to which the funds will be transferred. 3. Receive funds into a trust account. Receive commissions. Please keep the rest of the money until I arrive after the transfer is complete.

Best regards, Michael Bangura. ”

(Laughter) (Applause) This is really embarrassing.

We were told 18 minutes left behind the scenes.

Only 15 were prepared.

(Laughs) So, if it's okay, I'd like to wait for just three.

(laughter) (ends laughter) I'm so sorry.

(Laughter) (Applause) What's your name?

(Laughter) Mark Serfus.

Pretty cool, isn't it? pursue happiness.

(laughs) Are you a virgin? virgin?

So -- no, you mean like TED?

(laughs) Is that so? oh yeah?

So are you a thousand or two thousand out there?

teeth? oh?

Don't you know what I'm talking about?

(laughter) Oh, Mark -- (laughter) Serfus.

(Laughter) 1,860 -- Am I okay?

And it's nothing to be ashamed of.

It's nothing to be ashamed of.

(Applause) Yeah, I was hanging out with the Google guys last night.

Really great, we ended up wasted.

(Laughter) And they told me that Google software is so advanced that it can actually predict what you're going to say next based on your lifetime interactions with Google. (smile)

And I thought, 'Fuck out of here. That's crazy.'

(Laughs) But they said, 'No, but don't show it to anyone.

But they failed.

And I was told I could just type "What were you going to say next?"

And my name, and it will tell me.

Remember, this is pure software, this is a real Internet browser, a real Google site. And we are going to test it live today.

What were you going to say next?

And "Ze Frank" - that's me.

do i feel lucky?

(laughter) (shouting) Do I feel lucky?

Audience: Yes! yes!

(sighs) (laughter) Ze Frank: Oh! wonderful.

(Laughter) March 2001 -- (Laughter) I filmed myself dancing to "Justify My Love" by Madonna.

One Thursday, as part of an invitation to my 26th birthday party, I sent 17 of my closest friends a link to a website with these clips.

(laughter) (clears throat) By Monday, over a million people were visiting the site a day.

(sighs) (laughter) I got a call from Earthlink within a week saying they owed me $30,000 because of the 10 cents per megabyte overage charge.

(laughs) Needless to say, I was able to quit my job.

[I got fired] (laughter) And finally, I became a freelancer.

(Laughter) [Unemployed] But some people call me an Internet guru or [Jackass] Swami or something like that.

(Laughter.) I knew I had something.

Basically, I've distilled a philosophy that is very difficult and complicated to explain. It's a little too deep for all of you, so I won't go into it here, but -- (laughter) it's about what makes a website popular, which, you know, -- [dancing like an idiot and selling nothing] I'm afraid I don't have time anymore.

Maybe we'll come back next year.

(Laughter) I'm obsessed with email. You get a lot.

Four years later, I still get probably 200 or 300 emails a day from people I don't know. It's been a great opportunity to get to know different cultures.

It's like a microscope to the rest of the world.

You can get a peek into other people's lives.

I also feel that I draw a lot of inspiration from the average user.

For example, someone wrote, "Hey Ze, if you ever come to Boulder, rock out with me," and I said, "Why should we wait?"

[lockout] (video) (music) And they said, "Hey ze, thank you for locking me out, but what I meant was lockout like getting naked."

(laughs) And it was embarrassing.

But I said "of course" because it's kind of a collaboration between me and the fans.

[naked and locked out] (video) (music) (laughter) I hear a lot of your whispers.

(Laughter.) And I know what you mean, 'Oh my God!

Why is his presentation so smooth? ”

(Laughter.) And I have to say that this year it's not all about me.

I think we need to give Chris credit here. Because I think there have been some subpar speakers at TED over the years.

don't know.

So this year Chris sent me a TED conference simulator.

(Laughter) It allowed us, as speakers, to arrive on the scene, go into the trenches, practice at home, and prepare for this experience.

And I have to say it's really, really great to be here.

(Recorded applause) I want to give you a little joke.

(pre-recorded applause and cheers) But it's not all good.

You can do Yazi mode.

Voice: Hey you idiot, get off the stage!

ZF: Get off the stage.

(laughter) Voice: I want Malcolm Gladwell.

(laughter) (baby cooing) (crowd applause) Just in case you run out of time.

(Heroic music) I just want to say one last thing, really -- (laughter) I want to thank all of you for being here.

(loud music) (laughs) And frog mode.

(singing) (singing) "Oh, the first time I made love to a rock shrimp --" (laughter) [Spam's joke is the new airplane joke] (sigh) True.

Some people say to me: "You're doing all this stuff and internet stuff and you're not making a penny."

(Laughter) "Why?" And I say, "Mom, Dad -- (Laughter) Good luck."

I don't know if you all know this, but the video game market, kids playing these video games, probably has a ton of money.

So, I'd say about $100,000 a year is spent on these things.

So I decided to try my hand at it.

I came up with some games.

(Laughter) This is called an atheist.

I thought it would be popular with young children.

OK。

See, I move around and say something.

(sigh) [Game over. No replays. ] (Laughter) So it didn't work very well.

(laughs) I have no idea why you're laughing.

(Laughter) I should have done this before I threw it.

Of course, "Buddhist" is very similar to "Atheist".

(Laughter) But you will come back as a duck.

(Laughter) This is great. Because you can play this for a long time for a quarter.

(Laughter) And Chris said in an email that we should really bring something new to TED, something that nobody's seen before.

So I made this for TED. It is "Christian".

It's the third in the series.

I hope this year goes well.

(sighs) (laughter) Do you have a preference?

(laughs) Good choice.

(laughter) So we can wait for the Second Coming. Second Coming is a random number between 1 and 500 million.

(Laughter) So, really, what are we talking about here?

Ah, the joys of technology.

(Laughter) For me, the joy of technology means something. Because I get a lot of pleasure from technology.

In fact, using technology to make things, albeit in an ironic voice, but we're talking seriously here, don't stop.

Making things actually gives me great joy.

It's the creative process that has always made me feel like a bubble of constant anxiety in my life, and that feeling when a project is about 80% done, knowing there's still work to be done, but it's not done, not started, really fills my whole life.

So I became interested in creating an online social space to share that sentiment with people who don't consider themselves artists.

We are in a guruship culture.

The reason software is so hard to use is because it feels unapproachable and you have to read the manual.

So I'm trying to create a very minimalist activity that allows people to express themselves, and hopefully -- ("The End" by The Doors) Oops! It says -- on the page, but it doesn't exist.

(Laughter) It's all serious, but (Laughter) we try to create a meaningful environment for people to express themselves.

(Laughter) I created a contest here called "When Office Supplies Attack." I think this resonated with the working class.

(Laughter) We had over 500 entries in three weeks.

Toilet paper fashion.

(Laughs) Again, everyone from all over the country.

Watches are especially nice.

(Laughter) Online drawing tools -- you've probably seen a lot of them.

i think they are great.

It's a chance for people to play with crayons and such.

But what interests me is the process of creation as a real event.

And the problem is that a lot of people aren't good at drawing and are disappointed by the awful little things they create, like stick figures.

And eventually, they stop playing with it, or draw penises and so on.

(laughter) So Scribbler is an attempt to create a generation tool.

It's an auxiliary tool.

Draw a simple stick figure and it can work together to create something like an etching of post-war Germany.

(Laughs) In fact, it's tweaked to draw better things that don't look good.

So let's start scribbling.

So the idea that something really crappy can look beautiful while you can actually participate in this process.

And here are some of my favorites.

This is a little trap marionette submitted to me.

Very cool.

(laughs) Darling.

beautiful things.

I mean, this is incredible.

An 11 year old girl drew and posted this.

It's simply wonderful.

(Laughter.) We're really serious here.

This is no joke.

(laughs) But I think it's really fun and great.

Hence it is called a "fiction project".

It's an online space, essentially a refurbished bulletin board that encourages collaborative writing.

These are haiku.

Not all haiku were written by the same person.

In fact, each line was contributed by a different person at a different time.

"Now tied up, tied up, a cruel mistress approaching me, now tied up, it's up," I think.

This is a great method. If you came home and your spouse or whoever said, "Let's talk," it chilled you to the core.

(Laughs) But it's these peripheral activities that allow people to get together and do fun things.

They actually get to know each other and I think it's kind of a low threshold peripheral activity that is key to cultivating the social capital of bonding that we lack.

And right off the bat, I love dolls.

Here is the doll.

Dance to the music.

Lotte Reiniger was a great shadow puppeteer in the 20's and started doing more elaborate things.

I'm interested in dolls, so I'd like to show you one last thing.

Ah, so this is how dolls are made.

(Applause) Chris Anderson: Ladies and gentlemen, Mr. Ze Frank.

(applause)

I want to talk about what we can learn from conservatives.

And I'm in a stage in life right now where I'm nostalgic. So let me confess that I was certainly conservative when I was a kid.

I was a young Republican, a teenage Republican, and a teenage Republican leader.

In fact, I was the youngest member of the delegation to the 1980 party convention that elected Ronald Reagan as the Republican presidential nominee.

Well, I know what you're thinking.

(Laughter) You're thinking, "That's not what the Internets are saying."

You're probably thinking, "Wikipedia doesn't mention this fact."

And really, this is just one example of the junk that flows across the internet tubes here.

Wikipedia claims that this man, a former congressman from Erie, Pennsylvania, was one of the youngest to attend the Republican National Convention at the age of 20, but that's not entirely true.

(Laughter) Admittedly, it's very frustrating for me, so let me change this little fact here.

(Laughter) (Applause) Okay. Ok, so...perfect.

completely.

(Laughter) Now, Speaker, Lawrence Lessig, yes.

have understood.

The truth is finally here.

Did you understand? Has completed. Almost completed. please.

"...the youngest Republican" Yes, it's over.

that's it. Please save this.

Good, let's go.

And... Wikipedia is finally fixed.

Ok, but no, this doesn't really matter.

(Applause.) But when you think of conservatives, what you should be thinking about is not the 1980 Convention, but this. they go to church

Now, many people go to church.

I'm not saying only conservatives go to church.

And I'm not talking about God.

I don't want to get into it. That's not my point.

they go to church So we do a lot for each other for free.

They host potluck dinners.

Yes, they also sell books about potluck dinners.

They give food to the poor.

They share, give and give away for free.

And it's the very people who head the companies on Wall Street who show up on Sunday to share information.

It's not just food, is it?

These people, on many occasions, are strong believers in the limits of the market.

They are in many important places against the market.

In fact, they celebrate this kind of relationship, just like we all do.

But they're so desperate not to drop money on the relationship that it would otherwise end up like this.

They want us conservatives to be regulated and stop markets from spreading to those places.

Because they understand that there are places where markets exist and places where they shouldn't exist, where we should be free to enjoy fellowship with others.

They recognize that both of these things need to coexist.

And the second great thing about conservatives is that they understand ecology.

Yes, it was Teddy Roosevelt, the first great Republican president of the 20th century, who taught us how to think about the environment.

They first taught me about ecology in terms of natural resources.

And they started teaching us in the context of innovation and economics.

They understand "freedom" in that context. They understand that 'freedom' is also an important and integral part of cultural ecology.

I want you to think about them.

Okay, I know you don't believe me, really here.

So, this is the first exhibition.

I would like to share with you my latest hero, Julian Sanchez. Julian Sanchez is a libertarian who works at the Cato Institute, which is "evil" to many.

Well Julian made this video.

He's a terrible video producer, but the content is great, so I'll give you a little introduction.

Here he starts.

Julian Sanchez: Let's take a look at how remix culture seems to be evolving...

Larry Lessig: So he started telling us about these three videos.

This is a great Brat Pack remix for listomania.

Of course, it spread virally.

Big success.

(music) And some guys from Brooklyn saw it.

They decided they wanted to do the same.

(music) And of course people in San Francisco saw it too.

And the people of San Francisco thought they had to do the same.

(music) So they are beautiful, but this libertarian has some important lessons that he wants us to learn from here.

Here is lesson number one.

JS: There's obviously something very nice about this as well.

They work in the sense that they emulate the original mashup.

And the guy who filmed it clearly has strong eyes and video editing experience.

But it's also basically just a group of friends having a real social time and having fun together.

Anyone who's ever sung with a group of good friends or had a dance party should be able to relate to and relate to this song.

LL: Or...

JS: So it's very different from the previous videos we've seen. Because the remix here isn't just about an individual doing something alone in a basement. It becomes an act of social creativity.

And not only does it ultimately produce different kinds of artifacts, it can change the way we relate to each other.

All our normal social interactions become a kind of invitation to this kind of collective expression.

Our real social life itself is transformed into art.

LL: So what this libertarian draws from these two points is...

JS: One remix is ​​about an individual who uses our shared culture as a kind of language to communicate something to the audience.

Stage 2 social remixing is really about mediating people's interactions using social remixing.

First, within each video, the Brat Pack characters are used as a kind of template to act out the social realities of each group.

But there is also dialogue between the videos, a kind of platform for articulating the similarities and differences between the social and physical worlds of the group once the basic structure is established.

LL: And this, for me, is the key to what Julian has to say...

JS: Copyright policy is not just about how to encourage the production of certain types of art products. It's about what level of control we allow over our social reality, the one that pop culture is inevitably permeating.

I think it's important to keep in mind these two different kinds of public goods.

I think that if we just focus on how to maximize the supply of one thing, we run the risk of stifling this different, richer and in some ways even more important thing.

LL: Yes. bingo. point.

Freedom needs this opportunity to have both the commercial success of great commercial productions and the opportunity to build this different kind of culture.

And for that to happen, the libertarian says, ideas like fair use that enable this kind of innovation need to be centrally protected between two creative cultures: commercial and communal.

The important thing is that they here, he understands the culture.

Now, my concern is that we Democrats, too often, are not.

Now, let's take this amazing company as an example.

In the good old days when this Republican ran the company, their greatest work was the work of the past.

All of Disney's great work has been either remixed from the public domain or waited until it was in the public domain to celebrate the creativity of this add-on remix.

Indeed, Mickey Mouse himself, of course, as "Steamboat Willie," is a remix of "Steamboat Bill" by Buster Keaton, which was very dominant and very popular at the time.

This man was an extraordinary remixer.

He's just the epitome and ideal of this kind of creativity.

But then the company goes through this dark phase to this Democrat.

Very different.

This was the mastermind behind finally passing what we call the Sonny Bono Copyright Term Extension Act, which extended the term of existing copyrights by 20 years so that no one could do to Disney what Disney did to the Brothers Grimm.

Now, if we challenge this, go to the Supreme Court, and call on the Supreme Court and the conservative group there -- if we can wake them up to this -- we enlisted Nobel laureates, including this right-wing Nobel laureate, Milton Friedman, to break this issue down. He told me that he would only participate in our brief if the word "no brain" was somewhere in the brief.

(Laughter) But clearly, when the Democrats passed this bill and signed it into law, there were no brains in this place.

Now, for a little quibble, you might say Sonny Bono was a Republican, but I don't think so.

This person is not a Republican.

Now, as a second example, consider this cultural hero, the icon on the left, the creator of this character.

Check out the "Star Wars" mashup site he built. We are inviting people to use their creative energy to generate new generation attention for this highly important cultural icon.

read the license.

These remixer licenses transfer all rights to the remixes to Lucas.

Mashup is owned by Lucas.

In fact, anything you add to your mashup, add music, Lucas has the worldwide, perpetual rights to exploit it for free.

There is no creator to be acknowledged here.

The creator has no rights.

In this story the author is a sharecropper.

And we should remember who hired the sharecroppers — the Democrats, right?

So the point is that Republicans here recognize a certain need for ownership, a respect for ownership, a respect that should be given to the creators, remixers, owners, property owners, copyright holders of this extraordinarily powerful thing, not a generation of sharecroppers.

I think there is a lesson for us to learn here, a lesson about openness.

Our lives are, at least in part, shared activities.

At least in part, even for the head of Goldman Sachs.

And we need fair-use, well-protected spaces for that shared activity to take place.

That's the best. Second: This shared ecosystem needs freedom to create.

Freedom means the ability to create without anyone's permission.

And third, we need to respect the creators of these remixes through rights tied directly to them.

Well, this describes the right-wing non-profit organization Creative Commons.

Actually, this isn't a right-wing non-profit, but of course, I'll tie it in here, Creative Commons provides authors with this easy way to mark their content with the intended freedom.

So we are moving from a world of "all rights reserved" to a world of "some rights reserved", allowing people to know the freedom that comes with content, to build on and create from this creative work.

These tools we have built enable this partial sharing through licenses, clarify the freedom to create without requiring permission first, as permission has already been granted, and respect the creators as they are based on freely licensed copyrights.

And with over 350 million digital objects currently freely licensed in this manner, it also explains the enormous right-wing conspiracy that apparently revolves around these licenses.

Now, the picture of the ecosystem of creativity, the picture of the balanced creativity ecosystem, is that the creativity ecosystem we have now?

You know, many of us don't believe we are.

Just last week, I stumbled upon the reality of this creative ecosystem.

I made a video based on the Wireside Chat you provided and uploaded it to YouTube.

Then, oddly enough, I received this email from YouTube, notifying me that content owned by the mysterious WMG had content matching that content ID.

So I didn't think much of it.

And someone on Twitter said to me: "Your talk on YouTube has been DMCA processed. Was that your intention?"

I imagined there was a deep conspiracy to expose the DMCA's obvious flaws.

I said no. I didn't even think about it.

However, when I went to the site after that, all the audio in the site was turned off.

My entire 45 minute video was silenced. Because that video contained video snippets about fair use that included music from Warner Music Group.

Now, interestingly, they were still selling ads for that music when playing a silent video.

I was able to purchase music, but it was muted so I couldn't hear anything.

So I did what the current administration said it had to do to keep YouTube free to talk about fair use.

I had to visit this site and answer these questions.

And in a very juvenile, Bart Simpson-like way, you have to actually type these words, type them right, and reaffirm your freedom to speak.

And I felt like I was in third grade again.

"There are no rivets in the teacher's chair.

The teacher's chair is not riveted. ”

This is absurd.

That's outrageous.

This is an extraordinary perversion of the liberal system that we should encourage.

And the question I ask you is who is fighting it?

Now, interestingly, who was the most vocal opponent of this regulatory system of online speech in the last presidential election?

John McCain.

His campaign has been banished from the internet on multiple occasions because of YouTube's refusal to honor fair use with its anomalous notification and takedown system.

Well, this was my story at the time, the good old days of right-wing madness.

Well, now that I'm a little left-wing, I'm definitely left-handed, so let's get back to at least being left-handed. And how can we, the Left, hope to create this ecosystem of freedom in a world where we know the extraordinarily powerful influence over freedom, amusing even such Left-wing icons and pushing legislation that effectively bans open access requirements to government-funded research?

A president who has favored a process of negotiating treaties in secret is likely to effectively tie us to the insane system of DMCA that our country has adopted, possibly trapping us in the path of three strikes, but of course it is ridiculous to support this process that the rest of the world is increasingly adopting.

Not a single example of reform has yet been produced.

And this change won't show up in this system anytime soon.

Here are some openness lessons that I think we need to learn.

Openness is a commitment to certain values.

We need to talk about those values.

value of freedom. It's a community value.

Regulatory limits.

It is a value that respects the creator.

Now, if we can learn those values ​​from at least some influence on the right, and we can take them and incorporate them, we can probably do a little bit of a deal.

We will learn the values ​​of the left and perhaps enact things like health care and global warming bills on the right.

Anyway, please share these values ​​with me.

thank you very much.

(applause)

It's been 25 or 26 years since the Macintosh came out. The Macintosh was an amazingly original event in the history of man-machine interfaces and computing in general.

It fundamentally changed the way people think about computing, how they think about computers, how they use computers, and how many people can use them.

In fact, it was such a radical change that the early Macintosh development team in '82, '83, and '84 had to create an entirely new operating system from scratch.

Now, this is an interesting little message, and one that I think has since been forgotten or lost, is the lesson that an OS is an interface.

The interface is the OS.

It is like the land and the king (i.e. Arthur), they are inseparable and one.

And creating a new operating system was no whim.

It wasn't just a matter of adjusting graphics routines.

There were no graphics routines. There was no mouse driver.

So it was a must.

But a quarter of a century later, we've seen all the underlying support technology run amok.

So memory capacity and disk capacity are 10,000 to 1,000,000 times larger.

The same is true for processor speed.

Networks, when the Macintosh came out, we didn't have networks at all, but that's the most prominent aspect of how we live with computers.

And, of course, the graphics. For $84.97 at Best Buy today, you get more graphics power than you could get from SGI for $1 million just a decade ago.

So we've had incredible growth.

On the other hand, we have the web and, increasingly, the cloud. This is great, but it's also kind of a distraction in that the interface is basic.

So we forgot to invent a new interface.

Indeed, we have seen a lot of changes in that regard in recent years and people are starting to realize that.

So what happens next? Where do you go from there?

As we see it, the problem concerns a single simple word 'universe', or a single simple phrase 'real world geometry'.

Computers, and the programming languages ​​we speak and teach them, are terrifyingly insensitive when it comes to space.

They don't understand real world space.

Interestingly enough, the rest of us use it often and very well.

They don't understand time either, but that's another story.

But what if we start explaining the universe to them?

One of the things you might get is something like a Luminous Room.

A Luminous Room is a system conceived where the input and output spaces are co-located.

It's strangely simple, but still an untapped idea, isn't it?

When using the mouse, the hand is placed on the mouse pad.

It's not even on the same plane as what you're talking about. Pixels are on the display.

In other words, here is a room where walls, floors, ceilings, pets, potted plants, everything in there can be felt as well as exhibited.

This means that the input and output are in the same space, making things like this possible.

It's digital storage within a physical container.

The contract is the same as for a real word object in a real world container.

Whatever you put in has to come out.

There were a few other tricks in this little design experiment here in our little office.

When presented with a chessboard, we try to understand what it means.

And with nothing to do, the chess pieces eventually got bored and jumped.

The academics overseeing this study thought it was too frivolous, so they built very serious applications, like this optical prototyping workbench where the toothpaste cap on the top of the cardboard box turns into a laser.

Beam splitters and lenses are represented by physical objects that the system projects into the path of the laser beam.

So now we have an interface without an interface.

You manipulate the world in the same way you manipulate the real world: in your hands.

Similarly, digital wind tunnels, where the digital wind flows from right to left, are in some ways less remarkable. We didn't invent mathematics.

However, when it is displayed on a cathode ray tube or flat panel display, it is meaningless to hold an arbitrary object, a real-world object, inside it.

Here, the real world merges with simulation.

And finally, to bring it all together, this is a system called Urp for City Planners. With this system, confiscated models are returned to architects and city planners when they insist on using their CAD systems.

And let the machine fill halfway.

It casts a digital shadow down, as seen here.

And with the introduction of this counterclock-like tool, you'll be able to control the position of the sun in the sky.

It's shade at 8am.

It gets a little shorter at 9am.

There is you wielding the sun.

Short shadows, such as at noon.

And built a set of tools like this.

There is an intershadowing learning that kids can operate without knowing anything about urban planning. To move the building, just reach out and the building will move.

Material wands make buildings look like Frank Gehry, reflecting light in all directions.

Are you blinding passersby and drivers on the highway?

Zoning tools connect distant structures, buildings, and roads.

Are you going to be sued by the zoning board? etc.

Now, if these ideas look familiar, or maybe a little old, that's great. It should look familiar.

This work is the first in 15 years.

This work was carried out at MIT and the Media Lab under the excellent guidance of Professor Hiroshi Ishii, Director of the Tangible Media Group.

But that's what Alex McDowell, one of the world's legendary production designers, saw.

But Alex was prepping a little-known indie arthouse movie called Minority Report for Steven Spielberg, and invited us to come out of MIT and design the interfaces that would appear in that movie.

And what's great about this piece is that Alex was so enthusiastic about the idea of ​​truthfulness, the idea that the presumed year 2054 we're portraying in the film is true, and took on the design work as if it were an R&D effort.

And the results are happily permanent.

People still refer to these sequences from "Minority Report" when talking about new UI designs.

So, in a strange way, these ideas end up in what we believe the future of human-machine interfaces needs: Spatial Operating Environments, or Spatial Operating Environments.

Lots of content and some images here.

And with hands, you can actually exercise 6 degrees of freedom, 6 degrees of navigation control.

And it's fun to fly through Mr. Beckett's eyes.

And you can make your way back through the terrifying orangutans.

That's fine.

Let's do something a little more difficult.

There are tons of completely different images here.

we can fly around them.

Navigation is therefore a fundamental issue.

Must be able to navigate in 3D.

To begin with, many of the things we want computers to help us with are spatial in nature.

And parts that aren't spatial can often be spatialized in a way that wetware can better understand it.

This content can now be distributed in a variety of ways.

So you can leave it as is. Let's reset.

You can organize it like this.

And, of course, it's not just about navigation, it's about navigation as well.

So if there's something we don't like, or if you're very interested in Ernst Haeckel's scientific camouflage, you can remove it as such.

Then, when it's time for analysis, you can step back a bit and ask for a different distribution.

Let's go down and fly around.

It's a different way of looking at things.

If you're of a more analytical nature, you might actually want to look at this as a histogram of colors.

Now you have colors categorized and angles mapped to colors.

And now, if you want to pick things, 3D, space, the idea that you're tracking your hand in real space becomes very important. Because we get to real 3D, not 2D or fake 2D.

Below are some selection planes.

And we love tapirs on yellow and green grass, so we do this boolean operation.

So from there to the real world of work.

It's a logistics system, part of something we're building right now.

There are many elements.

And one of the very important things is to combine traditional tabular data with 3D and geospatial information.

Now this is a familiar place.

I'll bring this back here for a bit.

Maybe choose it a little.

And let's make this graph.

And now we should be able to fly over here and take a closer look.

These are logistical elements scattered across the United States.

One of the things that three-dimensional interaction and the general idea of ​​imbuing computation with space can do is to finally destroy the unfortunate one-to-one combination between humans and computers.

That is the old way, the old belief. One machine, one person, one mouse, one screen.

Well, it doesn't really make sense anymore.

The real world has people working together. There are people I have to work with and different displays.

And you might want to take a look at these different images.

You may want to ask for help.

The author of this new pointing device is sitting over there, so you can pull this from there to over there.

These are unrelated machines, right?

Therefore, the computation is not spatially dependent, but also network dependent.

I have a question for Paul, so I'll put that aside.

Paul is the designer of this wand, and it's probably easiest for him to come here and tell me directly what's going on.

So let's get some of these out of the way.

Let's break this down. Go ahead and detonate it.

Kevin, can you help me?

Let's see if we can help you find the circuit board.

Mind you, this is a kind of gratuitous field-stripping work, but we do it in the lab all the time.

have understood.

So collaboration is always important, whether it's in the same immediate location or in another location far away.

And again, such things need to be done in a cosmic context.

And finally, I would like to leave you with a glimpse that takes us back to the world of images.

It's a system called TAMPER, and it's a slightly quirky look at what the future holds for editing and media manipulation systems.

We at Oblong believe media should be accessible in a more granular format.

A lot of movies are trapped here.

Let's pick up some elements.

Potentially you can avoid them.

You can grab an element from the front, reanimate it there, bring it to life, and drag it to the table here.

Now go to Jack Tati, grab your blue friend and put it on the table.

You may need more than one.

And let's be honest, you probably want a cowboy.

(Laughter) Yes, let's take that.

(Laughter) You see, cowboys and French farce people don't mix well, and the system knows that.

Let me think about one last thing. One of the greatest English writers of the last thirty years suggested that great art is always a gift.

And he wasn't talking about whether the novel costs $24.95 [$] or whether he needs to raise $70 million to buy the stolen Vermeer. He was talking about the circumstances of its creation and existence.

And I think it's time to ask technology to do the same.

Technology can express and imbue with a certain generosity. In fact, we should demand it.

For some of this kind of technology, the ground center is a design combination and very important.

Technology can no longer advance if the design is not integrated from the beginning.

And as effective as it is, it comes with agency.

We as humans are creatures of creation, and we need machines to help us in our work and to make sure we are built in the same image.

Well, that's it. thank you.

(Applause) Chris Anderson: So I'm going to ask the obvious question -- actually this is from Bill Gates -- when? (John Underkoffler: When?) CA: When really?

Does it apply to all men, or just to corporations and film producers?

JU: No, it should be for all humans.

That's our ultimate goal.

We won't succeed unless we take the next big step.

So 25 years have passed.

Is it really possible to have only one interface? You can't.

CA: But does that mean you need a projector or a camera at your desk or at home?

How does it work?

JU: No, this will be built into the bezel of all displays.

It is built into architecture.

Gloves wear out in months or years.

So this is inevitable.

CA: So, do you think in five years someone will be able to buy this as part of a standard computer interface?

JU: If you buy a computer in five years, I think you'll get this.

CA: Well, that's great.

(Applause.) There are practices in the world that make us wonder how these things are actually used.

What do you think is the first killer app for this?

JU: That's a good question, we ask ourselves that every day.

At this point, our early adopter customers, and these systems are deployed in the real world, are using it to solve all their big data-heavy data-heavy problems.

So logistics and supply chain management, natural gas and resource extraction, financial services, pharmaceuticals, bioinformatics, etc. are the things we're talking about right now, but they're not the killer apps.

And I understand what you are looking for.

CA: Come on, come on. martial arts, games. here we go.

(laughs) Thank you, John, for making science fiction real.

Ju: I was very happy.

Thank you everyone.

(applause)

This morning I would like to share with you some stories about the ocean through my work as a stills photographer for National Geographic magazine.

I think I became an underwater photographer and photojournalist because I loved the ocean as a kid.

And I wanted to tell stories about all the amazing things I've seen underwater, incredible wildlife and interesting behavior.

And after 30 years of doing this, 30 years of exploring the ocean, I continue to be amazed by the wonderful encounters I encounter while at sea.

Recently, however, we have seen more and more scary things underwater, but I don't think most people realize that.

And to tell a more complete story, I was forced to turn my camera on these issues.

We want you to see both the horror and the magic of what happens underwater.

The first article I wrote for National Geographic was an article about harp seals that made me realize that environmental issues could be included in natural history reporting.

The story I originally wanted to do was just a small focus to look at the weeks each year when these animals descend from the Canadian Arctic into the Canadian Gulf of St. Lawrence to court, mate and give birth.

And all this unfolds against the backdrop of temporary ice floes that are moved by winds and currents.

And since I'm an underwater photographer, I wanted to capture this story from both the top and bottom, showing one of the little puppies swimming in 29-degree ice water for the first time.

However, as I got deeper into the story, I realized that there were two major environmental issues that I couldn't ignore.

The first is that these animals continue to be hunted and killed in hakapicks between 8 and 15 days old.

In fact, it is the largest marine mammal slaughter on earth, killing hundreds of thousands of seals each year.

But as disturbing as it is, I think the bigger problem for harp seals is the loss of sea ice due to global warming.

Here is an aerial photo I made showing the Gulf of St. Lawrence during harp seal season.

You can see a lot of ice in this photo, but there's also a lot of water that didn't exist historically.

And the ice there is pretty thin.

The problem is that these puppies need a solid ice platform to nurse from their mother.

It takes only 12 days from birth to become independent.

However, if 12 days have not passed, you can fall into the sea and die.

Here's a photo I took of one of the puppies, about 5 or 7 days old, still with a bit of the umbilical cord in her belly, but it fell off due to the thin ice and the mother desperately pushed her up to breathe and try to get her back to a stable position.

Since I was there, this problem continues to grow year after year.

I read an article last year that pup mortality was 100 percent in some areas of the Gulf of St. Lawrence.

So obviously this species has a lot of problems ahead.

This ended up being a National Geographic cover story.

And it got a lot of attention.

So I realized that I might start writing another article on maritime issues.

So I suggested a story about the global fish crisis. Part of the reason is that I have witnessed first-hand the degradation of the ocean over the last 30 years, but also because I read a scientific paper that 90 percent of the ocean's big fish have disappeared in the last 50-60 years.

Tuna, marlin and shark.

I was shocked by the numbers when I read it.

I thought this would be front page news in any media, but it wasn't, so I wanted to do a completely different kind of underwater story.

I wanted to make it more like a war photo. I wanted to create a more shocking picture that shows readers what is happening to the marine wildlife of our planet.

But the first element of this story that I found essential was to give readers an appreciation for the sea animals they eat.

You know, people walk into a restaurant and they think someone orders steak, and we all know where the steak comes from, and someone orders chicken, and we know what chicken is, but when they're having bluefin tuna sushi, do they have any sense of the wonderful animal they're eating?

These are sea lions and tigers.

In reality, these animals have no terrestrial counterparts. they are unique in the world.

These are animals that can practically swim from the equator to the poles and can cross an entire ocean in a year.

Bluefin tuna grow all their lives, and if we weren't able to catch them so efficiently, we would end up with 30-year-old bluefin tuna weighing up to a tonne.

But the truth is that we are far too efficient at catching them, and their resources are plunging around the world.

This is the daily auction at Tsukiji Market, which I took a few years ago.

And every day these tuna, bluefin tuna like this, are piled up like cordwood, from warehouse to warehouse.

While walking around and taking these pictures, I somehow realized that the ocean is not a grocery store.

Do not continue taking without expecting serious consequences as a result.

Also, in this story, I wanted to show readers how fish are caught and some of the methods used to catch fish, including one of the most common methods in the world, the trawler.

This is a small net used to catch shrimp in Mexico, but the mechanism is basically the same everywhere in the world.

It has a large net in the middle and two steel doors at each end.

And when this assembly is towed through the water, the door meets the resistance of the sea and the mouth of the net opens, placing the float on top and the lead lines on the bottom.

And this simply drags the bottom, in this case for catching shrimp.

But as you can imagine, it catches everything else in its path as well.

And they destroy valuable seafloor benthic communities such as sponges and corals, which are important habitats for other animals.

This photo shows a fisherman holding a prawn he has caught after pulling his net for an hour.

So he had a handful of shrimp, maybe seven or eight, but all the other animals on the deck of the boat are bycatch.

These are animals that died in the process, but have no commercial value.

So this is the actual cost of a shrimp dinner, maybe 7 or 8 shrimp and 10 pounds of other animals that had to die in the process.

And to make that point even more visual, I made a photo of a man swimming under a shrimp boat and shoveling this bycatch into the sea as garbage, and took this series of death photos. As you know, animals such as guitarfish, bat rays, flounder, and puffer fish were on the bottom of the ocean alive just an hour ago, but now they are thrown into the garbage.

We also wanted to focus on the shark fishery, as over 100 million sharks are currently killed on the planet each year.

But before I went to photograph this component, I was struggling with the concept of how to create a dead shark photo that would resonate with my readers. You know, I think there are still a lot of people who think that the only good sharks are dead sharks.

But this morning I jumped in and found a dead threshing machine in a gill net just recently.

And its huge pectoral fins and eyes were still so clearly visible that it struck me like a kind of crucifixion, so to speak.

This ended up being the starring photo in National Geographic's global fishing article.

And I hope it made the reader aware of this 100 million shark problem.

And I love sharks, so I'm a little obsessed with sharks, so I wanted to do another, more celebratory, story about sharks as a way to talk about the need for shark conservation.

So I went to the Bahamas because there aren't many places in the world where sharks are doing well these days, but it seems like a place where shark stocks are pretty healthy, mostly because the Bahamian government banned longlines a few years ago.

And I wanted to introduce some species that are not often introduced in magazines, so I worked in many places.

One of those places was this shallow-water tiger shark congregation called Tiger Beach in the northern Bahamas.

Here's a low-altitude photo I took showing a dive boat with about a dozen large old tiger sharks swimming behind it.

But one thing I definitely didn't want to do in this interview was continue to portray sharks as monstrous.

I didn't want to be overly threatening or frightening.

And I think I've reached that goal with this beautiful photo of a 15-foot-long, maybe 14-foot female tiger shark. She was swimming with these little barjacks out of her nose and my strobe cast a shadow on her face.

And I think it's a gentler picture, a little less threatening and a little more respectful to the species.

In this article, I also looked at the elusive hammerhead shark, which probably wasn't photographed much until seven or ten years ago.

They are very lonely creatures.

However, the animal is considered scientifically data-deficient in both Florida and the Bahamas.

You see, we know very little about them.

We don't know where they migrate, where they migrate from, where they mate and where they give birth, but the Atlantic hammerhead population has declined by about 80 percent in the last 20 to 30 years.

As you know, we are losing them faster than we find them.

This is the marine whitetip shark, an animal that is considered the fourth most dangerous species if you pay attention to such lists.

However, the animal is about 98 percent depleted across most of its range.

This is a pelagic animal, lives in deep waters, and we were not working on the seabed, so we brought a shark cage here. And my friend, shark biologist Wes Pratt, is in the cage.

Photographers, of course, know that here they were not in a cage. Obviously, biologists are a little smarter than photographers.

And at the end of this story, I also wanted to focus on baby sharks, shark nurseries.

And then I went to Bimini in the Bahamas and worked with lemon shark kids.

This photo of a lemon shark cub shows the animal spending its first two to three years in protected mangroves.

This is a very unshark-like photo.

This is not what is commonly thought of as a shark photo.

But, you know, here you see a shark, maybe 10 or 11 inches long, swimming in about a foot of water.

However, this is an important habitat, where they spend the first few years of their lives until they are large enough to emerge onto the rest of the reef.

After leaving Bimini, I actually found out that this habitat was being bulldozed to make way for a new golf course and resort.

And other recent articles have focused on single endangered workhorse species in the oceans as a way of talking about different threats.

One such story I documented was the leatherback turtle.

It is the largest, most widespread, deepest diving and oldest of all turtle species.

Here we see females crawling out of the sea in the moonlight on Trinidad.

These are animals whose lineage dates back to about 100 million years ago.

And once in their lifetime, they'd seen Tyrannosaurs running when they came up out of the water to nest.

And today they crawl out and look at the mansion.

However, despite this amazing longevity, it is now considered endangered.

In the Pacific, where I took this picture, that stock has declined by about 90% over the last 15 years.

Here is a picture of a chick about to taste seawater for the first time at the beginning of this long and dangerous journey.

Only 1 in 1,000 hatchlings of leatherback turtles reach maturity.

However, this is due to natural predators such as vulture attacks on the beach and predatory fish waiting offshore.

Nature has learned to compensate, and females lay eggs over and over again to overcome the odds.

But what they can't deal with is the human stress, the human one, like this photo of a leatherback turtle caught in a gillnet at night.

When I actually jumped in and took a picture, I got the permission of the fisherman and cut the turtle, and it was able to swim freely.

But as we all know, thousands of other leatherback turtles are not so lucky each year, and the future of this species is in great danger.

Another charismatic megafauna species I've worked with is the story of the right whale.

And basically, the story of the right whale is this. About a million years ago, there was one species of right whale on Earth, but as land moved and oceans became more isolated, the species kind of split, and today there are essentially two distinct lineages.

There are Southern Right Whales seen here and Northern Right Whales seen with mothers and cubs off the coast of Florida.

Both species were now hunted to near extinction by early whalers, but the southern right whale has recovered far more, as it lives far from human activity.

Because the North Atlantic right whale is an urban whale, it is listed as the most endangered species on the planet today. They live along the eastern coasts of North America, the United States and Canada and have to deal with all these urban ailments.

This photo shows an animal sticking its head out at sunset off the coast of Florida.

You can see a factory burning coal in the background.

They have to deal with toxins, medicines, etc. that are washed into the sea and possibly affect their reproduction.

They can also get caught in fishing gear.

Here is a photo showing the tail of a right whale.

And those white spots are not natural spots.

This is a tangle mark.

Seventy-two percent of the population has such scars, but most people don't remove their gear, such as lobster traps and crab cages.

They cling to them and eventually kill them.

Another problem is being hit by a ship.

This was an animal that had been hit by a towing vessel in Nova Scotia, Canada, and an autopsy was performed to determine the cause of death, which was certainly a boat collision.

So all these diseases overlap these animals and keep their numbers very low.

And to contrast that beleaguered North Atlantic population, I visited a new primordial population of southern right whales discovered just over a decade ago in a sub-Antarctic region of New Zealand called the Auckland Islands.

I went there in winter.

And these were animals that had never seen humans before, and I was probably one of the first humans they had ever seen.

I went into the water with them and was amazed at their curiosity.

This photo shows my assistant standing on the ocean floor about 70 feet deep and one of the stunningly beautiful 45 foot long, 70 tonne whales that looks like a city bus swimming up.

They were in perfect condition, very fat and healthy, strong, no entangled scars, just the way they should have been.

You know, I read that when pilgrims landed at Plymouth Rock, Massachusetts in 1620, they said they could walk across Cape Cod Bay on the back of a right whale.

And while we can't go back and look at it today, we can probably save what we've left behind.

And I wanted to conclude this program with a story of hope, a story of what we've done with marine reserves as a kind of solution to the problem of overfishing, a story of the global fish crisis.

I chose to work in New Zealand because it was very progressive and very progressive when it came to protecting the oceans.

And I really wanted this story to be about three things. I wanted it to be about abundance, diversity and resilience.

One of the first places I worked was at a reserve called Goat Island in Lee, New Zealand.

Scientists there told me that when this first marine reserve was protected in 1975, they hoped and expected that something might happen.

For example, certain fish species, such as the New Zealand snapper, were commercially endangered, so they hoped they would come back.

and they are back. What they couldn't foresee was that other things would happen.

For example, these fish preyed on sea urchins, and when all the fish were gone, all anyone saw in the water was acres of sea urchins.

But when the fish returned and began to prey on and control the sea urchin population, a kelp forest appeared in the shallows.

That's because sea urchins eat kelp.

So once the fish controlled the sea urchin population, the ocean returned to its natural equilibrium.

This is probably what the ocean looked like here a year or two hundred years ago, but nobody told us.

I have worked in other parts of New Zealand and in beautiful fragile and protected areas like Fiordland where this marine colony was found.

A small blue cod swims and changes color.

In northern New Zealand, I dived into slightly warmer blue waters and photographed this giant ray-like animal swimming through an underwater canyon.

Every part of the ecosystem in this place seems very healthy, from small animals like sea slugs crawling on covered sponges to leather jackets grazing the bottom and allowing new life to settle.

And I wanted to close with this photo. This was taken on a very stormy day in New Zealand when I was just laying on the bottom with schools of fish swirling around me.

And I was in a place that had just been sheltered about 20 years ago.

I spoke with some divers who have been diving for many years and they said that the marine life is in better condition now than it was in the 1960s.

And it came back because it was protected.

So I think the message is clear.

Yes, the ocean is resilient and to some extent tolerant, but we have to be good stewards.

I fell in love with the ocean and became an underwater photographer. I still take pictures because I want to protect the ocean. I don't think it's too late now.

thank you very much.

Tom Green: It's 4chan.

Kids on the internet have this group of kids who like to say funny words like "barrel roll".

This is a video game move from "Star Fox".

"Star Fox 20"? (Assistant: "Star Fox 64") Tom Green: Yeah. And they followed me for a year.

Let me tell you, it's driving me crazy, actually.

Sometimes I wake up in the middle of the night and scream "4-chan!"

Christopher Poole: When I was 15, I found a website called Futaba Channel.

And it was a Japanese forum and image board.

At the time, this format of forum was not well known outside of Japan.

So what I did was translate it into English and put it up for my friends to use.

Six and a half years later, there are over 7 million people using it, and they post over 700,000 posts per day.

And the board went from 1 to 48 cards.

It looks like this.

What makes this site unique is that it is anonymous and has no memory.

No archives, no barriers, no registration.

What we are used to on forums does not exist on 4chan.

And that led to this completely raw, totally unfiltered discussion.

Because of this environment, the site is known for facilitating the creation of Internet phenomena, viral videos, and more, known as "memes."

Two of the biggest memes to come out of this site, as you may know, are these LOLcats. Just a silly photo of a cat with text.

And this clearly resonates with millions of people. Because there are tens of thousands of these photos, and now there are entire blog empires devoted to photos like this.

And Rick Astley has kind of come back in the last two years...

Rickroll was this bait and switch, really simple and classic bait and switch.

An 80's pop song plays when someone says they're linking to something interesting. That was it.

And it got so big that last year's Macy's Thanksgiving Day parade featured a float, popped by Rick Astley, and captivated millions on TV.

(Laughter) Thousands of memes come out of this site.

Only a handful have escaped the mainstream, some of which I just showed you, but people are producing thousands every day and every month.

So what are the rules for sites like this?

we do. They are codified rules that I have come up with, but are more or less ignored by the community.

So they came up with their own set of rules, the "Rules of the Internet."

There are three specific things I would like to introduce.

Rule one is don't talk about /b/.

Second, we're not talking about /b/.

And this is an interesting one. "Where it exists, there exists porn of it. There are no exceptions."

(Laughter) I'll leave that slide out.

I swear it's really true.

/b/ is the first board we started with and in many ways the heart of the website.

A third of all traffic goes there.

And /b/ is, above all, known not only for the memes they create, but also for their exploits.

And Chris mentioned one of them just a second ago. It was a Time 100 poll.

So I thought it would be interesting if someone at Time magazine nominated me for this project they did last year.

So they put me on it so the internet knew about it. My community decided they wanted me to win.

I never instructed them to do so. They just decided it was what they wanted.

So, you know, a 390 percent approval rating isn't that bad.

(Laughter.) So they beat the poll.

And finally came out on top.

I ended up attending this truly gorgeous party.

But that's not the interesting point of this work.

It's just that they weren't trying to put me at the top of this list. In fact they were. It was refined enough to spell out all the top 21 as "mARBLECAKE. ALSO, THE GAME."

(Laughs) The amount of time and effort put into it is truly incredible.

And "Marble Cake" is significant in that it is a channel organized by this group called Anonymous.

Anonymous is a very famous group of people who protested against Scientology.

The story is that Scientology had this embarrassing video of Tom Cruise. I was on the internet.

They took it offline and managed to piss off some of the internet.

And less than a month later, more than 7,000 people organized in 100 cities around the world, here in Los Angeles, to protest the Church of Scientology, and two full years later, they are still protesting.

They are still protesting.

(Laughter) So we have this activist group, this grassroots group that came out of the site.

Finally, I'll give you an example from Dusty the Cat's story.

Dusty is the name we gave this cat.

The young man posted a video of him abusing his cat on YouTube.

And as you know, this was not accepted by the people and there was an outpouring of support from the people to do something about it.

So what they've done is put the CSI to shame here -- the Internet sleuths are on the move.

They matched and found him on MySpace.

They shot a YouTube video and mashed everything in the video.

Within 24 hours he was named and within 48 hours he was arrested.

(Applause.) So what's really interesting about a community like 4chan is that it's this open place.

Like I said, it's raw and unfiltered.

And sites like this are now kind of on the same path as the dinosaurs.

They are endangered as we move to social networking.

We are striving for a lasting identity.

We are moving toward a lack of privacy.

We are sacrificing so much of it, and in doing so, I think we are losing something precious in moving towards those things.

thank you.

(Applause) Chris Anderson: Thank you.

I have a few questions.

But if I ask them, will the TED website go down?

CP: We're lucky that this isn't being streamed live right now.

CA: Well, you never know. Some of them are watched by people in 75 countries.

please don't say

But seriously, the problem with this anonymity is that you made the point there.

But with anonymity you can basically say anything and all the rules are gone.

I had to contend with issues like child pornography.

And I want to know if you sometimes lie awake in the middle of the night worrying that you've opened Pandora's box.

CP: Yes, no.

So there is a lot of good from this environment, but there is also a lot of bad.

There are many drawbacks.

But I think a greater good is being done here by just allowing people. There are very few places today where you can say whatever you want completely anonymously without having an identity.

And I think it's powerful to say what you like.

Doing what you love crosses the line.

But I think it's important to have a place like this.

When I receive an email, they say, "Thank you for giving me this outlet, this place where I can be myself after work."

CA: But words, saying things can be constructive. It can really hurt.

And cutting the link between what is said and attribution to you certainly carries great risks.

CP: Certainly.

But -- CA: Tell me what -- I assume you asked the board what you were going to say at TED, right?

CP: Yes, I posted the thread on Sunday.

And within 24 hours there were more than 12,000 responses.

The problem is that I didn't attend the presentation. Because more or less I can't read what they said.

(Laughter) Ninety-nine percent just leaked.

But there were also some good things that came out of it.

(Laughter) You mentioned love and peace.

CA: You mentioned love and peace, but it was in quotation marks.

CP: You also mentioned cats and dogs.

CA: And all that content is now off.

So is it gone? Or is it still there?

CP: I pasted that thread to last for a few days.

The number of posts has grown to about 16,000 and has now been deleted.

CA: Okay, yes.

Now, I'm not sure I necessarily encouraged everyone at TED to go check it out anyway.

Chris, are you yourself? So you are the target of a conspiracy.

You have this amazing semi-underground clout, but you're not making a ton of money yet.

What is the commercial photo here?

CP: In terms of commercial images, I don't think there really are many.

This site contains adult content.

So, obviously, it contains very offensive and obscene content, even from a language standpoint alone.

And when you get it, you've pretty much sacrificed your hopes of making a lot of money.

CA: But you still live at home, right?

CP: I actually recently moved.

CA: That's pretty cool.

(Applause) CP: I'm out of mommy's and now back in school.

CA: But what conversations did you or your mom have about 4chan?

CP: At first, it was a very painful and awkward conversation.

The content is never a table conversation.

But I think my parents can understand it because they can't.

(Laughter) CA: And they were probably happy that you topped the Time poll.

CP: Right. But they still didn't know what to think of it.

(laughs) CA: So what do you see yourself doing 10 years from now?

CP: Good question.

As I said, I'm just back in school and am considering majoring in urban studies and then urban planning. It's like taking everything you've learned from your online community and trying to adapt it to your physical community.

CA: Thank you, Chris. Really charming. Thank you for coming to TED.

Of course, we live in difficult and difficult economic times.

And while I believe that one of the first victims of difficult economic times is public spending of all kinds, what is certainly at the forefront at the moment is public spending on science, especially curiosity-driven science and exploration.

So I want to convince you in 15 minutes or so that it's a ridiculous and ridiculous act.

But I want to show, to set the scene. The next slide isn't trying to show you the worst TED slide ever, but it's a little confusing.

(Laughter) But really, it's not my fault. It's from the Guardian.

And indeed, it's also a spectacular demonstration of just how much science can cost.

Because if I'm going to insist on continuing to spend on curiosity-driven science and exploration, I should tell you how much it costs.

This is the game "find the science budget".

This is an expenditure of the UK government.

About 620 billion a year.

The science budget is actually, if you look to the left, you have a set of purple blobs, then a set of yellow blobs.

And it's one of those yellow blobs around the big yellow blob.

That's about £3.3 billion a year out of £620 billion.

That funds everything in the UK.

Medical research, space exploration, particle physics, engineering and even the arts and humanities where I work at CERN in Geneva are funded from its 3.3 billion science budget. It's that little little yellow blob around the orange blob in the top left of the screen.

That's what we are discussing.

By the way, the percentage is about the same in the US, Germany and France.

Publicly funded economy-wide research and development is about 0.6% of GDP.

That's what we are discussing.

First of all, and this is a direct quote from The Wonders of the Solar System, the exploration of our solar system and space has shown us that it is indescribably beautiful.

This is actually a picture sent back from the Cassini spacecraft orbiting Saturn after completing the Wonders of the Solar System.

So it's not in the series.

Satellite Enceladus.

So the big white sphere in the corner is actually Saturn in the background of the picture.

And the crescent moon there is the moon Enceladus, about the size of the British Isles.

Its diameter is about 500 kilometers.

So little moon.

What is attractive and beautiful

By the way, this is an unprocessed photo, but in black and white taken directly from Saturn's orbit.

What is beautiful is that you can see a faint, almost smoke-like thing rising, perhaps from the limbs.

Here's a visualization of it in Wonders of the Solar System.

It's a beautiful graphic.

What we discovered was that those faint globs of light were actually fountains of ice welling up from the surface of this tiny moon.

Fascinating and beautiful in and of themselves, the mechanism that powers these fountains is thought to require a lake of liquid water beneath the moon's surface.

And the important thing about it is that on our planet, on Earth, wherever liquid water can be found, life can be found.

So finding strong evidence of liquids - liquid pools - under the surface of the Moon, 750 million miles from Earth, is truly amazing.

So what we're saying is that, in essence, it could be a habitat for life in our solar system.

Well, let me tell you, it was the graphics. I just want to show you this photo.

Another picture of Enceladus.

That's when Cassini flew under Enceladus.

Therefore, it passed very low, only a few hundred kilometers above the surface.

And this is also a real photo of ice fountains towering in space, really beautiful.

But it's not a prime candidate for life in our solar system.

It's probably this place, Jupiter's moon Europa.

And also, like most moons, it took a flight to the Jupiter system to get a sense that this moon was nothing more than a ball of dead rock.

It's actually an ice moon.

So what you're looking at is the surface of the moon Europa, a thick slab of ice perhaps 100 kilometers thick.

But by measuring how Europa interacts with Jupiter's magnetic field and observing how the cracks in the ice seen in its graphics move around, we very strongly deduced that there is a liquid ocean surrounding Europa's entire surface.

So, under the ice, there is a liquid ocean around the entire moon.

Its depth is believed to be hundreds of kilometers.

We think it's salt water, which means that Jupiter's moons have more water than all the Earth's oceans combined.

Therefore, that location, the small moons around Jupiter, is probably the best candidate for finding life on the Moon and other celestial bodies outside of the Earth as we know it.

A wonderful and beautiful find.

Exploring the solar system has taught us that the solar system is beautiful.

It may also show how to answer perhaps one of the most profound questions you can ask, "Are we alone in the universe?"

Does exploration and science have any use other than a mere sense of wonder?

Well, there is.

This is a very famous photo, actually taken on my very first Christmas Eve, December 24, 1968, when I was about eight months old.

Taken by Apollo 8 as it orbits the far side of the Moon.

Apollo 8 Earthrise.

famous photo. Many said this photo saved them from the turmoil of 1968, the height of the student riots in Paris, and the Vietnam War.

The reason so many people think so about this photo, and indeed why Al Gore says it over and over again on the TED stage, is probably because it was the beginning of the environmental movement.

Because for the first time we saw our world not as a solid, immovable, sort of indestructible place, but as a very small, fragile world that just hangs in the darkness of space.

A lesser-known aspect of space exploration and the Apollo program is the economic contribution it made.

I mean, you could argue that it was a great, tremendous accomplishment to provide a picture like this, but it cost a lot of money, right?

Now, in fact, many studies have been conducted on the economic effects and economic impact of Apollo.

The largest was by Chase Econometrics in 1975.

And it turns out that for every $1 spent on the Apollo, $14 was returned to the US economy.

So I think the Apollo program paid off 14 times more in terms of inspiration, engineering, performance, and inspiring young scientists and engineers.

So the exploration pays for itself.

What about scientific discoveries?

What about driving innovation?

Well, this almost looks like a picture of nothing.

What it is is a picture of the spectrum of hydrogen.

In the 1880s and 1890s, many scientists and observers focused on the light emitted by atoms.

And they saw strange pictures like this.

What you see through a prism is that when you heat hydrogen, it doesn't just glow like white light, it just emits a certain color of light, such as red, light blue, and some dark blue.

This led to an understanding of the atomic structure. The explanation is that an atom is a nucleus with electrons orbiting around it.

Electrons can only exist in certain places.

Then, when it jumps up to the next location and drops down again, it emits light of a certain color.

And the fact that when atoms are heated, they only emit light in very specific colors, was one of the key drivers that led to the development of quantum theory, a theory of the structure of atoms.

I just wanted to show you this photo because it's worthy of your attention.

This is actually a picture of the Sun's spectrum.

And now this is a picture of atoms in the sun's atmosphere absorbing light.

And also, as electrons jump up and down, they absorb only certain colors of light.

But look at the number of black lines in that spectrum.

And the helium element was discovered simply by looking at the light from the sun, as some black lines were found that did not correspond to any known element.

That is why helium is called helium.

It is called "Helios", that is, Helios from the Sun.

Now, that sounds esoteric, and indeed it was an esoteric pursuit. However, quantum theory quickly led to an understanding of electron behavior in materials such as silicon.

The behavior of silicon and the fact that we can build transistors is a purely quantum phenomenon.

So, without this rather esoteric theory, our curiosity-driven understanding of the structure of the atom that leads to quantum mechanics, there would have been no transistors, no silicon chips, and little foundation for the modern economy.

I think there is another great twist to this story.

In "The Wonders of the Solar System" we continued to emphasize that the laws of physics are universal.

One of the greatest things about our understanding of physics and nature that we have on Earth is that we can carry it not only to planets, but to the most distant stars and galaxies.

And one of the astounding predictions of quantum mechanics is that, just by looking at the atomic structure (the same theory that explains the transistor), there can be no stars in the universe that have reached the end of their lives, specifically more than 1.4 times the mass of the Sun.

It is the limit imposed on the mass of stars.

Do the math on paper in the lab, get your telescope and swing it up into the sky, and you'll find that no dead star has more than 1.4 times the mass of the Sun.

That's an unbelievable prediction.

What if there is a star just on the edge of that mass?

Well, here's the picture.

This is a photo of the galaxy. A typical "our garden" galaxy with a whopping 100 billion Sun-like stars.

It's just one of billions of galaxies in the universe.

There are billions of stars in the center of the galaxy, and they shine so brightly.

It's about 50 million light years away, so it's one of our neighbor galaxies.

But the bright star there is actually one of the galaxy's stars.

So that star is also 50 million light years away.

It is part of that galaxy, shining as brightly as the center of a galaxy containing a billion suns.

This is a type Ia supernova explosion.

It's an amazing phenomenon, because it's a star sitting there.

It is called a carbon oxygen dwarf.

It is there with about 1.3 times the mass of the Sun, for example.

And it has a binary companion star orbiting around it, a large star, a large ball of gas.

And what it does is suck gas from a companion star until it reaches this limit, called the Chandrasekhar limit, and then explode.

Then it explodes, glowing as bright as a billion suns for about two weeks, releasing not only energy but vast quantities of chemical elements into space.

In fact, it is a carbon oxygen dwarf.

Well, neither carbon nor oxygen existed in the Big Bang universe.

And in the first generation of stars, there was neither carbon nor oxygen in the universe.

It was made in such stars, trapped, and then returned to space in such explosions to recondense into planets, stars, new solar systems, and indeed people like us.

I think this is a remarkable demonstration of the power, beauty and universality of the laws of physics. Because we understand the process, we understand the structure of atoms on Earth.

Here's a beautiful quote I found -- we're talking about chance coincidences -- by Alexander Fleming. "When I woke up just after dawn on September 28, 1928, I had no intention of discovering the world's first antibiotic and revolutionizing all medicine."

Well, the explorers of the atomic world had no intention of inventing the transistor.

And they had no intention of explaining the mechanics of supernova explosions that would tell us where in the universe the building blocks of life were ultimately synthesized.

So I think science has potential. Serendipity is important.

it may be beautiful. It can reveal something very surprising.

I also think it can finally reveal to us our deepest thoughts about our place in the universe and the value of our actual home planet.

This is a great photo of our home planet.

It doesn't feel like our home planet now.

It looks like Saturn, of course.

It was taken by the space probe Cassini.

But it's not the beauty and majesty of Saturn's rings that makes this famous photo, but actually a tiny, faint mass that hangs under one of the rings.

So if I blow up there, you'll find out.

It looks like the moon, but it's actually a drawing of the Earth.

It was a picture of Earth captured within a frame of Saturn.

It's our planet 750 million miles away.

I think that the earth has a mysterious property that the farther away it is, the more beautiful it looks.

But it's not the most distant or most famous picture of our planet.

It was photographed by this object called the Voyager spacecraft.

And that's my photo in front of it to adjust the scale.

Voyager is a small machine.

It is now 10 billion miles from Earth, transmitting with its antenna at 20 watts of power, and we are still communicating with it.

But it has visited Jupiter, Saturn, Uranus and Neptune.

And after visiting all four of those planets, one of my great heroes, Carl Sagan, had the brilliant idea of ​​turning Voyager around and taking pictures of all the planets it visited.

And I took a picture of this earth.

It is very difficult to see the Earth there now, and it is called the "Pale Blue Dot" picture, but the Earth is floating in that red shaft of light.

It's Earth, 4 billion miles away.

Finally, I would like to read what Sagan wrote about it. Because there are no more beautiful words to describe what I saw in the pictures he took.

He said, "Let's consider that point again.

Here it is. That's home. that's us.

It contains everyone you love, everyone you know, everyone you've ever heard of, everyone you've ever lived.

There are thousands of self-confident religions, ideologies and economic doctrines, all hunters and gatherers, all heroes and cowards, the creators and destroyers of all civilizations, all kings and peasants, all young couples in love, all mothers and fathers, hopeful children, inventors and explorers, all moral teachers, all corrupt politicians, all superstars, all supreme leaders, all saints and sinners, all the saints of human history. and sinners lived there on the dust, in the sun's rays.

Astronomy is said to be a humbling and character-building experience.

Perhaps nothing better illustrates the folly of human conceit than this distant image of our little world.

For me, it emphasizes our responsibility to be kinder to each other and to preserve and cherish the pale blue dot, the only home we've ever known. ”

Beautiful words about the power of science and exploration.

The argument that we know enough about the universe has always been and always will be.

It could have been in the 1920's. You wouldn't have penicillin.

It could have been in the 1890s. No transistors.

And it was made in this difficult economic time today.

Sure, we know enough.

We don't need to discover anything else about our universe.

I would like to leave my final words to my fast-growing hero, Humphrey Davey, the scientific breakthrough of the early nineteenth century.

He was obviously constantly assaulted.

"As of the early nineteenth century, we knew enough.

Just abuse it. It just builds things. ”

He said, "Nothing is more fatal to the progress of the human spirit than to believe that our view of science is ultimate, that our victories are complete, that there are no mysteries in nature, and that there are no new worlds to conquer."

thank you.

(applause)

Hi.

I'm going to talk a little bit about music, machines and life.

More specifically, what I learned from building very large and complex machines for music videos.

Some of you may recognize this image.

This is the opening frame of the video we made.

I'll show you the video at the end, but before that I'd like to say a few words about what they wanted.

Well, when we first started talking to OK Go -- the song is called "This Too Shall Pass" -- they expressed interest in building a machine they could dance with, so we were really excited.

Of course, they have a history of dancing with machines, so we were very excited about this.

They are responsible for this video "Here It Goes Again".

Over 50 million views on YouTube.

Four men dancing on treadmills. No cuts, just a stationary camera.

A wonderfully viral and amazing video.

So we were really excited to work with them.

And we started talking about what they wanted.

And they explained they wanted something like the Rube Goldberg machine.

Now, for those of you who don't know, the Rube Goldberg Machine is a complex device, an incredibly over-engineered machine that performs relatively simple tasks.

So we got excited about the idea and started talking about what it would look like.

And I figured out some parameters. As you know, building a Rube Goldberg machine is limited, but it's also very flexible.

And I wanted to make sure I made something worthy of a music video.

So we came up with the "Ten Commandments", a list of requirements. It was as follows, in order of increasing difficulty: The first is "banning magic".

Everything that happens on screen should be very easy for the average viewer to understand.

The rule of thumb was that if my mother didn't understand it, it couldn't be used in the video.

They wanted band integration, that is, machines acting on band members, not the other way around.

I wanted to add machine action to match the mood of the song.

So as the songs heighten the emotion, so should the machine grow grander in the process.

They wanted us to take advantage of the space.

So we split our 10,000-square-foot warehouse over two floors.

It included an external loading dock.

We took advantage of it all, including a huge hole in the floor through which the camera and cameraman actually descended.

They wanted it messy and we were happy to accommodate.

The machine itself will start the music.

Then the machine starts, moves some distance, responds in the middle, presses the play button on the iPod, tape deck, etc. and starts playing.

And the machines stay in sync all the time.

Speaking of sync, they wanted to sync to the rhythm and hit certain beats along the way.

have understood. (Laughter) They wanted to finish on time.

Now, the timing has to be perfect from start to finish.

And they wanted the music to drop out at certain points in the video and want the actual live audio from the machine to play a portion of the song.

And as if that wasn't enough, all these incredibly complicated things, yes, they wanted to be done in one go.

(Laughter) (Applause) Okay.

Here are some stats about what we went through in that process.

The machine itself has 89 different interactions.

It took 85 takes to get satisfactory footage.

Of those 85 takes, only 3 actually completed the run successfully.

In the process, I destroyed 2 pianos and 10 televisions.

We went to home improvement stores over a hundred times.

(Laughter) And then one of our engineers, Heather Knight, forgot her high heel shoes, went back to the build after a nice dinner, left them in the pile of luggage, and lost a pair of high heel shoes.

And another engineer thought, "That's pretty good," and ended up using it as a very good trigger.

And it's actually inside the machine.

So what have we learned from all this?

Now that you've completed this, it's time to take a step back and reflect on a few things.

And I learned that small things stink.

A small ball on a wooden track is very susceptible to moisture, temperature and even a little dust and will fall off the track. It will be difficult to get the correct angle.

Yet the bowling ball always follows the same trajectory.

It doesn't matter what the temperature is or what the obstacles are. Gets you almost where you need it.

But small things stink, but I needed a place to start so I could have a place to go.

And then you have to start. You have to concentrate on it.

Small things stink, but of course, it's essential, right?

what else? Planning is very important.

(Laughter) You know, we spent a lot of time figuring out and even building some of these things.

It is said that "no battle plan survives contact with the enemy".

I think our enemy was physics -- (Laughter) and she's a cruel mistress.

A lot of the time things ended up having to be undone as a result, for reasons like timing and aesthetics.

So planning is important, but so is flexibility.

All of which didn't make it into the final machine.

Also, put the trusted ones last, i.e. the ones that run every time.

Again, small to large scale matters.

A small Lego car at the beginning of the video is a reference to a large real car near the end of the video.

Big real cars always work. No problem about that.

The little one had a tendency to run away from the course and that was the problem.

But you don't have to reset the whole machine just because your last LEGO car doesn't work, right?

So if it fails, at least put it forward so you know you don't have to reset the whole thing.

Life can get messy.

There were some incredibly difficult moments in building this product.

I spent months in this small, cold warehouse.

And what a great feeling of exhilaration when it's finally finished.

So, for better or worse, it's important to remember that "This Too Shall Pass."

thank you very much.

(Applause) So, let me introduce you to the music video. It's OK Go.

OK Go: Introduction. Hello, this is TEDxUSC.

we are ok

what are we doing? Oh, I'm just dating a Grammy. What!

I think we can do better than this. Hello, this is TEDxUSC.

we are ok Have you read "Natural Curiosity Cabinet"?

It means "curiosity". Excuse me.

Let's start again.

We need something more ridiculous than a "cabinet of natural curiosities".

Tim's sundial hat.

Have you seen their new addition to the Waltz Tower?

Sorry, please try again.

(barking) Dogs.

Hello, this is TEDxUSC. We are OK Go and here is our new video "This Too Shall Pass".

[Unintelligible] Kay, I think we can do something else, yes.

That's pretty good. I'm getting better.

(music) ♫ You know you can't stay depressed ♫ ♫ And you can't keep dragging that dead weight ♫ ♫ If you don't have that much to carry ♫ ♫ You'd better run hard when you hit the ground ♫ ♫ When the morning comes ♫ ♫ When the morning comes ♫ ♫ You can't stop these kids from dancing And yet ♫ ♫ 'Cause even if my heart won't move and my knees won't bend ♫ ♫ Well, don't blame the kids anymore ♫ ♫ When the morning comes ♫ ♫ When the morning comes ♫ ♫ When the morning comes ♫ ♫ When the morning comes ♫ ♫ When the morning comes ♫ ♫ When the morning comes ♫ ♫ Let it go ♫ This too will pass You know you can't keep it down ♫ ♫ No, you can't keep it down ♫ ♫ You can let it go ♫ ♫ This too will pass ♫ ♫ When the morning comes ♫ ♫ When the morning comes ♫ ♫ When the morning comes ♫ ♫ When the morning comes ♫ (Cheers)

Azim Khamisa: We humans have many defining moments in our lives.

These moments can be joyful at times, heartbreaking and tragic at other times.

But in these decisive moments, if we can make the right choices, we are literally doing miracles for ourselves and others.

My only son, Tariq, was a college student, kind and generous, a great writer, a great photographer, dreamed of working for National Geographic, engaged to a beautiful woman, and worked as a pizza delivery man on Fridays and Saturdays.

He was lured to a false address by a youth gang.

A 14-year-old boy then shot him dead after being introduced to the gang.

The sudden and senseless death of an innocent, unarmed human being. Immense grief for the family. Complete confusion as you try to absorb a new, terrifying reality.

Needless to say, it crashed my life.

One of the most difficult things I ever had was calling his mother who lived in another city.

How do you tell a mother that she's never going to see her son again, hear his laughter, or hug him?

I practice as a Sufi Muslim.

I meditate for 2 hours every day.

And sometimes, in deep trauma and deep tragedy, a glimmer of clarity emerges.

So what I downloaded during meditation was that there were victims on both ends of the gun.

It's easy to see that my son is a victim of a 14-year-old boy, but it's a little more complicated to understand that he's a victim of American society.

So the question arises, who is American society?

Yes, it's you and me. Because I don't believe society is just a coincidence.

I believe we are all responsible for the society we have created.

And children killing children is not a symbol of civil society.

So, nine months after Tariq passed away, I founded the Tariq Kamisa Foundation. The Tariq Kamisa Foundation's mission is to stop child murder by breaking the cycle of youth violence.

And basically we have three missions.

Our number one priority is saving children's lives.

It is important to We lose many people every day.

Our second mission is to help children make the right choices so they don't end up in danger and choose life between gangs, crime, drugs, alcohol and weapons.

And our third mission is to teach the principles of nonviolence, empathy, compassion and forgiveness.

And I started with the very simple premise that violence is a learned behavior.

No child was born violent.

If we accept that as a truism, nonviolence can also be a learned behavior, but children are not going to learn it through osmosis, so it must be taught.

Shortly thereafter, I contacted my brother here with the attitude that we both lost our son.

My son passed away.

He lost his grandson to the adult prison system.

And I asked him to join me.

As you can see, 22 years later we are still here together. I can't bring Tariq out of the dead, and you can't get Tony out of prison. But one thing we can do is keep other young people in our community from dying or going to jail.

By the grace of God, the Tariq Kamisa Foundation has achieved success.

We have a safe school model with 4 different programs.

The first is a live assembly by Ples and myself.

We are introduced, this man's grandson killed this man's son, and here they are together.

We have an in-class curriculum.

We have an after school mentoring program and have established a peace club.

And I am happy to share with you that in addition to teaching the principles of non-violence, we have reduced suspensions and dropouts by 70 percent, which is a huge accomplishment.

(Applause.) That's a big deal.

Five years after Tariq's death, I went to see the young man who killed my son to complete my journey of forgiveness.

he was 19 years old.

I remember that meeting. Because he's 37 and still in prison. But at that first meeting, our eyes were glued.

I look into his eyes, he looks into mine, and I look into his eyes trying to find the killer, but I don't.

I could touch his humanity through his eyes and see that the radiance in him is no different than the radiance in me or anyone else here.

So i didn't expect that. he regretted it

he was speaking clearly. he was well behaved

And I know that my forgiving hand changed him.

So welcome my brother Pullz.

(Applause) Prez Felix: Tony is my only daughter's only child.

Tony was born my daughter. She was 15 when she gave birth to Tony.

Parenting is the hardest job on earth.

There is no harder task on earth than raising another human being and making sure they are safe, secure and well positioned to succeed in life.

When Tony was young, he experienced a lot of violence in his life.

He witnessed the murder of one of his favorite cousins ​​in Los Angeles due to automatic weapon fire and gang involvement.

He was very traumatized in many ways.

Tony is now living with me.

I wanted to make sure my child had everything he needed to be successful.

But this particular night, after years of being with me and trying so hard to be successful and live up to my expectations of being successful, Tony ran away that night, went to people he thought were his friends, and was given drugs and alcohol, thinking it would make him feel better.

But that only increased his anxiety and created more anxiety...

More deadly thoughts on his part.

He was lured into a robbery and handed a 9mm pistol.

He then shot and killed the man's son, Tariq Kamisa, in front of the 18-year-old boy who took command and two 14-year-old boys he thought were his friends.

There are no words that can express the loss of a child.

Realizing that my grandson was responsible for this human murder, I went to the prayer closet and began to pray and meditate as the old folks taught me.

What I have in common with Mr. Kamisa, in addition to being wonderful people, and what we didn't know, is that we both meditate.

(Laughter.) This was very helpful for me as it provided an opportunity to seek guidance and clarity on how I wanted to support this man and his family through this loss.

Indeed my prayers have been answered. Because I was invited to a meeting at this man's house, and had the opportunity to meet his mother, father, wife, and brothers to meet his family and to be in the presence of God's spiritual people led by this man, guided by a spirit of forgiveness.

The programs that we have at the Tariq Kamisa Foundation provide so many tools for children to put in their toolkits and carry with them throughout their lives.

While it is important for children to understand that loving and caring adults care and support them, it is also important for children to meditate, learn to be at peace, learn to be centered, and learn to interact with other children in kind, empathetic and wonderfully loving ways.

We need more love in society. That's why we are here to share our love with children. Because children guide the way for us. Because we all depend on our children.

When we get old and retire, they will take over this world for us, so if we teach them love, they will give it back to us.

Bless you. thank you.

(Applause) AK: So I was born in Kenya, educated in England, and my brother here is Baptist.

I practice as a Sufi Muslim.

He's African-American, but I always tell him, "I'm the African-American in the group."

I was born in Africa. you weren't

(laughter) And I was naturalized as a citizen.

I am a first generation citizen.

And as an American citizen, I felt I had to take part in the murder of my son.

why? Because an American child opened fire.

You can take the place, he killed my only son, he should be hung from the highest pole.

How will it improve society?

And I'm sure you're probably wondering what happened to that young man.

he is still in prison. He just turned 37 on September 22nd, and we have good news for you.

We have been trying to get him out for 12 years.

He finally joins us after a year.

(Applause.) And I'm very excited to have him join us. I know we saved him, but when he shares his testimony at the school we regularly attend, he will save tens of thousands of students.

He tells his children, "I joined a gang when I was 11.

When I was 14, I killed Kamisa's son.

I have spent the last ten years in prison.

I want to tell you Do you think children will listen to the voice, "It's not worth it"?

Yes, because his intonation will be that of the person who pulled the trigger.

And I know he wants the clock back.

Of course that is not possible.

I hope so. I wanted my son back.

My brother was going to get his grandson back.

I think this shows the power of forgiveness.

So what's the big point here?

So I would like to end the session with this quote, which is the basis of my fourth book. By the way, the preface to the book was written by Tony.

So it looks like this: Continuous goodwill breeds friendship.

You can't make friends by bombing, right?

You can make friends by spreading goodwill.

it should be obvious.

Therefore, sustained goodwill breeds friendship, sustained friendship breeds trust, sustained trust breeds empathy, sustained empathy breeds compassion, and sustained compassion breeds peace.

I call this my peace formula.

It begins with goodwill, friendship, trust, empathy, compassion, and peace.

But people ask me, how do you convey good intentions to the person who killed your child?

I tell them you do it through forgiveness.

As you can see, it worked for me.

It worked fine for my family.

The miracle is that it worked for Tony, it worked for his family, it worked for you and your family, it worked for Israel and Palestine, it worked for North and South Korea, Iraq, Afghanistan, Iran and Syria.

It could work for the United States.

So my sisters, and some brothers, I'd like to leave you with this. (Laughter.) Peace is possible.

how can i know that?

Because I am at peace.

thank you very much. Namaste.

(applause)

One thing the world needs and this country desperately needs is a better way to conduct political discussions.

We need to rediscover the lost art of democratic discourse.

(Applause.) When you think about our debates, most of the time it's yelling on cable TV or ideological food brawls on the floor of Congress.

I have a suggestion.

Look at all the debates we have these days over healthcare, Wall Street bonuses and relief, the wealth gap, affirmative action and same-sex marriage.

Beneath the surface of these arguments, with passions raging on all sides, lies the great question of moral philosophy, the great question of justice.

But even we rarely articulate, defend, or discuss these big moral issues in politics.

So what I want to do today is have a discussion.

First, let's take a famous philosopher who wrote on issues of justice and morality, give a very short lecture on Aristotle of Ancient Athens, Aristotle's Theory of Justice, and then have a discussion here to see if Aristotle's ideas actually inform how we think and discuss issues today.

So are you ready for the lecture?

According to Aristotle, justice is giving people what they deserve.

That's it; that's the lecture.

(Laughter) Well, you might say that's obvious enough.

The real problems begin when arguing about who deserves what and why.

Take the flute for example.

Suppose you want to distribute flutes.

Who should get the best?

Let's see who they are -- what do you think?

Who should get the best flute?

just call it.

(Audience: Random.) Michael Sandel: Random. It would be nice to do it by lottery.

Or by whoever ran into the hall first and got it.

who else?

(Audience: All you great flutists.) MS: All you great flutists. (Audience: Worst flutist.) MS: Worst flutist.

How many people can say they are the best flutists?

why?

In fact, it was also Aristotle's answer.

(Laughter) But here's a more difficult question.

For those of you who voted like this, why do you think the best flute should go to the best flutist?

Peter: It's in the best interests of all.

MS: The biggest benefit for everyone.

When the best flute is in the hands of the best flutist, you will hear better music.

is that peter? (Audience: Peter.) MS: Okay.

Well, that's a good reason.

We would all be happier if good music was played than bad music.

But Peter, Aristotle disagree with you that this is the reason.

fine.

There was another reason Aristotle said that the best flutes should be given to the best flutists.

He said the purpose of the flute is to play it well.

He states that in order to reason simply about the distribution of an object, it is necessary to reason and sometimes argue about the object's purpose and social activity, in this case musical performance.

And the point, the essence of playing music is to produce good music.

It will be a happy byproduct that we all benefit from.

But when we think about justice, says Aristotle, what we really have to think about is the essential nature of the activity in question and its worth of being respected, admired, and recognized.

One of the reasons why the best flutists should get the best flutes is that playing music not only makes us happy, but also celebrates and recognizes the excellence of the best musicians.

Now, the flute... flute distribution may seem like a trivial case.

Let's look at a modern example of a dispute over justice.

It had to do with golf.

Casey Martin -- Casey Martin a few years ago -- has anyone heard of him?

He was a very good golfer, but he had a disability.

He had bad legs and circulatory problems that made walking the course very painful.

In fact, it risked injury.

He asked the PGA, the professional golf association, for permission to use golf carts at PGA tournaments.

They said, "No.

It gives you an unfair advantage. ”

He filed a lawsuit, and believe it or not, the case over the golf cart made it all the way to the Supreme Court. This is because the law stipulates that consideration must be given to persons with disabilities. However, as long as the consideration does not change the nature of the activity.

He says, "I'm a great golfer.

I want to compete

But you need a golf cart to move from one hole to the next. ”

Suppose you are in the Supreme Court.

Assume you are judging justice in this case.

How many people here can say that Casey Martin has the right to use a golf cart?

And how many people will say, "No, he's not"?

Okay, let's vote and raise our hands.

How many will rule in favor of Casey Martin?

How many are not? How many people would say he is not?

Ok, opinions are very divided here.

If anyone doesn't want to give Casey Martin the right to buy a golf cart, why not?

Please raise your hand. Bring your mic.

What is the reason?

(Audience: That's an unfair advantage.) MS: If he can ride a golf cart, that's an unfair advantage.

Okay, I think most of you guys who aren't going to give him a golf cart are worried about an unfair advantage.

What about those who say he should be given a golf cart?

How would you respond to that objection?

Yes, okay.

Audience: Karting is not part of the game.

MS: What's your name? (Audience: Charlie.) MS: Charlie says -- I'll give Charlie a microphone in case someone wants to reply.

Tell me, Charlie, why do you say he should be able to use a golf cart?

Charlie: Karting is not part of the game.

MS: But what about walking from hole to hole?

Charlie: It doesn't matter. It's not part of the game.

MS: Isn't walking the course part of golf?

Charlie: It's not in my book, there's no such thing.

MS: Okay. Stay there, Charlie.

(Laughter) Who has the answer to Charlie?

Okay, who can answer Charlie?

what would you say

Audience: The endurance element is a very important part of the game and you will be walking every hole.

MS: Are you walking through all those holes?

Is that part of golf too? (Audience: Right.) MS: What's your name? (Audience: Warren.) MS: Warren.

Charlie, what do you say to Warren?

Charlie: I'll stick to the original paper.

(laughs) MS: Warren, are you a golfer?

Warren: I'm not a golfer.

Charlie: And so am I. (MS: Okay.) (Laughter) (Applause) Well, interesting.

In this case, the lower courts brought together golf's greats to testify on this very issue.

Is walking the course mandatory for the game?

And they brought in Jack Nicklaus and Arnold Palmer.

And what do you think they all said?

yes. They agreed with Warren.

They said, "Yes, walking the course is strenuous exercise."

Fatigue factor is an important factor in golf.

So giving him a golf cart would change the fundamental nature of the game.

Now, an interesting note -- well, first we have to talk about the Supreme Court.

decided by the Supreme Court.

what do you think they said?

They replied that they should provide Casey Martin with a golf cart.

They dominated 7-2.

What's interesting about their ruling and the discussion we just had is that the debate about rights, justice in this issue hinged on understanding what the nature of golf is.

And Supreme Court justices wrestled with the matter.

And Justice Stevens, speaking for the majority, said that he had read all of golf's history and that the essential point of the game was to get a very small ball into the hole from one place with as few strokes as possible, and that walking was not essential, but incidental.

Now there were two opponents, one of whom was Justice Scalia.

He would not have allowed carts and made a very interesting objection.

What is interesting is that he rejected the Aristotelian premise that underlies the majority of opinions.

He said it was impossible to judge the nature of a game like golf.

he said:

"When we say something is essential, we usually mean that it is necessary to achieve a particular purpose.

But since the nature of games is that they have no purpose other than entertainment (laughter), that is, what distinguishes them from productive activity (laughter), it is quite impossible to say that any arbitrary rule of the game is essential. ”

That is, Justice Scalia accepts the Aristotelian premise of the majority opinion.

Justice Scalia's opinion is questionable for two reasons.

First, no real sports fan would speak like that.

(Laughter.) If we thought that the rules of the sports we care about were merely arbitrary, rather than designed to evoke the virtues and excellences we deem worthy of admiration, we wouldn't care about the outcome of the game.

It's also uncomfortable for a second reason.

At first glance, this debate about golf carts appeared to be about fairness, what an unfair advantage is.

But if fairness were the only issue at stake, there would have been an easy and obvious solution.

what will it be? (Audience: Let's all use carts.) If you want to ride a golf cart, let's all ride.

Then the objection to impartiality will disappear.

But I think allowing everyone to ride a kart would have been more abominable to the great world of golf and the PGA than to make Casey Martin the exception.

why?

For the golf cart controversy was not only about the nature of golf, but also about what abilities, associated with it, deserved honor and recognition as athletic prowess.

Please let me be as polite as possible. Golfers are a little more sensitive about the athletic state of their game.

(Laughter) After all, there is no running or jumping, the ball is stationary.

(Laughter) So if golf were the kind of game you could play while riding in a golf cart, it would be hard to give the greats of golf the status that we're giving them, the honor and recognition that truly great athletes deserve.

This shows that in golf, as in the flute, it is difficult to determine the question of what justice requires without addressing the question: "What is the nature of the activity in question, and what qualities and excellences associated with it deserve honor and recognition?"

Let's take a final example that stands out in modern political discourse: same-sex marriage.

Some support state recognition of only traditional marriages between one man and one woman, while others support state recognition of same-sex marriage.

How many here would support the first policy, that the state should only allow traditional marriages?

And how many people would support a second same-sex marriage?

Well, let's do this. What ideas about justice and morality underlie our discussion of marriage?

Opponents of same-sex marriage argue that the primary purpose of marriage is to produce offspring, which should be respected, recognized and encouraged.

And same-sex marriage advocates say marriage isn't just about procreation, no. What about a lifelong, mutually loving commitment?

Marriage is just like that.

So Aristotle has a point about hotly contested issues like flutes, golf carts, and even gay marriage.

It is very difficult to discuss justice without first discussing the purpose of social institutions and what qualities deserve honor and recognition.

So let's take a step back from these cases and see how they shed light on ways to improve and enhance the conditions of political discourse in the United States and, for that matter, around the world.

We tend to think that dealing too directly with moral issues in politics breeds disagreement and, for that matter, intolerance and coercion.

Therefore, it is better to avoid or ignore the moral and religious beliefs that people bring into civic life.

Our discussion seems to reflect the opposite. A better way to achieve mutual respect, then, is to engage directly with the moral beliefs citizens bring into public life, rather than requiring people to cast their deepest moral beliefs out of politics before they enter politics.

That seems to me to be the way to start restoring the art of democratic debate.

thank you very much.

(Applause.) Thank you.

(Applause.) Thank you.

(Thank you for applause.

thank you. thank you.

Chris.

Thank you Chris.

Chris Anderson: From the flute to the golf course to same-sex marriage, it was a genius connection.

Come on, you are an open education pioneer.

Your talk series was one of the first to do it on a large scale.

What is your vision for this next stage?

MS: Well, I think it's possible.

In the classroom, we discuss our students' most fiercely held moral beliefs about big public issues.

And I think we can do that in a more general public setting.

So my real dream is to broadcast a public TV series that we have produced based on this course and make it available for everyone to watch online for free anywhere in the world. It is also to consider whether we can partner with university institutions in China, India, Africa and around the world to advance civic education and a richer kind of democratic debate.

CA: So do you imagine that at some point you could have this kind of conversation, live, in real time, with people from China and India coming in and asking questions?

MS: Yes. We've done a little bit of it here in Long Beach with 1,500 people, and we're doing it in a classroom at Harvard University with about 1,000 students.

Wouldn't it be interesting to take these ideas and debates, tackle big moral issues, explore cultural differences, and connect with students in Beijing and Mumbai and Cambridge, Massachusetts through live video connections to create a global classroom?

that's what i want to do.

(Applause) CA: So I think there are a lot of people who would love to be part of that effort.

Michael Sandel. Thank you very much. (MS: Thank you very much.)

You only get one chance to make a first impression. This is true not only for humans, but also for robots.

I first encountered these robots in 2008 at a place called the Willow Garage.

When I visited there, my host took me inside the building and met this little boy.

He rolled into the hallway, came over to me, sat there, stared blankly behind me, did nothing for a while, turned his head quickly 180 degrees, and ran away.

And it wasn't a great first impression.

What I learned about robots that day is that they have their own behavior, but they are not fully aware of humans.

And I think that as we're experimenting with the future potential of these robots, we're actually learning a lot more about ourselves than just these machines.

And what I learned that day was that I had high hopes for this little guy.

Not only could he navigate the physical world, but he was supposed to be able to navigate my social world as well. he's in my space It's a personal robot.

wWhy didn't you understand?

My host explained to me: "The robot was trying to get from point A to point B, but you were in the way, so it had to replan its path, figure out where to go, and get there another way." This wasn't very efficient in practice.

If the robot had understood that I was a human, not a chair, and that I would be happy to get in your way if I wanted to go somewhere, it would actually have done its job more efficiently if it had bothered to notice that I was a human and had different affordances than a chair, a wall, etc.

You see, we tend to think of these robots as being from outer space, from the future, from science fiction. That may be true, but I would argue that robots are actually here today and still live and work among us.

These are the two robots that live in my house.

They vacuum the floor and mow the grass every day. This is more work than I would do if I had time to actually do these things, and they probably do it better than I do.

This person actually takes care of my kittens.

Every time he uses the box, he cleans the box, which is not what I want to do. And in fact, it makes his life better than mine.

And while we call these robotic products “robot vacuum cleaners, robotic lawn mowers, and robotic little boxes,” I think there are actually plenty of other robots lurking in the mundane. They've become so useful and commonplace that we call them 'dishwashers' and such, haven't they?

they get new names.

They are no longer called robots because they actually serve a purpose in our lives.

Same goes for the thermostat, right?

My robotics friends probably balk at me calling this a robot, but it has a purpose.

Its goal is to make my home 66 degrees Fahrenheit and sense the world.

You know it's a little chilly, make a plan, and make an impact in the physical world.

It's robotics.

Even if I don't look like Rosie the Robot, I'm doing something that really helps my life so I don't have to turn the temperature up and down myself.

And I think these systems are living and working in us now. Not only do these systems live among us, but perhaps you too are a robot operator.

Driving a car feels like operating a machine.

Also, from point A to point B, your car probably has power steering, probably an automatic braking system, an automatic transmission, and possibly adaptive cruise control.

And while it may not be a fully self-driving car, it does have some autonomy and they are very useful and make our driving safer. And we feel invisible that the car is in use, right?

Therefore, when you drive a car, you should feel like you are traveling from one place to another.

We spend so much time learning how to drive that it doesn't feel like a big deal to have to deal with, manipulate and use these controls because they have become an extension of ourselves.

Park your car in a tight garage space and you'll know where your corner is.

Also, if you are driving a rental car that you have never driven before, it will take some time to get used to your new robot body.

This also applies to people who operate other kinds of robots, so I'd like to say a few words about that.

Address remote collaboration issues.

So I had a colleague at Willow Garage named Dallas, and Dallas was like this.

He worked from his home in Indiana to our company in California.

For most of our meetings he was yelling in a box on the table which was fine but if we were having a really heated discussion and I didn't like what he was saying we might just hang up.

(Laughter) And then we might have a meeting after that meeting and then actually make decisions in the hallway when he wasn't there anymore.

I mean, it wasn't that great for him.

And as Willow's robotics company had some leftover robot body parts, Dallas and his friend Kurt put this together. It's like Skype on a stick on wheels, and while it looks like a silly tech toy, it's actually probably one of the most powerful tools I've ever built for remote collaboration.

So now, if I don't answer Dallas' email question, he could literally roll into my office, block off my doorway, and ask the question again — until I answer it (laughs).

Besides, I'm not going to turn him off, am I? That's kind of rude.

In addition to this one-on-one communication, just attending an all-hands meeting within the company was effective.

Sit back and show people that you're there and that you're passionate about the project, and that's really important and helps a lot with remote collaboration.

We have seen this situation over the months and years, not just at our company, but at other companies as well.

The best thing that can happen with these systems is that you feel like you are there.

People actually start giving personal space to these things because it's just you and just your body.

So when you're doing a standup meeting, people stand around the space as if you were there in person.

It's great until it breaks down, but it doesn't.

People who see these robots for the first time start poking you in the face thinking, "Oh, where are the parts? There must be a camera over there."

“You speak too quietly, turn it up” is like a colleague walking up to you and saying, “You talk too quietly, turn it up.”

It's awkward and not OK. So, ultimately, we need to build new social norms around the use of these systems.

Similarly, when you start to feel that it's your body, you start to notice things like "Oh my robot is kinda short".

Dallas said something to me. He was six feet tall. We used robots to take him to cocktail parties and more, just like you. The robot was about five feet tall, close to my height.

And he said to me, 'People don't look at me very much.

I feel like I'm just looking at this sea of ​​shoulders, but it just needs a taller robot. ”

And I said to him, "Um, no.

Please put on my shoes and walk today.

You get to know what it's like to be on the short end of the spectrum. ”

And he actually ended up building a lot of empathy for the experience, which was kind of nice.

So when he visited me in person, he stopped standing over me and talked to me, sitting down and making eye contact with me. It was kind of beautiful.

So we decided to actually test this out in the lab to see what other kinds of differences, such as the height of the robot, made.

And half of the people in our study used a short robot, and half of the people in our study used a tall robot. In fact, it turns out that the exact same person who has the exact same body as someone and says the exact same thing is perceived as more convincing and more trustworthy when in the form of a tall robot.

It makes no rational sense, but that's why we study psychology.

And indeed, as Cliff Nass says, we have very old brains and yet we have to deal with these new technologies.

Human psychology hasn't changed as fast as technology, so we're always catching up and trying to understand this world of autonomous things running around.

It's usually humans who speak, not machines, right?

So imbuing a lot of meaning into something like height of a machine rather than a human and attributing it to the human using the system.

I think this is very important when thinking about robotics.

Rather than reinventing humans, it's more about figuring out how to extend ourselves, right?

And we end up using things in some amazing ways.

Robots don't have arms, so they can't play pool, but they can jerk at people playing pool, which can be important for team bonding, which is kind of nice.

People who become very good at operating these systems may even devise new games, such as robot soccer that pushes trash cans around in the middle of the night.

But not everyone is good.

Many people have problems operating these systems.

This is a man who actually logged into the robot, and his eyeballs were rotated 90 degrees to the left.

He didn't know that, so he ended up rampaging around the office, bumping into people's desks, being so embarrassed, and just laughing about it. His volume was too loud.

And the man in this image says, "I need a mute button on my robot."

And what he really meant was that we don't want it to be that disruptive.

So, as a robotics company, we added obstacle avoidance to our system.

It has a little laser range finder that lets you see obstacles, and if I, the robot operator, tries to hit the chair, it doesn't let it and just plans a path around it, which seems like a good idea.

Using that system obviously made people hit fewer obstacles, but it actually took a lot longer for some people to get through the obstacle course. We wanted to know why.

It turns out that humans have important sides. It is an aspect of personality called the Seat of Control, and those who have a powerful Seat of Control within them need to be masters of their own destinies and are very reluctant to relinquish control to their autonomous systems. So much so that it fights autonomy. "If you want to hit that chair, hit that chair."

And they will really suffer from that automated driving assistance. This is an important thing to know as we develop more and more self-driving cars, like cars, right?

How do different people deal with this loss of control?

It depends on the human dimension.

Humans cannot be treated as if they were a monolith.

We differ by personality, culture, and even our emotional states from moment to moment. To be able to design these systems, human-robot interaction systems, we need to consider not only the technical aspects, but also the human aspects.

With a sense of control comes a sense of responsibility.

If you are a robot operator using one of these systems, your interface will look like this:

It looks a bit like a video game, which can be good because it's familiar to people, but it can also be bad because it makes you feel like it's a video game.

I had kids at Stanford University playing with the system, driving robots around my office in Menlo Park, and they started saying things like, "If you hit that guy, you get 10 points. That guy gets 20 points."

And they followed me down the corridor.

(Laughter) I said to them, 'Well, they are real people.

If you actually hit it, it will bleed and you will feel pain. ”

And they will say, "Okay, okay."

But after 5 minutes they'll be like, 'Twenty points for that guy, he looks like he needs to be beaten'.

It's a bit like Ender's Game.

There is a real world on the other side, and I think it's our responsibility as designers of these interfaces to help people remember that their actions have real consequences, and that they feel responsible when manipulating these increasingly autonomous things.

They are kind of a good example of experimenting with the future possibilities of robots, and I think it's pretty cool that we can augment ourselves and learn about how to augment ourselves into these machines, while at the same time expressing our humanity and our individuality.

We also build empathy for others in terms of being short, tall, fast, slow, or even armless. This is kind of nice.

It also builds empathy for the robot itself.

This is one of my favorite robots.

It's called a tweenbot.

And this guy has a little flag that says "I'm going to this crossroads in Manhattan" and it's cute and rolls forward and that's it.

They don't know how to make maps, they don't know how to see the world, they just ask for help.

The nice thing about people is that you can actually rely on the kindness of strangers.

It reached across the park to the other side of Manhattan. This is very nice. Just because people picked it up and pointed it in the right direction.

(Laughter) Isn't that great?

We are building a world where humans and robots can coexist and cooperate with each other. We don't have to be completely autonomous and do things on our own.

we actually do something together.

And to do that, we really need the help of artists, designers, policy makers, jurists, psychologists, sociologists, anthropologists, and others. It takes more perspective to do what Stu Card has to say: inventing the future we actually want to live in.

And I think we can continue to experiment with the future of these different robots together. In doing so, we will eventually learn even more about ourselves.

thank you.

(applause)

Philippines: An idyllic country with the clearest water and bluest skies on earth.

It is also at the center of the world's fastest growing HIV epidemic.

On the surface, it looks like we are just late bloomers.

However, the reasons for the current epidemic are much more complex and may portend a global resurgence of HIV.

Globally, the number of new HIV infections continues to decline, but this trend may be short-lived as the next wave of more aggressive and resistant viruses arrives.

HIV has the potential to mutate into a new and different virus each time it infects a cell.

We've made tremendous progress in reversing the epidemic, but the reality is that the virus mutates to a near catastrophe.

To understand how HIV changes with each breeding, let's compare the genes.

When looking at DNA differences between humans of different races on different continents, the actual DNA difference is only 0.1 percent.

If you look at the genetic differences between humans, apes and rhesus monkeys, the number is 7%.

In contrast, genetic variation between HIV subtypes in different patients can be as much as 35%.

It has been shown that within HIV-infected individuals, genetic differences between the infecting mother virus and subsequent daughter viruses can be as high as 5%.

This is equivalent to a gorilla giving birth to a chimpanzee, then an orangutan, then a baboon, and then any great ape in one lifetime.

HIV has nearly 100 subtypes, and new subtypes are discovered regularly.

HIV in developed countries almost all belongs to one subtype, subtype B.

Much of what we know and do about HIV treatment is based on research on subtype B. Even if it's only 12 percent of total HIV cases worldwide.

However, the genetic differences between different subtypes are profound, making some subtypes more likely to develop drug resistance and accelerate progression to AIDS.

We found that the explosion of HIV infections in the Philippines was due to a shift from the Western subtype B to the more aggressive Southeast Asian subtype AE.

We see young, sick patients with high rates of drug resistance.

Initial invasions of this subtype have already occurred in developed countries such as Australia, Canada and the United States.

We may soon see a similar explosion in the number of infected people in these countries.

And just like any real tide, HIV is over, we think the tide has turned, but it could be back soon.

In the early 1960s, malaria was in danger.

As the number of infected people decreased, people and governments paid less attention.

As a result, highly lethal drug-resistant malaria has revived.

We need to think of HIV not as a single virus that we think we have figured out, but as a rapidly evolving and highly unique collection of viruses. Each virus can cause the next deadly epidemic.

We are introducing new, more powerful tools to help detect the next deadly strain of HIV. This should be done in parallel with urgent research into non-B subtype behavior and appropriate treatment.

We need to convince governments and funding agencies that the HIV response is not over.

More than 35 million people die from HIV.

We are on the verge of an AIDS-free generation.

Caution is required.

We must stay vigilant and follow through.

Otherwise, millions more will die.

thank you.

(applause)

I have to say, it's not a little intimidating for an old American to be here trying to tell an African something new about their continent.

But sometimes outsiders can see things in another way, such as from the sky.

That's what I discovered while flying low over the African continent and photographing the spectacle of its diversity.

And I wasn't always old.

(Laughter) This is me in 1979. A boy from California who was backpacking through the Ituri Forest in Zaire.

I was on a year long hitchhiking trip.

I had just dropped out of Stanford and went through Tunis, Kisangani and Cairo to learn how to live on $10 a day.

It was a great experience for me.

I spent about a week in a Dinka cattle camp on the banks of the Nile in South Sudan.

The Dinka people taught me how to tie papyrus to shelters. We also observed how they adapted their lifestyles to meet the needs of their beloved cattle migration.

It felt like an ecoethnology graduate school, and I was busy taking notes with my camera.

Without money for a ride, they often put Muzungu on the roof of a truck or, in this case, a train across South Sudan.

It felt like riding on the back of an insect across a giant African tapestry.

The view from there was amazing, but I couldn't help thinking that it would be even better if I could fly over it like a bird.

Well, that thought stuck with me, and 20 years later, after becoming a professional photographer, I was able to convince National Geographic to shoot a big story in central Sahara, and I came back with a new kind of flying machine.

This is me flying the lightest and slowest aircraft in the world.

(laughs) It's called an electric paraglider.

Composed of backpack motors and parachute-like wings, it flies at about 30 mph.

10 liters of fuel will give you about 2 hours of flight, but what's really cool is the unobstructed horizontal and vertical view, like a flying lawn chair.

A hitchhiker's dream of flying over Africa came true when he found a caravan of two unconscious camels in the middle of the Sahara Desert.

Those in the foreground carry salt out of the desert, and those in the background carry food for animals returning to the desert.

It turns out that conventional planes can't take pictures like this.

Airplanes are too fast and helicopters have too much downdraft and are too noisy. And then I realized that this crazy little plane I'm piloting would open up new ways to see remote parts of the African landscape in ways never before possible.

Let me explain how it works.

(Applause.) Thank you.

(Applause.) This may seem a little dangerous, but I'm no adventurer.

I am a flying photographer and I fly just to take pictures.

My favorite altitude is between 200ft and 500ft, which allows me to see the world not only in three dimensions, but also on a human scale.

A lot of what I've done over the years in Africa I thought could be done with a drone, but drones weren't really built for exploration.

It has a battery life of about 20 minutes, a range of only about 3 kilometers, and only displays what you see on its small screen.

But I like exploring.

I want to go over the horizon and find new and strange things, like Niger's volcanic caldera.

Looking at the altimeter on my left foot, I see that I am about a mile above takeoff altitude.

Flying that high really surprised me, but when I talk to professional pilots, they tell me that altitude is actually your friend. Because the higher the altitude, the longer it takes to solve the problem.

(Laughs) As an amateur rank, I figured this would give me more time to scream on the descent.

(Laughter) To calm myself down, I started taking pictures. As I did so, I became rational again. Then, exposed to the Harmattan winds that were blowing from the upper right corner of this photo, I began to notice how the winds filled the entire crater with sand.

When I got to the north of Chad, I found a different kind of volcano.

With all the outer skin stripped away, leaving only the old core, it felt like I was looking at a living, skinned Earth in the middle of the Sahara Desert.

Most of the Sahara Desert lies beneath a huge freshwater aquifer.

When I go to the basin, I can see water leaking from time to time.

You can drink fresh water from your footprints as you walk through the palm grove.

But what about that green lake water?

Due to extreme evaporation, it is saltier than sea water and virtually lifeless.

In Niger it was amazing to see how the locals learned how to take advantage of different types of desert springs.

Here, salty mud was mixed with spring water and spread over shallow ponds, turning into a colorful spectacle as it evaporated.

My rig is also great for observing agriculture.

This photo was taken in southern Algeria, where locals are learning how to pump shallow groundwater and garden in portable dune farms.

I also loved seeing how the animals adapted to the African landscape.

This photo was taken at Lake Amboseli just across the border here in Kenya.

Elephants carve shallow lakes into a network of small paths, spaced far enough apart that only elephants with long trunks can suck the most succulents.

In Namibia, zebras have learned how to thrive even when there is no rain.

These grasses are irrigated by the thick coastal fog that blankets the area each morning.

And what about those bald spots?

They call them fairy circles, but scientists still struggle to understand their causes.

This is Mount Vysoke, which has a small crater lake on its summit at an altitude of 3,700 meters.

Forming the roof of the Great Rift Valley, it also forms the border between Rwanda and Congo.

It's also the center of a legendary mountain gorilla sanctuary.

They are, in fact, Rwanda's big money-makers, and on this side of the border conservation efforts are thriving.

Rwanda has the highest rural population density in Africa, and I have seen such sights in almost every country I have been to.

I've heard that land competition was one of the causes of the tensions that led to the genocide in the 1990s.

I returned to South Sudan a few years ago and was amazed to see how much things had changed.

The Dinka still loved their cows, but they gave up their spears for Kalashnikov.

The cattle camp from above was more spectacular than I imagined, but even there things were different.

Can you see that little blue dot over there?

The Dinka have adapted to the new reality and have now covered their papyrus shelters with tarps from the United Nations food convoy.

The Bozo people of Mali have learned how to thrive in the pulsating rhythm of the Niger River.

When the rainy season ends and the water recedes, they plant rice in the fertile bottom.

And the village in the lower right corner is Gao. It is one of the starting points for major trade routes across the Sahara Desert.

After harvesting, the Bozo mix the remaining rice straw with mud to reinforce the roofs and village mosques.

I must have flown over a dozen such villages along the Niger River, and each one was unique and had a different pattern.

And each mosque was like a masterpiece of sculpture, no two alike.

I have traveled all over the world and nothing compares to the cultural diversity of Africa.

Every country has this spectacle, from Morocco, Ethiopia, South Africa, Mozambique, South Sudan and Mali.

The different environments and adapted cultures are really nice and the history is also very cool.

From the sky, I got a unique window into the early waves of colonial history.

These are Cyrene in the Libyan coastal mountains, founded as a center of learning by the Greeks in 700 BC, and Timgad, in what is now Algeria, by the Romans in 100 AD.

It was built as a retreat for old Roman soldiers, and I was surprised to think that North Africa was once the granary of the Roman Empire.

But 700 years after Timgad was built, it was buried under sand, and even then, the African climate was wetter than it is today.

Africa's climate continues to change, and we see that change everywhere, including here in the Ziz Valley. There, a freak rainstorm came down from the Sahara Desert and covered the mountains with snow.

I didn't expect to see date palms in the snow, but that day the kids were having fun throwing snowballs at each other.

But I wondered, how will Africans adapt to this rapidly changing climate in the future?

In a continent as dynamic and diverse as Africa, change can seem to be the only constant.

But one thing I've learned is that Africans are the ultimate improvisers and always find a way to adapt and move forward.

thank you.

(applause)

we were all wrong.

everyone.

we were all wrong.

The last thing we have to do is clean up the ocean.

Very last.

Yes, every minute, every hour of every day, plastic garbage trucks pour into the ocean.

And countless birds and animals die just from encountering plastic.

We are experiencing the fastest rate of extinction in history and plastic is in our food chain.

And I am still here, standing in front of you to tell you that the last thing we have to do is clean up the oceans.

Very last.

You have to think quickly as you walk into the kitchen and the sink overflows, water spills onto the floor and seeps into the walls. You will panic. Have a bucket, mop, or plunger.

What do you do first?

Why don't you close the faucet?

There's no point in mopping, pouring water, or scooping up if you don't turn off the faucet first.

Why don't we do the same with our oceans?

Even if ocean cleanup projects, beach plastic recycling programs, or well-meaning ocean plastic companies were 100 percent successful, it would still be too little, too late.

Over 300 million tonnes of plastic is on track to be produced this year.

About 8 million tonnes race into the sea, adding to the estimated 150 million tonnes already in existence.

Reportedly, 80 percent of ocean plastic comes from countries suffering from extreme poverty.

And if you constantly worry about food and housing, or security and recycling and find yourself trapped in poverty, it's beyond your imagination.

That's exactly why I created Plastic Bank.

We are the world's largest chain of stores for the extreme poor, and everything in our stores can be purchased using plastic waste.

All.

school tuition.

medical insurance.

Wi-Fi, mobile talk time, power.

Sustainable cooking fuel, efficient stove.

And we keep wanting to add everything the world might need but can't afford.

Our chain of stores in Haiti is like a community center where one of our collectors, Lise Nasis, has the opportunity to make a living by going door to door, on the street and collecting supplies from company to company.

And at the end of the day, she can bring the ingredients back to us where we weigh them, check the quality and transfer the value to her account.

Lise now has a stable and reliable source of income.

and transfer that value to her online account.

And since it's a savings account, it becomes an asset that she can borrow.

And because it's online, it's safe from theft, and more importantly, I think she has a new set of values.

And new values ​​will be born in plastics.

Hmm.

And then we collect that plastic, add value to it, sort it, de-label it, de-cap it.

It is shredded or packed in bales and prepared for export.

Now it's no different than walking over acres of diamonds.

Even though Liese walks over acres of diamonds, there are no shops, no banks, no way to use or trade diamonds, and diamonds are worthless.

And after the 2010 Haiti earthquake, Lise was widowed and homeless with no income.

And thanks to the program, Lise can afford school fees and uniforms for her two daughters.

Well, that plastic we sell.

We sell this to great branded suppliers like Marks and Spencer who commission the use of Social Plastics in their products.

Or, like German consumer goods company Henkel, it uses social plastics directly in its own manufacturing.

We have closed the circular economy loop.

If you buy shampoos and laundry detergents with social plastic packaging now, you are indirectly contributing to the recovery of plastics from ocean waterways and alleviating poverty.

And the model is fully replicable.

In São Paulo, church sermons encourage parishioners not only to bring offerings on Sundays, but also to bring recycled items.

Then we match churches and poor people.

Or, more strongly, I believe that a mosque in London can be matched with a poor church in Cairo.

Or, like Vancouver's Bottle Deposit Program, individuals and groups can now return refundable recyclables with a deposit, and instead of taking the cash home, they can deposit the value in poor people's accounts around the world.

We are now able to use recycling to support recyclers and create.

One bottle you keep at home can serve hundreds of brews around the world.

Or like Shell, an energy company investing in a plastic-neutral program.

Plastic neutral is like carbon neutral.

But plastic neutrality means investing in recycling infrastructure that doesn't exist.

And it will incentivize the poor by raising prices.

Or, like the slums of Manila, the smallest market with a simple scale and phone could embrace social plastics as a new form of payment by weight, allowing them to serve more people and have greater social impact.

And the common thread here is that social plastic is money.

Social plastic is money, a globally recognized and tradable currency that, when used, alleviates poverty and cleans up the environment at the same time.

It's not just plastic.

It is not a recycled plastic, but a social plastic, a material whose value is passed on through the lives of those who meet it, rich and poor alike.

Humans have produced more than 8 trillion kilograms of plastic so far, most of which is still here as waste.

8 trillion kilograms.

Worth about 50 cents per kilo, we could unlock $4 trillion in value.

Well, I think of Social Plastics as Bitcoin for the planet -- (laughter) for everyone.

The entire ecosystem is now managed and supported through an online banking platform that provides safe and secure transfer of value on a global scale.

Recyclables can now be deposited in Vancouver and Berlin, and families can now withdraw building bricks and cell phone minutes to the slums of Manila.

Alternatively, Lycee can deposit recyclables at a center in Port-au-Prince, and her mother can withdraw cooking fuel and cash across the city.

And the app adds rewards, incentives, group awards and user ratings.

We made recycling into a game.

We add fun and formality to the informal industry.

We have operations in Haiti and the Philippines.

We chose Brazilian staff and partners.

And this year we are also focusing on India and Ethiopia.

We collect hundreds of tons of matter.

We continue to add partners and customers and our collection is growing daily.

As a result of our program with Henkel, Henkel has committed to using more than 100 million kilograms of material each year.

That alone will put hundreds of millions of dollars into the hands of the poor in emerging economies.

And now we can all be part of the solution, not the pollution.

So yes, cleaning the ocean may be a waste.

It is possible.

But preventing ocean plastic could represent humanity's richest opportunity.

thank you.

(applause)

In Africa, it is said that "God gave clocks to whites and time to blacks."

(Laughter) I think, how can someone with so much time tell their story in 18 minutes?

I think it will be quite a challenge for me.

Most African stories these days talk about hunger, HIV and AIDS, poverty, or war.

But the story I want to share with you today is about success.

It's about Namibia, a country in southwestern Africa.

Namibia has a population of 2.1 million, but its area is only twice the size of California.

I come from a remote area in the northwest of this country.

It is called the Kunene region.

And in the center of the Kunene region is the village of Sesfontein. This is where I was born.

This is my hometown.

Most people following the story of Angelina Jolie and Brad Pitt will know where Namibia is.

They love beautiful sand dunes taller than the Empire State Building in Namibia.

Wind and time have distorted our landscape into very strange shapes, dotted with wildlife adapted to this harsh and strange land.

I am Himba.

You may wonder why I am dressed like this.

I am Himba and Namibian.

The Himba are one of the 29 ethnic groups in Namibia.

We live a very traditional lifestyle.

I grew up farming and taking care of livestock such as goats, sheep and cows.

And then one day my father actually took me into the bush.

He said, "John, I want you to be a good pastoralist.

Hey, if you're taking care of our livestock and you see a cheetah eating our goat - the cheetah is very nervous - walk up.

Come up to it and pat it on the back. ”

(laughter) "And he will let the goat go and run away."

But then he said, "Boy, if you meet a lion, don't move.

Don't move. argue your position.

Just puff up your chest and look him in the eye, and he might not want to fight you. ”

(Laughter) But then he said, ``If you see a leopard, boy, you better run as fast as you can.''

(Laughter) "Imagine being able to run faster than the goats you care for."

This way -- (laughter) this way I really started learning about nature.

Besides being a normal Namibian and Himba, I am also a trained conservationist.

And if you're in the field, knowing what to face and what to run away from is very important.

I was born in 1971.

We were living under the apartheid regime.

Whites could farm, graze, and hunt as much as they wanted, but we blacks weren't considered responsible for exploiting wild animals.

Whenever we tried to hunt, we were called poachers.

As a result, we were fined and locked up in jail.

From 1966 to 1990, US and Soviet interests fought for control of our country.

And, as you know, in wartime the army is on the move.

And the army hunted for the valuable rhino horn and tusks.

They could sell these things for between $5,000 per kilo.

In the same year, almost all Himba had rifles.

It was wartime, and British .303 rifles were flooding the country.

Around the same time, around 1980, we had a very severe drought.

It killed nearly everything that was left.

Our livestock were nearly endangered, but they were protected as well.

we were hungry.

I remember nights when a hungry leopard broke into my neighbor's house and pulled my sleeping child out of bed.

It's a very sad story.

However, the memory still remains in people's hearts.

They can pinpoint the exact location where all this happened.

And in the same year we lost almost everything.

Then my father said, "Why don't you go to school?"

And they sent me off to school, just to keep busy somewhere else.

And the year I went to school, my father actually got a job with a non-governmental organization called IRDNC (Integrated Rural Development and Nature Conservation).

In fact, they spend most of their time in their communities each year.

They were trusted by the local community, like our leader, Joshua Kangombe.

Joshua Kangombe saw what was happening. Wildlife was disappearing, poaching was on the rise, and the situation seemed very hopeless.

Death and despair surrounded Joshua and our entire community.

But then the IRDNC people proposed to Joshua. "Why don't you pay people you trust to care for wild animals?"

Are there people in your area or people who know a lot about forests and wildlife?

The village chief said, "Yes, our poachers."

"Huh? A poacher?"

"Yes. Our poachers."

And it was my father.

My father was a poacher for quite some time.

Instead of shooting poachers as was done in other parts of Africa, the IRDNC has helped people regain the ability to control their ethnic groups and the right to own and control wild animals.

In this way, as people start to feel a sense of ownership over wildlife, wildlife numbers are beginning to return and it is indeed becoming the basis for conservation in Namibia.

With independence, the whole community-engaging approach was embraced by the new government.

Three things that really help lay this foundation: First, respect traditions and be open to new ideas.

This is our tradition. Every Himba village has a sacred fire.

And in this sacred fire, our ancestral spirits speak through the chiefs, telling us where to get water, where to eat grass, and where to go and hunt.

And I think this is the best way to regulate ourselves regarding the environment.

And here is a new idea.

Using a helicopter to transport a rhino is much easier than talking through an invisible spirit, don't you think?

And these things we were taught by outsiders.

We learned these things from outsiders.

We needed new boundaries to describe our traditional lands. We needed to learn more about things like GPS. It was to see if the GPS could really reflect the true reflection of the land, or if it was just made somewhere in the West.

And we wanted to see if we could match our ancestral maps to digital maps made elsewhere in the world.

Through this, we really started to realize our dreams, continuing to honor our traditions but still being open to new ideas.

The second factor is that we wanted to live a better life where we would benefit from many things.

Like my father, most of the poachers were from our own communities.

They were not people from outside.

they were our own people.

And sometimes, once captured, they were treated with respect, brought back into their communities, and made part of a larger dream.

Best of all, like my father -- I'm not campaigning for him -- (Laughter) they were responsible for stopping other people from poaching.

And when this started happening, we started to become one community and reconnected with nature.

And it was very strong in Namibia.

The final element that really helped these developments was partnerships.

Our government has given legal status to our traditional lands.

The other partner we got is the business community.

The business community has helped put Namibia on the world map and has also contributed to making wildlife a very valuable land use, along with other land uses such as agriculture.

And most of my conservation colleagues in Namibia today have been trained through this effort through their involvement in the World Wide Fund for Nature's latest conservation efforts.

They have also funded the entire program for 20 years.

And so far, with the support of the World Wide Fund for Nature, we have been able to scale a very small program into a national program.

Namibia...or Sethfontein was no longer an isolated village hidden somewhere in Namibia.

With these assets, we are now part of the global village.

It's been 30 years since my father first worked as a local game guard.

I am deeply saddened that he passed away and will not be able to see his success as I and my children are seeing today.

When I graduated from school in 1995, there were only 20 lions in the entire Northwest—our area.

But now there are over 130 lions.

(Applause.) So if you go to Namibia, make sure you stay in a tent.

Don't go out at night!

(Laughter) Black rhinoceros -- they nearly went extinct in 1982.

Today, however, Kunene has the largest concentration of black rhinos in the world – free-roaming black rhinos.

This is outside the protected area.

(Applause.) Leopards -- Leopards are now abundant, but like zebras, springboks, and so on, they are now far from our villages because of the increased natural plains.

As this other animal has grown from less than a thousand to tens of thousands, they stay very far away.

What started as a very small community involvement community ranger community has grown into what is now called a conservation organization.

Conservation societies are institutions legally established by the government and run for the benefit of the communities themselves.

Namibia currently has 60 protected areas, managing and protecting over 13 million hectares of land.

We are already rebuilding conservation efforts across the country.

No other country in the world has such a large-scale community conservation effort.

(Applause.) In 2008, conservation groups generated $5.7 million.

This is our new economy, an economy based on respect for natural resources.

And we can use this money for many things. Most importantly, we are spending that money on education.

Second, it applies to infrastructure. food.

This is also very important. We will invest this money in AIDS and HIV education.

You know that Africa is affected by these viruses.

And this is good news from Africa that we must shout from our rooftops.

(Applause.) And what the world really needs now is that you help me and my partners take some of what we learned in Namibia to other places that have similar problems, places like Mongolia, or your own backyard, or the Northern Great Plains, where buffalo and other animals suffer and many communities are in decline.

What I like is that Namibia is a model for Africa, and Africa is a model for the United States.

(Applause.) We were successful in Namibia because we dreamed of a future that was more than just healthy wildlife.

We knew conservation would fail if it didn't improve the lives of local communities.

So come talk to me about Namibia, and even better, come to Namibia and see for yourself how we've done it.

And please visit our website to learn more and see how you can support CBNRM in Africa and around the world.

Imagine you are a member of parliament.

You've worked very hard.

You've knocked on thousands of doors, sweating and shivering, depending on the season.

You've probably called hundreds, maybe thousands, of times to people you don't know, asking for help or begging for money.

And now you got one of these.

It hangs on the door in Washington, DC.

It says you are a member of Congress and a representative of the people of the state.

Now imagine you are a conservative member of parliament.

For some of you here in Boston, Massachusetts, it takes a strong imagination.

(Laughter.) But imagine you're a conservative member of Congress.

You grew up in Milton Friedman.

You love his free market, free enterprise and free trade.

I watch President Ronald Reagan's farewell speech over and over again, and I cry every time. (Laughter.) He comes to the part about the shining city on the hill. And if a city needed walls, those walls would have had doors. It's a door for those who want to breathe freely.

I get goosebumps when he tells Gorbachev to tear down the wall.

You are a conservative congressman who agrees with President John F. Kennedy that America is an exceptional place.

For inspiration, go to YouTube and watch his "Moonshot" speech at Rice University in September 1962.

And you'd be surprised that he admitted in that speech -- a 17-minute speech of pure American exceptionalism -- that some of the materials needed for spacecraft hadn't been invented yet.

no matter.

We will go to the moon before the decade is over.

You agree with him that the oath of this nation will only be fulfilled if we in this nation are first and therefore we intend to be first.

You own the influence he embodied. So when leaders are optimistic, they are saying they believe in the people they represent.

You are a conservative legislator who believes in the precautionary principle.

You believe in data-driven analytics.

You know climate change is real and man-made, and you see a quiet, slow-moving Sputnik moment in climate change.

It's as much a call to national greatness as the original Sputnik moment.

You are a conservative member of parliament.

You high-five your memory of Jack Kemp and believe with him that the test of conservatism is whether it works for everyone, regardless of skin color.

You are appalled by the alt-right.

You want them to have nothing to do with your brand, your political party, or your legacy.

you reject them outright.

You -- (applause) You are a conservative member of Congress.

You stand up with a heart of mercy to save the life of your unborn child, but otherwise you think the consenting adult's bedroom is a pretty weird place for the government.

You are a conservative member of parliament.

With John Adams, you fear the mob.

Because he knows, as he knew, that the mob cannot defend liberty, let alone liberty.

And you will be amazed at the wisdom he and other planners possessed in establishing a slow, deliberative governance process—an essentially conservative one.

It will help the country.

It will be much bigger than they imagined.

You are a conservative member of parliament.

You fear the flames of populist nationalism because you know that those who play with fire cannot control it.

Just look at their pitchforks and torches and you'll see they're not good building tools.

Pitchforks and torches can break or burn out, but they cannot accumulate.

They are unable to build the institutions and communities needed for a stable and prosperous nation.

You are a conservative member of Congress and you are concerned about the upcoming county convention.

You want your party to be a party of great occasion, not a grumpy old-fashioned party.

(Laughter) They want to hear from you about how secret Muslim non-American socialists took over the White House and destroyed the country, and you know none of that is true.

(Applause.) I know they want to hear you say, with all the sincerity and thoughtfulness that 140 characters can rally, that it's okay to insult, it's okay to chant "lock her up," it's okay to make policy statements.

You are a conservative member of parliament.

You realize a lot of people at the party are looking to the good old days that you know didn't exist.

For example, while they cling to the fossils that fueled growth in the last century, we all know that better, cleaner and more abundant fuels await us, and that abundance can lead the world to more energy, more mobility and more freedom.

You are a conservative member of parliament.

You know that many party members yearn for the 50's and 60's. Because, after all, those were the good old days.

But you know the Cuyahoga River was on fire at the time.

You know that in Pittsburgh the street lights turned on at noon because of soot in the air.

Schools are segregated, neighborhoods are zoning, communism threatens freedom, and cancer won't last long.

You're a conservative member of Congress, and you'd like to put it like John F. Kennedy did at Rice, where John F. Kennedy said, "Of course there are those who ask us to stay here a little longer and wait and rest."

But everything in you tells him that this city of Houston, this state of Texas, this country of the United States was not built by people who wanted to wait and rest and look behind.

you are ready to lead.

You are ready to prove the power of free enterprise to solve challenges like climate change.

you are ready to lead.

So I have a suggestion for you. please lead...

now.

Step out, step up.

As you know, we are asking America's best to die in literal hills in places like Iraq and Afghanistan.

Is it overkill to ask for a metaphorical death on the political hills of Washington DC?

When your time in Washington is over, they will remove this plaque from your door.

they're going to give it to you you're going to take it home

Can you imagine the emptiness of knowing that you held no position, took no risks, and only followed the terrified people to where they were already going instead of trying to lead them to a better place?

There is little reason to be there if you don't want to lose your seat in Congress.

(Applause) The important thing is that it's not too late.

There is still time to lead.

Speak up, speak up, call madness madness. It's crazy.

Tell the American people that there is still a moonshot among us.

Tell people at your county convention, "I believe free enterprise can solve climate change."

Tell them Milton Friedman would tax pollution more than profits.

Tell them it's okay, no, it's good that progressives agree.

Tell them the very good news that we can unite America to meet these challenges and lead the world.

Tell them free enterprise can do these things.

Tell them America must stop dividing and start uniting.

tell them

Do your part before it's too late.

(Thank you for applause.

(applause)

Those of you who remember me at TEDGlobal will remember that I asked some questions that still haunt me.

One was: 'Why should we spend £6 billion to speed up Eurostar trains? For about 10 per cent of that money, could we hire top male and female supermodels and give Château Pétrus free to all passengers for the duration of the journey?'

There will still be five billion coins left and people will demand that the trains slow down.

Now, you may also remember me asking this question, which is a very interesting observation. A strange little sign that actually flashes '35' depending on whether you're within or outside the speed limit, with occasional small smiles or frowns, is actually more effective at preventing traffic accidents than speed cameras with the threat of jail time.

Thus, many areas of human problem-solving, especially those concerned with human psychology, seem to have a strange imbalance at work. It is the tendency of organizations and organizations to exercise as much force, as much force as possible, but in fact the tendency of individuals to be affected almost absolutely inversely to the amount of force exerted.

So there seems to be a complete disconnect here.

So what I am asking is the creation of a new position. More on this later, but perhaps adding new words to the English language.

Because it seems to me that big institutions, including of course the biggest institutions, governments, are actually completely disconnected from what actually matters to people.

Let me give you an example of this.

You may remember this as the merger of AOL and Time Warner. At the time, it was touted as the largest single deal in history.

As far as I know it may still be.

Now, everyone in this room is, in one way or another, probably a customer of one or both of the merged organizations.

Just out of curiosity, did anyone notice anything different as a result of this?

So, if you don't happen to be a shareholder in some organization, or one of the traders or lawyers involved in an undoubtedly lucrative activity, then you are really engaged in a gigantic activity that represents an absolute nuisance to anyone.

In contrast, years of marketing experience have taught me that if you actually want people to remember you and appreciate what you do, it's actually the very little things that work best.

This is Virgin Atlantic's upper class, Cuette Salt & Pepper set.

It's a very nice thing in itself, it's as small as an airplane.

What makes me really, really happy is that everyone watching these things has the exact same naughty thoughts. It's like, "I think I can steal this."

However, when you actually pick it up, underneath it is actually metal with the words 'stolen from Virgin Atlantic's advanced class'.

(Laughter) Years after you remembered the strategic question of whether to take the 777 or the Airbus, you remember the words and the experience.

Likewise, this belongs to the Stockholm hotel Lydmar.

Has anyone stayed there?

It's an elevator, a series of buttons in an elevator.

Nothing unusual, except that these aren't really buttons to go to individual floors.

I think it's appropriate to start at the bottom garage, but don't go garage, ground floor, mezzanine, one, two, three, four.

It actually says Garage, Funk, Rhythm & Blues.

I have a set of buttons. You are the one who actually chooses the lift music.

My guess is that it would probably cost £500-£1,000 max to install this in the elevator at the Lydmar Hotel in Stockholm.

Frankly, it's more memorable than the millions of hotels we've all stayed in, and being told that your room was actually recently renovated for half a million dollars to resemble every hotel room we've stayed in in our entire lives.

Now, accept that these are examples of trivial marketing.

But I recently attended a TED event where Esther Duflo, perhaps the leading de facto poverty eradicator in the developing world, actually spoke.

And she ran into a similar example that fascinated me as something that, in a business context or a government context, would be considered too trivial a solution and something to be embarrassed about.

It wasn't just a social event, it was to encourage children to be vaccinated. I think behavioral economics is being used well in that when you go to get your child vaccinated with a few other mothers, the trust is much higher than when you get vaccinated alone.

But second, to encourage vaccination by giving every participant a kilo of lentils.

It's a small, small thing.

If you are a UNESCO executive and someone asks you, "So what are you doing to eradicate poverty in the world?"

You don't have the confidence to stand there and say, "I cracked it, it's a lentil," right?

Our own sense of self-aggrandizement makes us feel that big important problems must be accompanied by very important and, most of all, expensive solutions.

Nonetheless, behavioral economics has repeatedly shown that there are very strong imbalances at work in human behavior and behavioral change, and that what actually changes our behavior and attitudes toward things is not actually proportional to the amount of cost involved or the amount of force applied.

But everything about the system makes them uncomfortable with its imbalance.

So what's going on inside the facility is that whoever has the power to fix the problem has a very large budget.

And when you set a very large budget, you actually look for expensive things to spend it on.

Completely lacking are those who have enormous power but no money at all.

(Laughs) These are the people I want to send out to the world in the future.

Now, another thing happens here. This is what I sometimes call "Terminal 5 Syndrome". Big, expensive things get the attention of big, highly intelligent people, and they're great. Terminal 5 is really nice, but the usability of the details, down to the signage, is devastating.

Exit 'Arrivals' at the airport, follow the big yellow signs that say 'Trains' and you'll be right in front of you.

So you walk another 100 meters in hopes of another sign, perhaps politely yellow, that says "Train" in front of you.

No, no, the next one is actually blue on the left and says 'Heathrow Express'.

In other words, it may be close to that scene in the movie "Airplane".

A yellow sign? That's exactly what they would expect.

In fact, more and more is happening in the world. All this thanks to the British Airport Authority.

I talked about this before, and a smart guy reached out to me and said, "Okay, what can I do?"

So I've come up with five suggestions that I'm working on.

One of them is, logically having an elevator without up and down buttons is a very good idea, but if it only has two floors available, it's actually pretty scary.

Because when the door closes and there's nothing left to do, you're literally in a Hammer movie.

(Laughter) These questions are... what's going on in the world is actually great things being done well.

But that little part called the user interface is surprisingly poorly done.

But also there seems to be a complete dead end in terms of solving these small solutions.

Because those who can actually solve the problem are too powerful to actually solve the problem and are too preoccupied with what they think of as a "strategy".

I recently tried this exercise while talking about banking.

They said, "Can we do an advertising campaign?"

How can we encourage more online banking?”

I said, "It's really easy."

I said, "There are probably a lot of things people want to see very much when they log into an online bank.

The thing I don't want to see most in this world is my balance. ”

Some of my friends don't actually use their bank's automated teller machine at all because of the risk of the balance being shown on the screen.

Why are we willing to expose ourselves to bad news?

Ok, you simply wouldn't.

I said, ``Once I actually made it, I said, 'Give me your balance. ”

Let's be honest, how many of us actually check our balances before taking cash out of an automated teller machine?

And you are quite wealthy by the standards of the world as a whole.

Now, the interesting thing is that no one does that, or at least no one can admit to being anal enough to do it.

But what is interesting about this proposal is that it will cost less than £10m to implement. No need to spend a lot of money. It actually costs about £50.

Still, it never happens.

Because, as I said earlier, there is actually a fundamental disconnect that those in power want to do big expensive things.

And, to some extent, the business world is rife with strategy myths.

And come to think of it, it is very important that the strategic myth is maintained.

For if the board convinces everyone that the success of the organization depends almost entirely on the decisions of the board, the pay differential is slightly more justified than if it actually admits that much of the credit for the company's success may actually lie elsewhere, in small tactical activities.

But that's what actually happens, and the invention of spreadsheets didn't help this. Many things did not help this. Corporations and governments suffer from a kind of physics envy.

I want the world to be a place where input and change are proportional.

It's the kind of mechanical world we all want to live in. In effect, it fits very well on a spreadsheet, everything is quantifiable, and the amount of money you spend on something is proportional to the scale of your success.

That's the world people really want.

In fact, we live in a world that science understands.

Unfortunately, the science is perhaps closer to climatology in that very small changes can often have disproportionately large impacts, and likewise vast areas of activity or gigantic mergers can actually accomplish downright thorny problems.

But actually admitting that we live in such a world is deeply offensive.

But what I'm saying is that if we take this very simple four-way approach, we can make things a little better for ourselves.

It's really a strategy, and I'm not denying that strategy has a role.

Sometimes you spend a lot of money and get a lot done.

And denying it outright is a mistake.

Now, on a different subject, of course, we move into the consulting realm.

(Laughter) I thought it was very disrespectful for Accenture to cut Tiger Woods off in such a hurry.

So Tiger was indeed following Accenture's model.

He has developed an interesting outsourcing model for sexual services. (Laughter) No longer tied to a single monopoly provider, often sourcing things locally and of course the ability to deliver 1-3 girls at any given time improved load balancing.

So I don't know why Accenture is suddenly so unattractive about it.

Then there are times when it doesn't cost much and accomplishes nothing at all.

It's called trivia.

But there is a fourth thing.

And the fundamental problem is that we don't really have words for this.

I don't know what to call it.

And the truth is, we don't spend enough money looking for those things, or looking for little things that may or may not work, but when they do, the successes are utterly disproportionate to the expense, effort, and chaos it causes.

So the first thing I'd like to do is have a contest, for people watching this as a movie, come up with a name for the thing in the bottom right corner.

And second, I think the world needs people to do that.

That's why I call it "Chief Detail Officer".

Every corporation needs a ministry of detail, every government needs a ministry of detail.

People who don't really have the money and don't have the luxury of a budget, but who understand that they could have greater success in implementing government programs by actually doubling the level of benefits they pay, but that simply redesigning the forms and writing in plain English would probably have the exact same effect.

And if you actually create a Ministry of Detail, and indeed have a Chief Detail Officer in your company, then the sorely neglected fourth quadrant at the moment may finally get the attention it deserves.

thank you very much.

Chris Anderson: It's under discussion.

The discussion revolves around the proposition that what the world needs now is nuclear energy. right or wrong?

I'd really like to raise my hand before the discussion, but for now, are you for or against this?

So if you say yes, please raise your hand. "for."

Ok, shut up.

Raise your hand if you disagree.

Well, at first I read that it was about 75 to 25 in favour.

I mean, we're going to have a vote at the end to see how that changes, if any.

The format is: With 6 minutes each, and then a little quick exchange between them, I'll ask the two people on either side of this discussion in the audience to make one short, vivid, provocative, and powerful point for 30 seconds.

So, perhaps shockingly enough, it's the very Stewart Brand, one of the founding fathers of the environmental movement, the longtime TEDster, the founder of the Whole Earth Catalog, and someone we all know and love who's in favor of the proposal.

Stewart Brand: Wow.

(Applause.) There's a saying about the climate that those who know the most worry the most.

For the nucleus, those who know best worry the least.

A prime example is NASA climatologist James Hansen, who is pushing for atmospheric carbon dioxide concentrations of 350 ppm.

He recently published a wonderful book called 'Storms of My Grandchildren'.

And like most climatologists who take the issue seriously, Hansen is adamantly opposed to nuclear power.

This is the design situation. A half-urbanized planet facing climate change.

Look at your customer base for this.

Five out of six of us live in developing countries.

We are moving to cities. We are moving up in the world.

And while we're educating our kids and having fewer kids, it's basically good news.

But we move to cities in search of bright lights. So one of the things we want outside of work is electricity.

And if it's not readily available, I'm willing to steal it.

This is one of the most wanted things of the world's poor, in both urban and rural areas.

City power, at its best, is what is called baseload power.

That's where it's always on.

And so far, there are only three main sources of supply: coal and gas, hydropower, which has reached maximum output in most places, and nuclear power.

I would love to have something in fourth place here, but in terms of stable, clean and scalable energy, [solar] and wind and other renewables are not there because they are not stable.

Nuclear power has been around for 40 years.

Now, from an environmental point of view, the most interesting thing is what happens to the waste from the two main sources of electricity: nuclear power and coal.

If all your lifetime electricity came from nuclear power, the waste from that lifetime electricity would end up in Coke cans -- pretty heavy Coke cans, about two pounds.

However, a typical 1 gigawatt coal-fired power plant produces a huge amount of carbon dioxide when using a day's worth of coal.

So what happens to the waste?

Most locations don't yet have underground storage, so nuclear waste is usually stored in dry cask storage behind the parking lot at the reactor site.

It can stay as it is, so that too.

Gigatonnes of carbon dioxide are being pumped into the atmosphere, but we can't get it back, causing the problems that most concern us.

So when you add up the lifetime greenhouse gases of these different energy sources, nuclear power ranks with wind and hydropower, well below solar power, and clearly far below all fossil fuels.

The wind is great. I love the wind

I love being around these big wind generators.

But one thing we are discovering is that wind, like sunlight, is actually a relatively scarce energy source.

So it would require a very large footprint in land, a very large footprint in terms of materials, five to ten times what you would use for nuclear power, and typically 1 gigawatt of power is equivalent to about 250 square miles of wind farm.

Countries such as Denmark and Germany have already reached their limits for wind power.

Good sites are gone.

Power lines are overloaded.

and you peak out.

Similarly, with regards to solar power, especially here in California, we found that 80 upcoming solar projects basically want to bulldoze out 1,000 square miles of the Southern California desert.

Well, as an environmental activist, I would prefer that not to happen.

Even rough farmland is fine.

Solar power is great on the roof.

But on the outside, 1 gigawatt is equivalent to about 50 square miles of bulldozer-filled desert.

Putting it all together, Saul Griffith did the math and calculated what it would take to get 13 terawatts of clean energy from wind, solar and biofuels. Its area is roughly the size of the United States, a region he calls "Lenewistan".

One person who has summed it all up quite nicely is the British physicist David McKay, who in his excellent book Sustainable Energy and others said, "I'm not trying to be a pro-nuke, I'm just a pro-arithmetic."

(Laughter) As far as weapons go, nuclear power is by far the best weapon for disarmament.

We have destroyed Russian warheads and turned them into electricity.

Ten percent of America's electricity comes from retired warheads.

The American stockpiles have not even started yet.

I think that the TED audience will be most interested in the new generation of very small nuclear reactors, from about 10 megawatts to 125 megawatts.

This one is made by Toshiba.

This is what the Russians float on the barges already under construction.

And it will be very interesting for developing countries.

These things are usually buried in the ground.

They are called nuclear batteries.

Incredibly safe, with all the other features like weapon spread prevention.

This is a commercial version called Hyperion in New Mexico and another commercial version called NuScale in Oregon.

Babcock & Wilcox, who manufacture nuclear reactors, this is an integrated fast reactor.

A thorium furnace in which Nathan Myrvold was involved.

The governments of the world will have to decide that coal needs to be expensive, and coal will be promoted.

And here is the future.

(Applause) CA: Okay. have understood.

(Applause.) Countering someone who has been at the heart of the energy and climate debates for years.

In 2000, he found that soot is probably the second largest cause of global warming, after CO2.

His team has detailed calculations of the relative impacts of different energy sources.

It was his first time at TED, and he probably had a handicap from Stanford professor Marc Jacobson, but we'll see later. Good luck.

Marc Jacobson: Thank you.

(Applause.) So my premise here is that nuclear power emits more carbon dioxide, emits more air pollutants, has higher mortality rates, and takes longer to start up than any real renewable energy system: wind, solar, geothermal, hydro-storm.

It also promotes the proliferation of nuclear weapons.

Now let's look at the CO2 emissions from the life cycle.

CO2e emissions are equivalent to the CO2 equivalent of all greenhouse gases and particulate emissions that contribute to global warming.

Looking at the graph, wind and concentrated solar have the lowest CO2 emissions.

Nuclear -- There are two bars here.

One is a low estimate and the other is a high estimate.

The lower estimate is the nuclear energy industry estimate.

This highest value is the average of 103 peer-reviewed scientific studies.

This is just CO2 from the life cycle.

Looking at the delays, it takes 10 to 19 years from planning to operation of a nuclear power plant.

This includes approximately three and a half to six years to site approval.

It also takes two and a half to four years for construction permits and issuance, followed by four to nine years for actual construction.

And China is now installing 5 gigawatts of nuclear power.

And the average for these construction periods alone is 7.1 years plus the planning period.

While we are waiting for nuclear power to be completed, we have to keep the normal power grid running. Most of it is coal in the US and around the world.

And the graph here shows the difference in emissions from the regular grid using nuclear or something else versus using wind, CSP or solar power.

Wind power takes about 2-5 years on average. This is the same as centralized photovoltaics or photovoltaics.

So the difference is the opportunity cost of using nuclear versus wind versus otherwise.

So when you add these two together, you see that nuclear power alone produces at least 9 to 17 times more CO2-equivalent emissions than wind energy.

And this doesn't even take into account the ground footprint.

Looking at the health effects of air pollution, this is the annual number of deaths in 2020 from car exhaust alone.

Suppose that all vehicles in the United States were converted to battery electric, hydrogen fuel cell, or flex fuel vehicles running on E85.

Air pollution currently kills between 50 and 100,000 people a year in the United States, approximately 25,000 of which are caused by automobiles.

By 2020, improvements are expected to bring that number down to 15,000.

On the right are 2020 gasoline emissions and mortality rates.

Using corn or cellulosic ethanol actually increases mortality slightly.

Moving to nuclear power certainly offers significant savings, but not as much as wind or concentrated solar power.

Now consider the fact that the proliferation of nuclear weapons is linked to the proliferation of nuclear energy, because we know, for example, that India and Pakistan secretly developed nuclear weapons by enriching uranium at their nuclear energy facilities.

North Korea has done it to some extent.

Iran is doing it now.

And if Venezuela starts with nuclear energy facilities, it will.

The massive expansion of nuclear energy around the world, resulting in only one nuclear bomb being manufactured to destroy cities such as Mumbai and other metropolises and megacities, would result in additional mortality averaged over a 30-year period proportional to the population of the United States.

This is it.

So do you need this?

Then what about footprints? Stewart mentioned footprints.

In fact, the ground footprint of wind power is by far the smallest of any energy source in the world.

That's because, as you can see, the footprint is just a pole touching the ground.

And between 73,000 and 145,000 5-megawatt wind turbines could power the entire U.S. fleet.

This would require an area of ​​1-3 square kilometers across the ground.

Spacing is another.

It's always confusing footprints.

Some people confuse footprint with space.

As you can see from these photos, this spacing can be used for multiple purposes such as farmland, ranch, and open land.

Not even land on the sea.

Now let's look at the nuclear -- (laughter) what do we have with the nuclear?

There are facilities around here. There is also a buffer zone of 17 square kilometers.

And then there are also uranium mines that have to be dealt with.

Now when we go to the area, there are many situations worse than nuclear and wind power.

Cellulosic ethanol, for example, would require this much land to power an entire fleet of vehicles in the United States.

It is a cellulosic, second-generation biofuel made from grasslands.

This is corn ethanol. It's smaller.

This is based on the extent of the data, but if we look at nuclear power, we have Rhode Island sized to power the U.S. fleet of vehicles.

For wind, the area is larger, but the footprint is much smaller.

And of course, if there's wind, they could be set up all over the East Coast, theoretically offshore, or split up.

Now, coming back to geothermal, geothermal is even smaller than both, and solar is slightly larger than the internuclear spacing, but still quite small.

And this is to power the entire fleet of vehicles in the US.

To power the world with 50% wind power would require about 1% of the world's land.

Consistent with reliability, base load is really irrelevant.

I want to match the power supply amount for each hour.

Combining renewable energy makes it possible.

This is from real data looking at California wind and solar data.

It also considers using only existing hydropower to meet hourly power demands.

The world's wind resources are:

There is five to ten times more wind power available worldwide than we need.

Here are the final rankings.

I would like to show you one last slide. This is a choice. You can choose between wind power or nuclear power.

Using the wind ensures that the ice lasts longer.

In the case of the nucleus, the time lag alone could melt the North Pole, and melt more elsewhere.

And nuclear power can guarantee clear blue skies and an uncertain future.

(Applause) CA: Okay.

So while they're making a comeback with each other, and yours is slightly shorter because you overrun slightly, I need two on either side.

So if you are in favor of this, if you are in favor of nuclear power, please raise your hands.

If you disagree, stand up.

I want two for each microphone.

Well, you guys give him a little reversal to score the points he said, challenge it, whatever.

SB: Mark, I think the differences between us have to do with weapons and energy.

These figures show that nuclear power somehow emits a large amount of greenhouse gases. Many of these studies include the content that ``Of course, war is inevitable, so situations such as burning cities will occur,'' but I think this is a bit difficult.

The reality is that there are a whopping 21 countries with nuclear power.

Seven of these countries possess nuclear weapons.

In each case, they got weapons before they got nuclear power.

Two countries, North Korea and Israel, have nuclear weapons, but none of them have nuclear power.

The countries where we really want clean energy the most are China, India, Europe and North America, all of which have their nuclear weapons situation in order.

This means that in some places, like Iran and perhaps Venezuela, anything to do with fissile material has to be monitored very closely.

Advancing nuclear power means really knowing where all the fissile material is, and once it's all there, we can move towards zero weapons remnants.

CA: Mark, 30 seconds, or talk about what Stewart said.

MJ: Well, I know that India and Pakistan were the first to have nuclear energy and then secretly developed nuclear weapons in their factories.

The other is that we don't need nuclear power.

Plenty of sun and wind.

As shown in this diagram, you can make it highly reliable.

It's from real data.

And this is an ongoing study. This is not rocket science.

If we get serious about using clean, renewable energy, we can solve the world's problems.

Nuclear power plants are absolutely not necessary.

(Applause) CA: We need someone.

Rod Bextrom: Thank you, Chris. I am ICANN CEO Rod Bextrom.

I have been involved in global warming policy since 1994, when I joined the Board of Trustees of the Environment Defense Fund, one of the creators of the Kyoto Protocol.

And I want to support Stewart Brand's position.

I've been here in the last 10 years.

I used to be against nuclear power.

I now moderately support Stewart's position from a risk management standpoint and agree that the risk of global overheating outweighs the risk of a nuclear accident, and it is certainly possible and very real.

But I think there may be a win-win solution where both sides can win this argument. In short, we are faced with a situation of sticking to the carbon ceiling on Earth or disappearing.

And in the U.S. Senate, it takes bipartisan support to get climate change through the Senate, and it takes just one or two votes, and this chamber will help.

So if you can do that, Mark will solve these problems for you. Thank you Chris.

CA: Thank you Rod Bextrom. Against.

David Fanton: Hi, my name is David Fanton. There are a few things I would like to say briefly.

The first is to beware of propaganda.

Propaganda from the industry is very powerful.

And the other side of the debate isn't broadcast enough so that people can draw their own conclusions.

Be very careful with propaganda.

Second, think about this.

If you build all these nuclear power plants, all that waste will end up on the hundreds, if not thousands, of trucks and trains that move across this country every day.

Say they don't have accidents.

Please tell me that these accidents do not release harmful substances into the environment for hundreds of thousands of years.

And tell me that none of those trucks and trains is a potential target for terrorism.

K: Thank you.

for.

Anyone else agree? go.

Alex: Hello, I'm Alex. Just wanted to say, first of all, I'm a big fan of renewable energy.

We have solar panels installed on the roof.

I have a hydropower conversion on my own water wheel.

And I'm, you know, very "professional" when it comes to that sort of thing.

However, there is a basic arithmetic problem here.

The ability of the sun to shine, the wind to blow, and the rain to fall is not enough to add up.

So if you want your lights to stay on, you really need a solution that keeps them generating all the time.

I campaigned against nuclear weapons in the 80's and still do.

However, we have the opportunity to recycle them into something more useful so that we can always obtain energy.

And after all, math problems don't go away.

We cannot get enough energy from renewable energy alone.

I need a solution that always generates.

If you want to keep the lights on, nuclear power is the solution.

K: Thank you.

Anyone else disagree?

Man: The last voter in favor made the assumption that there are not enough alternative renewable resources.

And our "against" supporters here have made it very clear that we actually do.

So there can be no erroneous idea that we need this resource and that we can actually deliver it in any meaningful time frame.

I would like to add one more thing.

Ray Kurzweil and all other talks show the stick going up exponentially.

So you can't just look at the cutting edge technology in renewable energy and say, 'This is all we have'.

Because five years from now, we're going to be blown away by what this horribly disastrous alternative to nuclear power really is.

CA: I understand that point. thank you.

(Applause) Now, I would like to ask each of you to really just write a few sentences, about 30 seconds to summarize.

One last suggestion, Stewart.

SB: I loved the "everything balanced" chart there.

It was a sunny day and a windy night.

And now a cold wave hits England.

All winds across the country stopped for a week.

None of them were mind boggling.

And, as usual, we had to buy nuclear power from France.

2 gigawatts pass through the channel.

This keeps happening.

I used to worry about the 10,000 year factor.

And as a matter of fact, we intend to use the nuclear waste we have to fuel the forthcoming Generation 4 reactors.

And especially small reactors need to move forward.

I heard from Nathan Meervold - and I think this is the point of action - that the Nuclear Regulatory Commission needs Congressional legislation to start moving quickly on these small reactors, which we sorely need here and in the world.

(Applause) MJ: So, using California data, we looked at solar and wind, and analyzed hourly electricity demand and supply.

And we can meet that demand on an hourly basis for most of the year.

Now, in terms of resources, we have developed the world's first 80 meter wind speed map from data alone.

We know what wind resources are. 15 percent coverage.

15% of America

The wind is blowing fast enough to be cost competitive.

And there are far more solar power than wind power.

There are many resources. You can make it trustworthy.

CA: Okay. So thank you, Mark.

(Applause) So if you were in Palm Springs...

(Laughter) (Applause) Shameless. Shameless. Shameless.

(Applause) So, TED community, I say that what the world needs right now is nuclear energy.

If you agree, please raise your hands.

(shouting) And all those who oppose.

Ohhhh.

Well my take on it is...

Just be patient... whoever changed their mind during the debate, or voted differently, please raise your hand.

Raise your hand if you changed your mind to yes.

have understood. So read it here.

Both gained supporters, but by my calculations, the mood in the TED community went from about 75-25 to about 65-35 yes-yes.

You both won. Congratulations to both of you.

Thank you.

(applause)

This is the venue where some of the music I wrote was first performed when I was younger.

Surprisingly, it was a pretty good sounding room.

It actually sounded pretty good, despite the bumpy walls and trash here and there.

The song was recorded there.

(music) Anyway, it's not Talking Heads in this picture.

(Music: "A Clean Break (Let's Work)" by Talking Heads) So, given the nature of the room, words were understandable.

I understood the lyrics of the song quite well.

Sound system was ok.

And there was almost no reverberation in the room.

So it can be very concise, with the rhythm pretty much intact as well.

There were similar rooms in other locations around the country.

This is Tootsie's Orchid Lounge in Nashville.

The music was different in some ways, but very much the same in structure and form.

Customer behavior was similar.

So the Tootsies and CBGB bands had to play loud enough. The volume had to be loud enough for people to fall, yell, and do other things.

I have since played elsewhere, much nicer.

I have performed at Disney Hall and Carnegie Hall here.

And I was so excited.

But I also realized that the music I wrote, or was writing at the time, might not sound so good in some halls.

We managed, but sometimes those halls just didn't seem to fit the music I was or was making.

So I asked myself: Am I writing something for a specific room?

Do you have a place or venue in mind when you write?

Is it a kind of model for creativity?

Do we all create things with a venue or context in mind?

Well, Africa.

(Music: "Wenlenga" / various artists) Most of the popular music we know today has its roots largely in West Africa.

The music, the instruments, the complex rhythms, the way they play, the settings, the backgrounds, everything is perfect. everything works perfectly.

Music works perfectly in that environment.

There is not much room for reverberations or confusing rhythms.

The instruments are loud enough to be heard without amplification.

It's no coincidence.

Perfect for that particular context.

And it would be confusing in a situation like this. This is a Gothic cathedral.

(Music: "Spem in Arium" by Thomas Tallis) This kind of music is perfect for Gothic cathedrals.

The keys don't change, the notes are long, there's little rhythm, and the room complements the music.

It actually makes it better.

This is the room where Bach composed. This is the organ.

It's not as big as a Gothic cathedral, so you can write something a little more complicated.

He's so innovative that he can actually change keys without risking major dissonance.

(Music: Johann S. Bach "Fantasia to Jesus, Friend") This is a little later.

This is like the room Mozart composed.

I think it is around 1770 now.

They're smaller and have less reverberation, so he can write very complex, very frilly music, and it works.

(Music: Wolfgang A. Mozart "Sonata in F major" KV13) Perfect for your room.

This is La Scala.

I believe it was built around the same time, around 1776.

When these opera houses were built, the audience was yelling at each other.

They were eating and drinking and yelling at people on stage just like they do at places like CBGB.

If they liked the aria, they would yell at them and suggest they play it again as an encore immediately instead of at the end of the show.

(laughs) It was an opera experience.

This is the opera house that Wagner built for himself.

And the room size is not so large.

smaller than this.

But Wagner innovated.

He wanted a bigger band.

He wanted to sound a little more bombastic, so he increased the size of the orchestra pit so that more low-end instruments could be placed there.

(Music: Richard Wagner "Lohengrin/Prelude to the Third Act") Now.

This is Carnegie Hall.

Clearly, this sort of thing has become fashionable.

Hall got bigger. The size of Carnegie Hall.

Larger than other Symphony Halls.

And it's much more reverberant than La Scala.

Around the same time, a rule of this kind was enforced, requiring spectators to keep quiet, according to Alex Ross, a contributor to The New Yorker. No eating, drinking, shouting, or talking to each other during the show.

They had to keep very quiet.

So these two things combined meant that a different kind of music worked best in this kind of hall.

That meant there could be extreme dynamics that weren't present in other types of music.

I heard a quiet sound that seemed to be drowned out by gossip and shouts.

But in a room like Carnegie Hall, there is reverberation, so the music probably needed to be a little less rhythmic and a little more textured.

(Music: Gustav Mahler "Symphony No. 8 in E flat major") Mahler.

It's like Bob Dylan, but it's Mahler.

That was Bob's last record.

(Laughter) Popular music will also appear at the same time.

This is a jazz band.

According to Scott Joplin, the band played on riverboats and clubs.

It's noisy again. They are playing for dancers.

There were certain sections in the song and different sections that the dancers really liked.

And they say, "Play that part again."

Well, there is a finite number of times you can play the same section of a song over and over again for your dancers.

So the band began improvising new melodies.

And a new musical form was born.

(Music: "Royal Garden Blues" by W.C. Handy/Ethel Waters) Mainly performed in small rooms.

People are dancing, screaming and drinking.

Therefore, the music must be loud enough to be heard over it.

The same is true of 20th century popular music as a whole, whether it's rock or Latin music. It is the beginning of this century.

[Live music] doesn't change much.

About a third of the way into the 20th century, it became one of the premier venues for music.

And this was one way the music got there.

Microphones have allowed singers, musicians and composers in particular to completely change the type of music they write.

In the past, much of what was on the radio was live music, but singers like Frank Sinatra were able to do things with microphones that they would never be able to do without them.

Other singers after him went further.

(Music: "My Funny Valentine" by Chet Baker) Chet Baker.

And none of this would have been possible without Mike.

It wouldn't have been possible without recorded music.

And he's singing right in front of your ears.

he whispers in your ear

The effect is purely electrical.

It's like the guy is sitting next to you and whispering something in your ear.

So at this point, the music diverged.

Some is live music, some is recorded.

And they no longer have to be exactly the same.

Now there are venues and discos like this, bars have jukeboxes, and you don't even need to hire a band.

There is no need for live musicians at all and the sound system is excellent.

People started making music specifically for discos and sound systems.

And like jazz, dancers preferred certain sections to others.

So early hip-hop guys would loop certain sections.

(Music: Sugarhill Gang's "Rapper's Delight") Just like jazz players improvise melodies, MCs improvise lyrics.

And a new musical form was born.

The live performances, though incredibly successful, ended up in arguably the worst acoustic venues on the planet: sports stadiums, basketball arenas, and hockey arenas.

The musicians who got there did their best.

They wrote what we now call arena rock, mid-range ballads.

(Music: U2's "I Still Haven't Found What I'm Looking For") They did the best they could considering this is what they're writing for.

The tempo is moderate. Sounds big.

It's a social situation rather than a musical situation.

And in a way the music they write for this place works perfectly.

So, we have added new venues.

One of the new things is automobiles.

I grew up with a car radio.

But now it has evolved into something else.

The whole car is the venue.

(Music: "Who You Wit" by Lil Jon & The East Side Boys) Music that could be described as written for a car sound system and works perfectly.

It might not be what you want to hear at home, but it's great in the car. The frequency spectrum is vast, the bass and treble are loud, and the voice feels like it's stuck in the middle.

You can share car music with your friends.

There's another new kind of venue: private MP3 players.

Presumably this is for Christian music only.

(Laughter) In a way, it's like Carnegie Hall. So it's like when the audience had to shut up. Because now you can hear every detail.

In another sense, this is similar to West African music. Because if the music on your MP3 player is too quiet, turn up the volume and the next moment you hear louder sounds.

So it doesn't really work.

Pop music, mostly what is written today, I think, to some extent, was written for this kind of player, for this kind of personal experience where you can hear extreme detail, but the dynamics don't change much.

So I asked myself. "Well, is this a model of creation, an adaptation that we are doing?"

And does it happen elsewhere?

So do birds, according to David Attenborough and others. Birds in the leafy canopy tend to be high, short, and repetitive.

And birds on the floor tend to have low-pitched calls so that their calls aren't distorted when they bounce off the forest floor.

And this savanna sparrow-like bird tends to make a humming sound (sound clip: savanna sparrow song).

And sounds like these have proven to be the most energy-efficient and practical way to transmit their calls to fields and savannahs.

Other birds, like this goldfinger, have adapted within the same species.

The tanangers on the east coast of the United States, where the forest is a little denser, have one type of call, while the tanangers on the opposite west side (sound clip: Scarlet Tanager Song) have a different type of call.

(Sound clip: Scarlet Tanager Song) So do birds too.

And so I thought. If this is the model of creation, if we create music, or at least primarily forms, to fit these contexts, create art to fit gallery walls and museum walls, and create software to fit existing operating systems, how does that work?

yes. I think it's evolutionary.

it is adaptive.

But the joy, the passion, the joy is still there.

This is the opposite of the traditional Romantic view.

The romantic way of thinking is that passion comes first, then emotion comes out, and then it somehow takes shape.

And what I mean is that the passion is still there, but the vessel into which it is infused and poured—instinctive and intuitively created first.

We already know where that passion will lead.

But this conflict of opinion is interesting.

Author Thomas Frank says that this may sort of explain why some voters vote against their best interests. Voters, like many of us, assume that when they hear something that sounds sincere, it comes from the heart, is passionate, and is more genuine.

And they will vote for it.

I mean, if someone can fake their sincerity, if they can fake their passion, they're more likely to be picked that way, but this seems a little risky.

My point is that passion and joy are not mutually exclusive.

Perhaps what the world needs now is to recognize that we are like birds.

we adapt.

we sing

And just like the birds, even if we change our behavior to suit the situation, the joy is still there.

thank you very much.

(applause)

The last time I was here was in 2006, when global climate change turned out to be a pretty serious problem, and I covered it quite extensively in Skeptic magazine.

We explore all sorts of scientific and quasi-scientific controversies, but we've found that the world will end in 2012, so we don't need to worry about these.

Another update: Remember when I introduced you to the Quadro Tracker?

It's like a water dowsing device.

It's a hollow piece of plastic with a rotating antenna.

And when you walk around, it points to something.

For example, looking for marijuana in a student's locker will quickly find someone.

I'm sorry. (Laughter) This special thing that's been given to me, especially when I'm on the golf course and I check under enough bushes, I find a golf ball.

Well, in the category "What's the harm in such absurdity?"

This device, an ADE 651, was sold to the Iraqi government for $40,000 each.

It's a totally worthless thing that supposedly works by "electrostatic magnetic ionic attraction" and translates to "pseudoscientific idiot" - that's a nice word - a bunch of nice-sounding words, but it's utterly useless.

In this case, allowing people through at a point of entry just because a small tracking device says it's okay is actually deadly.

So there is a danger in pseudoscience in believing in this sort of thing.

So what I want to talk about today is belief.

I want to believe and you want to believe too.

And really, I think my point here is that belief is the natural state of things.

This is the default option. we just believe.

We believe in all sorts of things.

It is natural to believe. Mistrust, skepticism, and science are not natural.

It's harder.

Not believing in things is uncomfortable.

So who wants to believe in UFOs, like Fox Mulder in The X-Files? Well, we all do. The reason is that we have a belief engine in our brain.

At heart, we are pattern-seeking primates.

Connect the dots. A connects to B. B is connected to C.

And sometimes A is actually connected to B . This is called associative learning.

We find patterns and make connections between them. Here Pavlov's dogs associate the sound of the bell with food and then salivate to the sound of the bell, and Skinner rats associate their behavior with the reward and repeat the behavior.

In fact, Skinner discovered that if you put a pigeon in a box like this, and the pigeon has to press one of these two keys, try to figure out what the pattern is, and give it a little reward in the hopper box there. If you assign rewards randomly so that there are no patterns, the pigeons will understand any pattern.

And they repeat that particular pattern no matter what they were doing right before they got the reward.

Sometimes it would spin twice anti-clockwise and once clockwise to poke the key twice.

It's called a superstition, and unfortunately it's always with us.

I call this process "patternability". That is, the tendency to find meaningful patterns in both meaningful and nonsense noise.

When I run this process, I get two types of errors.

A Type I error, or false positive, is believing the pattern to be real when it isn't.

A second type of error is a false negative.

A Type II error is not believing the pattern to be real when it is.

So let's do a thought experiment.

You are a primitive man who walked the plains of Africa three million years ago.

Your name is Lucy, okay?

And I hear a rustling sound in the grass.

Is it a dangerous predator or just the wind?

Your next decision may be the most important of your life.

Well, if you think the rustling of grass is a dangerous predator and it turns out to be just the wind, you've made a mistake in perception and made a Type I error, a false positive.

But it doesn't hurt. just walk away

you are more careful Please be more vigilant.

On the other hand, if you believe the rustling of grass to be just the wind, and it turns out to be a dangerous predator, it's lunchtime.

Just won the Darwin Award.

You have been taken out of the gene pool.

The problem here is that patternability occurs whenever the cost of making a type I error is less than the cost of making a type II error.

By the way, this is the only equation that appears in this story.

The pattern detection problem of assessing the difference between Type I and Type II errors is very problematic, especially in moment-to-life situations.

So the default positions are: We believe every pattern is real -- not just the wind, but every rustle in the grass is a dangerous predator.

So I think we evolved...

There was a natural choice in the tendency of our belief engine, the pattern-searching brain process, to always find meaningful patterns and inject those kinds of predatory or deliberate means. More on this later.

For example, what do you see here?

A horse head, yes.

looks like a horse. It must be a horse.

it's a pattern.

And is it really a horse?

Or do you look like a frog?

You see, our pattern detector supposedly in the anterior cingulate cortex -- it's our little detector there -- is easily fooled, and this is the problem.

For example, what do you see here?

Yes, of course cows.

Once you prime your brain, it's called cognitive priming, but once you get your brain to recognize, it pops up again, even if there's no pattern I've imposed on it.

And what do you see here?

Some see Dalmatian dogs.

yes, I have. And then there's Prime.

So if you go back without a prime, your brain already has the model and can look at it again.

what do you see here?

Saturn. yes, that's good.

how about here?

Shout out everything you see.

Good audience, Chris.

Because it doesn't contain anything. Well, they say nothing.

This is an experiment conducted by Jennifer Whitson of the University of California. Austin talks about the corporate environment and whether feelings of uncertainty and out of control lead people to perceive illusory patterns.

That means most people see Saturn.

People who are emotionally out of control are more likely to see something in their unpatterned emotions.

In other words, we are more likely to spot these patterns when we lack control.

For example, baseball players are notoriously superstitious when batting, but less superstitious when fielding.

Because fielders have a 90-95 percent chance of success.

The best hitters fail 7 out of 10 times.

So all their superstitions and patterns are associated with feelings such as lack of control.

What do you see in this particular one here in this area?

Has anyone seen an object there?

Actually there is something here, but it is degraded.

While you're thinking about it, here's an experiment done by British psychologist Susan Blackmore who showed subjects this degraded image and looked for correlations between scores on the ESP test. It's about how much they believe in the paranormal, paranormal, angels, etc.

And those who scored high on the ESP scale not only saw more patterns in their degraded images, they were also more likely to see inaccurate patterns.

Here's what to display on the subject:

Fish degrade 20 percent, 50 percent, and the one I showed you 70 percent.

A similar experiment was conducted by another (Swiss) psychologist named Peter Brugger, who found that significantly more meaningful patterns were perceived in the right hemisphere via the left visual field than in the left hemisphere.

Therefore, if the subject is presented with an image that is viewed in the right hemisphere rather than the left hemisphere, they are more likely to see the pattern than if it were viewed in the left hemisphere.

Our right hemisphere seems to be where a lot of this patterning occurs.

So what we're going to do is take a deep dive into the brain to see where all of this is happening.

Brugger and colleague Christine Mohr administered L-DOPA to subjects.

L-dopa, as you know, is a drug given to treat Parkinson's disease, which is associated with depletion of dopamine.

L-DOPA increases dopamine.

The increase in dopamine caused subjects to see more patterns than subjects who did not receive dopamine.

Therefore, dopamine is considered to be a pattern-related drug.

In fact, neuroleptic drugs used to eliminate psychotic behaviors, paranoia, delusions, hallucinations, etc. are patternistic.

Those are the wrong patterns. Those are false positives. These are Type I errors.

And when you administer drugs that are dopamine antagonists, the symptoms disappear.

That is, the amount of dopamine is reduced and the tendency to see such patterns is reduced.

Amphetamines, like cocaine, on the other hand, are dopamine agonists.

They increase the amount of dopamine.

As such, you are more likely to feel euphoric, more creative, and find more patterns.

In fact, I recently saw Robin Williams say that when he was doing cocaine, when he had that problem, he thought he was a lot crazier than he is now.

Therefore, increased dopamine may be related to increased creativity.

I think dopamine changes the signal-to-noise ratio.

That is, how accurate it is at finding patterns.

If it is too low, too many Type II errors are likely.

You miss the real pattern. Don't be too skeptical.

If you are too skeptical, you will miss out on good ideas that are really interesting.

Indeed, you are creative and not overly deceptive.

Too high and you might see patterns everywhere.

You think people are staring at you every time someone looks at you.

You think people are talking about you.

And when it goes too far, it is simply labeled insane.

It is perhaps a distinction that may be made between two Nobel laureates, Richard Feynman and John Nash.

Perhaps just the right number of patterns to win a Nobel Prize.

Like the other one, maybe there are too many patterns.

And we call it schizophrenia.

Therefore, the signal-to-noise ratio poses pattern detection problems.

And of course you all know exactly what this is, right?

And what patterns do you see here?

Again, I'm testing your anterior cingulate cortex here, causing conflicting pattern detection.

Of course, these are Via Uno shoes.

These are sandals.

Pretty sexy legs, I must say.

It may have been slightly photoshopped.

And, of course, vague numbers that go back and forth.

It turns out that what you think has a huge impact on how you tend to look.

You can see the lamp here.

Because the lights are on here.

Of course, thanks to the environmental movement, we're all sensitive to the plight of marine mammals.

Of course, what you see in this vague picture is a dolphin, right?

Here are the dolphins, here are the dolphins, here are the dolphins.

It's a dolphin's tail.

(laughter) If you can provide conflicting data, then again, your ACC will go into hyperdrive.

It's okay if you look down here. A look here gives conflicting data.

Then you have to flip the image to make sure it's your setup.

Impossible wooden box illusion.

It's easy to fool your brain with 2D.

So you say, "Oh, Shermer, anyone can do that kind of illusion with Psych 101 text."

Well, this is a 3D illusion of The Impossible Box by the late great Jerry Andrus. Jerry is standing in an impossible box.

And he kindly posted this to expose us.

Of course, it's all about camera angles. There's a photographer over there, and you see this board and this, this board and that board, and so on.

But even with that removed, the illusion is very powerful due to how the brain is wired to spot certain kinds of patterns.

This is fairly new and surprises us because of the inconsistent pattern of comparing this angle to that angle.

In fact, they are all the same photos.

So what you're doing is comparing to that angle, not this angle.

And your brain is tricked.

Once again the pattern detection device is fooled.

The temporal lobe is equipped with more advanced facial recognition software, making it easier to see faces.

There are some faces on the sides of the rock.

As a matter of fact, I don't even know if this is the case. This may have been processed in Photoshop.

But in any case, the point is still made.

Now, which one looks strange to you?

Which one looks weird with a quick reaction?

the one on the left. have understood. Then rotate it so that it is on the right side.

And you are right.

It's a pretty famous illusion. This was first done by Margaret Thatcher.

Now they replace politicians every time.

So why is this happening?

Well, we know exactly where it happens, in a small structure above the ear called the fusiform gyrus, directly opposite the temporal lobe.

And there are two types of cells that do this, recording facial features globally, or specifically these large, fast-firing cells that first look at the overall face.

I mean, Obama will find out soon enough.

And I noticed something rather strange about the eyes and mouth.

Especially if it's upside down, you'll end up using generic facial recognition software.

Now, in a little thought experiment, I said, you are a primitive man walking on the plains of Africa.

Is it just the wind, or is it a dangerous predator?

what's the difference between them?

Well, the wind is inanimate. Dangerous predators are purposeful agents.

And I call this process agenthood.

It is the tendency to inject meaning, intent, subjectivity, and often invisible presence into patterns from the top down.

This was an idea I got from fellow TEDster Dan Dennett, talking about taking a deliberate stance.

So I think it's kind of expanded to explain different things. Souls, spirits, ghosts, gods, demons, angels, aliens, intelligent designers, government conspirators, and all sorts of invisible agents with power and intent are believed to haunt our world and control our lives.

I think that is the basis of animism and polytheism and monotheism.

It's the belief that aliens are somehow more advanced than us, more moral than us, and the story is always that they're here to save us and rescue us from the heights.

Intelligent designers are always portrayed as super-intelligent and moral beings who come down to their design life.

Even the idea that the government will save us, it's not the wave of the future anymore, but I think it's a kind of agentiness. Projecting someone big and powerful out there would save us.

And I think this is also the basis for conspiracy theories.

Whether it's the Illuminati or Bilderberger, there's someone behind the scenes pulling the strings.

But this is a pattern detection problem, isn't it?

Some patterns are real, some are not.

Was JFK assassinated in a conspiracy or by a lone assassin?

Well, if you go there, on any given day there will be people there, and like when I went there and here, they'll tell you where the various gunmen were.

My favorite is him in the manhole.

And he popped out at the last minute to shoot.

But of course Lincoln was assassinated by conspiracy.

Therefore, we cannot dismiss all such patterns uniformly.

Because, let's be honest, some patterns are real.

Some conspiracies are really true.

It probably explains a lot.

And 9/11 has conspiracy theories. It's a conspiracy.

We've dealt with the whole issue on that.

It is a conspiracy that 19 members of Al-Qaeda plan to crash a plane into a building.

But that's not what the "9/11 truthers" think.

They believe it was an inside job by the Bush administration.

Well, that's a whole other lecture.

Do you know how you know 9/11 was not orchestrated by the Bush administration?

Because it worked.

(Laughter) (Applause.) So we are born dualists.

Our process of agenthood stems from the fact that we can enjoy movies like this.

Because, in essence, you can imagine continuing.

Stimulating the temporal lobe is known to induce out-of-body experiences and near-death experiences simply by applying electrodes to the temporal lobe.

Alternatively, it can be done by losing consciousness, by accelerating in a centrifuge.

Hypoxia, or lack of oxygen, occurs.

And the brain senses that there was an out-of-body experience.

Try Michael Persinger's God Helmet, which fires electromagnetic waves into your temporal lobe.

And you can get an out-of-body feeling.

So I'd like to end here with a short video clip that summarizes all this.

It's only a minute and a half.

Combine all this with the power of expectation and the power of belief.

Let's roll it.

Narrator: This is the venue they chose for their fake audition for a lip balm ad.

W: We wish we could use some of this for a national commercial, right?

Here are some lip balm tests.

And they are the models Roger and Matt who help us out.

And we have our own lip balms and we have leading brands.

Is it okay to kiss a model for testing?

Girl: No.

Woman: Why not? (Girl: No) Woman: I think that's fine.

Girl: That's fine. (Woman: Okay.) So this is a blind test.

Let me blindfold you first.

Kay, do you see anything? (Girl: No) Please pull until you can't see the bottom. (Girl: Okay.) Woman: You're completely blind now, aren't you?

Girl: Yes. (Woman: Okay.) Now, what I'm looking for in this test is how it protects your lips, texture, yes, and maybe you can discern taste.

Girl: Okay. (Woman: Have you ever done a kiss test?) Girl: No.

Woman: Take a step here.

Now let me get angry.

Shrug it wide and lean forward a little, okay?

(music) (laughter) (laughter) Woman: Okay.

So, Jennifer, how did that feel?

Jennifer: Good.

(laughs) Girl: What!

(Laughter) Michael Shermer: Thank you. thank you. thank you.

So if you are in the audience today, or watching this talk at another time or place, you are a participant in the digital rights ecosystem.

Whether you're an artist, a technician, a lawyer, or a fan, handling copyright directly affects your life.

Rights management is no longer just a matter of property rights, but a complex web of relationships that is an important part of our cultural landscape.

YouTube takes the rights of content owners very seriously, but in order to give content owners choices about things like copying and mashups, we first need to identify when copyrighted material is uploaded to our site.

Let's watch a specific video to see how it works.

Two years ago, recording artist Chris Brown released the official video for his single "Forever."

A fan watched it on TV, recorded it with a camera phone, and uploaded it to YouTube.

Sony Music had Chris Brown's video in their Content ID system, so within seconds of trying to upload the video, the copy was detected and Sony could choose what to do next.

But how do you know that a user's video is a copy?

First, a content owner submits an asset to the database and stipulates a usage policy that dictates what to do if a match is found.

Compare each upload with all referenced files in the database.

This heat map shows how the brain of the system works.

Here you can see that the original reference file is compared with the user-generated content.

The system compares one moment to the other to see if they match.

This means that matches can be identified even if the copy used was part of the original file, played in slow motion, and had degraded audio and video quality.

And do this every time the video is uploaded to YouTube.

That's over 20 hours of video per minute.

If a match is found, apply the policy set by the rights owner.

And the scale and speed of this system is truly amazing.

We're not just talking about a few videos, we're talking about 100+ years of daily videos between new uploads and regular legacy scans of all content on the site.

When you compare these 100 years of video, you're comparing against millions of reference files in your database.

It's like 36,000 people staring at 36,000 monitors every day without a coffee break.

Now, what if we find a match?

Well, most rights holders allow copies to be published instead of blocking them.

And profit through exposure, advertising and linked sales.

Remember Chris Brown's video "Forever"?

Well, the day cleared and fell off the charts, and that seemed to be the end of the story, but at some point last year, a young couple got married.

This is their wedding video.

You may have seen it.

(music) What's so great about this, if the wedding procession was so much fun, can you imagine how much fun the reception would have been?

I mean, who are these people?

I really want to go to that wedding.

As such, their little wedding video has garnered over 40 million views.

And instead of blocking, Sony allowed the upload to run.

And they put ads on it and linked to iTunes from there.

The song returned to number 4 on the iTunes charts for the first time in 18 months.

So Sony makes money from both of these.

And happy couple Jill and Kevin, returning from their honeymoon, found their video going viral.

And they ended up appearing on a number of talk shows, using it as an opportunity to make a difference.

The video has raised over $26,000 to help end domestic violence.

“JK Wedding [Admission] Dance” became so popular that NBC parodied it in the season finale of “The Office”, proving to be a true cultural ecosystem.

Because not only are amateurs borrowing from big studios, sometimes big studios are borrowing them back.

By enabling choice, we can create a culture of opportunity.

And all that was needed to change the situation was to enable choice through the identification of rights.

So why has no one solved this problem so far?

Because it's a big problem, complicated and messy.

It's not uncommon for a single video to have multiple rights holders.

It also has a music label.

There are multiple music publishers.

And each of these may vary from country to country.

There are many cases where multiple works are combined.

As such, you may have to manage multiple claims for the same video.

YouTube's Content ID system handles all these cases.

But this system works only with the participation of rights holders.

If you have content that other people have uploaded to YouTube, you need to register with the Content ID system. That way, you will be able to choose how your content is used.

And carefully consider the policies that apply to that content.

By simply blocking all reuse, you miss out on new art forms, new audiences, new distribution channels, and new revenue streams.

But it's not just money and impressions that matter.

See the joy spread by progressive rights management and new technology.

And I think we can all agree that joy is definitely an idea worth spreading.

thank you.

(applause)

Thank you very much. I would like to take you on a journey through the underwater acoustic world of whales and dolphins.

As we are a very visual race, this is hard to really understand, so we used a combination of diagrams and sounds and hopefully this can convey that.

But as a visual species, think about what it feels like to go snorkeling or diving and peer underwater.

You can't really see very far.

Our vision, which works so well in the air, suddenly becomes very limited and claustrophobic.

And how marine mammals have evolved over the past tens of millions of years is how they rely on sound to explore the world and to communicate with each other.

Dolphins and toothed whales use echolocation.

They emit loud clicks for orientation and can hear echoes from the ocean floor.

They can hear the echoes of their prey to determine where food is and which ones they want to eat.

All marine mammals use sounds to communicate.

This is why large baleen whales emit long, beautiful songs that are used in reproductive advertising between males and females to find each other and choose a mate.

And because the close bond between parent and young animals uses vocalizations to communicate with each other, sounds are very important to their lives.

My initial interest in the vocalizations of these aquatic animals came from evidence from captive dolphins that they can imitate human vocalizations.

And I said I'm going to use some visual representations of sound.

Here is the first example.

This is a plot of frequency against time. It's like a musical score, high notes are high, low notes are low, and time moves in this direction.

Here is a picture of the trainer's whistle. It is the whistle that the trainer blows to tell the dolphin that he has done the right thing and is coming to catch fish.

It's kind of like "tweet". so.

This is how captive calves imitate the trainer's whistle.

If you sing this song to your dog or cat and they sing the same song to you, you will be quite surprised.

Very few non-human mammals can imitate sounds.

It's really important to our music and language.

So this is a mystery. Why do some other mammalian groups that do this?

Much of my career has been spent trying to understand how these animals utilize learning and their ability to change what they say based on what they hear in their own communication systems.

So let's start with the vocalizations of non-human primates.

Many mammals need to make contact calls when, for example, mothers and calves are separated.

This is an example of the call a squirrel monkey makes when isolated from other squirrel monkeys.

You can see that there is not much variation in these calls.

In contrast, the characteristic whistle that dolphins use to communicate has a radically different call here for each individual.

This ability can be used to learn vocalizations and develop more complex and characteristic vocalizations to identify individuals.

What about settings where the animal should use this call?

Now let's look at the mother cow and the calf.

In the normal life of mother and pup dolphins, when mother dolphins are chasing fish, they often separate and swim apart, and when separated they have to get back together again.

This figure shows the fraction of the dolphins whistling and separating relative to the maximum distance.

This means that if the dolphins are less than 20 meters apart, they spend less than half the time using the whistle.

Most of the time, they can find each other just by swimming around.

However, whenever they become more than 100 meters apart, they must each use their own distinctive whistle to reunite.

Most of these unique signature whistles are highly formulaic and remain stable throughout the dolphin's life.

However, there are also some exceptions.

When male dolphins leave their mothers, they often merge with other males and form alliances that can last for decades.

As these two animals form a social bond, their signature whistles actually converge and become very similar.

This plot shows two members of the pair.

As you can see at the top here, they share an upsweep like "Woop, Whoop, Whoop".

They both have such upsweep.

On the other hand, these members of the pair will be "Wat, wat, wat".

And what happened is that they used this learning process to develop new markers to identify this new social group.

This is a very interesting way they can form new identifiers for their new social groups.

Let's take a step back and see what this message tells us about protecting dolphins from human interference.

Anyone looking at this photo will know that this dolphin is surrounded and clearly harassed.

This is a bad situation.

But it turns out that when just one boat approaches a pod of dolphins hundreds of meters away, the dolphins begin to whistle, change their behavior, form a more cohesive group, and wait for the boat to pass before returning to their normal duties.

In places like Sarasota, Florida, the average interval between boats passing within 100 meters of a pod of dolphins is 6 minutes.

So even conditions that seem less serious still affect how long these animals have to do their normal jobs.

And when you look at very pristine environments like western Australia, Lars Bidder has been doing studies comparing dolphin behavior and distribution long before there were dolphin-watching boats.

When I had one boat, it didn't affect me much.

And two boats: When the second boat was added, what happened was that some of the dolphins left the area entirely.

Among the remaining individuals, the reproductive rate declined.

Therefore, it can have a negative impact on the population as a whole.

When we think of marine sanctuaries for animals like dolphins, this means that we have to be quite conscious of activities that we used to think were benign.

Recreational boating and actual whale watching intensity may need to be regulated to prevent such problems.

I would also like to point out that sound does not follow boundaries.

Thus, lines can be drawn to protect an area, but chemical and noise pollution will continue to pass through it.

And I now want to switch from this local, familiar coastal environment to the wider world of baleen whales and the open ocean.

This is the kind of map that we have all seen.

The world is mostly blue.

But I also want to point out that the oceans are much more connected than we think.

Notice how fewer barriers impede movement across the ocean compared to land.

To me, the most striking example of the interconnectedness of the oceans comes from an acoustic experiment in which oceanographers sailed to the southern Indian Ocean and installed underwater speakers to reproduce sound.

It's the same sound traveling west and heard in Bermuda, traveling east and heard in Monterey.

We live in a world of satellite communications, and I'm used to global communications, but it's still amazing to me.

The ocean has the property that basically low frequency sound travels throughout the earth.

The sound propagation time for each of these paths is approximately 3 hours.

Approximately half the circumference of the earth.

In the early 1970s, Roger Payne and a marine acoustician published a theoretical paper suggesting that sound could travel over these wide ranges, but few biologists believed it.

But in fact, it turns out that whales have apparently spent tens of millions of years evolving ways to take advantage of this amazing property of the ocean, even though we only knew about long-distance breeding decades ago.

Therefore, blue and fin whales produce very low frequency sounds that travel very long distances.

The top plot here shows a complex series of calls repeated by the male.

They form songs and seem to play a singing bird-like role in reproduction.

Below this, both males and females produce vocalizations, which also carry a very long range.

Biologists were skeptical of long-distance communication long after the 70s, until the end of the Cold War.

What happened was that during the Cold War, the US Navy had a then top secret system for tracking Russian submarines.

It had deep underwater microphones, or hydrophones, cabled to the shore, all wired to a central location that could hear sounds across the North Atlantic Ocean.

And after the fall of the Berlin Wall, the Navy made these systems available to whale bioacoustics to see what they could hear.

This is a plot by Christopher Clarke who tracks a blue whale through Bermuda, down to Miami latitude and back again.

It was tracked over 43 days and swam 1,700 kilometers, or over 1,000 miles.

This indicates both that calls are detectable over hundreds of miles and that whales routinely swim hundreds of miles.

They are scaly animals that live in the ocean and communicate over much longer distances than we expected.

Unlike fin and blue whales, which disperse in temperate and tropical waters, humpback whales congregate in traditional local breeding grounds, which allows them to produce a slightly higher frequency, broader, and more complex sound.

So here we are listening to a complex song produced by humpback whales.

Once humpback whales have the ability to sing this song, they listen to other whales and modify what they sing based on what they hear, just like songbirds and dolphin whistles discussed earlier.

This means that humpback song is a form of animal culture, just like music for humans.

I think one of the most interesting examples of this is in Australia.

Biologists on the east coast of Australia had recorded humpback whale songs in the area.

And this orange line shows the typical song of an East Coast humpback whale.

In '95 everyone was singing normal songs.

But in '96 they heard some strange songs, and it turned out that these strange songs were unique to West Coast whales.

West Coast calls became more and more popular, and by 1998 no whales sang East Coast songs. It was completely gone.

They just sang a cool new West Coast song.

It's as if the new hit style completely wiped out the old obsolete style and the golden oldies station was gone.

No one sang the old songs.

I would like to briefly describe what role the ocean plays in these calls.

You are now listening to a humpback whale recorded by Chris Clark 0.3 miles away.

You can hear the entire frequency range. Quite noisy.

It sounds very close.

The next recording you'll hear is the same humpback song recorded 80 miles away.

that is shown here.

Only low tones are heard.

When sound travels long distances through the ocean, you can hear echoes, but they are not very loud.

After playing these humpback calls, play the blue whale calls, but the frequency is very low, otherwise you can't hear it, so you have to speed it up.

This is the call of a blue whale at a distance of 50 miles for a humpback whale.

It's loud, clear, and very clearly audible.

This is the same call recorded from a hydrophone 500 miles away.

Lots of noise, mostly other whales.

But I can still hear its faint cries.

Let's change our minds here and think about the possible impact on the human body.

The loudest sound that humans put into the sea comes from shipping.

This is the sound of a ship. You have to speak a little louder to speak beyond that.

Imagine a whale hearing from 500 miles away.

A potential problem is that this type of ship noise can obscure whale-to-whale sounds.

Well, this one has been known for quite some time.

This is a diagram from a textbook on underwater sound.

And the y-axis is the average deep-sea ambient noise magnitude for each frequency.

At low frequencies, this line shows sounds resulting from earth's seismic activity.

Above, these shifting lines indicate an increase in noise in this frequency range due to higher winds and waves.

But right here in the middle of the sweet spot, the noise is dominated by human ships.

Think about it. This is amazing. In this frequency range where whales communicate, the main source of noise around the world, on our planet, is human ships, thousands of human ships, far away, all collectively.

The next slide shows how this affects the range a whale can communicate.

Here you get a volume like a whale call.

And the farther you go, the quieter the sound gets.

In the pre-industrial oceans, this whale call was easy to detect, as I mentioned earlier.

At a range of 1000 kilometers it is louder than noise.

Now consider the further increase in noise caused by transport.

Suddenly, the effective communication range increases from 1,000 kilometers to 10 kilometers.

Now, if this signal were used by males and females to find each other for mating, and they dispersed, imagine what impact this would have on the recovery of endangered populations.

As described for dolphins, whales also have contact calls.

Plays the contact sounds that right whales use to communicate.

This is the type of call that mother right whales and their cubs use when parting to return again.

Imagine here. Let's put the noise of the ship into the picture.

What should the mother do if the boat arrives and there are no calves?

Let's discuss some strategies.

One strategy is to shift the frequency of the call outside the noise band to improve communication if the call is stuck here and the noise is within this band.

Susan Parks of Pennsylvania State University has done a study of this.

She looked out over the Atlantic Ocean. This is the data for the South Atlantic Ocean.

This is a typical South Atlantic contact phone from the 70's.

Look what happened to the average phone call by 2000.

The same thing happened in the North Atlantic in the 50s and 2000s.

Over the last 50 years, these whales have been forced to change as we have added more noise to the ocean.

It's as if the entire nation had to transition from playing bass to singing as a tenor.

This is an amazing change, both in time and space, induced by humans on such a large scale.

And we now know that whales can compensate for noise by calling louder, waiting for silence, or shifting their calls outside their noise band, as I did when ships were playing.

Now, calling louder or moving the frequency away from where you want it is probably costly and can result in lost opportunities.

If we too have to wait for silence, they may miss important opportunities to communicate.

Therefore, we should be very concerned when in-habitat noise degrades habitats, making them costly to communicate or preventing them from performing important functions.

That's a really important question.

And given the impact of shipping on whales, I am pleased to say that there are some very promising developments in this area.

Regarding ship noise, the United Nations International Maritime Organization has formed a group tasked with establishing guidelines for quieting ships and informing industry on how to quieten ships.

And we've already found that smarter propeller design can reduce noise by 90%.

In fact, insulating and isolating ship machinery from the hull can reduce noise by 99 percent.

So at the moment it's mainly a matter of cost and standards.

If this body can establish a standard and the shipbuilding industry can adopt that standard for building new ships, we will see this potential problem gradually diminish.

However, the ships described here have another problem. It's a matter of collisions.

This is a whale that has just snarled out of a collision with a fast-moving container ship.

But collisions are a serious problem.

Endangered whales are killed each year in ship collisions and trying to reduce this is very important.

We describe two approaches that show great promise.

The first case originated from the Bay of Fundy.

These black lines mark the shipping lanes in and out of the Bay of Fundy.

The shaded area indicates the danger of collisions with endangered right whales as ships travel in this lane.

The lanes here pass through a major feeding area for right whales during the summer months and proved to be a very high collision risk area.

Biologists who couldn't accept a no answer went to the International Maritime Organization and petitioned, "Can't you move that lane? It's just a line on the ground."

Could you move me to a less dangerous place? ”

And the International Maritime Organization responded very strongly: "These are new routes."

A shipping lane has been moved.

As you can see, the risk of collision is much lower.

So it's actually very promising.

We can be very creative in thinking of different ways to mitigate these risks.

Shipping companies' concerns about the greenhouse gas emissions associated with global warming have also launched another measure that the shipping companies themselves have just taken on their own.

Maersk Line looked at its competitors and realized that everyone in shipping believes that time is money.

They are in full speed to get to the port.

But they often wait there.

What Maersk did was take steps to slow it down.

It can slow you down by about 50%.

This reduced fuel consumption by about 30%, saving money and also benefiting the whales significantly.

Slower speeds reduce noise and reduce the risk of collisions.

In conclusion, I would like to point out that whales live in a wonderful acoustic environment.

They have evolved over tens of millions of years to take advantage of this.

And we need to be very careful and vigilant in thinking that our actions may unintentionally prevent them from accomplishing their vital activities.

At the same time, we have to be very creative in coming up with solutions to mitigate these problems.

I hope these examples have given you some of the different directions we can take in addition to protected areas to keep our oceans safe so that whales can continue to communicate.

thank you very much.

(applause)

I didn't finish school and I'm willing to bet you're the dumbest guy in the room. I had a hard time at school.

But I knew from an early age that I love money, I love business, I love this entrepreneurial thing.

I was raised as an entrepreneur.

It's something I've been really passionate about since then, and I've never talked about this before, but three days ago, this is the first time anyone other than my wife has heard of it.

I told her that I think I'm missing an opportunity to find kids with entrepreneurial qualities and groom them and show them that being an entrepreneur can actually be great.

As it happens in many societies, it's not bad and it's not condemned.

Children grow up to have dreams, passions and visions, but somehow they shatter them.

We are told that we need to study more, concentrate more, or get a tutor.

My parents gave me a French tutor, but I'm still not good at French.

Two years ago, I was a top-rated lecturer at MIT's Master's in Entrepreneurship Program.

It was a speaking event in front of a group of entrepreneurs from all over the world.

In my sophomore year, I won a city-wide speech contest, but no one ever said to me, "You're a good speaker."

He has no concentration, but loves to walk around and cheer people up. ”

No one said, "Get him a speaking coach."

They wanted me to have a tutor for my weak points.

So I think we should start looking for those traits because our kids show these traits, but we should raise our kids to be entrepreneurs, not lawyers.

Unfortunately, the school system has led the world to say, "Let's be a lawyer" or "Let's be a doctor."

We're missing out on that opportunity because no one tells us to be an entrepreneur.

Entrepreneurs are people who have an idea, a passion, or see a need in the world and decide to get up and do it. There are many people in this room.

And we are betting everything to make it happen.

We have the ability to gather around a group of people who want to build that dream together.

And if we can get our kids to embrace the idea of ​​being entrepreneurial at a young age, I think we can change everything that's going on in the world today.

Someone has an idea for every problem in the world.

And as a young child, no one can tell you that it can't happen. Because you are too stupid to understand that you cannot understand it.

I think we have an obligation as parents, as a society, to start teaching our children to fish rather than giving them fish. It's an old parable. "If you give a man a fish, he will be fed for a day.

If we can teach our children to be entrepreneurial, that is, children who display that predisposition, what if we look at entrepreneurial children and teach them to be entrepreneurs in the same way that we teach scientifically gifted children to pursue a career in science?

Instead of waiting for government benefits, you could let your kids promote your business.

What we do is teach children what not to do. don't bite don't swear

Now we are teaching our children to pursue really good work. The school system teaches us to become doctors, lawyers, accountants, dentists, teachers, pilots, and more.

And the media say it would be really cool if we could go out and be models or singers or sports heroes like Luongo or Crosby.

Our MBA program does not teach children to be entrepreneurs.

The reason I avoided an MBA program is that, apart from getting into nowhere because I averaged 61 percent in high school and at Carlton, the only school in Canada that accepted me, I averaged 61 percent, because MBA programs don't teach kids to be entrepreneurs.

They teach them to work in companies.

So who started these companies? It's these random few people.

A book that makes entrepreneurs heroes is the only book I've ever found, even in popular literature. This should be on your reading list. The only book that makes an entrepreneur a hero is Atlas Shrugged.

Everything in the world looks at entrepreneurs and says we're bad people.

Both my grandfather and father were entrepreneurs.

My brother, sister and I all run companies.

We all decided to start doing these things because it's the only place that's right for us.

We were not fit for regular work. We cannot work for others, we are stubborn, and we have all the other traits.

But children can also become entrepreneurs.

I am a key member of several organizations called the Entrepreneurs' Organization and the Young Presidents' Organization.

I just got back from speaking at the YPO Global Conference in Barcelona.

And all the entrepreneurs I met over there were struggling academically.

I have been diagnosed with 18 out of 19 signs of Attention Deficit Disorder.

So this thing here surprises me.

(Laughter) That's probably why I'm a little panicked, besides the caffeine and sugar I've taken.

But this is really scary for entrepreneurs.

Attention Deficit Disorder, Bipolar Disorder.

Did you know that bipolar disorder is also called CEO disease?

Ted Turner got it. Steve Jobs has it.

All three Netscape founders had it.

I could keep going.

Children -- These symptoms can also be seen in children.

And we gave them Ritalin and said, 'Don't be entrepreneurial.

Try to adapt and become a student in this alternative system. ”

Sorry, entrepreneurs are not students.

I stole my essay. I cheated on the exam.

I hired kids to do 13 straight accounting assignments in college.

But as an entrepreneur, you hire an accountant, not do accounting.

So I just figured it out.

(Laughter.) (Applause.) At least I admit to cheating in college. Most people wouldn't.

I'm also quoted -- and I told the textbook author -- I'm now quoted in the exact same college textbooks in all Canadian college and college studies -- in management accounting, I'm Chapter 8.

Open Chapter 8 to talk about budgeting.

After the interview was over, I told the author that I had cheated on the same course.

But kids, you can see these signs in them.

An entrepreneur is defined as “a person who organizes, runs and takes on the risks of a business”.

That doesn't mean you have to go to an MBA program or finish school.

I once heard, "Is it upbringing or is it natural?" right?

Is it the 1 or the 2? What is it?

Well, I don't think so either. I think both are possible.

I was raised as an entrepreneur.

When I was growing up as a child, I had no choice. Because I've been taught from an early age that when my dad realizes that I don't fit into everything else that's taught in school, he teaches me to understand business from an early age.

He raised the three of us to hate the idea of ​​having a job and love the fact of building a company that could employ other people.

I was in my bedroom with a long extension cord calling every dry cleaner in Winnipeg to see how much they would charge me for a coat hanger.

Then my mother came into the room and said, "Where do you buy hangers to sell to the dry cleaners?"

So I said, "Let's go see the basement."

We went to the basement and opened this cupboard.

I collected about 1,000 hangers. I was going door to door collecting hangers for the basement when I told her I was going out. Because I met her a few weeks before that. I get paid, but I used to pay 2 cents for each coat hanger.

So, I thought, "There are many kinds of hangers, so maybe I should go get them."

And I learned that I can actually negotiate with people.

This guy offered me three cents and I gave him up to three and a half cents.

As a seven year old, I even knew that I could get a fractional percent of a cent and people would pay for it because it would be many times more.

At 7, I figured it out.

Earn 3.5 cents on 1,000 hangers.

Door-to-door sales of license plate protectors.

In fact, my father made me find someone to sell them wholesale.

At the age of nine, I roamed the streets of Sudbury selling license plate protectors door-to-door.

And I remember this customer very vividly. I have also done other work with these customers. I sold newspapers, but he never bought them from me.

But I was sure I was going to get him to buy me a license plate protector.

And he says, "I don't need that."

Remember, I'm 9 years old.

"You have two cars, but you don't have license plate protectors.

And only one license plate of this car is crumpled. ”

He said, "That's my wife's car."

I said, "Why don't we test it on her car and see if it lasts?"

So we know we have two cars, each with two license plates.

Even if you can't sell all four, you can get at least one.

I learned it at an early age.

When I was about 10, I used to sell comic books from a cottage on Georgian Bay.

I rode my bike to the end of the beach and bought all the comics from the poor kids, then went back to the other side of the beach and sold the comics to the rich kids.

It was clear to me. Buy low and sell high.

Those who have the money need it.

Wealthy people do. Of course?

It's like a recession.

That's why we have a recession.

Go get some of them. I learned it at an early age.

Also, don't reveal the source of the information. After four weeks of this, I was beaten. Because one of the rich kids found out where I was buying comics and didn't like him paying more.

I was forced to take the paper route when I was 10 years old.

I didn't want the paper route, but my dad said, "That's your next job."

Not only did he buy me one, I had to buy two too.

He wanted me to hire someone to deliver half the newspaper, and I did.

That's when I realized I could make all my money by collecting chips.

So it was time to collect the chips and receive the payment.

I collect newspapers, but he only has to deliver them.

Because I knew I could make money.

At this point, I never intended to become an employee.

(Laughter) My dad ran an auto and industrial repair shop.

He had all his old auto parts lying around.

They had old brass and copper.

When I asked what happened to it, he said he just threw it away.

I said, "Will someone pay for it?" And he said, "Maybe."

Remember. 34 years ago, at the age of 10, I saw an opportunity in this and realized there was money in the trash.

Then I collected it from a local auto shop on my bike.

Then on Saturday my dad drove me to a scrap metal recycler where I got my money.

And I thought that was kind of cool.

Strange, 30 years later, are we building 1-800-GOT-JUNK?

And I make money with it.

We made this pincushion for Mother's Day out of wooden clothespins for Mother's Day when we used to hang our clothes on the outside clothesline.

And you will make these chairs.

And I had a little pillow that I sewed together.

You can also stuff pins inside.

Because people were sewing and they needed spools of thread.

But I realized I needed options, so I spray painted a lot of them brown. So when I went to the front door, they didn't say, "Do you want to buy?"

It's "What color do you want?"

I'm 10 years old; I can't say no, especially when I have two options: brown or transparent.

So I learned that lesson at a young age.

Yes, lawn mowing is cruel.

But since I had to mow the lawn for all of my neighbors during the summer and I had to get paid for the work, I realized that the regular revenue from one customer was amazing and that if I could get this customer once and get paid by him every week, it would be much better than trying to sell clothespins to one person. Because you can't sell more.

That's why I love this recurring revenue model that I started learning at a young age.

Remember, I was made to do that. I wasn't even allowed to have a job.

I went to golf courses and caddies for people and realized that there was a big hill on the 13th hole of our golf course and people couldn't carry their bags up that hill.

So I sat in a lawn chair and carried the load for those who didn't have a caddy.

I carry their golf bag up to the top. They paid me $1, but my friends worked hours to carry a man's bag for $10.

It makes no sense. Find out how to make more money faster.

Every week, I would go to the corner store and buy all these pops and deliver them to the 70 year old women playing bridge.

They said they would give me the next week's order.

I would deliver a pop and charge it twice.

You don't need a contract, just supply and demand, and an audience that supports you.

These women weren't going to other people because they liked me, and I sort of figured it out.

But everyone else was searching through bushes and ditches for golf balls.

I feel like that's no good. they are in the pond And no one enters the pond.

So I went into the pond and crawled around and picked it up with my toes and then with both feet.

You can't do that on stage.

Get a golf ball, throw it in your swimsuit trunks, and when you're done you'll have hundreds of balls.

But the problem is, people didn't want all the golf balls.

So I just packed them. I'm about 12, right?

Had Pinnacles, DDH and some really cool stuff.

They were selling for $2 each.

Then I got a good one for 50 cents a piece that doesn't look bad.

And sell 50 pieces of crap at once.

And you can also use them as practice balls.

When I was a student, I sold sunglasses to all high school students.

You are always trying to squeeze money out of all your friends and this is what really makes everyone hate you.

But the bill was paid.

So I sold a lot of sunglasses.

Then, when the school suspended me, they called me into the office and said they couldn't do it, I went to the gas station and sold a lot of gas to the gas station and had the gas station sell it to customers.

We had a retail store back then, so that was great.

I was 14, I think.

Then I paid for my first year of college at Carleton University in full by door-to-door wineskins.

Did you know you can fit a 40oz bottle of rum and 2 bottles of cola in your wineskin?

So, right? But do you know?

Put this in your pants when you go to a football game and get free booze.

Everyone bought it.

I also put a brand on it, so I sold it for 5 times the normal price.

It had the university logo on it.

We teach our kids games, we buy them games, but if they're entrepreneurial kids, why not give them games that develop the qualities they need to be entrepreneurs?

Why don't you teach them not to waste their money?

In Banff, Alberta, I remember being told to go out in the middle of the street.

I threw a penny on the street, and my father said, "Come and pick it up."

I work too hard for my money. I'm not going to see you waste a dime. ”

I still remember that lesson.

Pocket money teaches children bad habits.

Pocket money is primarily meant to teach children to think about work.

Entrepreneurs don't expect regular salaries.

Pocket money means making young children expect a regular paycheck.

If you want to grow entrepreneurs, it's wrong for me.

What I do with my 9- and 7-year-olds is to teach them to walk around the house and the garden and look for things to do.

come on and tell me what it is

So do you know what we are doing? negotiate.

They hunt around for what it is and then we negotiate how much to pay them.

They don't have regular checks, but they do have the opportunity to find out more and learn negotiation and opportunity-finding skills.

That's what I'm cultivating.

Each of my children has two piggy banks.

50% of the money they earn goes into the home account and 50% into the toy account.

With a toy account, you spend money on things you like.

Fifty percent of their home account is sent to the bank every six months.

they walk with me

Every year, all the money in the bank goes to their broker.

It teaches you to enforce that saving habit.

It pisses me off when a 30-year-old says, "Maybe I should start donating to the RSP now."

Damn, I missed 25 years.

You can teach these habits to young children who are not yet in pain.

Instead of reading bedtime stories every night, ask them to tell you stories four or three nights a week.

Sit down with your kids and give them four items—a red shirt, a blue tie, a kangaroo, and a laptop—and ask them to tell a story about those four items.

It teaches them to sell, it teaches them to be creative, it teaches them to think for themselves.

Do that and have fun.

Have the children stand in front of the group to speak, play a play, or give a speech, even if it's in front of their friends.

These are the entrepreneurial qualities you want to develop.

Show me the grumpy employee.

If you see grumpy customer service, point it out.

Say, "By the way, that person is a bad employee."

(Laughter) If you walk into a restaurant and the customer service is bad, show them what bad customer service looks like.

(Laughter) We have all these lessons in front of us, but we don't take those opportunities. We teach our children to have a tutor.

Imagine that you actually took all the junk your kids have at home right now, or the toys that were too big two years ago, and said, “Would you like to sell this on Craigslist and Kijiji?”

And they'll actually sell it and learn how to spot scammers when an offer comes along.

They can break into your account, subaccounts, etc.

However, how do I fix the price, how do I guess the price, and how do I view the photos?

Tell them how to make money doing such things.

Then 50 percent goes to the home account and 50 percent goes to the toy account.

Entrepreneurial traits that must be nurtured in children include achievement, tenacity, leadership, self-reflection, interdependence, and values.

All these traits are found in young children and you can help raise them.

look for something like that.

There are two peculiarities that we cannot escape from their system that I would like to draw your attention to.

Do not give your child attention deficit disorder medication unless the attention deficit disorder is really severe.

(Applause.) Same thing with mania, stress, depression in general, unless it's very clinically brutal.

Bipolar disorder is also called “CEO disease”.

Imagine Steve Jurvetson, Jim Clark, and Jim Barksdale were put on Ritalin when they all figured it out and built Netscape.

Al Gore really would have had to invent the internet.

(Laughter) These, like everything else, are skills that should be taught in the classroom.

I'm not saying don't make your kids want to be lawyers.

But what about ranking entrepreneurship as high as other companies?

Because there are big opportunities out there.

Finally, I would like to share a quick video made by one of the companies I teach.

These guys are grasshoppers.

It's about children.

I hope this inspires you to take what you've heard from me and use it to do something to change the world.

[Kid… ``So you thought you could do anything?''] [I still can. ] [Many of the things we think are impossible] [because they are easy to overcome] [because you may not be aware, but we live in] [one individual can make a difference] [want proof?] [look at the people who built our country:] [our parents, grandparents, aunts, uncles] [they were immigrants, newcomers trying to make a name for themselves] [perhaps they came in with very little money] [or , perhaps they [just one great idea] [these guys are thinkers and doers] [innovators] [until they came up with the name] [entrepreneurs] [they changed the way we think about what is possible. ][They have a clear vision of how to make life better][For all of us, even in difficult times. ] [It's hard to see now] [When your vision is cluttered with obstacles. ] [But turbulence creates opportunities. ] [to succeed, achieve and push us] [to discover new ways of doing things] [so what opportunities do you pursue and why?] [if you are an entrepreneur] [you know risk is not reward. ] [no. Rewards drive innovation] [Change people's lives. create jobs. ] [ Promote growth. ] [And make a better world. ] [ Entrepreneurs are everywhere. ] [They run the small businesses that support our economy. ] [designing tools to help you] [staying connected with friends, family and colleagues] [and they are finding new ways to help solve society's oldest problems. ] [Do you know an entrepreneur?] [An entrepreneur can be anyone...even you] [so seize the opportunity to create the jobs you've always wanted] [help heal the economy] [create [the difference]. ] [Take your business to new heights] [But most importantly] [Remember when you were a kid] [When everything was within reach] [And quietly but determinedly tell yourself:] [It still is. ] Thank you so much for having me.

(Music) [Sanskrit] This is a hymn to the Mother Goddess and most of us in India learn it in childhood.

I learned it at my mother's lap when I was four years old.

That year she introduced me to dance and my attempt at classical dance began.

In the 40 years since then, I have trained with the best in my field, performed around the world, taught, created, collaborated and choreographed for men and women of all ages alike, weaving a rich tapestry of artistry, achievement and awards.

His crowning glory came in 2007 when he was awarded the Padma Shri Award, the country's fourth highest civilian award, for his contribution to the arts.

(Applause.) But I was completely unprepared for what I was told on July 1, 2008.

I heard the word "cancer".

Yes, breast cancer.

As I sat dazed in the doctor's office, I heard the words "cancer," "stage," and "grade."

Until then, Cancer was my friend's zodiac sign, the stage was my appearance, and my grades were what I got in school.

That day, I realized that I had a new life partner who was unwelcome and uninvited.

As a dancer, I know the nine rasas, or navarasas, of anger, courage, disgust, humor, and fear.

I thought I knew what fear was.

That day I learned what fear is.

Overwhelmed by the magnitude of it all and the feeling of being completely out of control, I cried profusely and asked my loving husband, Jayan.

I said, "Is this the end? Is this the end of the road?"

Is this the end of my dance? ”

And he, being a positive soul, said, "No, this is just a break. It's a break in therapy. You'll be back to doing what's best for you."

I thought I was in complete control of my life, but I realized there were only three things I could control. It is your thoughts, your mind, the images that your thoughts produce, and the actions that derive from them.

So I've been crouching here in a maelstrom of emotion and depression, do you want to go to a place of healing and health and well-being in the enormity of this situation?

I wanted to go where I wanted to go from where I was, and I needed something to do that.

I needed something to lift me out of all this.

So I wiped my tears and declared to the whole world...

I said, "Cancer is just one page of my life and I will not allow this page to affect the rest of my life."

I have also beaten cancer and declared to the world that I will never have it.

But to get from where I am to where I want to go, I needed something.

To move forward from there, I needed anchors, images, and pegs to anchor this process.

And I found it in my dance, my dance, my strength, my energy, my passion, my very breath of life.

But it wasn't easy.

Believe me, it was never easy.

How do you keep your spirits up when you go from beauty to bald in 3 days?

If climbing a flight of stairs was pure torture for me, a chemo-battered body, why would I not despair?

How can I not be overwhelmed by that despair and misery?

All I wanted to do was curl up and cry.

But I kept telling myself that fear and tears weren't an option for me.

So I dragged my body, mind and spirit into the dance studio, day after day, relearning and redoing and relearning and reorganizing everything I learned as a four year old.

It hurt a lot, but I made it.

difficult.

I focused on my mudras, dance imagery, poetry, metaphors, and the philosophy of the dance itself.

And slowly, I got out of that miserable state of mind.

But I needed something else.

I needed something to move forward, and I found it in that metaphor I learned from my mother when I was four.

Mahishasura Maldini metaphor of Durga.

Durga, the fearless mother goddess created by the pantheon of Hindu deities.

Ornate, ornate and beautiful, with eighteen arms ready for battle, Durga rode into battle on a lion to destroy Mahishasr.

Durga, the epitome of creative feminine energy, or Shakti.

Durga who knows no fear.

I have made the image of Durga and her every attribute, every nuance my own.

Driven by mythological symbolism and the passion of my training, I brought a laser-like focus to dancing that I was dancing just a few weeks after surgery.

I danced through cycles of chemotherapy and radiation, much to the disappointment of my oncologist.

I danced between chemo and radiation cycles and scolded him for my dance performance schedule.

What I did is stay away from cancer and focus on dancing.

Yes, cancer is just one page of my life.

My story is one of overcoming setbacks, obstacles and challenges that life throws at you.

My story is the power of thought.

My story is the power of choice.

It's concentration.

It is the force that makes you turn your attention to something that energizes you and moves you, making even things like cancer insignificant.

My story is the power of metaphor.

That's the power of images.

Mine was Durga's, Durga was fearless.

She was also called Simhanandini who rode a lion.

As I ride on my own inner strength, my inner resilience, arm myself with medication to continue treatment, and call on the rogue cells to act, I want to be known as a cancer survivor, not a cancer survivor.

Here is an excerpt from the work "Simhanandini".

(Applause) (Music) (Applause)

I'll tell you a simple truth about leadership in the 21st century.

In the 21st century, we really need to think. And what I really want to encourage you to consider today is going back to school days when you learned how to count.

But I think it's time to think about what to focus on.

Because what we actually count really counts.

Let's start with a little story.

Van Quack.

She came to the country in 1986 from Vietnam.

She changed her name to Vivian because she wanted to fit in here in America.

Her first job was as a maid at an inner-city motel in San Francisco.

I happened to purchase the motel about three months after Vivian started working there.

So Vivian and I have worked together for 23 years.

In 1987, a 26-year-old with youthful idealism founded the company and actually wanted to create the joy of life, hence the very unrealistic name Joie de Vivre.

And my first hotel, motel, was a pay-by-the-hour, secret motel in the heart of San Francisco.

When I spent time with Vivienne, I could tell she had a certain joie de vivre in the way she approached her work.

It left me wondering and curious: How can one actually find joy in cleaning toilets for a living?

I spent some time there with Vivian and found that she didn't enjoy cleaning the toilet.

Her job, goal, and vocation was not to become the world's greatest toilet scrubber.

Important to Vivian was the emotional connection she formed with fellow employees and guests.

And what gave her inspiration and meaning was the fact that she was caring for people far from home.

Because Vivian knew what it was like to be far from home.

This very human lesson from over 20 years ago helped me during the last economic downturn.

Due to the dotcom crash and 9/11, San Francisco Bay Area hotels experienced the biggest drop in revenue in US hotel history.

We were particularly vulnerable because we were the largest hotel operator in the Bay Area.

But remember, back then, we stopped eating French fries in this country.

Well, not exactly, but of course not.

We started eating "freedom fries" and boycotting anything made in France.

The name of my company is Joie de Vivre. So I started getting letters from places like Alabama and Orange County saying they were going to boycott my company because they thought we were a French company.

And I wrote them back and said, "Oh my God, we are not French.

We are an American company. We are based in San Francisco. ”

"Oh, that's even worse," came the curt reply.

(Laughter) So, one particular day, when I was feeling a little depressed and not feeling much joie de vivre, I stumbled upon my local bookstore around the corner from my office.

And I first went to the business section of the bookstore looking for business solutions.

But given my confused mental state, I quickly ended up in the self-help section.

This is where I rediscovered Abraham Maslow's Hierarchy of Needs.

I took a psychology class in college and learned about Abraham Maslow. Most of us are familiar with his hierarchy of needs.

But as I sat there reading Maslow all afternoon, I realized it was true for most readers.

One of the simplest facts in business is what we tend to ignore: we are all human.

Each of us has a hierarchy of needs at work, regardless of our role in the business.

So, as I started reading more of Maslow, what I began to realize was that later in life, Maslow wanted to apply this hierarchy to individuals, and apply it to groups, organizations, and especially businesses.

Unfortunately, he died prematurely in 1970 and never fully realized his dream.

So in that dotcom crash, I realized my role in life was to channel Abe Maslow.

And that's what I did years ago. That's when I turned the five-level pyramid of needs into what I call the Transformation Pyramid of Survival, Success, and Transformation.

It is not only the basis of business, it is also the basis of life.

And we started asking ourselves how we were actually addressing the higher needs, the transformative needs of key employees within the company.

These three levels of needs are related to Maslow's five levels of needs.

But when I started asking myself how I was meeting the more advanced needs of my employees and customers, I realized there was no metric.

We didn't have anything to actually know if we were doing it right.

So we started asking ourselves what less obvious metrics we could use to really assess our employees' sense of meaning or our customers' emotional connection with us.

For example, we actually started asking employees, do they understand the company's mission, do they feel they believe in it, can they actually influence it, and do they feel their work actually influences the company's mission?

We started asking our customers if they felt an emotional connection with us in one of seven different ways.

Miraculously, we found that when we asked these questions and started paying attention higher up the pyramid, we generated more loyalty.

Customer loyalty soared.

Our employee turnover rate has dropped to one-third the industry average, and our company tripled in size during the five-year dot-com bankruptcy.

When I went out and started spending time with other leaders and asking how they were getting through the period, what they told me over and over was that they were only managing what they could measure.

What we can measure are the concrete things at the bottom of the pyramid.

They didn't even see the intangibles above the pyramid.

So I started asking myself, how can I get leaders to value the intangible?

If we, as leaders, are taught to manage only what we can measure, and if all we can measure is the visible in life, then we miss out on many things at the top of the pyramid.

So I went out and did some research. A survey found that 94 percent of business leaders worldwide believe intangible assets such as intellectual property, company culture and brand loyalty are important to their business. But only 5 percent of those same leaders actually had the means to measure intangibles in their business.

So, as a leader, I understand that intangibles are important, but I don't know how to measure them.

Here's another Einstein quote. "Not everything that can be counted can be counted, and not everything that can be counted can be counted."

I hate to argue with Einstein, but if the most valuable things in our lives and businesses can't actually be counted and evaluated, wouldn't we just spend our lives obsessed with measuring the mundane?

It was the sort of thorny question of what's important that made me take off my CEO hat and fly to the top of the Himalayas for a week.

I flew to a place that has been shrouded in mystery for centuries, a place people call Shangri-La.

In fact, it has gone from a pyramidal subsistence base to a role model for world change.

I have been to Bhutan.

The teenage king of Bhutan was also a curious figure, but it dates back to 1972, when he ascended the throne two days after his father died.

At 17, he began asking the kind of questions one would expect from a beginner thinker.

During a trip to India early in his reign as king, he was asked by an Indian journalist about Bhutan's GDP, or the size of Bhutan's GDP.

The King responded in a way that really changed us 40 years later.

He said: "Why are we so obsessed with gross domestic product and so focused on it?"

Why do we care less about Gross National Happiness? ”

Now, in essence, the King was asking us to think of another definition of success, what has come to be known as GNH (Gross National Happiness).

Most world leaders didn't pay attention, and those who did thought it was just 'Buddhist economics'.

But the king was serious.

This was a remarkable moment. Because it was the first time in nearly 200 years that a world leader had hinted at intangible happiness. That leader 200 years ago, Thomas Jefferson, who made the Declaration of Independence. 200 years later, this king was suggesting that intangible happiness is something we should measure, something we, as government workers, should really appreciate.

Over the next three decades, as king, the king actually began to measure and manage Bhutan's well-being - including most recently moving the country from an absolute monarchy to a constitutional monarchy without bloodshed or coups.

For those of you who don't know, Bhutan is the world's newest democracy, born just two years ago.

So spending time with the leaders of the GNH movement really helped me understand what they were doing.

And I ended up spending time with the Prime Minister.

Over dinner, I asked him a cheeky question.

I asked him, "How can we create and measure what evaporates - happiness?"

And he was a very smart man and said, 'Look, Bhutan's goal is not to create happiness.

We create the conditions for happiness to occur.

In other words, we create a home of happiness. ”

Wow, that's interesting.

He said they have the science behind the technology and have created four key pillars, nine key indicators and 72 different indicators to help measure GNH in practice.

One of those key indicators is: "How do Bhutanese spend their time each day?"

Good question. How do you feel about how you spend your time each day?

Time is one of the most scarce resources in the modern world.

But of course, that little invisible data is not taken into account in the GDP calculation.

When I spent a week in the Himalayas, I started imagining something called the Emotional Equation.

And it focuses on a quote I read a long time ago by a man named Rabbi Hyman Shaktel.

How many people know him? who?

In 1954, he wrote a book called The True Joy of Life, suggesting that happiness is not about getting what you want, but rather getting what you want. Instead, want what you have.

In other words, I think Bhutanese believe that happiness is equal to wanting what you have, or being grateful divided by having what you want and being satisfied.

Bhutanese are not on ambitious treadmills, always focusing on what they don't have.

Their religion, their isolation, their deep respect for their culture, and the principles of the current GNH movement have all fostered an appreciation for what they have.

How many of us here, as TEDsters, spend a lot of time in the bottom half of this equation, the denominator?

We are a bottom culture in many ways.

(Laughter) The reality is that in Western countries, too often people focus on the pursuit of happiness, as if happiness is something you have to get out of, something you have to get, or many things.

In fact, if you look up dictionaries, many define chasing as "chasing with hostility."

Do we pursue happiness with animosity?

good question. Now back to Bhutan.

Bhutan borders 38% of the world's population on its north and south sides.

Could this small country, like a mature industrial start-up, be the spark plug for China and India's middle classes in the 21st century?

Bhutan has created a new global currency of ultimate export: happiness. Currently, 40 countries around the world are studying their GNH.

As you may have heard, this past fall, Nicolas Sarkozy of France published the results of an 18-month study by two Nobel economists focused on well-being and health in France.

Sarkozy suggested that world leaders should stop focusing on GDP myopicly and consider a new index that some French called the "joie de vivre index."

i like it.

Co-branding opportunities.

Just three days ago here at TED, there was a simulcast of Britain's future Prime Minister David Cameron, quoting one of my favorite speeches, Robert Kennedy's poetic speech in 1968, suggesting that we are shortsightedly focused on the wrong things and that GDP is a misguided metric.

This suggests that the momentum is changing.

Quoting Robert Kennedy's words, I tried to make a slightly new balance sheet here.

This is a collection of Robert Kennedy quotes.

GDP counts everything from air pollution to the destruction of sequoias.

But the health of children and the integrity of civil servants are not considered.

After reading these two columns, doesn't it seem like it's time to find a new way of counting, a new way of imagining what's important in life?

(Applause.) Indeed, Robert Kennedy suggested just that at the end of his speech.

He said GDP "just measures everything except what makes life worthwhile."

oh.

So how do we do that?

Let me tell you one thing, at least in this country, that you can start 10 years from now.

Why in the world does the U.S. have a census in 2010?

We spend $10 billion on the Census.

We're asking you 10 quick questions - it's simplicity.

But those questions are all concrete.

They are about demographics.

It's about where you live, how many people you live with, and whether you own a home.

That's it.

We are not looking for meaningful metrics.

We are not asking important questions.

We are not looking for something intangible.

Abe Maslow said something a long time ago that you may have heard, but you didn't know it was him.

"If the only tool you have is a hammer, everything looks like a nail," he said.

We have been fooled by our tools.

Sorry for that expression.

(Laughter) We've been fooled by tools.

GDP was a hammer for us.

And our nails were a successful model for the industrial age of the 19th and 20th centuries.

Yet 64 percent of the world's GDP today is in the intangible industry we call services, the industry I'm in.

And only 36% are involved in specific industries such as manufacturing or agriculture.

So maybe it's time to get a bigger toolbox?

Perhaps it's time to get a toolbox that not only counts the things that are easy to count, the tangible things in life, but actually counts the things we hold most dear: the intangibles.

I consider myself a curious CEO.

When I was an undergraduate, I majored in economics.

Economists have learned to measure everything in concrete units of production and consumption, as if each of those concrete units were exactly the same.

they are not the same.

In fact, what we need to learn as leaders is that we can influence the quality of our units of production by creating the conditions for our employees to fulfill their mission.

For Vivian, her unit of production is not the time she works, but the invisible change she makes during that hour of work.

This is Dave Allindale, a long time resident of Vivian's motel.

He has stayed there 100 times over the last 20 years and remains loyal to the property because of the relationships Vivienne and her fellow employees have built.

They created a happy home for Dave.

He told me that Vivian and the staff there always put me at ease.

Why can't business leaders and investors see the link between creating the intangible of employee happiness and creating the tangible of financial gain in business?

You don't have to choose between employee inspiration and huge profits, you get both.

In fact, inspired employees often contribute to generating sizable profits, right?

So what the world needs now, in my opinion, is business and political leaders who know what to consider.

we count the numbers

We rely on people.

What really matters is when you actually use the numbers to truly care about your employees.

I learned it from the motel maids and the kings of the country.

Where can we start counting today?

Whether it's your work life or your business life, can you start counting the one things in your life that actually matter today?

thank you very much.

(applause)

this is me. My name is Ben Saunders.

They are good at dragging heavy objects and walking in cold places.

On May 11th of last year, I was standing alone at the geographic North Pole.

I was the only human in an area of ​​5.5,000 square miles, 1.5 times the size of the United States.

More than 2,000 people have climbed Mount Everest.

12 people stood on the moon.

Only four people including myself have skied to the North Pole alone.

The reason, I think -- (applause) -- thank you -- the reason is, it's -- it's -- well, as Chris said, it's funny.

It's a journey near the limits of human ability.

I skied the equivalent of 31 consecutive marathons. 800 miles in 10 weeks.

And I dragged everything I needed, food, necessities, equipment, sleeping bag, one change of underwear, for nearly three months.

(Laughter) Today, I'm going to try to answer three questions in just over 16 minutes. First, why?

Second, how do you go to the bathroom in minus 40 degrees?

"Ben, I read somewhere that at minus 40 degrees, exposed skin will be frostbitten in less than a minute. So how do you answer nature's call?"

I don't want to answer these now. I will explain them at the end.

Three: How do you get past it? What's next?

It all started in 2001.

My first expedition was with a very experienced man named Pen Haddow.

This was like my polar exercise.

We were going to ski here from the islands of Severnaya Zemlya to the North Pole.

And what fascinates me about the North Pole, the geographic North Pole, is that it's banging in the middle of the ocean.

This is pretty much what a map would give you, and to get there you would have to literally ski over the frozen crust of the Arctic Ocean - the floating ice surface of the Arctic Ocean.

I have spoken with all the experts.

I would have read many books. I studied maps and charts.

But on the first morning, I realized I had no idea exactly what I was accepting myself for.

i was 23 years old. No one in my generation had attempted anything like this, and pretty quickly everything that could go wrong went wrong.

On the second day we were attacked by a polar bear.

My left toe was frostbitten.

Food began to become very scarce. We were both pretty hungry and had lost a lot of weight.

Some very unusual weather conditions, very difficult ice conditions.

We were clearly communicating in a low-tech way.

I couldn't afford a satellite phone, so I had an HF radio.

You can see two ski poles sticking out of the roof of the tent.

Wires hang down on both sides.

That was our HF radio antenna.

Two-way communication with the outside took less than two hours in two months.

Eventually I ran out of time.

We skied 400 miles. With just over 320 miles to the pole, we ran out of time.

It was too late for summer. The ice was beginning to melt. We spoke to Russian helicopter pilots over the radio, and they said, 'Guys, we're running out of time.

I have to pick you up. ”

And I felt that I had failed from the bottom of my heart.

I was a failure.

For as long as I can remember, I've had one goal, one dream - I couldn't even come close to it.

And while skiing on that first trip, to keep me motivated, I had two imaginary video clips that I would play over and over in my head when things got tough.

The first goal was to reach the pole itself.

I could clearly see it being filmed through the helicopter door. There was some sort of rock music playing in the background and I could see ski poles with Union Jacks flying in the wind.

I saw myself sticking the flag to the pole, you know, oh, what a great moment, the music reached a kind of crescendo.

The second video clip I envisioned was about returning to Heathrow Airport. Then the flashes of the cameras flashed, and I could see paparazzi, autograph hunters, and bookstores coming to sign me up again.

And of course neither of these things happened.

We never got to the pole, and no one knew about the expedition because we had no money to pay anyone for publicity.

and returned to Heathrow Airport. my mother was there my brother was there My grandfather was there -- he had a little Union Jack -- (Laughter) -- and that was it. I came back to live with my mother.

I was physically exhausted, mentally completely exhausted, and thought I was a failure.

I personally ran into a lot of debt from this expedition and spent every day lying on my mom's couch watching daytime TV.

My brother sent me a text message, sms. It was a quote from "The Simpsons." It said, "You tried hard and failed miserably.

The lesson is, don't try.

(Laughter) Let's fast forward three years. I finally got up off the couch and started planning another road trip. This time I wanted to go from Russia at the top of the map, to the winding North Pole in the middle, to Canada.

No one has fully crossed the Arctic Ocean on their own.

Two Norwegians did it as a team in 2000. No one had ever achieved it solo.

A very famous and accomplished Italian climber, Reinhold Messner, attempted the climb in 1995 and was rescued a week later.

He said the expedition was ten times more dangerous than Mount Everest.

So, for some reason, I knew I wanted to try this, but I knew I had to take a drastic approach in order to stand any chance of making it to Canada, let alone returning home safely.

This meant everything from perfecting a cut, sub-2-gram toothbrush to working with the world's leading nutritionists to develop a completely new and innovative nutritional strategy of 6,000 calories a day from scratch.

And the expedition started in February last year.

big support team. We had a film crew, a few logistics guys, my girlfriend, and a photographer.

It was pretty reasonable at first. I flew to Moscow with British Airways.

The next leg from Siberia to Krasnoyarsk was on KrasAir, a domestic Russian airline, spelled K-R-A-S.

The next moment we chartered a fairly old Russian plane and flew to the town of Hatanga. It was sort of the last piece of civilization.

Our cameraman turned out to be a pretty nervous aviator even at the best of times, but actually asked the pilot before we boarded the plane how long this flight would take. And the pilot--a Russian pilot--was completely deadpan, and replied, "Six hours to live."

(Laughter) We arrived in Katanga.

I think it's a joke that Katanga isn't the end of the world, but you can tell from there.

(laughs) I was planning to stay for one night. We were stuck there for ten days.

There was a sort of salary dispute between a helicopter pilot and a helicopter owner over vodka, and we were stuck. we couldn't move.

Finally, on the morning of the eleventh day, the weather cleared and the helicopter was loaded, two helicopters flew in tandem, and dropped me on the edge of the ice floe.

We spent 45 minutes filming and taking pictures like crazy. While the helicopter was still there, I interviewed by satellite phone. Then everyone else went back to the helicopter and, oh my God, the door closed and I was alone.

And I'm not sure words can accurately describe that moment.

All I could think of was running back to the door and knocking on it and saying,

(Laughter) To make matters worse, I see a white dot in the upper right corner of the screen. it's a full moon.

Of course, we were stranded in Russia, so the full moon brings highs and lows. Standing on frozen waters, high and low tides usually mean something interesting happens. The ice starts to move a little.

As you can see, I was pulling two sleds.

In total, 95 days of food and fuel, 180 kilos, or almost 400 pounds.

Both were able to pull when the ice was flat or flat.

I had no hope in hell when the ice wasn't flat.

I had to take one out, leave it and go back and get another one.

It literally pushes through what is called pressure ice. The ice was crushed by the pressure of ocean currents, winds and currents.

NASA said last year's ice conditions were the worst since records began.

And it's always floating. Drift ice is always drifting.

Last year, out of the 10 weeks I spent alone, I was skiing against the wind for 9 of them and skiing backwards most of the time.

My record was minus 2.5 miles.

We woke up, took down our tents, skied north for 7.5 hours, pitched our tents and found ourselves 2.5 miles back from where we left off.

I literally couldn't keep up with the ice flow.

(Video): So, day 22.

I lie down in my tent and prepare to leave.

The weather was terrible last night and oh man, I ended up going back five miles.

On subsequent expeditions, the problem was no longer ice.

It was ice-deficient, which means it was open water.

I knew this was happening. I knew the Arctic was warming.

I knew there was more open water. And I had a secret weapon.

This was my little biomimic.

Polar bears in the Arctic Ocean travel straight.

When it comes to the water's edge, it climbs up and swims across.

So I worked with a team in Norway to develop a dry suit that I could climb into, based on something like the survival suit worn by helicopter pilots. It pulled up over the boots, over the mittens, and around the face, making a pretty tight seal around the face.

This meant you could ski on very thin ice and even if you fell it wouldn't be the end of the world.

It also meant that if the worst happened, you could actually dive in, swim across, drag a sled and chase.

Quite radical technology, radical approach, but it worked perfectly.

Another exciting thing we did last year was in communications technology.

In 1912, Shackleton's Endurance expedition had one of its crew members, a man named Thomas Oude-Ries.

"Explorers in 2012 will definitely carry pocket radio phones with radio telescopes if they have anything left to explore," he said.

Well, Olde-Reese's guess was wrong for about eight years. This is my pocket wireless phone, an Iridium satellite phone.

The radio telescope was a digital camera that I had in my pocket.

And every day of the 72 days I was alone on the ice, I blogged live from my tent, sent a little diary, sent back information on the distance traveled, including ice conditions and temperatures, and a daily photo.

Remember, in 2001, we had less than two hours of radio contact with the outside world.

Last year I posted a live blog from an expedition said to be 10 times more dangerous than Everest.

Not everything was high tech. This is so-called white-out navigation.

As the fog increases and the clouds lower, the wind begins to blow snow.

I can't see much. As you can see, I have a yellow ribbon tied to one of my ski poles.

Use the wind direction to navigate.

So it's an odd combination of high-tech and low-tech.

Arrived at the poles on May 11th.

It took 68 days to arrive from Russia and there is nothing there.

(laughter).

The poles don't even have utility poles. There is nothing there because it is sea ice. drifting.

If you plant a flag there and leave it there, it will soon drift away, usually toward Canada or Greenland.

I knew that, but I expected something.

A strange and complex mixture of emotions. By this stage the temperature was very warm, there was plenty of open water around, and although I was of course delighted to be there on my own, I was beginning to realize that my chances of reaching Canada, 400 miles away, were at best slim.

The only evidence that I was there is a blurry picture of GPS, a small satellite navigation device.

As you can see, we have a string of 9s and zeros here.

90 N -- that's the slapstick at the North Pole.

I took a picture of it. sat in my sleigh I made something like a video diary.

I took some pictures. I took out my satellite phone.

I warmed the battery under my armpit.

I dialed 3 numbers. I called my mother.

I called my girlfriend. I called the sponsor's CEO.

I received 3 voicemails.

(laughs) (video): 90.

It's a special feeling.

The whole earth is spinning under my feet.

It's the whole world below me.

I finally got in touch with my mother. She was standing in line at the supermarket.

she started crying. She asked me to call her back.

(Laughs) I crossed the pole and skied for a week.

I wanted to get as close to Canada as possible before the situation became too dangerous to continue.

This day was my last day on the ice.

When I spoke to the project management team, they said, 'Look, Ben, things are getting too dangerous.

There is a large body of water just south of your position.

I would like to pick you up.

Ben, can you find the runway for me? ”

This was the view outside the tent when I received the fateful phone call.

I had never tried to build a runway before. Tony, the expedition's manager, said, "Hey Ben, we have to find 500 meters of flat, thick, safe ice."

The only ice I found was exactly 473 meters after 36 hours of skiing to find the runway. I was able to measure it with a ski board.

I didn't tell Tony about it. I didn't say that to the pilot.

I thought that was the only way.

(Video): Oh, oh, oh, oh, oh, oh

It almost worked. It was a pretty dramatic landing. The plane actually flew over four times, but I was a little worried that it wouldn't land at all.

I knew the pilot was named Troy. I had expected Troy to be a pretty tough dude for a living.

By the time the plane landed, I was wide-eyed and crying. It was quite an emotional moment.

So I thought I had to make up my mind for Troy.

I'm supposed to be the rough, tough explorer type.

The plane taxied to where I was standing.

The door has opened. This man jumped out. He is that tall. He said, "Hello, my name is Troy."

(laughter).

The co-pilot was a woman named Monica.

She was sitting there wearing what looked like a knitted jumper.

They were the least macho people I've ever met, but they made my day so much fun.

Troy was smoking on the ice. we took some pictures. he climbed the ladder. He said, "Anyway, get in the back."

He rode in front and threw out his cigarette while I rode in the back.

(Laughter) After walking up and down the runway a few times to flatten it out a bit, he said, And although he has now learned that this is standard practice, it worried me at the time.

he put his hand on the throttle.

You can see that the engine controls are actually on the cockpit roof.

It's a small bar over there. he put his hand on the throttle.

Monica put his hand over him very softly.

I thought: "God, let's go. We, we, this is all or nothing."

thrust forward. I jumped onto the runway. We have just taken off.

One of the skis has just clipped and banked a pressure ridge at the end of the runway. I peered into the cockpit and saw Troy struggling with the controls. He let go of one hand, reached back, and simply flipped a switch on the cockpit roof. It was the "Fasten your seat belt" sign on the wall.

(Laughter) And you could only see the big picture from the air.

Of course, when you're on ice, you can only see one obstacle at a time, whether it's a pressure ridge or a bit of water.

Perhaps this is why the runway length was not an issue.

I mean, we were really starting to break up.

why? I'm not an explorer in the traditional sense.

I'm not skiing while drawing a map. Everyone knows where the North Pole is.

Antarctica has a large scientific base. There is a runway.

There are also cafes and tourist shops.

For me, this is about exploring human limits, exploring the limits of physiology, psychology and technology. Those are the things that excite me.

And it is also a question of potential on an individual level.

For me, this is a chance to explore the limits. Really push the limits of your own possibilities and see how far they can go.

And in a broader sense, it amazes me that people go through life just scratching the surface of their potential and just doing the 3, 4, 5 percent of what they're really capable of. So, in a broader sense, I hope that this journey will inspire others to think about what they want to do with their potential and what each of us wants to do with the little time we have on this planet.

As far as I can summarize, this is the closest thing to it.

The next question is how to answer nature's call to minus 40 degrees.

Of course, the answer is a trade secret. And last question, what's next?

Antarctica is next.

It is the coldest, highest, windiest and driest continent on earth.

In late 1911 and early 1912 there was a race to be the first to reach the South Pole, the center of Antarctica.

Including the coastal ice shelf reveals that the Ross Ice Shelf is the largest ice shelf here. The Ross Ice Shelf is the size of France.

Antarctica is a very large continent, twice the size of Australia including its ice shelves.

And there is a race to the pole between Amundsen, a Norwegian (who owned dog sleds and huskies) and Captain Scott, an Englishman.

Scott had a pony, a tractor and several dogs, but all went wrong and Scott and his team of four ended up on foot.

When they arrived at the poles in late January 1912, the Norwegian flag was already there.

There was a tent and a letter to the King of Norway.

They then turned and returned to the coast, all five dying on the way back.

Since then, no one has skied. This was 93 years ago, and since then no one has skied from the coast of Antarctica to the North Pole and back.

All Antarctic expeditions you may have heard of have departed from the poles by plane or made some sort of crossing using vehicles, dogs, kites, etc., and none have returned. That's the plan.

I'm doing it with two people.

That's all.

The last thing you want to think about before going to the bathroom is having this. I meant to scan this but forgot. But I have a school report. I'm 13 and it's framed on my desk at home. It reads, "Ben lacks enough impetus to accomplish anything worthwhile."

(Laughter) (Applause) If I've learned anything, it's this. It means that no one else has authority over your potential.

Only you decide how far you can go and what you can do.

Folks, this is my story.

thank you very much.

Start by reading a poem.

"Oh dear dentist, your rubber finger in my mouth...

Your voice is so soft and muffled...

Put your mask down, dear dentist, put your mask down. ”

(Laughter) Now, in this presentation, we're going to train the right brain through some pretty serious training.

I see a lot of images that aren't necessarily related to what I'm talking about. So split your head in half, let the image flow on one side, and listen to me on the other.

I am one of those people with a transformative personal story.

Six years ago, after working in graphic design and typography for 20 years, I changed the way I work, and the way most graphic designers work, in pursuit of a more personal approach to my work. It was just a humble attempt to make a living doing what I love.

But something strange happened.

I became strangely popular.

My current work seems to resonate with people and I am so amazed that I often wonder what the hell is going on.

And little by little, I realized that the appeal of what I was doing might have something to do with why I was doing it.

I call myself a graphic artist these days.

So my job as a graphic designer was to follow strategy, but now my job is to follow my heart and interests, guided by my ego, to produce work that is mutually beneficial for myself and my clients.

Now, this is heresy in the world of design.

Ego should not be involved in graphic design.

But for myself, without exception, I find that the more I treat a work as my own and personal, the more compelling, interesting, sustainable and successful it becomes.

In short, I exist a little outside the mainstream of design thinking.

Others may focus on measurable results, but I tend to be more interested in more ethereal qualities such as "does it bring joy?"

Do you have a sense of wonder?

"Does it arouse curiosity?"

By the way, this is a scientific diagram.

I don't have time to explain, but this has to do with DNA and RNA.

That's why I take a special, imaginative approach to my visual work.

What I'm interested in when I work is visual structure, surprises, and the need to make sense of things.

For this reason, I am particularly drawn to systems and patterns.

Here are some examples of how my brain works.

This is a piece I contributed to the British Guardian newspaper.

They have a magazine called G2.

This is the 2007 puzzle feature.

And it's incomprehensible.

I started by creating a series of tile units.

These tiling units were specially designed to contain part of the shape of a letter within its shape so that these parts could be joined together to create letters and words within an abstract pattern.

But at the same time, they could be flipped, rotated, and combined in various ways to create regular or abstract patterns.

Now here's another word puzzle.

And this is the abstract surroundings.

And as you can see, it's very hard to read.

But all I have to do is fill in the specific area of ​​those letters so I can pick those words out of the background pattern.

But that might be a little too obvious.

So you can add some color to the background and add a little more color to the words themselves. This way, you can work with the art director to bring it just right where it's puzzling to the audience. The audience can understand that there is something to read, but it is not impossible for the audience to read.

I'm also interested in treating unusual or common materials in unusual ways.

So this requires understanding how to make the most of the inherent properties of something and how to bend it to your will.

So, ultimately, my goal is to produce something unexpected.

To this end, I've been working with sugar under three-time TED speaker Stefan Sagmeister.

And this project basically started on my kitchen table.

I've been eating cereal for breakfast all my life.

And for the same amount of time I spilled sugar on the table and played with my fingers.

And in the end, I used this technique to create a work.

Then I used it again to create six pieces for Stephen's book Things in My Life I've Learned So Far.

These were created freehand, without sketching, by placing sugar on a white surface and manipulating it to draw letters and designs from it.

Recently, I've also made a rather lofty baroque border using sleazy pasta.

This is the chapter I'm doing in the book, and the chapter is about honor.

Surprisingly, this refers to macaroni art that children make for their parents, or make at school and give to their parents, which is an honor in itself.

You can do this with household aluminum foil.

This is what you can do with aluminum foil at home.

(Laughter) I'm strangely very interested in design as a catalyst for exploration.

Saying "I wonder" is the same as saying "I wonder", "ask".

And to experience wonder is to experience awe.

So I'm currently writing a book that plays with both senses. Exploring my own ideas and quests while visualizing peacock-like grandeur.

The world is full of wonders.

But the world of graphic design, for the most part, is not.

So I use my writing as a kind of test bed for books with a kind of seductive interdependence between words and images.

I think one of the things that religion did right was that it used visual wonders to convey its message.

I think this true fusion of art and information is woefully underutilized in adult literature. I'm wondering why visual richness isn't more commonly used to enhance intellectual richness.

When you see a work like this, you tend to associate it with children's literature.

Decorative graphics are meant to detract from the seriousness of the content.

But I really want the opportunity to change that perception.

This book will take a long time, but I will finish reading it soon.

For some reason, I thought I should put a break in my talk.

That's all. Please give me and you time to update me.

(laughter) That's why I do Valentine's Day.

I have been sending valentines on a fairly large scale since 2005.

These are my Valentines from 2005 and 2006.

And I started by creating just one image like this and sending it to each person.

But in 2007, I had the cockamamie idea of ​​hand-painting Valentine's Day for everyone on my mailing list.

I have reduced the mailing list to 150 people.

And I drew each one their own valentine, wrote their name on it, numbered it, signed it and shipped it out.

Believe it or not, I devised this as a way to save time.

I was so busy at the beginning of the year that I didn't know when I would have time to design and print a valentine.

And I thought maybe I could do this bit by bit while traveling.

It didn't work out that way at all.

This one has a longer story to tell, but it was all done in time and was very well received.

We were able to get an almost 100% response rate.

(laughter) And those who did not respond will never receive anything from me again.

(Laughter) Last year, I took a more conceptual approach to Valentine's.

I had an idea that people would like to receive some kind of mysterious love letter, like a piece found in a mailbox.

I wanted it not to be addressed to them, not signed by me, so that they would wonder what the heck it was.

And I wrote 4 pages that are not particularly connected.

There were 4 different versions of this.

And I wrote it so that it starts in the middle of the sentence and ends in the middle of the sentence.

I avoid specific names and places because they are universal on the one hand, but also personal on the other.

That's why I wanted people to feel that they received something like a love letter.

Read one of them.

"You've never really been convinced of this, but I guarantee you that this habit of being self-conscious is very attractive.

Just accept that this part of you runs away with your smile, and that those of us who notice it will gladly catch it as we pass by.

Spending time with you is like chasing and catching a little bird, but without the scratches and the bird droppings. ”

(Laughter) "I mean, your thoughts and words fly around, sometimes bewildering and elusive, but when you get caught and examined, oh, what a wondrous and very pleasant reward.

There is no time to pass with you, just collecting. It is a collection of moments that I hope will be released as soon as they are preserved.

impossible? i don't think so.

I know you're embarrassed.

I'm sure you can see that your face is blushing.

But I have to say this because sometimes I hear your voice of self-doubt, and it's so devastating to think that you might not know how amazing, how inspiring, how fun you are, and how really, really perfect you are..."

(Laughter) (Applause) Valentine's Day is just a few days away, and Valentine's Day is now arriving in mailboxes around the world.

This year, I have to say, a really cool idea: laser cut Valentine's cards out of used Christmas cards.

So I asked my friends to send me their used Christmas cards and made 500 Christmas cards.

Each one is completely different.

I'm really, really excited about them.

Not much else to say but they did really well.

I spend a lot of time at work.

And one of the things I've been thinking about lately is what is value?

What would be worth spending my time and life on in this way?

Working in the world of commerce, this is something you sometimes struggle with.

Sure, money can get swayed.

But all in all, I don't think it's a worthy goal.

What makes anything valuable to me is the people I work with, the conditions I work in, and the audience I can reach.

So I might ask: "Who is it for?"

"What's written on it?"

and "What does it do?"

Let me tell you, it's really hard for someone like me, an incredibly smart mind who thinks about really big-picture, world-changing, life-changing ideas and technologies, to get on stage at this conference.

And it's all too often for designers and visual arts people to feel that we're not contributing enough, or worse, that all we're doing is contributing to the landfill.

Here we are; show you some beautiful visuals and talk about aesthetics.

However, I have come to believe that truly imaginative visual works are very important in society.

Just as we draw inspiration from all kinds of books and magazines, conversations and movies, I think that when we put our visual work in the mass media, we sow the seeds of the public imagination with works that are interesting, unusual, intriguing, perhaps open to the inquisitive mind.

And because inspiration is something that cross-pollinates, you never know who will take something out of it and turn it into something else.

So my work can inspire playwrights, novelists and scientists, and it can be the seed that inspires doctors, philanthropists and babysitters.

And this is not something that can be quantified, tracked or measured, and we tend to underestimate what we cannot measure in society.

But I truly believe that a fully functioning, prosperous society needs these seeds coming from all directions and all fields to keep the wheels of inspiration and imagination circulating and growing.

That's why I do what I do, why I put so much time and effort into it, and why I work in the commercial, public realm rather than the isolated, private realm of art.

And I realize that there is a real meaning in spending such a limited and precious time on this earth.

And thank you for letting me see it.

(applause)

I am very happy to be here.

I am very happy to speak after Brian Cox of CERN.

I think CERN is the home of the Large Hadron Collider.

What Happened to the Small Hadron Collider?

Where is the Small Hadron Collider?

Because the Small Hadron Collider used to be big.

Today, the Small Hadron Collider sits in a cupboard, overlooked and neglected.

When the Large Hadron Collider started, when it didn't work, people tried to figure out why, but it was the Small Hadron Collider Team that thwarted it.

The entire Hadron Collider family must be unlocked.

In a way, that's exactly what Brian's presentation, and all these great photos, teach us. That point of view determines everything you see.

What Brian was saying is that science has opened up more and more different perspectives from which we can look at ourselves, and that's why science is so valuable.

So the perspective from which you look determines everything you can actually see.

The kind of question you ask determines a lot of the answers you get.

So, when I ask the next question, "Where do you expect the future of education?"

The answer we've traditionally given to that, at least for the last 20 years, is pretty simple. "I'm going to Finland".

Finland has the best school system.

Finns may be a little boring and melancholy and have a very high suicide rate, but stupidly, they deserve it.

And they have a really great education system.

So we all go collectively to Finland, marvel at the miracle of Finnish social democracy and its cultural homogeneity and everything else, and struggle to imagine how we can bring back lessons.

Well, last year, with the help of Cisco, who sponsored me, I was looking elsewhere to do this.

Because sometimes radical innovation actually comes from the best people, but more often it comes from places where there is huge need (potential unmet demand) and insufficient resources to make traditional solutions work: traditional high-cost solutions that rely on experts, schools and hospitals.

That's how I ended up here.

This place is called Monkey Hill.

One of the hundreds of favelas in Rio.

Most of the population growth over the next 50 years will occur in cities.

Over the next 30 years, there will be 6 more cities with 12 million people each.

Almost all of that growth will take place in the developed world.

Almost all of that growth will be concentrated in places like Monkey Hill.

It is home to the world's fastest growing youth population.

So if you want to apply recipes to virtually anything: health, education, government politics, education, you have to go to these places.

When I go to places like this, I meet people like this.

A man named Juanderson.

Like many 14-year-olds in the Brazilian education system, he dropped out of school at age 14.

it was boring.

And Juanderson instead tackled something that offered a kind of opportunity and hope for the place he lived in: the drug trade.

After a rapid rise, by the age of 16, he was running a drug business with 10 favelas.

He was making over $200,000 a week.

He employed 200 people.

He was due to die by the age of 25.

And luckily he met a man named Rodrigo Baggio. He is the first laptop owner to appear in Brazil.

In 1994 Rodrigo started something called CDI. This involved placing corporate-donated computers in favela community centers to create places like this.

What changed Juanderson was learning technology that made learning fun and accessible.

Alternatively, you can go to a place like this.

Kibera is the largest slum in East Africa.

Millions of people live here and it stretches for many kilometers.

There I met these two, Azra on the left and Maureen on the right.

They have just obtained their diploma in secondary education in Kenya.

Just look at the name and you'll see that Kenya's education system borrows almost everything from circa-1950s England and makes it even worse.

There is a school in such a slum.

This is the place.

That's the school Maureen attended.

they are a private school. There are no public schools in the slums.

And the education they received was miserable.

There was also a place like this. This is a school founded by nuns in another slum called Nakuru.

Half of the children in this classroom have no parents because they died of AIDS.

The other half have one parent, but the other has died of AIDS.

So the challenge of education in a place like this is not to learn the kings and queens of Kenya or England.

They want to stay alive, make a living, and not become HIV-positive.

The only technology that straddles the rich and poor in a place like this has nothing to do with industrial technology.

It has nothing to do with electricity or water.

it's a cell phone.

If you want to design virtually any service from scratch in Africa, you're probably starting now with mobile phones.

Alternatively, you can go to a place like this.

This is a place called Madangiri Settlement, a very developed slum about 25 minutes from New Delhi. There I met these characters who had guided me through the day.

What is remarkable about these girls, and a sign of a kind of social revolution sweeping the developing world, is that they are not married.

Ten years ago they would definitely have been married.

Now they are not married and want to study further and build a career.

They were raised by mothers who were illiterate and never did their homework.

There are millions, tens of millions, hundreds of millions of parents in developing countries who are doing homework and exams with their children for the first time.

And the reason they continue their studies is not because they went to a school like this.

This is a private school.

This is a paid school. This is a good school.

This is the best you can get in Hyderabad in Indian education.

This was the reason why they continued their studies.

This is a computer installed at the entrance of a slum by a revolutionary social entrepreneur named Sugata Mitra, where he conducted the most radical experiment, showing that under the right conditions children could learn on their own with the help of computers.

They have never touched Google.

They know nothing about Wikipedia.

Imagine what their lives would be like if you could get it to them.

So, if you, like me, look through this tour through about 100 case studies of different social entrepreneurs operating in these very extreme situations, and look at the recipes they've come up with to learn, they're nothing like school.

what do they look like?

Well, education is a world religion.

And education and technology are great sources of hope.

You can go to places like this.

This is a school three hours away from São Paulo.

Most of the children there have illiterate parents.

Many of them have no electricity at home.

However, they find things like using computers and websites, making videos, etc. completely obvious.

When you go to a place like this, you realize that education in an environment like this works by pull, not push.

Most of our education system is push type.

I was literally shoved into school.

When you go to school, you are forced to do a lot of things: knowledge, exams, systems, timetables.

It doesn't make much sense to have a compulsory education course if you want to attract people like Juanderson who can buy guns, wear jewelry, ride motorcycles, and catch girls in the drug trade.

It wouldn't really charm him.

you have to pull him

Therefore, education should work by pull, not push.

Therefore, in such an environment, the idea of ​​a curriculum makes no sense at all.

We need to start education by making a difference in our children's environment.

what is that?

Well, the key is motivation, but there are two sides to it.

One is to provide the extrinsic motivation that education has consequences.

All of our educational systems work on the principle that there is a payoff, but you have to wait for quite some time.

It's too long if you're poor.

If you need to meet your daily needs, take care of your siblings, or have a business to help out, waiting ten years for the rewards of your education is too long.

Therefore, proper education is needed and people should be helped to earn a living on the fly.

And you also have to make it inherently interesting.

So many times I have found such people.

A wonderful man named Sebastian Rocha, who lives in Belo Horizonte, the third largest city in Brazil.

He has invented over 200 games to teach virtually every subject under the sun.

At the school and community where Taio works, the day always starts in a circle and always with a question.

Imagine an education system that started with questions rather than knowledge to impart, or games that started with lessons rather than lessons, or an education system that started with the premise that you must first engage with people before you can teach them.

In our education system, if you're lucky, you can do sports, theater, music, all sorts of things later.

These things they teach thoroughly.

They attract people to study because it is really a dance project or a circus project or a music project the best example of which is El Sistema in Venezuela.

So instead of adding it after all the learning is done and eating cognitive vegetables, it engages people in learning through it.

So in El Sistema, Venezuela, we use the violin as a learning technique.

Taio Rocha uses soap making as a learning technique.

And when you participate in these projects, you'll find people and places used in amazing and creative ways.

Massive peer learning.

How do you educate people when there are no teachers, when teachers don't come, when you can't afford to hire teachers, and even if you hire teachers, when what they teach isn't relevant to the communities they serve?

Well, make your own teacher.

Create peer-to-peer learning, create associate teachers, or introduce professional skills.

But we find ways to get people relevant learning through different technologies, people and places.

This is a school inside a bus on a construction site in Asia's fastest growing city, Pune.

Pune has 5,000 construction sites.

There are 30,000 children at those construction sites.

It's a city.

Imagine cities exploding across the developing world and thousands of children spending their school days on construction sites.

This is a very simple plan for providing learning to students through the bus.

And all of them treat learning not as some sort of academic, analytical activity, but as something productive, something you make, something you can do, and perhaps even make a living off of.

There I met a character named Stephen.

He spent three years living on the streets in Nairobi after his parents died of AIDS.

And he was eventually sent back to school, not on a GCSE offer, but on an offer to learn practical building skills to become a carpenter.

That's why the world's trendiest schools, high-tech high schools, etc., uphold the philosophy of learning as a productive activity.

You don't really have a choice here.

For learning to be meaningful, learning must be productive.

And finally, they have different scale models. It's a Chinese restaurant model of how to scale.

And I learned that from this guy, he's an amazing person.

He is perhaps the world's most remarkable educational social entrepreneur.

His name is Madhav Chavan and he created what is called Pratham.

And Pratham now runs preschool playgroups for 21 million children in India.

The world's largest educational NGO.

We also support working-class children who go to school in India.

He is a complete revolutionary.

He was actually a trade union organizer and thus learned the skills of building an organization.

Once they reached a certain stage, Pratham grew big enough to collect free support from McKinsey.

McKinsey came up, looked at his model and said, "Maduff, do you know how to do this?"

Should change it to McDonald's.

Visiting a new site is like expanding a franchise.

And it's the same wherever you go.

It's reliable and people know exactly where they are.

And make no mistake. ”

And Madduff said, "Why should we do it like that?

Why can't it be more like a Chinese restaurant? ”

Chinese restaurants are everywhere, but not Chinese restaurants.

But we all know what a Chinese restaurant is.

Even if it's subtly different, different colors, different names, they know what to expect.

You can tell it's a Chinese restaurant.

These people work not in the McDonald's model, but in the Chinese restaurant model of the same principles, different applications, different settings.

McDonald's model scales.

The Chinese restaurant model spreads.

Mass education thus originated with social entrepreneurship in the 19th century.

And that is what we desperately need again on a global scale.

And what can we learn from all of this?

We can learn a lot because our education system is failing hopelessly in many ways.

Unable to reach the people most in need of service.

They achieve their goals, but often miss the point.

It is becoming increasingly difficult to organize improvements. Our faith in these systems is incredibly disturbing.

This is a very easy way to understand what innovations, what different designs are needed.

There are two basic types of innovation.

There are sustainable innovations that maintain existing institutions and organizations, and disruptive innovations that dismantle them and create new ways of doing things.

There are formal environments where innovation takes place, such as schools, universities, and hospitals, and informal environments such as communities, families, and social networks.

Almost all of our efforts have been poured into this box to maintain innovation in the formal setting and to obtain a better version of the essentially Bismarckian school system that developed in the 19th century.

And, like I said, the problem with this is that developing countries don't have teachers to make this model work.

Millions of teachers will be needed in China, India, Nigeria and other developing countries to meet the needs.

And we know that in our system, simply making this even stronger will not eat into deep educational inequalities, especially in urban centers and former industrial areas.

That's why we need three more types of innovation.

We need more reinvention.

And now we see more and more schools around the world reinventing themselves.

They are clearly schools, but they look different.

There are big picture schools in the US and Australia.

There is a Kunskaskoran school in Sweden.

Only 2 of the 14 are attending school.

Most of them are in other buildings not designed as schools.

There is a wonderful school in North Queensland called Jaringan.

And they all have the same kind of characteristics. Highly collaborative, highly personalized, and often prevalent technology, learning that begins with questions, problems, and projects rather than knowledge and curriculum.

So it's definitely needed more.

However, many of the problems in education are not only in schools, but also in families and communities, so what is definitely needed is the one on the right.

Efforts must be made to supplement the school.

The most famous of these is Reggio Emilia in Italy. This is a family-based learning system to support and encourage people in school.

Most exciting is the Harlem Children's Zone, led by Geoffrey Canada, which for more than a decade has sought to combine schooling with family and community projects to transform not just education in schools, but the entire culture and aspirations of some 10,000 families in Harlem.

We need more of a whole new and radical way of thinking.

Within an hour from this room, we can be down the road where we need it, where we need the kind of radicalism we never imagined.

And finally, we need transformative innovations that can be imagined to bring learning to people in entirely new and different ways.

So, in 2015, we are on the cusp of the astounding achievement of schooling the world.

By 2015, all children up to the age of 15 who wish to attend school will be able to do so.

That's amazing.

But unlike the automobile, which developed so rapidly and orderly, the school system was in fact a distinct legacy from the 19th century, inherited from the German Bismarck model of schooling adopted by British reformers and often by religious missionaries, taken up as a social cohesion in the United States and then in the developing Japan and South Korea.

Its roots are clearly 19th century.

And, of course, it's a great achievement.

And of course it will bring great things.

It brings skills and learning and reading.

But it also wastes your imagination.

It wastes your appetite. It will erode social credibility.

It will both liberate society and stratify society.

And we are dedicating a century to reforming the school systems of the developing world.

That is why we need truly radical thinking, and radical thinking is more possible and needed than ever before in the way we learn.

thank you. (applause)

When I was ten, my cousin took me on a tour of medical school.

And as a special treat, he took me to the pathology lab and took a real human brain out of a jar and put it in my hand.

And there, in my hands, was the seat of human consciousness, the power source of the human body.

And that day, I knew I was going to be a neurologist or a scientist or something when I grew up.

After many years, when I finally became an adult, my dream came true.

That was while I was doing my PhD.

In researching the neurological causes of dyslexia in children, I came across an amazing fact that I would like to share with you today.

It is estimated that one in six children, or one in six, has some form of developmental disability.

This is a disorder that slows the mental development of children and causes permanent mental disorders.

This means that everyone here today knows at least one child who suffers from a developmental disability.

But here's where I got really stumped.

Despite the fact that all of these disorders originate in the brain, most of these disorders are diagnosed based solely on observable behavior.

But diagnosing brain disease without actually looking at the brain is akin to treating a patient with heart disease based on physical symptoms, without an ECG or even a chest x-ray to look at the heart.

It seemed so intuitive to me.

Accurate diagnosis and treatment of brain diseases requires direct observation of the brain.

Observing behavior alone can miss important pieces of the puzzle and give an incomplete or misleading picture of your child's problems.

However, despite all the advances in medical technology, the diagnosis of brain disorders in 1 in 6 children is still very limited.

And I met a team at Harvard University that took such advanced medical technology and eventually applied it not to brain research, but to diagnosing pediatric brain disorders.

Their ground-breaking technology records EEG (brain electrical activity) in real time, allowing us to observe how the brain performs different functions and detect even subtle abnormalities in any of its functions such as vision, attention, speech and hearing.

A program called electrical brain mapping then triangulates the cause of the abnormality in the brain.

Another program called Statistical Probability Mapping can then perform mathematical calculations to determine whether these abnormalities are clinically significant and provide a more accurate neurological diagnosis of the child's symptoms.

So I became head of neurophysiology for the clinical department of this team, and finally we were able to use this technology to actually help brain-injured children.

And I am happy to say that we are now in the process of establishing this technology here in India.

I would like to talk about such a child who was also featured on ABC News.

Seven-year-old Justin Seniger came to our clinic with a diagnosis of very severe autism.

Like many autistic children, his mind was trapped inside his body.

There were moments when I actually spaced out for a few seconds at a time.

And doctors told his parents that he would never be able to communicate or socialize, and he probably wouldn't use language excessively.

Using this groundbreaking electroencephalogram technology to actually observe Justin's brain yielded surprising results.

It turns out that Justin is almost certainly not autistic.

He was suffering from brain attacks that were invisible to the naked eye, but actually caused symptoms similar to autism.

After Justin was put on anti-seizure medication, his transformation was amazing.

Within 60 days, his vocabulary grew from 2-3 words to 300 words.

And his communication and social interaction improved dramatically, he entered a regular school and even became a karate super champion.

Studies show that 50 percent, almost 50 percent, of children diagnosed with autism actually suffer from hidden brain attacks.

These are the faces of children I tested in stories, just like Justin.

All of these children came to our clinic with diagnoses of autism, attention deficit disorder, mental retardation, and speech impediments.

Instead, our EEG scans revealed very specific hidden problems in their brains that their behavioral assessments probably failed to detect.

These EEG scans have therefore enabled us to provide these children with a more accurate neurological diagnosis and a more targeted treatment.

For too long, children with developmental disabilities have been plagued with misdiagnosis while their real problem has gone undiscovered and left to escalate.

And these children and their parents have suffered undue frustration and despair for far too long.

But we are now entering a new era of neuroscience that finally allows us to directly observe brain function in real time, non-invasively, without risk or side effects, and find the true causes of many disabilities in children.

So if even a fraction of today's audience can be encouraged to share this pioneering diagnostic approach with even one of the parents whose children suffer from developmental disorders, perhaps one more brain puzzle will be solved.

Another heart will be unlocked.

And another child, misdiagnosed or undiagnosed by the system, will finally realize his true potential while his brain still has time to recover.

All of this is possible simply by observing a child's brain waves.

thank you.

(applause)

So these are the dark ages.

And the Dark Ages are the period from when I was a kid when I last put away my Lego until when I became an adult and decided it was okay to play with children's toys.

My son, who was four years old at the time, said: "Oh, you should buy this kid some Lego.

That's cool. ”

I entered the Lego store.

I bought this for him.

It's perfect for a 4 year old.

(Laughter) I think it says "8-12" on the box.

I turned to my wife and said, "Who are you buying this for?"

She's like, "Oh, it's us." I'm like, "Okay, okay, that's cool."

It quickly got a little out of control.

The dining room looked like this.

It hurts to walk there.

So we rented a room in the basement, which was used as a kind of annex to Abu Ghraib.

(laughs) Torture, very funny.

wow you guys are awesome.

And then I laid down a little floor tile and then I went to eBay and bought £150 of Lego -- (Laughter) This is insane.

My daughter--the day I received her--I hugged her and said, "Honey, you're my treasure."

Then she said, "No, Lego is a treasure."

(Laughter.) And she said, 'Dad, we're rich with Lego.'

I said, "Yes.

We think so. ”

So when you do that, it's like, "Oh shit, where are you going to put this?"

So you go to The Container Store, spend tons of money, and start a crazy sorting process that never happens. It's just insanity.

Anything is fine.

Then I realized that there are these conventions.

And going to these conventions, a man built the Titanic.

And you say, "Oh my God!

He had to come with it like a truck, like a semi-truck. ”

And someone built this - this is Seattle's Smith Tower.

Simply beautiful.

And then there's the guy who sells these aftermarket weapons for Lego, because Lego, the Danes, no, they're not into guns.

But what about Americans? Oh, let's build a gun out of Lego, no problem.

And at some point, you'll look around and think, "Wow, this is really a bunch of geeks."

So this is a bunch of geeks, but it's kind of a few levels above fur.

(Laughter) The nerds here, except for the women with the condoms in their pockets, have sex, but at some point you say to yourself, "Am I part of this group? Am I interested in this?"

And I just thought, "Yeah, I think so."

It will come out.

I'm interested in these things, so I'll stop being shy. ”

So I'm really hooked and I think, 'The Lego guys in Denmark, they have all the software to let you build your stuff virtually.'

It's like building this CAD program.

And whatever you design virtually, click a button and a week later it will appear on your doorstep.

And some of the designs that people actually sell in stores.

Strangely, the Lego guys didn't pay any royalties, but a user made this and it sold.

And it's actually pretty amazing.

Second, if the Lego-provided CAD programs aren't enough for you, you'll find that open-source, third-party, and independent Lego CAD programs exist entirely. With it, you can do 3D modeling and 3D rendering to actually create a movie out of Lego. There are thousands of 3D movies on YouTube, made to look like famous movies or completely original content (just beautiful), and people are recreating all sorts of things.

I have to take some time.

I love guys who run away with clasps and hooks.

have understood. anyway.

(Laughter) With all the programming languages ​​and robotics tools out there, what if you want to teach someone how to program, whether you're a child or an adult?

The person who made this made a slot machine out of Lego.

It doesn't mean he made a Lego that resembles a slot machine. So he built a slot machine out of Lego.

The contents were Lego.

There are people who are drunk building Lego, but they have to finish it before they throw up.

Lego has a gray market and thousands of home businesses.

And some people sell this little guy to finance their entire Lego habit, but in that case you don't have a man on your ship.

Here are some examples: This is just a sculpture.

This is amazing.

Please don't joke. Architectural details, incredibly organic shapes, and once again nature is created from small blocks.

this is my house

And here is my house.

I was worried that a car would hit me while I was taking pictures for you guys.

I just don't have time.

But very quickly -- let's see if we can do this quickly.

Because there aren't enough TED logos around here.

(Laughter) Let's see here.

have understood.

just.

(applause)

My best friend recently had a baby.

And when I met him, I was awed to see this small, beautiful being enter our lives.

I also realized that he wasn't just entering our lives, he was entering the world, especially this crazy world that I find incredibly challenging right now.

In my work, I spend a lot of time talking to people about who we are, who we should be, and what our healing looks like.

So when I held him for the first time, I had words of encouragement ready.

I wanted him to know that the way we find our strength is through challenges.

We all wanted him to know that if we start small, we can achieve something big.

We all wanted him to know that he is more resilient than we could ever imagine.

So I'm holding little Thelonious.

I looked down at him and thought, "He's a baby."

(laughter) He's not going to understand a word of what I say to him.

So I thought it would be a better idea to go home and write instead.

I mean, this is for adults, but when Thelonious is old enough to read, the world will tell you to be a better person.

Don't be afraid to say yes.

Start by becoming a good listener.

Start by getting better at walking on the road.

see people

say hello "

Ask how they are doing and listen to what they have to say.

Start by being a better friend, a better parent, and a better child to your parents. A better brother, a better lover, a better partner.

Start by being a better neighbor.

Meet strangers and get to know them.

The world will say to you, "What are you going to do?"

Don't be afraid to say, "I know I can't do everything, but there is something I can do."

Say "I'm here to help" and go into more rooms.

Be generous and intimate.

Give what you can and do what you can.

Give dollars, give cents, give time, give love, give hearts, give spirits.

The world will tell you, "We need peace."

Find peace in your heart, keep it sacred, and carry it with you wherever you go.

We cannot share or create peace with others unless we first create it within ourselves.

The world will tell you 'they are the enemy'.

Be loving enough to understand that just because someone disagrees with you, it doesn't make them your enemy.

You may not win an argument, you may not be able to change your mind, but you can always achieve a victory of fundamental empathy, the understanding of the mind, if you set your mind to it.

The world will tell you, "We need justice."

investigation.

Find the truth beyond the stories told.

Find the truth beyond the appearance of things.

Ask "Why?"

Ask, "Is this fair?"

Ask, "How did you get here?"

Do this with compassion.

Do this with forgiveness.

Learn to forgive others.

Start by truly learning how to forgive yourself.

We are all beyond mistakes.

We are all more than who we were yesterday.

We all deserve dignity.

See yourself in others.

Recognize that your justice is my justice and my justice is yours.

If one of us is not free, the other cannot be freed.

(Applause.) The world will tell you, "I am violent."

Answer "No."

Not my words or actions. ”

The world will tell you, "I need to heal the earth."

Start by saying, "No, thank you. You don't need a plastic bag."

Recycle, reuse.

First, pick up one garbage on the block.

The world will tell you 'too many problems'.

Join the solution without fear.

Let's start by discussing the problem.

You cannot overcome what you ignore.

The more we talk about things, the more we realize that problems are connected because we are connected.

The world will tell you that racism needs to end.

Start by fixing it in your own family.

The world will say to you, "How can I speak to prejudice and prejudice?"

Have an initial conversation at your kitchen table.

The world will tell you 'so much hate'.

Dedicate yourself to love.

Love yourself and learn to love others without obstacles or criticism.

When the world asks us a big question that requires a big answer, we have two choices.

The first is that we do nothing because we feel so overwhelmed or unqualified.

The second is to qualify yourself, starting with one small action.

I am the Director of National Security and so are you.

Perhaps no one appointed us, no Senate approval, but we can secure the state.

Helping just one person stay safe makes a nation safer.

With just one hand held out, "Are you okay?"

I'm here for you" can turn anxiety into relief.

We find ourselves saying to the world, "What should we do?" "What should we do?"

A better question might be "How does it show up?"

I want peace in the world, but do I feel peace when I see my family and friends?

I ask the world to end hatred, but am I showing love not only to those I know, but also to those I do not know?

Am I showing love to those whose ideas conflict with mine?

I want the world to end suffering, but will I appear on the street to those suffering?

We say to the world, “Please change, we need change.”

But how can we change our lives?

How can we change the lives of people in our community?

James Baldwin said, "Now we must assume that everything is in our hands. We have no right to assume otherwise."

This has always been true.

No one named Harriet Tubman for her purpose, mission, and courage.

She didn't say, "How can I join the fight to abolish a system as big as slavery when I'm not a congressman or president of the United States?"

Instead, she made 19 trips over 10 years, releasing 300 people, one group at a time.

Consider those 300 children, grandchildren, great-grandchildren and beyond.

Our acts of justice create immense ripples in the endless river of justice.

In Hurricane Katrina, Harvey, Irma, Maria, people didn't say, "Too much damage. What should I do?"

They had to work on what they could do.

Those with boats got into the boat and began loading all the women, men and children they met.

Nearby and far, people gave their dollars, their cents, their hearts, their spirits.

We spend a lot of time thinking we don't have the power to change the world.

We forget that the power to change someone's life is always in our hands.

Change does not belong to a particular group of people. It belongs to all of us.

Don't wait for someone to let you know they are in this situation.

start.

Start with what you have, where you are, and what you can do your way.

We don't have to be heroes, wear uniforms, call ourselves activists, or participate in elections.

We just need the courage to care.

Well, around the time Thelonious was born, I went to a birthday party for a guy named Gene Moretti.

Today was his 100th birthday. So he lived in America through the Great Depression, World War II, the struggle for workers' rights, women's suffrage, the civil rights movement, the lunar people, the Vietnam War, and the election of the first black president.

I sat down with him and said, 'Gene, you've lived in America for 100 years.

Do you have any advice for times like this? ”

He smiled and said to me:

Be kind to as many people as possible. ”

And as he danced with my mom in a room full of generations of his family and hundreds of people (many of whom had traveled thousands of miles to celebrate him), I realized that he wasn't just giving me advice, he was giving me the first steps each of us can take if we want to make a real, heartfelt impact on the world around us right now.

"Be kind to as many people as possible."

thank you.

(applause)

The story begins in Kenya in December 2007. At the time, a presidential election was being contested, and inter-ethnic violence erupted shortly afterward.

And Nairobi lawyer Olly Okoro, who you may know from her TEDTalk, has started blogging on her site, Kenyan Pundit.

And shortly after the election and violence, the government suddenly imposed a massive media blackout.

As such, weblogs have gone from commentary as part of the media environment to an important part of the media environment trying to understand where the violence was.

Okoro then asked commenters for more information about what was going on.

The comments started pouring in and Okoro ended up collating them. she will post them.

And she immediately said, 'That's too much.

Even if I do this all day every day, I can't catch up.

There is more information than one person can manage about what is happening in Kenya right now.

I wish there was a way to automate this. ”

After reading her blog, two programmers raised their hands and said, “We can do that too,” and 72 hours later, Ushahidi was launched.

Ushahidi -- the name means "witness" or "testimony" in Swahili -- is a very easy way to get reports from the scene. Whether reports come from the web or, importantly, via mobile phone or SMS, we aggregate and display them on a map.

That's it, but it's all you need. Because what it does is get tacit information available to the whole nation. We all know where the violence is, but no one knows what everyone knows. Then take that implicit information, aggregate it, map it, and expose it.

And that operation, called "crisis mapping," was launched in Kenya in January 2008.

And enough people saw it and found it worthwhile, so the programmers who created Ushahidi decided to open source it and turn it into a platform.

It has since been deployed in Mexico to track election fraud.

Deployed to Washington, D.C. to track snow clearing operations.

And it was most famously used in post-earthquake Haiti.

And if you look at the map currently posted on the top page of Ushahidi, you can see that the number of Ushahidi deployments is spreading all over the world, right?

It went from one idea and one implementation in East Africa in early 2008 to a global rollout in less than three years.

Now, what Okoro did would not have been possible without digital technology.

What Okoro did would not have been possible without human generosity.

And what's interesting is the increasing number of environments where social design challenges depend on both of these things being true.

That's the resource I'm talking about.

I call it cognitive surplus.

And it represents the ability of people around the world to volunteer, contribute and collaborate on large-scale, sometimes global, projects.

Cognitive surplus consists of two components.

The first is, obviously, free time and talent in the world.

The world has over a trillion hours of free time per year to work on shared projects.

Now, that free time existed in the 20th century, but in the 20th century we didn't get ushahidi.

That's the second half of cognitive surplus.

The 20th century media environment is so good at helping people consume, and as a result, we've become so good at consuming.

But now that we've been given media tools like the internet and mobile phones that allow us to do more than consume, what we're seeing is that people didn't want to be couch potatoes.

We were couch potatoes because that was the only opportunity given to us.

Of course, we still like to consume.

But it turns out that we love to create, and we love to share.

And combining these two things—an ancient human motivation with modern tools that allow us to connect that motivation to large-scale endeavors—is the new design resource.

And the cognitive surplus is being used to do some truly incredible experiments in science, literature, art, and political endeavours.

designing.

Of course, I also get a lot of LOLcat.

LOLcats is a cute photo of a cat that is made even cuter by adding cute captions.

And they are also part of the rich media landscape we have today.

This is one of the participatory models. Like Ushahidi, it's one of the participatory models that comes out of it.

At this point, I would argue that LOLcats are the dumbest creative act possible, as lawyers say.

Of course there are other candidates, but in general LOLcats will suffice.

But the point here is that even the dumbest imaginable creative act is still a creative act.

Anyone who has done this has challenged something, proposed something publicly, no matter how banal and disposable.

And once you do it, you can do it again and make it even better.

There is a gulf between mediocre work and great work, and as anyone who has worked as an artist or creator knows, it's a constant struggle to bridge that gulf.

There is a gap between doing something and doing nothing.

And whoever makes LOLcat has already crossed that gap.

Now, the temptation is to get Ushahidis without the LOLcats, to get the real thing without the throwaways.

But media affluence never works that way.

Freedom to experiment means the freedom to experiment with anything.

Even with the sacred printing press, the erotic novel appeared 150 years before the scientific journal.

So before talking about the crucial differences between LOLcats and Ushahidi, I would like to talk about the shared sources of LOLcats and Ushahidi.

And the source is design for generosity.

It's one of the oddities of our historical time that social science is beginning to explain how important it is for us to be intrinsically motivated, to do things because we want to do them, not because our boss told us to do them or because we're being paid for them, even though cognitive surplus is becoming a resource we can design.

Here's a graph of a paper by Uli Gnizy and Aldo Rustichini that set out to test what they called "deterrence theory" earlier this decade.

And deterrence theory is a very simple theory of human behavior. If you want someone to do something less, add punishment and they will do less.

Simple, straightforward, common sense, but largely untested.

So they surveyed 10 childcare centers in Haifa, Israel.

They surveyed the daycares during the most stressful time: pick-up time.

At pick-up time, we want the teacher who has been with your child all day to pick up your child at the appointed time.

Parents, on the other hand, are probably a little busy at work, arriving late or running errands, but they need to have a little extra time to pick up their kids late.

So Gneezy and Rustichini asked, "How many cases of late pick-up have you seen in these 10 preschools?"

Well, they said, this is the graph, the number of weeks, the number of latecomers. We found that, on average, these 10 preschools were late for 6-10 pick-ups.

So they divided the nursery school into two groups.

The white group there is the control group. they don't change anything.

However, the group of nurseries represented by the black line said, "We are currently changing this contract.

If you pick up your child more than 10 minutes late, a fine of 10 NIS will be added to your bill.

boom. There is no “if”, no “it”, no “but”.

And the moment they did that, those nursery behavior changed.

Over the next four weeks, late pick-ups increased weekly until they reached three times the pre-fine average, but then fluctuated between two and three times the pre-fine average for the duration of the fine.

And you'll soon find out what happened, right?

This fine destroyed the nursery school culture.

By adding to the fine, what they did was tell parents that a payment of 10 shekels would release all debts to teachers and leave them with no guilt or social concerns they owe to teachers.

So the parents, very wisely, said, "Ten shekels to pick up the child late?"

What could be wrong? ”

(Laughter) The explanation of human behavior that we've inherited in the 20th century, that we're all rational, self-maximizing agents, was that daycares were supposed to be contractless and operate without any constraints.

But it is not correct.

They were operating under social constraints rather than contractual constraints.

And importantly, social constraints have created a more permissive culture than contractual ones.

So Gneezy and Rustichini ran this experiment for a dozen weeks, ran fines for ten weeks, and said, "Okay, that's it. It's all done, it's okay."

And then something really interesting happens. Nothing changes.

A culture broken by a fine remained broken when the fine was removed.

Not only is economic and intrinsic motivation incompatible, but that incompatibility can persist for long periods of time.

So the trick in designing this kind of situation is to understand when it relies on the economic part of the transaction (such as when a parent pays a teacher) and when it relies on the social part of the transaction, i.e. when you are designing with leniency in mind.

Hearing this brings me back to LOLcats and Ushahidi.

I think this is the key area.

Both of these rely on cognitive surplus.

Both are designed around the premise that people love to create and we want to share.

These crucial differences are: LOLcats have common values.

It is the value that participants create for each other.

The shared value on the networks we own is everywhere, whether it's photos on Flickr or videos on Youtube, whenever we look at the massive collection of data shared and published.

this is good I like LOLcats as much as the next guy, maybe a little more evenly, but this is also a mostly solved problem.

It's hard to imagine a future where someone would say, "Where can I find pictures of cute cats?"

Ushahidi, by contrast, is a civic value.

It is the value created by the participants and enjoyed by society as a whole.

The goal set by Ushahidi is not only to improve the lives of its participants, but to improve the lives of all people in the societies in which it operates.

And such civic value is not just a side effect of being open to human motives.

It will just be a side effect of our collective efforts of this kind.

1 trillion hours of participation value per year.

It will continue year after year and year after year.

The number of people who can participate in these types of projects will continue to grow, and organizations designed around a culture of generosity will find that they can achieve incredible results without incurring huge contractual overheads. This is very different from the default model of large group activities in the 20th century.

What makes the difference here is inventor and entrepreneur Dean Kamen.

"Free cultures get what they celebrate," Carmen said.

We have a choice before us.

We spend these trillions of hours a year.

We can and will use it to blame each other.

It's free.

But we can also celebrate, support and reward those who seek to use their cognitive surplus to create civic value.

And as long as we are willing to do it, as long as we can, we will be able to change society.

thank you very much.

Over the past 50 years, we've been building suburbs, with many unintended consequences.

And I'm going to talk about some of those results and present a number of very interesting projects that give us reason to be very optimistic that the next 50 years of big design development projects will be suburban renovations.

So, whether it's redeveloping a run-down shopping mall, repurposing a dead storefront, or rebuilding a wetland out of a parking lot, I think the fact that the number of vacant lots and underperforming sites, especially retail stores, is increasing across the suburbs really presents us with a great opportunity to turn our current unsustainable landscape into a more sustainable one.

And along the way, what we can do is direct more money and infrastructure to existing communities that can boost growth, rather than keep cutting down trees and tearing down edge green spaces.

So why is this important?

I'm sure there are many reasons, but I'll just list a few without going into details.

Even from a climate change perspective, the average U.S. urban dweller

The average suburban dweller has about a third of the carbon footprint. The main reason is that suburbans drive a lot and living in single-family homes provides more exterior surfaces for energy to leak through.

So from a strictly climate change perspective, cities are already relatively green.

A big opportunity to reduce greenhouse gas emissions actually lies in the urbanization of suburbs.

Continuing to drive in the suburbs doubled the mileage.

Increased reliance on foreign oil despite improved fuel efficiency.

We drive even more. We are technically unable to keep up.

Public health is another reason to consider renovations.

Researchers at the CDC and elsewhere are increasingly connecting suburban development patterns with sedentary lifestyles.

And they are associated with a rather alarming increase in obesity rates, shown in these maps here, which is also causing a massive increase in heart disease and diabetes, with a 1 in 3 chance of developing diabetes in a child born today.

And the rate is escalating at the same rate that children stop walking to school, again because of our developmental patterns.

And finally, there's the issue of affordability.

I mean, how affordable is it to continue living in a suburb where gas prices are rising?

Over the last 50 years, expansion into cheaper suburban land has helped generations of families live the American Dream, as you know.

But more and more savings are promised at affordable prices for driving to the point, which is basically our model, but the savings are wiped out when you factor in transportation costs.

For example, here in Atlanta, about half of households make between $20,000 and $50,000 a year, spending 29 percent of their income on housing and 32 percent on transportation.

So this is the number for 2005.

That was before it hit $4 a gallon.

No one really counts the cost of transportation, and it's not going to come down anytime soon.

Whether you love the lush privacy of your suburb or hate the soulless commercial premises, there's a reason why remodeling is important.

But is it practical?

That's right.

June Williamson and I have been researching the subject for over a decade and have discovered over 80 different projects.

But they're all really market-driven, and it's the biggest demographic shift that's driving the market in particular.

We all tend to think of suburbs as family-oriented, but that's not the case.

Since 2000, two-thirds of suburban households have already been childless.

We just haven't grasped this reality yet.

The reason for this has a lot to do with the dominance of two large population groups today. Generation X, the minority generation after the baby boomers are retiring and leaving a gap.

They still have children, but Generation Y is not yet of parenting age.

They are another big generation.

As a result, demographers predict that 75 to 85 percent of new households will be childless by 2025.

And market and consumer surveys that ask baby boomers and Gen Y what they want and want to live in show that there is a huge demand for a more urban lifestyle in the suburbs, and we are already seeing it.

So baby boomers want to age in place, Gen Y wants to live an urban lifestyle, but most of their work will continue to be in the suburbs.

Another major driver of change is the sheer performance of low-performing asphalt.

I always thought this would be a great name for an indie rock band, but developers usually use this name to refer to an unused parking lot. There are many such parking lots in the suburbs.

When post-war suburbs were first built on cheap land away from downtown, just building a flat parking lot was enough.

But as we continued to sprawl, these sites jumped many times and are now relatively centrally located.

It no longer makes sense.

That land is worth more than just a flat parking lot.

Now it makes sense to go back and build decks and build those sites.

So what do we do with dead shopping malls and dead office parks?

In the end, I learned a lot.

In an economic downturn like ours, resettlement is one of the most popular strategies.

So this is a dead mall in St. Louis reborn as an art space.

It is now home to artists' studios, theater groups and dance troupes.

It doesn't collect as much tax revenue as it once did, but it does contribute to the community.

The light stays on.

I think it's becoming a really great organization.

Other shopping malls have been repurposed as nursing homes, universities and office spaces of all kinds.

We also found many examples of large defunct stores such as many schools, many churches, libraries, etc. being converted to all kinds of community service uses.

This used to be a small grocery store, the Food Lion Grocery Store, which is now a public library.

On top of that, I think we did some beautiful adaptive reuse, demolishing part of the parking space, installing a bioswale to collect and clean runoff, and even more sidewalks to connect with the neighborhood.

And they transformed this place from just a storefront in a commercial district into a community gathering space.

This is a small L-shaped strip shopping center in Phoenix, Arizona.

In fact, all they did was repaint it brightly, create a gourmet grocery store, and open a restaurant in the old post office.

Never underestimate the power of food to turn a place around and make it a destination.

It was so successful that it now occupies the strip across the street.

All real estate advertisements in the area proudly state, "Walking distance to Le Grande Orange." Because it provides the region with a 'third place' favored by sociologists.

If home is the first place and work is the second place, the third place is where we go to hang out and build community.

And especially as suburbs become less centered on families and family households, more third places are desperately needed.

So the most dramatic renovations really belong in the next category, the next strategy: redevelopment.

Well, during the boom there were some really dramatic redevelopment projects. There, the original buildings were scraped into the ground and the entire site rebuilt with significantly higher density, creating a sort of compact, walkable urban district.

But some of them are more gradual.

This is Mashpee Commons, the oldest renovation we have found.

And over the last 20 years, little by little, urbanism has been built on parking lots.

So the black and white photo shows a simple 60's strip shopping center.

And the map above shows it's gradual transformation into a compact mixed-use New England village, with plans now approved to connect it across the main road to a new residential neighborhood on the opposite bank.

In other words, in some cases it may be a gradual increase.

Sometimes it happens all at once.

This is also a parking lot reclamation project for an office park outside of Washington, D.C.

When Metrorail expanded traffic to the suburbs and opened a station near this location, the owners decided to keep the existing office building while building a new parking deck and inserting a new main street, several apartment and condominium buildings over its surface lot.

Here is the scene in 1940. It was a small farm in the village of Hyattsville.

By 1980, it had been subdivided into a large mall on one side, an office park on the other, and a library and church buffer on the far right.

Now transportation, main street and new housing are all being built.

Ultimately, I expect that the redevelopment of the shopping district will probably extend the street.

Plans have already been announced to redevelop many of the garden apartments above the mall.

Transportation is a big driver of renovations.

It looks like this.

Between office buildings and public spaces, and the new Main Street, you'll see funky new condo buildings.

This is one of my favorites, Belmar.

I think they have built a really attractive place here and adopted all green architecture.

There is a huge amount of PV. Arrays are installed on the roof as well as the wind turbines.

This was a very large mall on a 100 acre superblock.

Today, 22 walkable city blocks with public roads, two parks, eight bus routes, and housing of all kinds give Lakewood, Colorado the downtown it lacked.

There was a shopping mall here in its heyday.

They had a prom at the mall. They loved malls.

This is the site of a shopping mall in 1975.

By 1995, shopping malls had disappeared.

Department stores are maintained - and I've found this to be true in many cases.

The department store is on the upper floors. they are better built.

Re-adapting is easy.

But the one story...

It's really history.

So this is an expected build situation.

I think this project has a very good connection with the existing neighborhood.

Offering more urban lifestyle options to 1,500 households.

About two-thirds of the work is now completed.

The new main street looks like this.

It has been so successful that 8 of Denver's 13 regional malls have now been announced or are in the process of being renovated.

But it's important to note that not all of this renovation work is going on, just bulldozers are coming and destroying the entire city.

No, it's a walkable location on the grounds of an underperforming property.

So while giving people more choice, it doesn't take away their choice.

However, it is not enough to simply create a comfortable place to walk.

I also want to aim for systemic reform.

The hallways themselves also need to be refurbished.

So this is California modified.

They occupied the commercial district shown in the black-and-white image below and built a boulevard that became the town's main street.

And it went from an ugly, dangerous, and undesirable address to a kind of good address that was beautiful, attractive, and dignified.

So now we're hoping to start seeing it. They have already built a town hall and have attracted two hotels.

I could imagine beautiful houses being built along it without knocking down another tree.

Lots of great things, but I would love to see more corridors refurbished.

But densification doesn't work everywhere.

In some cases, re-greening can be a really good solution.

There is much to be learned from successful land banking programs in cities like Flint, Michigan.

The suburban farming movement is also burgeoning, a sort of triumphant garden meets the internet.

But perhaps one of the most important aspects of re-greening is the opportunity to restore local ecosystems, as in this example from suburban Minneapolis.

When the shopping center disappeared, the city restored the original wetlands in its place, developed lakeside land, and attracted private investment. This is the first private investment in this very low-income neighborhood in over 40 years.

As such, they have successfully restored both the local ecosystem and the local economy at the same time.

This is another example of re-greening.

This makes sense even in a very strong market.

This Seattle facility is located in the lot of a shopping mall parking lot adjacent to a new transit stop.

And the wavy line is the path along the creek that is now in the sun.

The creek was culverted under the parking lot.

But sunlight in our streams really improves water quality and contributes more to the habitat.

So we introduced some of the first generation mods.

what's next?

I believe that there are three challenges for the future.

The first is to plan renovations more systematically on a metropolitan scale.

We need to target which areas should really be greened.

Where should we redevelop?

And where should resettlement be encouraged?

These slides are just two images from a large project trying to make it happen in Atlanta.

I led a team that was asked to imagine Atlanta 100 years from now.

And we decided to try to reverse the sprawl through three simple, costly but easy steps.

One is that within 100 years it will pass all major rail and road passages.

Two in 100 years, 1,000 feet of buffer will be installed on every creek path.

It's a bit extreme, but I have a little water problem.

In 100 years, subdivisions that are simply too close to water or too far from transportation will not survive.

So we created an eco-acre inter-transfer development concession to the transportation corridor, allowing the re-greening of former parcels for food and energy production.

A second challenge, therefore, is to improve the quality of the architectural design of the renovation.

And I end with this image of democracy in action. This is a protest taking place at the Astro Turftown Green renovation in Silver Spring, Maryland.

Today, renovations are often denounced as examples of false downtown and momentary urbanism, and not without reason. Nothing beats Astroturf town greens.

I have to say that this is a very hybrid place.

They are new, but they try to look old.

The streets are urban, but the proportion of parking lots is suburban.

The population is more diverse than a typical suburb, but not as diverse as a city.

And although they are public places, they are managed by private companies.

And the superficial appearance alone often daunts me, like the Astroturf here.

I mean, I'm happy that urbanism is playing its part.

The fact that there are protests means that the city blocks, the streets, the layout of the city blocks, the layout of public spaces, even if compromised, are still really great.

But the architecture needs to be improved.

The final challenge is you.

I want you to join the protests and start demanding more sustainable suburbs, more sustainable places.

But culturally we tend to think downtown should be dynamic, and we expect that.

But we seem to hold out hope that the suburbs should remain forever frozen in their first nascent adolescent form.

It's time to grow them, and we ask you to support the upcoming rezoning, road diets, infrastructure upgrades, and renovations in areas near you.

thank you.

The ocean can be very complex.

And what human health is can be very complicated.

Tying the two together can seem like a daunting task, but what I'm saying is that amidst all that complexity, there are some simple themes that, if you understand them, really move you forward.

And these simple themes are things we are all familiar with, rather than the complex science of what really happens.

And I'll start with this: If mom isn't happy, no one is happy.

You know that, right? we have experienced it.

And then you can take it as it is, build from there, and move on to the next step. In other words, if the sea is not happy, no one is happy.

That is the subject of my lecture.

And we are making the oceans pretty unhappy in many ways.

This is a picture of Cannery Row in 1932.

Cannery Row was at the time the largest industrial cannery on the West Coast.

We have accumulated vast amounts of pollution in our air and water.

Rolf Bolin, a professor at the Hopkins Marine Station where I work, wrote in the 1940s that "the smoke from the floating scum in the Gulf Cove was so bad that it blackened the lead-based paint."

The people who work in these canneries could barely stay there all day because of the smell, but do you know what they said?

They say, "Do you know what you smell like?

It smells like money. ”

That pollution was money for that community, and people needed money to deal with it and absorb it into their skin and bodies.

We have made the sea unhappy. We have made people very unhappy and unhealthy.

The relationship between ocean health and human health is actually based on some other simple maxim, which I like to call "Pinching a small fish hurts a whale."

Pyramid of Marine Life…

Now, when an ecologist looks at the ocean, I have to tell you, we look at the ocean in a very different way, and when an ecologist looks at the ocean, we see all the interrelationships, so we see different things than when a normal person looks at the ocean.

We look at the base of the food chain, the plankton, the little ones, how those animals feed on the animals in the middle of the pyramid, and then look further into this diagram.

And that stream, the stream of life, just from the bottom to the top, that's what ecologists see.

And that's what we're trying to protect when we say 'save the ocean, heal the ocean'.

That's the pyramid.

So why is it important for human health?

Because when you cram things into the bottom of a pyramid that shouldn't be there, very scary things can happen.

Pollutants, some pollutants are of our own making. Like PCBs, they are molecules that our bodies cannot break down.

Then they enter the base of the pyramid and drift up. They are thus passed on to predators, and even higher predators, and accumulate in doing so.

Well, to bring it back, I thought I'd invent a little game.

No need to actually play. Consider here.

It's a game of styrofoam and chocolate.

Imagine we were all given two Styrofoam peanuts when we boarded this ship.

Not much you can do. Keep it in your pocket.

Suppose you have a rule like this: Whenever I offer someone a drink, I always give them that drink, and I also give them Styrofoam peanuts.

What will happen is that the Styrofoam peanuts will begin to migrate through our society, accumulating among the most drunk and stingy people.

(Laughter) There's no mechanism in the game for them to go anywhere other than ramming into a pile of undigestible Styrofoam peanuts.

And that's exactly what's happening in this food pyramid PDB. PDBs are accumulated at that vertex.

Now, instead of the Styrofoam peanuts, I ate the nice little chocolates you gave me.

Well, some of us would eat those chocolates instead of passing them around. And instead of accumulating, they are just passed on to our group here, absorbed by us, so they don't accumulate in any group.

And that's the difference between PCBs and natural ones like the omega-3s we seek from the marine food chain, for example.

PCBs accumulate.

Unfortunately, there are great examples of that.

PCBs accumulate in dolphins in Sarasota Bay, Texas, North Carolina.

they enter the food chain.

Dolphins eat fish containing plankton-derived PCBs, and PCBs are fat-soluble and accumulate in the body of dolphins.

Now, whether it's a dolphin, a mother dolphin, or any dolphin, there's only one way to get the PCBs out of the dolphin.

So what is it?

in breast milk.

This is a diagram of the PCB load in Sarasota Bay dolphins.

Adult male: heavy burden.

Adolescents: a heavy burden.

Females after the first calf has already been weaned: the load is lower.

Those women aren't trying to do that.

These females pass PCBs from the fat in their milk to their offspring, who do not survive.

The mortality rate for these dolphins is 60-80 percent for the first pups born to all female dolphins.

These mothers inject their first children so generously with this contaminant that most of them die.

Now, the mothers can go and breed, but they pay a terrible price for the accumulation of this contaminant in these animals: the death of the first calf.

It turns out that there is another top predator in the sea.

The top predator is, of course, us.

And we also eat meat from the same places.

This is whale meat I photographed at a grocery store in Tokyo - or what?

In fact, what we did a few years ago was smuggle a molecular biology lab to Tokyo and use it to genetically test DNA from whale meat samples to learn how to identify what they really are.

And some of those whale meat samples included whale meat.

By the way, there was also illegal whale meat inside.

That's another story.

Some, however, were not whale meat at all.

It was written as whale meat, but it was dolphin meat.

There was also dolphin liver in it. There was also dolphin blubber inside.

And these dolphin parts contained large amounts of PCBs, dioxins and heavy metals.

And that heavy load was passed on to those who ate this meat.

Whale meat markets around the world have found large amounts of dolphins being sold as meat.

It's a tragedy for those people, but it's also a tragedy for those who eat it without knowing it's poisonous meat.

We had these data a few years ago.

I remember sitting at my desk and being pretty much the only person in the world who knew that the whale meat sold at these markets was actually dolphin meat, and it was poisonous.

This included 2-3 to 400 times more toxic substances than the EPA has ever allowed.

And I remember sitting at my desk and thinking, 'Oh, I know this, this is a great scientific discovery,' and it was so bad.

And for the first time in my scientific career, I broke the scientific protocol of taking data, publishing it in a scientific journal, and then starting to talk about it.

We just sent a very polite letter to the Japanese Minister of Health to point out that this is an intolerable situation for the Japanese people, not for us. Because breastfeeding mothers and mothers with young children end up buying things they thought were good for their health, but were actually harmful.

That led to a series of other campaigns in Japan and I am proud that at the moment it is very difficult to buy wrongly labeled meat in Japan, even though whale meat is sold in Japan, but I believe it should not be sold.

But at least it's labeled correctly, so you don't have to buy poisonous dolphin meat instead.

This doesn't just happen there, in the Canadian Arctic and in some Arctic communities in the United States and Europe, the natural diet of seals and whales has led to a buildup of PCBs that end up in these women from all over the world.

These women have toxic breast milk.

Due to the accumulation of these toxins within the food chain, which is part of the world's ocean pyramid, they are unable to breastfeed their offspring and children.

That means their immune system is compromised.

It means that children's development can be impaired.

Over the past decade, the world's attention to this problem has reduced the problem for women, not by changing the pyramids, but by changing specifically what they eat within them.

To solve this problem, we took them out of their natural pyramid.

While this is good for this serious problem, it does nothing to solve the pyramid problem.

There are other ways to destroy the pyramid.

If you stuff stuff into the bottom of the pyramid, it can back up like a clogged sewer pipe.

And stuffing the bottom of that food pyramid with nutrients, sewage, and manure can backtrack the whole thing.

We end up in a situation that we have heard of before. For example, red tides produce large amounts of toxic algae floating in the ocean, causing neurological damage.

Bacterial growth and viral growth can also be seen in the sea.

These are two shots of red tide arriving on the shores here and Vibrio bacteria including cholera.

How many of you have ever seen a "Beach Closed" sign?

Why is that happening?

This happens because we have stuffed too much into the base of our natural ocean pyramids, and these bacteria clog the pyramids and flood the beaches.

Often it is sewage that clogs us up.

Well, have you ever been to a state or national park? In front of the park, there was a big sign that read, "This park is too far away to be used because of the human waste."

Not very often. we will not tolerate it.

We can't allow parks to fill up with human waste, but many beaches are closed in our country.

More and more places around the world are closing down for the same reason, and I don't think we should allow that either.

It's not just a matter of cleanliness. It is also the question of how those microbes transform into human disease.

These vibrios, bacteria can actually infect humans.

They can get into the skin and cause skin infections.

This graph from NOAA's Marine and Human Health Initiative shows the increase in Vibrio infections in humans over the past few years.

Surfers, for example, know this incredibly well.

In fact, not only does the surfing site tell you what the waves are like and the weather, but the surfrider site gives you a little blinking poop alert.

So, while the beach may have great waves, it is a dangerous place for surfers. Because even after a day of great surfing, you can still carry a legacy of infections that can take a very long time to resolve.

Some of these infections actually carry antibiotic resistance genes, which makes infection even more difficult.

These same infections cause harmful algae.

Those blooms are producing other types of chemicals.

Here's a quick list of some of the types of toxins from these harmful algae blooms: shellfish poison, fish ciguatera, diarrheal shellfish poison - you don't want to know about it - neurotoxic shellfish poison, paralytic shellfish poison.

They are entering our food chain because of blooms.

Rita Culwell is very famous for tracking the very interesting story of how cholera entered human society and was brought not by the usual human vector, but by this marine vector, this copepod.

Copepods are small crustaceans.

It is only a few inches long and its tiny legs can carry the Vibrio cholerae bacteria that cause human disease.

This has sparked cholera epidemics in ports around the world, increasing the focus on efforts to keep the cholera vector from being transported around the world.

So what do you do?

There is a major problem with disturbed ecological flow, and the pyramid may not be working very well, blocking and clogging the flow from the base to the pyramid.

What do you do when the flow is disrupted like this?

Well, there are many things you can do.

For example, Joe can be called a plumber.

And he could come in and turn the tide.

But the fact is, when you look around the world, there are not only places of hope where problems can be solved, but also places where problems have been solved and people are recognizing these problems and starting to turn things around.

Monterey is one of them.

I started by showing how much damage we are doing to the Monterey Bay ecosystem with pollution, the canning industry and all the problems that come with it.

This is a photo from 1932.

In 2009, the situation changed dramatically.

The canning factory is gone. Pollution has been reduced.

But here the bigger implication is that what individual communities need is a functioning ecosystem.

They need a pyramid that works from base to apex.

And the Monterey Pyramid is working better today than it did in the last 150 years, thanks to the efforts of many people.

It didn't happen by chance.

It happened because so many people put in their time, effort, and pioneering spirit.

On the left is the mayor of my small hometown of Pacific Grove, Julia Pratt.

Became mayor at age 74 because something must be done to protect the ocean.

In 1931, Julia created California's first community-based marine sanctuary right next to one of the biggest polluters, a cannery. Because Julia knew that when the cannery was about to run out, the ocean needed a place to grow, and the ocean needed a place to produce seed, and she wanted to provide that seed.

People like David Packard and Julie Packard helped create the Monterey Bay Aquarium to perpetuate people's notions that the health of the oceans and marine ecosystems is as important to the region's economy as feeding the ecosystems.

This shift in thinking has dramatically changed the fate of not only Monterey Bay, but other places around the world.

Now, what we are really trying to do here is protect this ocean pyramid, and I want to leave you with the idea that that ocean pyramid is connected to our own pyramid of life.

An oceanic planet, we think of ourselves as a terrestrial species, but the pyramid of life in the sea and our own lives on land are intricately connected.

And only if the oceans are healthy can we keep ourselves healthy.

thank you very much.

(applause)

As you pointed out, I learn something every time I come here.

I think this morning the world's experts from perhaps 3-4 different companies on seat manufacturing came to the conclusion that the ultimate solution is that people shouldn't sit.

I could have told them that.

(Laughter) Yesterday the automotive guys gave us some new insights.

They pointed out that 30 to 50 years from now, cars will be steered by wires without any mechanical components.

(Laughs) That's reassuring.

(Applause.) Then they pointed out that we're going to have some sort of other control on the wire to get rid of all the mechanical stuff.

That's all very well, but why not get rid of the wires?

Then you don't need anything to control the car other than thinking.

I want to talk about technology. And someday in 15 minutes, I'd love to talk to all the techno geeks out there about what's here.

But before we get to the point, one thing I have to say about this is that the big idea wasn't technology when we started building it.

This was a big idea in technology when we started applying it to iBOT for the disabled community.

I think the big idea here is a new solution to a pretty big problem in transportation.

And maybe to put it in perspective, we have so much data on this that we're happy to give it in various forms.

I don't know what will catch anyone's attention, but everyone believes this car changed the world.

And Henry Ford started producing the Model T just about 100 years ago.

I don't think most people think about how technology is applied.

For example, at the time, 91 percent of Americans lived on farms or in small towns.

So the automobile, the horseless alternative to the carriage, was important. It went twice as fast as a carriage.

was half as long.

And it was environmental improvement. Because, for example, in 1903 they banned horses and prams in downtown Manhattan. Because I can imagine what the roads would be like when there were a million horses and a million of them urinating or doing anything else that could scarcely have been imagined causing typhoid fever or other problems.

In short, cars were a clean environmental alternative to horse-drawn carriages.

It was also the means by which people moved from farm to farm, farm to town, or town to city.

With 91 percent of the population living there, it all made sense.

By the 1950s, a network of highways, claimed by many to be the eighth wonder of the world, began connecting all towns.

And it's certainly strange.

By the way, while taking an old technology, I want to assure you, especially the auto industry, which has been so supportive of us, that I don't think this is going to compete with planes or cars.

But consider what the world is like today.

Currently, 50 percent of the world's population lives in cities.

That's 3.2 billion people.

We solved all the transportation problems that changed the world to get to where we are today.

500 years ago sailing ships started to be reliable enough. We found a new continent.

150 years ago, steam locomotives were efficient enough to turn a continent into a country.

Over the last 100 years, we started making cars, and over the next 50 years we connected every city with every other city in such an efficient way that we have a very high standard of living.

But throughout the process, more and more people are being born and more and more people are moving to cities.

In China alone, 400-600 million people will move to cities in the next 15 years.

Therefore, no one would dispute that the airplane has turned continents and countries into neighborhoods in the last 50 years.

And if you look at how the technology has been applied, it has solved all the problems of moving long distances, high speeds, large volumes and heavy loads.

No one would want to part with them.

And I don't want to part with planes, helicopters, Humvees and Porsches.

i like it all I don't have one in my living room.

As a matter of fact, the last mile matters, and half the world now lives in densely populated cities.

And people spend between 90 and 95 percent of their energy walking, depending on the person.

I think there is. I don't know what kind of data will impress you, but what do you think? Forty-three percent of the world's refined fuels are consumed by vehicles in metropolitan areas of the United States.

Three million people die each year in cities from poor air quality, and nearly all particulate pollution on Earth is generated by transportation, especially those located in cities.

Again, I don't think it's an attack on any industry. I really think so. i love airplanes A car traveling on the highway at 60 mph is very efficient from both an engineering standpoint, an energy consumption standpoint, and a utility standpoint.

And we all love our cars. I think so too.

The problem is, once you're in town, wanting to go four blocks away isn't fun, efficient, or productive.

it's not sustainable.

In 1998, 417 million people in China used bicycles. 1.7 million people used cars.

If 5 percent of that population wants to become middle class and follow the path we've been on for the last 100 years, while at the same time 50 percent of that population migrates to a city the size and density of Manhattan every six weeks, that's not environmentally sustainable. It's not economically sustainable, it's just not enough oil, it's not politically sustainable either.

So what are we fighting about now?

It can be complicated, but what is the world fighting over right now?

So it seemed to me that someone had to tackle that last mile, but it was sheer luck. We were working on an iBOT, and when we built it, we quickly decided that it could be a great alternative to jet skis. No water needed.

Or a snowmobile. No snow needed.

Or ski. It's just fun and people love to move around doing fun things.

By the way, all of these industries are multi-billion dollar industries for golf carts alone.

But if we put all our effort into understanding a world that has solved all other problems, not technology, as we usually do, it seemed to me to understand a world that has somehow come to accept that cities that have been meant to get around since ancient Greece, cities designed and built for people, now have left their mark and all other transportation problems have been solved. And it's like Moore's Law.

I mean, look at the time it took to cross the continent in a Conestoga wagon, then a railroad ride, then an airplane ride.

All other modes of transportation are being improved.

In 5,000 years we have fallen behind in urban migration.

they got bigger. they are spreading.

In any city on this planet, whether it's Wilshire Boulevard, Fifth Avenue, Tokyo or Paris, the most expensive real estate is downtown.

65 percent of our urban land is parked cars.

20 largest cities in the world.

So why not ask what if cities could offer pedestrians what we currently take for granted when traveling between cities?

What if we could make them fun, attractive, clean, and green?

What if, as the last link to public transport, it was accessible by car through this, and we could all live in the suburbs, use our cars as we please, and be a little more comfortable if we could re-energize the city?

We thought it would be pretty cool to do it, but one of the issues we were really worried about was how it would be legal on the sidewalks.

Because technically it has a motor. I have wheels I'm a car

I can't see the car.

My footprints are the same as pedestrians. I have the same unique ability to deal with other pedestrians in crowded spaces.

I took this to Ground Zero and rummaged through the crowd for an hour.

I am a pedestrian But law is typically a generation or two behind technology, and when told it doesn't belong on the sidewalk, you have two options.

We are recreational vehicles, nothing special. I don't spend time on such things.

Or maybe you should go out into the street and be in front of a greyhound bus or car.

We were very concerned about that and were the first to ever appear outside to visit the US Postmaster and say:

And those are the ones on the sidewalk that I would use seriously. ”

he agreed. We visited a number of police stations who wanted a police officer to quickly return to their neighborhood with a 70 pound package. they love it

And I can't believe the police cut the ticket.

(Laughter) So, we've been working really hard, but we knew that developing technology wasn't as hard as the attitude about what was important and how we applied it.

We went out and found visionaries who had enough money to allow these things to be designed and built, and hopefully enough time to get them accepted.

So I'm really happy to talk about this technology as much as you want.

And yes, it's really fun, so go out and try it.

But if I could ask you one thing, don't think of it as a piece of technology, imagine it. Everyone sort of understands that it makes sense to have a 4,000 lb machine that can go 60 miles per hour, but it will take you anywhere you want to go and somehow it's also what we used for the last mile and it's broken and doesn't work.

One of the more exciting things that we came up with as to why it's accepted happened here in California.

A few weeks ago, after we launched this, we were in Venice Beach with a crew of reporters, biking back and forth. He marveled at technology. Meanwhile, bicycles were galloping and skateboarders were galloping. And a little old lady, I mean, I looked up a dictionary, and a little old lady came to my side. And now, riding this, I'm a normal adult height. Then she stopped, the camera was there, looked up at me and said. , "Can I try it?"

So what was I -- how am I going to say something?

So I said, "Of course."

So when I got off and she got in, just a little bit like usual, oh, then she turned around, went about six feet, turned around, and had a big smile on her face.

And she came back to me, stopped, and said, "Finally, she made something for us."

And the camera is looking down on her.

I'm thinking, "Wow, that was great -- (laughter) -- please, miss, don't say anything more."

(Laughter.) And with the camera pointed at her, the guy had to put the mic to her face and said, "What do you mean by that?"

And I thought, 'It's all over' and she looked up and said, 'Well' she's still watching these guys go away. "I can't ride a bike," she said, "I can't skateboard, and I've never rollerbladed." She only knew her name. "It's been 50 years since I've ridden a bike," she said.

Then she looked up, looked up and said, "And I'm 81 and I don't drive anymore.

I still have to go to the store, but I can't carry a lot of things. ”

And among my many concerns, it suddenly dawned on me that I believe, not only that bureaucrats, regulators, and legislators may not understand, but that fundamentally, there is pressure among people not to encroach on the most precious little space left: the sidewalks of these cities.

If you look at the sidewalk legal requirement of 36 inches, then 8 feet for parked vehicles, then 3 lanes, then the remaining 8 feet, that little part is all there is.

But when she looked up and said, I thought, Kids don't care about it, they don't vote, businessmen and young people don't care about it -- they are very cool -- so I think subconsciously I was worried that it was the older people who were worried.

So seeing this, having been worried for 8 years, the first thing I would do is pick up the phone, ask the marketing guys and the regulators, call AARP and get an appointment right away.

I have to show them this.

And they brought it to Washington. they showed it. And they're coming on board, watching how these things are being absorbed in a lot of cities like Atlanta, and we're doing experiments to see if it actually helps revitalize downtown.

(Applause.) The point is, whether you believe the United Nations or other think tanks, in the next 20 years all of the population growth on earth will happen in cities.

In Asia alone, that number will exceed 1 billion.

They learned to start with their mobile phones.

They didn't have to join us on the 100-year journey we took.

They start at the top of the technology food chain.

We must begin to build cities and human environments that allow a 150-pound person to travel miles through dense, lush green environments without having to ride a 4,000-pound machine.

The car is not intended for parallel parking. These are great machines for getting between cities, but think about it. All long distance, high speed problems are solved.

The Greeks walked from the Theater of Dionysus to the Parthenon in sandals.

I do it with sneakers.

Not much has changed.

If this only goes at three times the speed of walking, then a 30 minute walk becomes 10 minutes.

If you live in the city and now have 10 minutes, it's your choice. After 30 minutes, you'll need an alternative, be it bus or train. We need to build the infrastructure, the light rail. Otherwise, you will keep those cars parked.

But pin up most cities and imagine how far you could walk in 30 minutes if you had the time. That's the city.

If you can make it fun and make it 8 or 10 minutes, you won't be able to find the car, get it out of the parking lot, move it, park it again, go somewhere else. I can't take a taxi or subway.

We can change the way people allocate their resources, how they use the energy of this planet, and make it more enjoyable.

And we hope, to some extent, that history will tell us we were right.

That's the Segway. This is the Stirling cycle engine. This was confused by a lot of the things we do.

This little beast is now producing hundreds of watts of power.

Yes, you can attach it to it, and drive from New York to Boston on a kilogram of propane if you like.

Perhaps the more interesting thing about this little engine is that it can burn any fuel. Because in most parts of the world some people might be skeptical about this engine's ability to make an impact just by plugging it into a 120 volt outlet.

In fact, we've been working on this as an alternative energy source all the way back from Johnson&amp;amp;amp;amp;amp;amp;amp;&amp;amp;&amp;&amp;&amp;&amp;&amp;&amp;&amp;&amp;&amp;&amp;&amp;&amp;&amp;&amp;&amp;&amp;&amp; Johnson, you need the best batteries you can get to run an iBOT -- 10 watt-hours per kilogram of lead, 20 watt-hours per kilogram of nickel-cadmium, 40 watt-hours per kilogram of nickel-metal hydride, 60 watt-hours per kilogram of lithium, 8,750 watt-hours per kilogram of propane or gasoline -- this is why no one drives an electric car. .

But in any case, if it can burn as efficiently as a kitchen stove (because it's external combustion), it turns out to be pretty clean if you can burn any fuel.

It produces just enough power to do this for example. This is enough power in the rest of the world to run computers and light bulbs at night, as Dr. Holly pointed out.

But what's even more interesting is that according to this thermodynamic, the efficiency can never exceed 20%.

It doesn't really matter. 200 watts of electricity is said to produce 700 or 800 watts of heat.

If you want to boil water and recondense it at a rate of 10 gallons per hour, you need about 25 kilowatts (just over 25.3 kilowatts), or 25,000 watts of continuous power.

This requires so much energy that we cannot afford to desalinate or purify water in this country.

Indeed, in other parts of the world, your choice is either to desolate the place and turn everything that burns into heat, or drink the available water.

Bad water is the number one cause of death for humans on this planet.

Between 60 and 85,000 people per day, depending on whose numbers you believe.

No need for advanced heart transplants in the world.

I need water.

And women don't have to spend four hours a day looking for it and watching their children die.

We've figured out how to put a vapor compression still on this, have a countercurrent heat exchanger that takes the waste heat, and use a little bit of electricity to control the process. At 450 watts, just over half the waste heat, it produces 10 gallons of distilled water per hour from whatever comes in for cooling.

So, if we put this box here in a few years, will we have solutions for transportation, electricity, communications, and perhaps drinking water in a sustainable package that weighs 60 pounds?

I don't know, but I'll try.

You'd better shut up

(applause)

This conference was really about the digital revolution, but I would argue that the digital revolution is over. we won.

We have experienced a digital revolution, but it doesn't have to continue.

And then I would like to see what happens after the digital revolution.

So let's start predicting the future.

These are some of the projects I'm currently working on at MIT looking at what happens after computers.

This first one, Internet Zero here -- this is a web server with the cost and complexity of an RFID tag (about $1) that can be attached to any light bulb or doorknob, and it's being commercialized very quickly.

And it's not the cost that's interesting. That's how the Internet is encoded.

It uses a kind of Morse code for the Internet, so it can be transmitted optically. It can communicate acoustically over power lines and RF.

It took the original principle of the Internet of network connections between computers and enabled devices to be connected to the Internet.

The whole idea that gave birth to the Internet can be brought down to the physical world with this Internet Zero, the Internet of Devices.

So this is the next step from there and this is what is being commercialized today.

The next step is a project on fungible computers.

Fungible goods in economics can be extended and traded.

So half grains are half useful, but half babies or half computers are less useful than whole babies or whole computers. And we've been trying to make computers that work that way.

So what you see in the background is the prototype.