In the developed world, one of the greatest ways we can change our impact on the planet is by changing the way we live in cities.

We are already a city planet. This is especially true in developed countries.

And people who live in cities in developed countries tend to be very wealthy, so they spend a lot.

If we could change this situation, first of all, by creating denser, more livable cities...

For example, here in Vancouver. If you haven't been there yet, please do visit. It's a wonderful city.

And they are achieving densities, new densities, perhaps greater than anyone else on Earth right now.

In fact, they've managed to get North Americans to stop driving, which is pretty cool.

That's why it has density. You can also manage growth.

Set aside what is natural is natural.

It's here in Portland. That's the actual deployment.

The land there will forever remain a pasture.

They demarcated the city with lines.

nature, city. nothing changes.

Once you have done these, you can start investing in all sorts of things.

You can start doing things like transportation systems that actually transport people in an effective and reasonably comfortable way.

You can even start changing what you built.

This is the Beddington Zero Energy development in London and is one of the greenest buildings in the world. It's a wonderful place.

We are now able to build buildings that generate all their own electricity, recycle much of their water, are much more comfortable than standard buildings, use only natural light, etc., and that will cost less over time.

green roof. Bill McDonough covered it last night, so I won't go into it much.

However, as people live closer to each other, the development of information technology will allow us to build smart places.

You can start figuring out where things are.

Knowing where things are makes sharing easier.

Sharing ultimately leads to less usage.

Car-sharing clubs are starting to take off in the US and are already widespread in many parts of Europe, which is a great example.

As anyone who drives knows, do you really need your car one day a week?

What information technology can do for us is to know how much we actually use, monitor it, and come up with ways to use less of it.

This is a power cord that glows brighter the more energy you use. I think this is a great concept, but there must also be a way of thinking that the less you use it, the brighter it gets.

But there may also be a simpler approach.

You just need to relabel it.

This light switch shows when there is a flash flood on the one hand and off on the other hand.

The way we build things can also change.

This is a biomorphic building.

It takes inspiration from life.

Many of these buildings are incredibly beautiful and even effective.

This is an example of biomimicry, and one that we are actually starting to explore further.

In this case the shell design is being used to create a new kind of exhaust fan and is very efficient.

A lot of things like this happen. It's really quite remarkable.

If you're interested in Worldchanging, check it out.

We are starting to cover this more and more.

There is also a neo-biological design, where life itself and life processes are increasingly being actually used and made part of industry.

For example, this is algae that produces hydrogen.

So we have a potential model, and the new model we're looking for is about how to transform the cities most of us live in into bright green cities.

But unfortunately most people on earth don't live in the cities we live in.

They live in emerging megacities in developing countries.

And then there are the statistics that I use a lot. That is, we add a city of Seattle every four days, a city the size of Seattle every four days on earth.

About two months ago, when I was giving a talk, a man who had worked for the United Nations came up to me and said very hastily: that's completely wrong.

That's every 7 days.

So every seven days we add a city as big as Seattle, and most of those cities look more like this than the one you or I live in.

Most of these cities are growing incredibly fast.

They have no existing infrastructure. Millions of people are living in poverty, and millions are trying to find new ways to do things.

So what does it take to turn a developing world megacity into a bright green megacity?

The first thing you need is a Leapfrog.

And this is one of the things we're looking for everywhere.

The idea behind Leapfrog is that there is no reason to invest in previous generations of technology if an individual or country finds themselves without the tools and technology they need. right?

Almost without exception, it's much better to look for low-cost or locally applicable versions of the latest technology.

One place we all see this a lot is on our mobile phones. right?

Across the developing world, people are skipping the landline stage altogether and going directly to mobile phones.

When many cities in the developing world have landlines, they are usually pretty bad systems with lots of glitches and huge costs.

That's why I prefer this picture here.

I especially like Ganesh talking on his mobile phone in the background.

In other words, the mobile phones we have in our hands are becoming more and more pervasive in our society.

We've heard all about this here this week, so I can't say much more than that what applies to mobile phones also applies to all kinds of technology.

The second is tools for collaboration, such as collaboration systems and intellectual property systems that facilitate collaboration. right?

When people are free to collaborate and innovate, they get different kinds of solutions.

And even those without capital can access these solutions in other ways. right?

So we have open source software, we have Creative Commons and other kinds of copyleft solutions.

And those things lead to things like this.

This is Telecentro in São Paulo.

It's a very remarkable program using free open source software, cheap hacked kind of machines, and basically abandoned buildings. We put together a community center where people can come in, get high-speed Internet access, and learn computer programming skills for free.

And now 250,000 people use them each year in São Paulo.

And that 250,000 are some of the poorest in São Paulo.

I especially like the little Linux penguin in the back. (Laughter.) So one of the things that it's creating is a kind of Southern cultural explosion.

And one of the things that's really, really interesting to us at Worldchanging is how the South is rediscovering itself, reclassifying itself in a way that doesn't really relate to most of us in this room.

So Bollywood doesn't just answer Hollywood. right?

As you know, the Brazilian music scene doesn't just cater to major labels.

I'm doing something new. Something new is happening.

There are interactions between them. And you know, you can get some great stuff.

I don't know if anyone has seen the movie "City of God"

Yes, it's a great movie for those who haven't seen it yet.

And it's all about this question in a very artistic and indirect way.

There are other radical examples of the widespread ability to use cultural tools.

These are people who have just been visited by Ugandan Internetbook Mobile.

People waving their first book in the air, I think that's a really cool picture. Look?

So there is also the ability for people to come together and start acting on their behalf in political and civic ways in ways that have never existed before.

And as we heard last night, and as we heard earlier this week, absolutely, fundamentally essential to our ability to create new solutions is that we must create new political realities.

And I personally want to say that we need to create a new political reality, not just in places like India, Afghanistan, Kenya, Pakistan, but here at home.

Another world is possible.

And it's kind of the big motto of the anti-globalization movement. right?

I have tweaked it quite a bit.

We talk about another world being more than just possible. Another world is here.

It's not just that we need to imagine another vague possibility, but that we need to start acting a bit more based on that possibility.

We need to start doing things like President Lula of Brazil.

How many people knew about Lula by today?

Well, I would say much better than the average spectator.

Lula, he's full of problems and full of contradictions, but one of the things he's doing is putting forward ideas about how to engage in international relations that completely shift the balance from the standard North-South dialogue to a whole new way of global cooperation.

I would like to keep an eye on this guy.

Another example of this kind of secondary psychic ability is the rise of so-called "serious play" games.

We are thinking about this a lot. This is spreading everywhere.

This is from "A Force More Powerful". Just a screenshot.

A Force More Powerful is a video game that teaches you how to participate in non-violent rebellion and regime change as you play. (Laughter) There's one more thing. This is from the game "Food Force", a game that teaches children how to run a refugee camp.

All of this contributes in a very dynamic way to a huge increase in public interest and passion for democracy, especially in developing countries.

We receive so little news about developing countries that it is easy to forget that there are literally millions of people in the world struggling to make things fairer, freer, more democratic and less corrupt.

And you know, we don't hear enough of those stories.

But it's happening everywhere and these tools are part of what makes it possible.

Now, add all of this up, and what do you get when you add up things like leapfrogs and new kinds of tools: secondary psychic abilities?

Well, developing countries will soon have a bright green future.

For example, you can get green power spread all over the world.

This is a building in Hyderabad, India.

It is the most environmentally friendly building in the world.

You can get grassroots solutions, something that works for those who don't have the funds or have limited access.

A barefoot photovoltaic engineer carries solar panels into a remote mountain.

Telemedicine will be available.

These are Indian nurses learning how to use PDAs to remotely access databases containing information that they cannot access at home.

You can have new tools for people in developing countries.

These are LED lights that help the nearly 1 billion people who mean darkness at night have new means of activity.

These are refrigerators that do not require electricity. They are a pot within a pot design.

and an aqueous solution is obtained. Water is one of our most pressing problems.

This is a design for collecting rainwater that is very cheaply available to people in developing countries.

It is designed to use sunlight to distill water.

This is a fog catcher that distills clean, drinkable water from the air if you live in a damp jungle-like area.

I will show you how to carry water here.

I love this, I mean, it's so hard to carry water around, so someone had the idea of ​​what would happen if you rolled it. right?

I mean, it's a great design.

This is a great invention, LifeStraw.

Basically, you can suck water through it and it will be drinkable by the time it hits your lips.

So people in desperate need can get this.

This is one of my favorite world changers.

This is a merry-go-round invented by the Roundabout company that pumps water while children play. Look?

Seriously -- try it. that's pretty awesome.

And the same applies to those who are in absolute danger. right?

More than 200 million people are expected to be displaced by 2020 due to climate change and political instability.

How can we help such people?

All kinds of amazing new humanitarian designs are being co-developed on Earth.

Among those designs are also models for acting, including a new model for teaching in a village in the middle of a refugee camp.

A new model of education for displaced persons.

And new tools have emerged.

This is one of my absolute favorites.

Anyone know what this is?

Audience: Detect mines.

Alex Steffen: Exactly, this is the flower of mine detection.

If you live in an area littered with about 500 million unaccounted for mines, you can throw these seeds out into the open.

And as they grow, they grow around the mines, their roots detecting the chemicals in the mines, and they must not set foot where the flowers turn red.

Yes, there are seeds that can save your life. Look?

(Applause.) I love this piece too. Because I think the exemplars and tools we use to change the world should be beautiful in their own right.

As you know, just surviving is not enough.

We have to build something better than what we have now.

And I think it will.

Finally, in the immortal words of H.G. Wells, I think better things are on the horizon.

In fact, I believe that "everything in the past is just the beginning."

Everything the human mind has accomplished is just a dream before waking. ”

I hope it turns out to be true.

The people in this room have given me more confidence than ever that it will happen.

thank you very much.

(applause)

As a magician, I strive to create images that make people stop and think.

I will try to do what doctors say is impossible.

I was buried alive in a coffin in New York City in April of 1999 and was buried for a week.

They lived there with only water.

And it was so much fun that I decided to do more of this.

The next is that I was frozen in a block of ice for three days and three nights in New York City.

It was a lot harder than I expected.

After that, I stood on a 100 foot high pole for 36 hours.

The hallucinations began to get worse and the building behind me started to look like the head of a large animal.

Then I went to London.

In London, I lived in a glass box with only water in it for 44 days.

For me, it was one of the hardest things I've ever done, but also one of the most beautiful.

There were so many skeptics that the London press, in particular, started flying cheeseburgers around my box in helicopters to entice me.

(Laughter) So when the New England Journal of Medicine actually applied that research to science, I felt very justified.

My next pursuit was to find out how long I could live without breathing. Likewise, how long can you live without anything, not even air.

I had no idea it would be the most amazing trip of my life.

As a young magician, I was obsessed with Houdini and his underwater adventures.

So I started competing with other kids early on. I competed to see if I could stay underwater on one breath while the kids went up and down five times to breathe.

By the time I was a teenager, I could hold my breath for 3 minutes and 30 seconds.

Later I learned it was Houdini's personal record.

In 1987, I heard the story of a boy who fell into the ice and was buried under a river.

He was crushed and hadn't breathed for 45 minutes.

When rescue workers arrived, he was resuscitated, but there was no brain damage.

His core temperature dropped to 77 degrees.

As a magician, I believe everything is possible.

And I think that what one person did, another person can do.

I began to think that if a boy could survive without breathing for that long, there must be a way I could too.

There, I met a top-notch neurosurgeon.

And I asked him how long he could go without breathing. Likewise, how long can you go without air?

And he told me there is a serious risk of hypoxic brain injury beyond 6 minutes.

Basically, I took it as a challenge.

(Laughs) It was my first attempt, and I thought I could do something similar, so I built a water tank and put ice and cold water in it.

And I stayed in that tank hoping that my core temperature would start to drop.

And I was shivering.

The first time I tried to hold my breath, I couldn't hold it for a minute.

So I realized that it doesn't work at all.

I went to my friend's doctor and asked, "How can I do that?"

“I want to hold my breath for a really long time, how can I do that?”

And he said, "David, you are a magician. Create the illusion that you are not breathing. It will be much easier to do that."

(Laughter) So he came up with the idea of ​​building a rebreather with a CO2 scrubber. It's basically a tube you buy at a hardware store with a balloon duct taped to it, and I thought maybe I could put it in my body and somehow circulate the air so my body could use it to re-breathe.

This is a little hard to see.

But this is an attempt.

So it clearly didn't work.

(Laughter) Then I actually started thinking about liquid breathing.

There is a chemical called Perflubron.

And because the oxygen levels are so high, you can theoretically breathe.

So I got that chemical, filled the sink with it, stuck my face in the sink and tried to suck it up, but it was really impossible.

It's basically like trying to breathe while standing an elephant on your chest, as the doctor said.

So that thought disappeared.

Then I started thinking, would it be possible to hook up a heart/lung bypass machine and have an operation to put tubes in the arteries to make it look like you weren't breathing while oxygenating your blood?

This was clearly an insane idea, too.

Then I thought about the craziest idea of ​​all. It's about actually doing it.

(Laughter) Trying to actually hold your breath beyond what doctors consider brain dead.

So I started researching pearl divers.

Because one breath will bring you down for 4 minutes.

And when I was researching pearl divers, I learned about the world of freediving.

It was the most amazing thing I have ever discovered.

Freediving has many facets.

There are depth records where people go as deep as possible.

And there is static apnea.

It's about holding your breath in the same place for as long as possible without moving.

That's what I studied.

The first thing I learned was that you should never move while holding your breath. It wastes energy.

Oxygen is then depleted and carbon dioxide builds up in the blood.

And I learned how to lower my heart rate.

I needed to be completely still and just relax and think I wasn't in my body and just control it.

Then I learned how to cleanse.

Purging is basically hyperventilating.

Breathe in and out -- (breathe out loudly) It makes me feel dizzy and tingle.

And it will definitely expel carbon dioxide from your body.

So when you hold your breath, it becomes much easier.

Then I learned that I had to take a deep breath, just hold my breath and relax, never let the air out, just stop and relax through all the pain.

Every morning this went on for months. The first thing you do when you wake up is hold your breath for 44 out of 52 minutes.

So basically what it means is I purge and breathe really hard for a minute.

And right after that, I left it on for five and a half minutes.

Then I breathed again for a minute, exhaled as hard as I could, and immediately afterwards again held my breath for five and a half minutes.

Repeat this process 8 times in a row.

Out of 52 minutes, you are only breathing for 8 minutes.

By the end of it, you're completely burned out, your brain.

You will feel like you are walking around in a daze.

And you have a terrible headache.

Basically, I'm not the best person to talk to when I'm doing stuff like that.

I started learning about world record holders.

His name is Tom Sietas.

And this guy is perfectly made to hold your breath.

He is 6ft 4 tall. he is 160 lbs.

And his total lung capacity is twice that of the average person.

I'm 6ft 1 tall and fat.

Do you say boned?

(Laughter) I had to drop 50 pounds in three months.

So I thought that everything I put into my body was medicine.

Each food was worth its nutritional value.

Throughout the day, I ate really small, controlled portions.

And I started to really adapt my body.

[There may be individual differences in results] (laughs) The leaner I got, the longer I could hold my breath.

And by eating well and training hard, my resting heart rate dropped to 38 beats per minute.

This is lower than most Olympians.

After 4 months of training, I can hold my breath for more than 7 minutes.

I wanted to hold my breath anywhere.

I wanted to try it in the most extreme situations to see if I could lower my heart rate under duress.

(Laughter) I decided to break the world record live on prime time TV.

The world record is 8 minutes and 58 seconds held by Tom Sietas, the man with the whale lungs we just talked about.

I was convinced that if I put up a water tank at Lincoln Center and stay there for a week without eating anything, I would get used to the situation and slow down my metabolism so that I could hold my breath longer.

I was completely wrong.

I entered the stadium one week before the scheduled broadcast date.

And I thought that everything seemed to be going well.

For the record, two days before my massive attempt to hold my breath, the producers of my TV special thought watching someone hold their breath and almost drown was too boring for TV.

(Laughter) So I had to put on handcuffs to escape while holding my breath.

This was a serious mistake.

I was wasting oxygen because I was moving.

And by 7 minutes I was in a terrible cramp.

At 7:08 I started to lose consciousness.

And by 7:30 they had to drag my body out and bring me back.

I was failing on every level.

(Laughter) So, naturally, I decided that the only way I could think of to get out of my slump was to call Oprah.

(laughter) I told her I wanted to raise the bar and hold my breath longer than any human being ever lived.

This was another record.

This is a pure O2 static apnea record and Guinness set a world record of 13 minutes.

So you're basically breathing pure O2 first, oxygenating your body and expelling CO2 so it can last longer.

I realized that my real competitor was Bieber.

(laughter) (end of laughter) In January of 2008, Oprah gave me four months of preparation and training.

So I slept in a hypoxic tent every night.

A hypoxic tent is a tent that simulates an altitude of 15,000 feet.

So it's like Base Camp, Everest.

This increases the number of red blood cells in the body and facilitates the transport of oxygen.

Every morning when I step out of my tent, my brain is completely wiped.

This was my first attempt at pure O2 and I was able to go as far as 15 minutes.

So it was quite a success.

A neurosurgeon pulled me out of the water. Because in his mind, in 15 minutes the brain is complete and brain dead.

So he pulled me up and I was fine.

There was one person there who was absolutely not impressed.

It was my ex-girlfriend.

While I was breaking records underwater for the first time, she was looking through my Blackberry and checking every message.

(Laughter) My brother had that picture. It really was— (laughter) (laughter ends) Then I announced publicly that I was going for the Sietas record.

In response he attacked Regis and Kelly, breaking his old record.

His main competitor then came out and broke his record.

So he suddenly extended his record to 16 minutes and 32 seconds.

It was about 3 minutes longer than I had planned.

It was longer than the record.

I wanted the Science Times to document this.

I wanted them to make a piece.

So I did what any serious pursuit of scientific progress would do.

I walked into the New York Times office and played card tricks on everyone.

(Laughter) So, I don't know if it's the magic or the lure of the Cayman Islands, but John Tierney flew in and wrote an article about the seriousness of holding your breath.

Of course, I tried to impress him while he was there.

And I dived to 160 feet (equivalent to the height of a 16-story building) and passed out in the water as I was coming up. This was really dangerous. That's how you drown.

Luckily Kirk saw me and swam me up.

So I started working on my complete concentration.

Perfectly trained how long to hold your breath for things to do.

But with an appearance on Oprah, there was no way to prepare for the live television aspect.

But actually, I did it on my stomach while floating in the pool.

But they wanted me upright so they could basically see my face on TV.

Another problem is that the suit is so buoyant that I had to tie my legs down to keep me from floating.

So I had to strap my feet to the loose straps and this was very problematic for me.

It made me extremely nervous and my heart rate went up.

Then they also put in a heart rate monitor which has never been done before.

And it was right next to the sphere.

So every time my heart beat, the ticking beep beep beep beep sound was really loud.

That made me even more nervous.

And there was no way to lower my heart rate.

It usually starts at 38 beats per minute and drops to 12 beats per minute while holding your breath, which is pretty unusual.

(Laughs) This time it started at 120 beats and never went down.

I spent the first five minutes in the water desperately trying to get my heart rate down.

I was sitting there thinking, "If I don't slow down, I'm going to fail."

And I became more and more nervous.

And my heart rate kept going up and up, up to 150 beats.

Basically, it's the same thing that caused my fall at Lincoln Center.

It was a waste of O2.

When I got to the halfway point, eight minutes, I was 100 percent sure I wouldn't make it.

I had no way of doing that.

Oprah spent an hour doing this breath-holding process, and I thought, if I hadn't dealt with it sooner, the full extent of my depression would be exposed.

(Laughter.) So I figured I'd better just fight and stay there until I passed out. At least after that they will pick me up and take care of me and so on.

(laughs) I kept trying until 10 minutes.

After about 10 minutes, I started to feel a very strong tingling sensation in my fingers and toes.

And I knew it was a blood shunting, blood rushing away from the extremities to oxygenate vital organs.

At 11 minutes my feet started to feel a throbbing sensation and my lips started to feel really weird.

At 12 minutes my ears started ringing and my arms started to go numb.

And remember, I'm a hypochondriac and numbness in my arm means a heart attack.

So I started getting really paranoid.

And after 13 minutes, I started feeling pain all over my chest, probably due to my hypochondriasis.

It was terrible.

(laughter) At 14 minutes I had terrible contractions that made me want to breathe.

(laughter) (ends laughter) In 15 minutes, I was suffering from severe oxygen deprivation to my heart.

And ischemia began to occur in the heart.

My heart rate goes from 120 to 50 to 150 to 40 to 20 to 150 again.

It will blow your mind.

it will start. it will stop. And I felt all this.

And I was sure I was going to have a heart attack.

So what I did in the 16th minute is I slipped out. Because I knew if I went outside, if I had a heart attack, they would have to jump into the bindings and take my legs off before they could pull me up.

I was really nervous.

And I didn't stick my head out.

But I was just floating there, waiting for my heart to stop, just waiting.

They had doctors with "PST" sitting and waiting.

And suddenly a cry is heard.

And I think there was something strange -- I'm afraid I died or something happened.

And when I noticed, I arrived at 16:32.

So, borrowing the energy of everyone there, I decided to keep moving forward.

And advanced to 17 minutes 4 seconds.

(Applause.) (End of applause.) As if that wasn't enough, what I did right after that was to go to Quest Labs and have them take all my blood samples and test everything and find out what my level was. Then the doctor will be able to use it again.

I didn't want anyone asking that either.

I had the world record and wanted to make sure it was legit.

So the next day I got to New York and I was walking out of the Apple store and this kid walked up to me and was like, 'Yo, D!

It's like, "Huh?"

He said, "If you really held your breath that long, why did you stay dry out of the water?"

"Huh?" I thought.

(Laughter) And that's my life. So -- (Laughter) As a magician, I try to show people what seems impossible.

And I think magic is pretty easy, whether you're holding your breath or shuffling cards.

It's practice, it's training, and it's -- (sobbing) it's practice, it's training, it's experimenting, (sobbing) working through the pain to be the best you can be.

That's magic for me, thank you.

(applause)

Now is the most exciting time to see new Indian art.

Contemporary Indian artists are interacting with the world like never before.

I thought it might be interesting for the many longtime and local collectors at TED to get an outsider's perspective on the 10 young Indian artists I want everyone at TED to know.

The first is Bertie Kell.

A central motif in Bharti's practice is the store-bought ready-made bindi that countless Indian women apply daily to their foreheads as an act closely associated with the institution of marriage.

However, the original meaning of bindi is to symbolize the third eye between the spiritual world and the religious world.

Bertie seeks to liberate this, she says, mundane cliché by blowing it up into something great.

She also creates life-size fiberglass sculptures of animals, which she covers completely with bindi, often expressing powerful symbolism.

She says she started with 10 Bindis packets and then wondered what she could do with 10,000 packets.

The next artist, Balasabramaniam, stands right at the intersection of sculpture, painting and installation, working with fiberglass to create extraordinary works.

Barra himself is going to speak at TED, so I won't be spending much time on him here today, but I will say that he is really successful in making the invisible visible.

Brooklyn-based Chitra Ganesh is known for his digital collages using Indian comic books called Amar Chitra Katas as their primary source.

These cartoons are a fundamental way for children, especially diaspora children, to learn about religious and mythological folklore.

I myself was deeply immersed in these.

Chitra basically remixes and retitles these iconic images to mince some of the sexual and gender politics embedded in these deeply affecting cartoons.

And she uses this vocabulary in her installation works as well.

Jitish Karat has successfully practiced across photography, sculpture, painting and installation.

As you can see, he is heavily influenced by graffiti and street art, and his hometown of Mumbai is a constant element in his work.

He masterfully captures the sense of density and energy that characterizes the modern city of Bombay.

He also creates fantastical sculptures made of bone from cast resin.

Here he envisions the corpse of an autorickshaw he once saw burning in a riot.

The next artist, N.S. Harsha, actually has a studio here in Mysore.

He puts a modern twist on the miniature tradition.

He creates these finely detailed images and repeats them on a large scale.

He uses scale to more and more spectacular effect, whether it's on the roof of a temple in Singapore or an increasingly ambitious installation where 192 sewing machines run and produce the flags of all United Nations member states.

Mumbai-based Dhurvi Acharya draws on her love of comics and street art to comment on the roles and expectations of modern Indian women.

She also mines the rich material of Amaru Chitra Katas, but in a very different way than Chitra Ganesh.

In this particular piece, she actually strips the imagery and leaves the actual text behind, revealing something provocative never seen before.

Rakib Shaw was born in Kolkata, raised in Kashmir and trained in London.

He too is trying to reinvent the miniature tradition.

He draws inspiration not only from Hieronymus Bosch, but also from the Kashmir textiles of his youth to create these gorgeous tableaux.

He actually uses a porcupine quill to apply metallic industrial paint to his work to achieve this rich and detailed effect.

The Raqs Media Collective is actually three artists working together, so we're cheating a little bit about the following artists:

Raqs is perhaps the foremost authority on multimedia art in India today, working across photography, video and installation.

They frequently explore themes of globalization and urbanization, and their hometown of Delhi is a frequent element in their work.

Here, viewers are encouraged to analyze the crime by looking at the evidence and clues embedded in these five different on-screen stories. The city itself could be the culprit.

The next artist is probably Subodh Gupta, a master of Indian contemporary art.

He was first known for creating huge realistic canvases, household paintings, and the stainless steel kitchen and tiffin jars that every Indian is familiar with.

He celebrates around the world and on an increasingly grand scale by incorporating these local, everyday objects into ever-larger sculptures and installations.

And last tenth, and definitely not least, Ranjani Shetter, who lives and works here in Karnataka, creates fantastical sculptures and installations that really blend the organic and the industrial, bringing the local world to life like Subodh.

These are actually wires wrapped in muslin and soaked in vegetable dyes.

And she places them in such a way that the viewer has to actually move through space and interact with the objects.

And light and shadow are a very important part of her work.

She also explores themes of consumerism and the environment. In this piece, these basket-like objects appear organic and woven, woven, but with steel pieces salvaged from a car found in a junkyard in Bangalore.

10 artists, 6 minutes, I think it's hard to absorb.

But I hope I can inspire you to go out and see and learn about the wonderful things that are happening in the Indian art world today.

Thank you very much for watching and listening.

(applause)

This is actually a painting that hangs in the Countway Library at Harvard Medical School.

And this is what it looked like when an organ was transplanted for the first time in history.

In fact, in the foreground you can see Joe Murray preparing a patient for a transplant, and in the back room you can see Harvard University's Harvard Urology Chair Hartwell Harrison actually taking a kidney.

Indeed, the kidney was the first organ to be transplanted into humans.

That was in 1954, 55 years ago.

But we still face many of the same challenges we faced decades ago.

There has certainly been a lot of progress and many lives have been saved.

However, there is a severe shortage of organs.

Over the past decade, the number of patients waiting for transplants has doubled.

On the other hand, the actual number of transplants has remained almost flat.

It really has to do with the aging of the population.

We are just getting older.

Medicine is doing a better job of keeping us alive.

However, as we age, our organs tend to malfunction.

So this is a challenge not just for the organ, but for the tissue as well.

They're trying to replace the pancreas or replace the nerves that help Parkinson's disease.

These are big issues.

This is actually a pretty amazing statistic.

Every 30 seconds a patient dies from a disease that could possibly be cured by tissue regeneration or replacement.

So what can we do about it?

We talked about stem cells tonight.

that's the way to do it.

However, in terms of the actual treatment of the organ, stem cells are still a long way from being administered to patients.

Wouldn't it be great if our bodies could regenerate?

Wouldn't it be great if we could actually harness the power of our bodies and actually heal ourselves?

Actually, this is not a very uncommon concept. It happens every day on earth.

This is actually a picture of a salamander.

Salamanders have amazing regenerative abilities.

Here is a small video.

Actually, this is a limb injury of this salamander.

And this is actually a real photo, a timed photo showing how that limb regenerates in a few days.

You can see the scar shape.

And from those scars, new limbs actually grow.

So salamanders can do that.

Why can't we? Why can't humans reproduce?

In fact, we can regenerate.

Your body has many organs, and every organ in your body has cell populations that quickly take over when damaged. it happens every day.

With each passing year, every passing year.

Bones regenerate every ten years.

The skin regenerates every two weeks.

So your body is constantly regenerating.

Problems arise when there are injuries.

When injured or sick, the body's first reaction is to cut itself off from the rest of the body.

It basically wants to fight off infections and seal itself off, whether it's internal organs or skin. The first response is scar tissue moving inward to seal itself off from the outside.

So how can we harness that power?

One way to do that is by actually using smart biomaterials.

How does this work? Now you can see the damaged urethra on the left here.

This is the passageway that connects the bladder to the outside of the body.

And you can see it hurt.

We basically discovered that these smart biomaterials can actually be used as bridges.

When you build that bridge and isolate it from the outside environment, you can build that bridge, and the cells that regenerate in your body can cross that bridge and continue on their way.

That's exactly what we have here.

This is actually the smart biomaterial we used to treat this patient.

It was an injury to the left urethra.

I used that biomaterial in the middle.

And 6 months later, on the right side, you can see this redesigned urethra.

It turns out that your body can regenerate, but only for a short distance.

The maximum distance that can be played efficiently is only about one centimeter.

So these smart biomaterials can only be used to fill that gap by a centimeter or so.

So it does regenerate, but the distance is limited.

What to do if there is damage to a large organ?

What if there is damage to structures much larger than one centimeter?

After that, you can start using the cells.

The strategy here is that if a patient comes to us with a sick or injured organ, we take a very small piece of tissue, less than half the size of a postage stamp, from that organ, disassemble the tissue, look at its basic building blocks, the patient's own cells, take those cells, grow and expand them in bulk outside the body, and then use a scaffold.

Although they look like blouses and shirts to the naked eye, these materials are actually quite complex and are designed to break down once they enter the body.

It will fall apart after a few months.

It functions only as a cell delivery vehicle.

It takes cells into the body. It allows the cells to regenerate new tissue and once the tissue is regenerated the scaffolding is gone.

And that's what we did to this muscle part.

This actually shows a piece of muscle, and how that structure is actually engineered to engineer the muscle.

We take the cells, expand them, place the cells on a scaffold, and then put the scaffold back into the patient.

But in practice, we actually move the scaffolding before placing it on the patient.

We want to condition this muscle so that patients understand what to do after injecting the muscle.

That is what is seen here. You can see this muscle bioreactor actually exercising the muscle back and forth.

have understood. These are the flat structures seen here, the muscles.

What about other structures?

This is actually an artificial blood vessel.

It's very similar to what we just did, but a little more complicated.

Here we take the scaffolding. Basically, scaffolding is like paper here.

And we can make this scaffold tubular.

And what we're doing is the same strategy of creating blood vessels.

Blood vessels are composed of two different cell types.

We take the muscle cells and stick or coat these muscle cells on the outside. It's very similar to baking a layer cake, so to speak.

Place the muscle cells on the outside.

Place the cells inside the blood vessel inside.

You now have a fully seeded scaffold.

Place this in an oven-like device.

Same conditions as the human body, 37 degrees Celsius and 95 percent oxygen.

Then run it as you saw on that tape.

And on the right side you can see the actual artificial carotid artery.

This is actually an artery that goes from the neck to the brain.

This is a radiograph showing patent functional blood vessels.

More complex structures like blood vessels and urethra, which I showed you earlier, are arguably more complex because you're introducing two different cell types.

But in reality they serve mainly as conduits.

At steady state, it allows liquid or air to pass through.

They are less complex than hollow organs.

Hollow organs are very complex because they require these organs to work on demand.

Therefore, the bladder is also one such organ.

Using the same strategy, a very small portion of the bladder, less than half the size of a postage stamp, is harvested.

The tissue is then divided into two distinct cellular components, muscle and bladder-specific cells.

We proliferate cells outside the body in large numbers.

It takes about 4 weeks for these cells to grow out of the organ.

Next, create a scaffold shaped like a bladder.

Lined with these bladder lining cells.

Coat the outside with these muscle cells.

Put it back in this oven-like device.

Six to eight weeks after the piece of tissue is removed, the organ can be put back into the patient's body.

This actually shows the scaffolding.

The material is actually covered with cells.

When we did our first clinical trials on these patients, we actually created scaffolds specifically for each patient.

We brought the patient in for an X-ray six to eight weeks before the scheduled surgery, and built a scaffold specifically for the size of the patient's pelvic cavity.

The second phase of the trial offered different sizes: small, medium, large and extra large.

(laughs) It's true.

And I think everyone here wanted an oversize. right?

(Laughter) So the bladder is certainly a little more complicated than the other structures.

But there are other hollow organs that add even more complexity.

This is actually a heart valve that we designed.

And the way this heart valve is designed is the same strategy.

We take a scaffold and seed it with cells. And here you can see the valve leaflets opening and closing.

In our hospital, these trainings are performed before transplantation.

Same strategy.

And the most complicated are solid organs.

For solid organs, it is more complicated as it uses more cells per centimeter.

This is actually a simple solid organ like an ear.

I am currently seeding cartilage.

It's a device like an oven. After the coating is completed, it will be placed there.

After a few weeks, the cartilage scaffolding can be removed.

This is actually the number we are designing.

These are built up one layer at a time, with the bone first and filling the gaps with cartilage.

Then start adding muscle to the top.

And start layering these solid structures.

Again, fairly complex organs, but the most complex parenchymal organs so far are actually organs such as the heart, liver, and kidneys, which are highly vascularized, highly vascularized, and highly vascularized.

This is actually an example, some strategies for manipulating solid organs.

This is actually one of our strategies. We use printers.

And instead of using ink, I just saw an inkjet cartridge, it uses just a cell.

This is actually a typical desktop printer.

We are actually printing this two-chambered heart one layer at a time.

You can see the heart coming out of it. It takes about 40 minutes to print and after about 4-6 hours you will see your muscle cells contract.

(Applause.) This technology was developed by Tao Ju, who worked in our lab.

And this is really still experimental and not intended for use on patients.

Another strategy we have taken is to actually use decellularized organs.

We can actually take donor organs, organs that are to be discarded, and use very mild detergents to remove all the cellular elements from these organs.

For example, the left panel, the top panel shows the liver.

We actually take a donor liver and use very neutral detergents and use these neutral detergents to get all the cells out of the liver.

After two weeks, you can basically lift this organ. It feels like a liver and can be held like a liver. It looks like a liver, but without cells.

All we have left is the skeleton of the liver, so to speak, made entirely of collagen, a non-rejection substance found in our bodies.

Available from one patient to the next.

Then, when you get this vascular structure, you can prove that the supply to the vessel is maintained.

As you can see, this is actually fluoroscopy.

We are actually injecting a contrast agent into the organ.

Now you can see the start. A contrast agent is injected into the organ into this decellularized liver.

And you can see the vascular tree remaining intact.

Cells, vascular cells, and vascular cells are then harvested and the vascular tree is perfused with the patient's own cells.

The outside of the liver is perfused with the patient's own hepatocytes.

And you can make a functional liver.

And that's actually what you're seeing.

This is still experimental. However, we can actually reproduce the function of liver structures experimentally.

On the kidney, I told you about the first picture you saw, the first slide you showed me, 90 percent of the patients on the transplant waiting list, 90 percent, are waiting for a kidney.

So another strategy we're doing is actually making wafers and stacking them like an accordion.

So we use kidney cells to stack these wafers.

And check out these miniature kidneys we designed.

They actually make urine.

Again, how to make a small structure bigger is our challenge, which we are currently working on in our laboratory.

So one thing I wanted to summarize for you is what is the strategy we are aiming for in regenerative medicine.

If possible, we would like to use smart biomaterials that can regenerate organs simply by taking them off the shelf.

The distance is currently limited, but the real goal is to increase that distance over time.

If you can't use smart biomaterials, you'd rather use your own cells.

why? because they don't refuse.

We can take cells from you, create structures, and put them back into your body. Cells do not refuse.

And if possible, we would rather use cells from your specific organ.

If there is a disease in the trachea, we would like to collect cells from the trachea.

If there is a disease in the pancreas, we would like to obtain cells from that organ.

why? Because we want to select a cell that you already know is the cell type you want.

Tracheal cells already know that they are tracheal cells.

It does not need to be taught to become a different type of cell.

Therefore, we prefer organ-specific cells.

And today, cells are available from almost every organ in the body, with the exception of a few organs that still need stem cells, such as the heart, liver, nerves, and pancreas.

And for them we still need stem cells.

If stem cells from your body are not available, we would like to use donor stem cells.

And we prefer cells that do not undergo rejection and do not form tumors.

And we're doing a lot of research with stem cells that we published two years ago, stem cells from amniotic fluid and placenta. These cells have these properties.

So I would like to tell you that there are some big challenges we have at the moment.

I just showed you this presentation and everything looks really good and everything works. No, these technologies are actually not that easy.

Some of the research you see today was done over 20 years by more than 700 researchers at our institute.

Therefore, these are very difficult techniques.

Once you understand the formula correctly, you can reproduce it.

But it takes a lot of time to get there.

That's why I always like to show this cartoon.

This is how you stop the stage runaway.

And there you see the stagecoach driver, and he, on the top panel, goes A, B, C, D, E, F.

Finally stopped the runaway stage.

And those are usually basic scientists, and the subordinates are usually surgeons.

(Laughs) I'm a surgeon, so it's not that funny.

(Laughter) But actually Method A is the correct approach.

My point is that whenever we introduce these technologies into the clinic, we try to do everything we can in the lab before introducing these technologies into the patient.

And when we bring these technologies to our patients, we want to make sure we ask ourselves some very tough questions.

Are you ready to apply this to your own loved ones, your own children, your own family? Let's move on.

Of course, our main goal is to do no harm in the first place.

What I'm about to show you is a very short clip. A 5 second clip of a patient who received one of the artificial organs.

We started porting some of these structures over 14 years ago.

So we now have patients who have been carrying organs and artificial organs for over ten years.

Here's a clip of a young woman.

She had spina bifida, a spinal cord defect.

She didn't have a normal bladder. This is part from CNN.

It takes 5 seconds.

This is the segment that Sanjay Gupta actually did.

Video: Kaitlyn M: I'm happy. I was always afraid of having an accident or something.

And now I can go out with my friends and do whatever I want.

Anthony Atala: Ultimately, the promise of regenerative medicine is a promise.

To improve the patient's condition, it is very simple.

Thank you for your attention.

(applause)

Does geographic information make you healthier?

In 2001, I was hit by a train.

My train had a heart attack.

I found myself in the intensive care unit recovering from emergency surgery.

And suddenly I found myself in complete darkness.

"So why me?" I started asking.

"Why now?" "Why here?"

"Could the doctor have warned me?"

So what I want to talk to you about in a few minutes is what is the secret to life and health.

Genetics, lifestyle and environment.

It sort of limits our risks, and if we can manage those risks, we will live better and healthier lives.

Well, I understand the genetics and lifestyle part.

And do you know why I figured it out?

Because doctors ask me about this all the time.

Have you ever had to fill out a long legal-sized form in the doctor's office?

So if you're lucky, you can do it multiple times, right?

(laughs) Repeat that over and over. And they ask about your lifestyle, family history, medication history, surgery history, allergy history, etc...Did I forget something in my history?

But I didn't really understand this part of the equation, and I don't think my doctor really understood this part of the equation either.

What does it mean in my environment?

Well, it can mean many things.

this is my life These are my life places.

we all have these.

As I speak, I want you to think about the following. How many places have you lived in?

Think about it, wander through life thinking about this.

And then you find yourself spending it in different places.

You spend it resting, you spend it working.

And if you're like me, you spend a good portion of your time traveling on planes.

Therefore, it is not so simple for someone to ask you, "Where do you live, where do you work, and where do you spend most of your time?"

And where do you expose yourself to risks that you probably aren't even aware of? ”

Well, when I do this for myself, I always come to the conclusion that I spend about 75 percent of my time in relatively few places.

And even though I'm an extensive global trekker, most of the time I don't roam very far from the place.

Well, let me take you on a little journey here.

I started out in Scranton, Pennsylvania.

I don't know if anyone is from northeastern Pennsylvania, but I spent my first 19 years here with a young lung.

As you know, we breathe unequal amounts of sulfur dioxide, carbon dioxide, and methane gas here, and have been doing so for 19 years.

If you've ever been to that part of the country, this is what a burning, smoldering pile of coal waste looks like.

So I decided to leave that part of the world and go to the Midwest.

Well, I ended up in Louisville, Kentucky.

Well, I decided to become a neighbor in a place called Rubbertown.

They make plastic. It uses a lot of chloroprene and benzene.

Well, I spent 25 years breathing it in varying concentrations in my middle-aged lungs.

And you never saw it, because it always looked like this on a sunny day.

It was insidious and it was actually happening.

Then I decided I had to get really smart and I thought I'd get this job on the West Coast.

And I moved to Redlands, California.

So wonderful, my old lungs, as I call them, were filled with particulate matter, carbon dioxide, and very high concentrations of ozone.

have understood? It is almost the highest peak in the country.

Here's what it looks like on a sunny day.

Anyone who's been there knows what I mean.

So what's wrong with this photo?

Well, the picture has a big gap here.

One thing that never happens in my office is that doctors never ask me about the history of my place.

I don't recall a single doctor ever asking, "Where have you lived?"

I was not asked what the quality of the drinking water I put in my mouth or the food I put in my stomach was.

they really don't do that. Missing.

Look at the types of data available.

This data is collected from all over the world, and countries invest billions of dollars in this type of research.

Now, I've circled the places I've been to.

Well, by design, if I wanted to have a heart attack, I was in the right place. right?

So how many white people are there?

How many people have spent most of their lives in a white space in a room?

who? Boy, you are lucky.

How many people spent money in the red part?

Oh, not so lucky.

There are thousands of maps of this kind in atlases around the world.

They kind of tell us what a train wreck would be like.

But there is nothing of the sort in my medical records.

And it's not in you either.

So, here is my friend Paul.

he is a colleague For the past two years, he has been able to track his cell phone every two hours, wherever he goes, 24/7.

And we know he's been to several places in America.

And this is where he spent most of his time.

If you really study it, it might give you some clues as to what Paul wants to do.

Anyone got a clue? ski. right.

If you zoom in here, you suddenly see where Paul actually spent most of his time.

And all those black dots are all toxic release inventories monitored by the EPA.

Did you know that data exists?

You can create your own personalized map for every US community.

In short, we can now build a history of locations on our phones.

This is how Paul did it. He did it on his iPhone.

This may be what we end up with.

This is what the doctor brings in front of him and her when we enter the office instead of the pink slip that says we paid at the counter. right?

This may be my humble assessment.

And he looked at it and said, "Hey Bill, just because we're here in beautiful California and it's warm every day, maybe I should just go out and run at 6pm instead of deciding.

Because of this report, Bill, I think it's a bad idea. ”

I would like to leave you with two prescriptions.

First of all, we must educate doctors about the value of geographic information.

It is called geomedicine. There are currently about six programs around the world that focus on this.

And they are in the early stages of development.

These programs need to be supported and we need to teach future doctors around the world the importance of the information we have shared with you here today.

The second thing we need to do is make sure that while billions of dollars are spent building electronic medical records around the world, the history of location is captured within those medical records.

It's not only important for doctors. It will be important for researchers who will be using large samples in the future.

But it will also help us.

If I had this information, wouldn't I have decided not to move to Ozone Capital in the US? I could have made that decision.

Alternatively, I can negotiate with my employer to make that decision in the best interest of myself and my company.

So let me just say that Jack Lord said this almost ten years ago.

Just look at it.

That was the conclusion of the Dartmouth Atlas of HealthCare, which said it could explain the geographic differences that occur in disease, sickness and health, and how the health care system actually operates.

That's what he was talking about in that quote.

And I think he got it right almost ten years ago.

Therefore, I strongly urge you to start seriously working on this as an opportunity to record it in your medical record.

So, my particular take on health is that geography is always important.

And I believe geographic information will keep you and me healthy. thank you.

(applause)

Video: Narrator: One point of view of an event gives an impression.

Looking at it from a different perspective gives a different impression.

But it's only when you get the big picture that you can fully understand what's going on.

Sasha Vucinić: Great clip.

And it turns out that those 29 seconds say more about the power and importance of independent media than one hour does.

So I thought it would be a good idea to start there.

And let's start with a little statistic.

According to relevant researchers, 83 percent of the planet's population lives in societies without an independent press.

Think about this number. Eighty-three percent of the planet's population doesn't really know what's going on in their country.

The information they get is filtered by someone who twists it, colors it, or adds something to it.

Therefore, they are unable to comprehend their reality.

To understand how big and important this issue is.

Well, I think people who are lucky enough to live in a society that makes up 17 percent should enjoy that society until it lasts.

Sunday morning, flip the paper and take out a cappuccino.

Enjoy while it lasts.

Because, as we heard yesterday, not only could a country lose a star from its flag, but it could also lose press freedom. Perhaps the Americans among us can tell you more.

But that's a completely different topic.

So back to my story.

My story begins in 1991. The story I want to share begins in 1991.

At the time I was running B92, the only independent, even the only electronic media in the country.

And I think we were sharing. We lived that normal life with the only independent media in the country operating in a hostile environment and the government really wants to make your life miserable.

And there are many ways.

That's right, it was the usual cocktail. A little intimidation, a little friendly advice, a little financial police, a little text control—there's always someone who never leaves the office.

But what they're really doing is very powerful, and if independent media companies don't like it, that's what governments started doing in the late '90s. In other words, they are threatening advertisers.

When they intimidate advertisers, they actually subvert market forces and advertisers don't want to come and advertise, no matter how meaningful it is to them.

And you have trouble making ends meet.

Back then, in the early 90's, we had that problem. It was, you know, surviving below one side, but what was really painful for me, remember, in the early 90s, Yugoslavia was collapsing.

We were sitting there with a country in slow motion downfall.

And we all had it all on tape.

We had the ability to understand what was happening.

We were actually recording history.

The problem was that the history had to be re-recorded a week later. Because if you don't, you won't be able to afford enough tapes to keep an archive of that history.

So even if I gave you that picture, I don't want to say too much about it.

Meanwhile, a gentleman came into my office.

It was still 1991.

He ran a media systems organization that is still in business and the gentleman is still in business.

What did I know about media systems back then?

I think of media systems as organizations. That means your media system needs to help you.

So I prepared two plans for the meeting, two strategic plans, a small plan and a big plan.

The small thing is that I wanted him to help me get that damned tape so I could preserve the archives for the next 50 years.

The big plan was to ask him for a $1 million loan.

Because I still thought serious, independent media companies were great business.

And I thought B92 would survive and be a great company without Milosevic, and it was.

The company is now probably the largest or second largest media company in the country.

And we figured all we needed at the time was a $1 million loan to get us through that difficult time.

Long story short, the gentleman came into the office in a fine suit and tie.

I told him what I thought was an excellent account of the political situation, and how war can be difficult and harsh.

In fact, I have to admit that I underestimated the atrocities.

Anyway, after that big, long explanation, the only question he had with me—I'm not kidding—is, after Michael Jackson's music airs, do we pay copyright fees?

That was really his only question.

He left, but I remember actually being very angry with myself, thinking there must be institutions in the world that finance media companies.

It's very obvious, and in the face of it, someone must have thought of it.

Someone must have started something like that.

And I thought I was just stupid and couldn't find it.

You know, in my defense, Google didn't exist back then. You couldn't just use Google in '91.

So I thought it was actually my problem.

Fast forward to 1995 here.

I left the country and had a third meeting with George Soros to try to convince him that his foundation should invest in something that should operate like a media bank.

And basically what I'm saying is very simple.

Forget about charity. it doesn't work.

Forget handouts. $20,000 doesn't help anyone.

The thing to do is treat media companies as businesses.

business everywhere.

Whether it's a media business or any other business, it needs to be capitalized.

And what they really need is access to capital.

At the third meeting, the discussion is fairly well-formed.

At the end of the meeting he said, look, it's not going to work. You will never get your money back. But my foundation is donating $500,000, so why not give the idea a try?

Make sure it doesn't work.

He said he would give me a rope to hang myself with.

(Laughter) After that meeting, I learned two things.

First of all, I am not going to hang myself under any circumstances.

And secondly, I don't know how to make it work.

On a concept level it was a great concept.

But having a concept is one thing. Getting it to actually work is another thing entirely.

So I had no idea how it actually works.

I had the wrong idea. I thought we could be a bank.

I see a bank -- I don't know if there are bankers here. Apologies in advance, this is the best job in the world.

Find someone who is respectable and has a lot of money.

you give them more money. They will pay it back over time.

It just collects interest and does nothing in between.

So I thought, why not get into that business?

(Laughter) Well, here comes our first client, an amazing guy.

Slovakia's first independent newspaper.

The government blocked them from all printing facilities in Bratislava.

Here is a daily newspaper printed 400 kilometers from the capital.

It's a daily newspaper that closes at 4pm.

That means they don't play sports. They don't have the latest news. Circulation decreases.

This is a very nice and elegant way to economically strangle your daily newspaper.

They come to us asking for loans.

they want to. The only way they can survive is to get their hands on the printing press.

And we said okay. see you; you bring us your business plan and finally they brought it.

Start a meeting.

These two sheets of paper are much larger as they are in A4 format rather than like this.

There are a lot of numbers out there. lots of numbers.

But no matter how you look at it, numbers don't mean anything.

And that's the best they can do.

We did the best they could.

This is how I understood what our method is.

not a bank. We had to actually get into these companies, establish a management system, unilaterally provide all the knowledge about how to run a business, etc., so that we could profit from fixing them. On the other hand, they all know how to run a business and create content.

Briefly describe the results.

Over the last decade, $40 million has been loaned at an affordable price, with an average interest rate of 5% to 6%.

Lately, they've been going wild, sometimes charging 7 percent.

We do it in 17 developing countries.

And here is the most amazing number.

The return rate, which Soros was so concerned about, is 97 percent.

97% of the scheduled repayments were paid back on time.

What do we typically fund?

We finance everything a media company needs, from printing presses to transmitters.

Most importantly, do it in a way that's good for supporting someone, whether it's a loan, equity, or lease.

But the most important thing here is who to fund.

We believe that the companies we have financed over the last decade are actually the best media companies in the developing world.

It's a "who is who" list.

I could spend hours talking about them. Because they are all kind of heroes.

You can, but I'll probably just give you one, and possibly two, examples where we work together.

We started out in Eastern and Central Europe and moved to Russia.

Our first loan in Russia was in Chelyabinsk.

I'm sure half of the people have never heard of the place.

In the south of Russia there is a man named Boris Nikolaevich Kirshin who runs an independent newspaper there.

The city, which produced, among other things, glass for Tupolev planes, was closed until the early 90s.

Anyway, he runs an independent newspaper there.

After working with us for two years, he has become the most respected newspaper in that little place.

One day the governor came up to him and actually invited him to come to his office.

He goes to see the governor. "Boris Nikolaevich, I understand that you are doing a great job. You are the most respected newspaper in our district," the governor said.

And I would like to propose a deal to you.

I have an election, so please give me a newspaper for the next nine months. We have an election in nine months.

I'm not running for office, but it's very important who the successor will be.

So, please give me nine months worth of paper. I send back to you.

I am not interested in the media business.

How much does it cost?

"Not for sale," says Boris Nikolaevich.

The governor says, "We will be closed."

Boris Nikolaevich says "No, you can't do that."

Six months later, the newspaper was discontinued.

Luckily, we had enough time to help Boris Nikolayevich take all the assets out of that company, bring them into the new one, get all the subscriber lists, and rehire the staff.

In other words, what the governor got was an empty shell.

But that's what happens when you're in the independent media business or you're an independent media banker.

Sounds like a great story.

In the meantime, we opened a media management center.

We started the Media Lab, sounds like a really great story.

But there is another side to this as well.

Second angle like this clip.

When I pick up the camera above, I start thinking about those numbers again.

$40 million spread across 17 countries over 10 years.

Isn't that too much?

It's actually just a drop in the ocean.

Because given the significance of that, I thought about some of the issues we discussed last night, the last session about Africa and his hypothetical $50 billion going to Africa.

Half, but not all, of these issues mentioned last night--government accountability, corruption, how to combat corruption, giving voice to the voiceless and the poor--is why the independent media are in business.

And that's why it was invented.

From that perspective, what we've done is just a drop in the ocean of needs we can identify.

Well, our story is just one story.

I think there are about 15 other great stories in this room from nonprofits doing great things.

Here's the problem, so I'll do my best to explain what the problem is.

And it's called fundraising.

Imagine that this room is one-third filled with people representing different foundations.

Imagine two-thirds of us here running great organizations and doing really important work.

Now imagine that each person is deaf and deaf and turns off the lights.

How difficult it is to match people on this side of the room with people on the other side of the room.

So we thought we needed some kind of big idea to reinvent it, to completely rethink funding.

As you know, instead of running around in this darkness, people are trying to find someone who fits them, who pleases them, who has the same goals as them.

Instead of everything we thought, we have to invent something new.

And then we came up with the idea of ​​issuing a bond, a press freedom bond.

If there are investors willing to finance the US government budget deficit, why can't we find investors willing to finance the press freedom deficit?

We decided to do it this fall. It will probably be issued in units of $1,000.

I don't want to advertise too much. it doesn't matter.

But the point is, if we survive to the point where we actually issue bonds and find enough investors to consider this a success, nothing will stop the next organization from starting bond issuance next spring.

And they can be environmental bonds.

And two weeks later, Iqbal Kudir will be able to issue electricity with Bangladeshi bonds.

And before you know it, practically every social activity is funded in this way.

Now, at 11:30 with 55 seconds left, I fantasize.

But let's take the idea further.

Starting it in America and starting it because, you know, that concept is very close to the American mind.

But you can actually bring it to Europe as well.

I can take it to Asia.

Understanding all these different points makes it easier for investors.

With all of these joins in one place, you can sit back and click.

Once you have more than 10 of them, you have to create some kind of matrix.

What do investors get?

Economic on the one hand, social on the other.

That's where the idea of ​​a Morningstar-style rating agency comes in.

It says the social impact here is great, 5 stars.

1 percent financially, only 1 star.

Please proceed to the last step.

Putting it all together, there is no single reason why we can't really open a market that can't dispose of all these bonds quickly.

That way we can organize our fundraising so there are no more dark rooms or blind people running around looking for each other.

thank you.

Today we are going to talk about architecture firms.

What I want to say is that it's time for architecture to do something again, not just express things.

This is the construction helmet I received two years ago at the groundbreaking ceremony for the biggest project my company and I have ever been involved in.

I was thrilled to get it. I was very happy because I was the only one on stage with a shiny silver helmet.

I thought it represented the importance of architects.

I was excited until I got home, threw the helmet on the bed, collapsed on it, and noticed the inscription inside.

(Laughter) Now, I think this is a great metaphor for the state of architecture and architects today.

For decoration purposes only.

(Laughter.) Now, who should we blame?

We can only blame ourselves. Over the past 50 years, the design and construction industry has become much more complex and litigious.

And we architects are cowards.

So we've stepped back and backtracked as we've faced responsibility, but unfortunately where there's responsibility, guess what's there: power.

So, in the end, we found ourselves in a completely alienated position here.

So what have we done? We are cowards, but we are also wise cowards.

So we redefined this alienated position as an architectural place.

And we said, "Hey, architecture, that's it. We're going to seed the control of the process with this autonomous language."

And we were about to do something horrible for this industry.

In fact, we created an artificial division between creation and execution, as if we could actually create without knowing how to do it, and as if we could actually do it without knowing how to create it.

Now another thing happened.

And that's when I started selling to the world that architecture was made by an individual who made genius sketches.

And the incredible effort that took years and years to perfect these sketches is not only something to be ridiculed, but simply dismissed as execution.

Now, I would argue that half an hour of mating is a creative act, that there is a nine month gestation period, and that, God forbid, twenty-four hour child labor is just execution.

So what do we architects need to do? You have to stitch back creation and execution.

And instead of authoring the object, you have to start the authoring process again.

If we do this, I believe we can go back 50 years and reinject agency, social engineering into architecture.

Now, managing contracts, learning how to write contracts, understanding procurement processes, understanding the time value of money, estimating costs, and all sorts of other things we architects need to learn how to do.

But I boil this down to three very pedantic statements at the beginning of the process.

The first is to obtain a core position with the client.

I think it's shocking that architecture actually says that.

The second position is actually taking a position.

Take a joint stand with your client.

This is the moment when you, as architect and client, begin to inject vision and agency.

But it has to be done together.

And only after this is done can we be allowed to do this and start proposing architectural assertions that articulate those positions.

And owners and architects alike are empowered to criticize their manifestations based on the position you take.

Now, when I run this, I believe something really amazing happens.

I like to call this the lost art of losing control productively.

I don't know what the final result will be.

But I promise that with enough brains, passion, and enough effort, you'll reach conclusions that transcend common sense. It will be something you never thought of originally or personally.

Well, I'm going to put all this together in a series of simple silly sketches here.

This is how we do it today.

We roll 120 feet Spartan, our vision, to your Troy gates.

And I don't understand why they wouldn't let us in.

Well, instead of doing that, why not run to the gate with what they want?

Now, this is a bit of a dangerous metaphor. Because, of course, we all know there were a lot of people with spears in the Trojan horse.

Therefore, the metaphor can be changed. Let's call the Trojan horse a vessel for passing through gates and past project constraints.

At that point, you and your client can start considering what to put in that vessel, agency, and vision.

And if you do it, you do so responsibly. I believe that instead of giving birth to a Spartan, I can give birth to a maiden.

If I were to boil it all down to one sketch, it would look like this:

If we're good at it, shouldn't we be able to come up with architectural expressions that seamlessly transcend project and client constraints?

Now, with that in mind, here's a project that's dear to many people in this room. Well, maybe not dear, but certainly close to many people in this room.

And it's a project about to open next week at the Dallas Theater Center, the new home of the Dee and Charles Wiley Theatre.

Here I will present it on the same terms: problem, position, architectural representation.

Well, the first problem we faced was that the Dallas Theater Center had an unexpected notoriety outside of the triumvirate of New York, Chicago, and Seattle.

And this had to do with the leader's ambitions.

But it also had something to do with something pretty unusual, and that was this terrifying little building where they were performing.

Why was this hideous little building so important to their fame and innovation?

Because they can do whatever they want with this building.

You can't tear down the proscenium when you're on Broadway.

In this building, the artistic director wanted to do "Cherry Orchard" and wanted people, so he brought in a backhoe to make people come out of the well on the stage, and just dug a hole.

Well, I'm looking forward to that.

And we can start getting the best artistic directors, stage designers and actors from all over the country to come and perform here because we can do things that we can't do anywhere else.

So our first position was, 'As architects, we shouldn't build a pristine building that doesn't give the company the same freedom that this old dilapidated warehouse offered.'

The second issue is a nuance of the first.

That is, the company and the building had a variety of shapes.

In other words, as long as there was manpower, performance could go back and forth between prosceniums, thrusts, flat floors, arenas, traverses, and more.

All they needed was work.

Well something happened. In fact, something happened in every institution in the world.

It started to become difficult to come up with operating costs and operating budgets.

So they stopped hiring cheap labor.

And finally, they had to freeze the tissue into something called "bastard turcenium."

So the second position we take is that the freedom we provided, the ability to move between stage configurations, should be done independent of operational costs. are you OK? Affordable.

The architectural representation was, frankly, just stupid.

It was about taking everything known as the front of the house and the back of the house and redefining them as the top of the house and the bottom of the house.

At first glance, you might think, "Oh my god, what the heck are we going to get?"

We built what we call Super Fries.

(Laughter) Well, Superfly, the concept is that you take all the freedom usually associated with flytowers and paint it all over the flytower and the auditorium.

Suddenly, the artistic director can move between different stage and audience configurations.

And that fly tower has the ability to pick up all the original elements, so suddenly the rest of the environment can be tentative. You can also drill, cut, nail, paint and replace screws at minimal cost.

However, the move provided an unexpected third benefit.

And that was to liberate the perimeter of the auditorium in a very unusual way.

And because of that, the artistic director was suddenly able to define the suspension of disbelief.

The building thus gives the artistic director the freedom to envision almost any kind of activity under this floating object.

But it also challenges the notion of suspension of disbelief, and in Macbeth's final act, if you want the allegory you see about Dallas to be tied to real life, he or she can.

Well, to make this happen, we and the client had to do something pretty remarkable.

In fact, it was the client who had to do it.

They had to make a decision based on our position that the budget would be redefined from 2/3rds Capital A architecture, 1/3rd infrastructure, to actually the opposite, 2/3rds infrastructure, 1/3rd Capital A architecture.

There are many things a client must commit to before they can actually see the fruits of their concept.

But they decided to do so based on position, knowledge and conviction.

And in effect created what we call the Theater Machine.

That theater machine now allows a few stagehands to quickly move between a series of configurations at the push of a button.

But it also has the potential to provide multiprocessor sequences, not just multiform.

Meaning: The Artistic Director does not necessarily have to go through the lobby.

One thing we learned when visiting different theaters is that they hate us architects. Because they say the first thing we have to do is take our architecture out of the audience's head for the first five minutes of any show.

Now, this building has the potential for an artistic director to actually move into the building without using our architecture.

So, in reality, there is a building and there is what we call a lottery.

You go down to our lobby and, like it or not, go through the lobby with our own little dangles and up through the stairs that lead to the auditorium.

But there is also the possibility of allowing people to move directly from the outside into the interior of the auditorium, in this case suggesting a sort of Wagnerian entrance.

And here's where it really came to fruition.

These are two large revolving doors that allow performers and spectators alike direct access from outside, inside, inside and outside.

Now imagine what it is. To be honest, this would take too long to be done in this building yet.

But take this a step further and imagine the freedom if you could actually think of the Wagnerian entrance, the first act thrust, the Greek intermission, the second act arena, and exit through the lobby with a bit of a dangle.

This is architectural performance.

It takes an architect's hand to actually get rid of the architect's hand and support the artistic director's hand.

We'll cover three basic configurations.

It has a flat floor configuration.

You can see that there is no proscenium, the balcony is raised, there are no seats, and the auditorium has a flat floor.

The first configuration is easy to understand.

We see the balconies descend and the seats come in as the orchestra begins to rake towards the front towards the final stage.

The third construct is a little more difficult to understand.

Here you can see that the balcony really needs to be moved out of the way in order to provide some impetus to the space.

And some seats have to actually turn and change the rake to make that possible.

I'll do it again, so please take a look.

Here is the side balcony of the proscenium.

And it's in the thrust configuration.

To do this, again, I needed a client willing to take an educational risk.

And they told us one important thing: "Don't beta test."

So whatever we do, we can't do it first.

However, they were willing to apply technology from other fields that already had fail-safe mechanisms to this building.

And the solution regarding the balcony was to use what we all know as a scoreboard lift.

Well, if you drop the scoreboard onto dirt and whiskey, it's going to suck.

If you couldn't get the scoreboard out of the arena and do ice capades the next night, that would be bad too.

So the technology already had all the fail-safe mechanisms and theaters and clients could actually do this with the confidence that they could change the configuration at will.

The second technology we applied was actually using something that is well known stageside at the Opera House.

In this case, what we do is lift the orchestra floor, rotate it, change the rake, move it back to a flat floor, and change the rake again. In essence, you can begin to freely define the tilt and viewing angles of the people in the orchestra seats.

Here you can see how the chair rotates to transition from a proscenium or end stage to a thrust configuration.

Also proscenium. As far as we know, this is the first building in the world where the proscenium can completely pop out of space.

Here you can see various acoustic baffles, as well as flight mechanics and catwalks above the auditorium.

And finally, a scene set that allows transformation is completed on the fly tower.

As I said earlier, all of this helped create a flexible yet affordable configuration.

But we got another advantage. It was the ability of the Perimeter to suddenly engage Dallas from the outside.

This is the current building with the blinds closed. This is a trompe l'oeil picture.

Actually this is not a curtain. These are vinyl blinds built into the window itself, with a fail-safe mechanism that can also be lifted up to give you a complete picture of the theater operations, rehearsals, etc. going on behind the scenes if you so choose.

But you can also show the audience Dallas or perform with Dallas as the backdrop for your performance.

Okay, so this is an early concept sketch, but let's talk about how it all came together.

It will essentially look something like this.

Bringing objects or performers into the performance room is permitted. You can bring "Aida", that elephant, an elephant.

You can publish an auditorium to Dallas and vice versa.

Portions can be opened for line changes, entered and exited during intermissions, and entered at the start and end of performances.

As I mentioned earlier, all balconies can be moved, but they can also disappear completely.

Proscenium can fly.

Large objects can be brought into the chamber itself.

But when I had to face the idea of ​​moving costs from architecture to infrastructure, this one represented the most compelling one.

Again, this isn't all about the flexibility of the actual building being built, but it at least hints at the idea.

The building will soon be converted back to flat floor construction and ready for rent.

Well, if anyone from American Airlines comes here, please consider having a Christmas party here.

(Laughter) This allows the company to increase its operating budget without competing with other venues with much larger auditoriums.

That's a huge advantage.

In short, the company is fully enclosed, light and sound controlled, and has the ability to present great acoustics and intimate Shakespeare, but also Beckett with the Dallas skyline in the background.

This is a flat floor configuration.

Theater is moving at such a pace.

This is the final configuration.

It's actually beautiful. I had a rock band.

We tried to stand outside to see if the acoustics were working and we could see them doing this but didn't hear them.

It was very unusual.

Here we have a thrust configuration.

And last but not least, you can see that this already has the ability to create events to generate operating budgets to overcome real functioning buildings so companies can overcome their biggest problems.

Introducing a short timelapse.

As I said earlier, this can be done by just two people and in a minimal amount of time.

This was the first time the actual switchover had taken place, and literally thousands of people turned up because everyone was so excited and wanted to be a part of it.

So, in a way, try to ignore the thousands of ants running around.

And think of it being done by just a few people.

Again, you only need a few people.

(laughs) I promise.

And there we go.

(Applause) In conclusion, just a few shots.

This is the Dee and Charles Wiley Theater at the AT&T Performing Arts Center.

It's night there.

And last but not least, the entire AT&T Performing Arts Center.

You can see the Winspear Opera House on your right and the Dee and Charles Wiley Theater on your left.

Now recall an example where architecture actually did something.

But we came to that conclusion without understanding where we were going and the set of issues facing the company and our clients.

And we took positions with them, and through those positions we began to take architectural expressions and came to conclusions that none of us, really any of us, would have ever conceived initially or individually.

thank you.

(applause)

Namaste. good morning.

I am very happy to be here in India.

And I've spent the last 11 years especially traveling the world with V-Day and "The Vagina Monologues", and I've been thinking a lot about what I've learned from meeting women and girls around the world to stop violence against women.

It is this particular cell, or group of cells, within each of us that I want to talk about today.

And I like to call it Girl Cell.

And it is not only in women, but also in men.

Imagine that this particular group of cells is central to the evolution of our species and the survival of humanity.

And imagine, at some point in history, the group of powers that invested in owning and controlling the world understood that the suppression of this particular cell, the suppression of these cells, the reinterpretation of these cells, the weakening of these cells, and making us believe in the weakness of these cells, crushing, eradicating, destroying, reducing these cells basically started the process of exterminating the girl cells, which was patriarchy by the way.

Imagine that this girl is part of the vast macrocosm of collective consciousness.

And it is essential for the balance, wisdom and practical future of all of us.

And imagine, this girl's cell is compassion, empathy, passion itself, vulnerability, tolerance, intensity, it's union, it's relationship, it's intuitive.

And consider how compassion breeds wisdom, and that weakness is our greatest strength, and that emotions have an intrinsic logic that leads to radical and appropriate saving actions.

And let us remember that we have been taught the exact opposite by those in power. Compassion cloudes thinking, gets in the way, vulnerability is weakness, emotions should not be trusted, and things should not be taken personally, these are some of my favorites.

I think people all over the world have basically been raised not to be girls.

How should I raise a boy? What does it mean to be a boy?

Being a boy actually means not being a girl.

Being a man means not being a girl.

Being a woman means not being a girl.

Being strong means not being a girl.

Being a leader is not about being a girl.

In fact, being a girl is so powerful that I think everyone had to train not to be.

(Laughter.) And of course it's ironic, but I also want to say that denying girls, suppressing girls, suppressing emotions, and denying emotions is so connected here.

In the world we now live in, the most extreme forms of violence, the most horrific of poverty, genocide, gang rape and destruction of the planet are completely out of control.

And we do not feel what is happening because we have suppressed our girl cells and suppressed our girlhood.

Therefore, we are not called upon to respond appropriately to what is happening.

I would like to say a few words about the Democratic Republic of the Congo.

For me it was a turning point in my life.

Over the past three years I have spent a lot of time there.

I feel that I have seen a lot of violence in the world until then.

For the past 12 years, I have lived in rapeseed fields virtually all over the world.

But the Democratic Republic of the Congo was really a turning point for my soul.

I spent time in a place called Bukavu in a hospital called Panzi Hospital with a doctor who is more saintly than any I have ever met.

His name is Dr. Dennis Mukwege.

For those of you who don't know, Congo has been at war for the past 12 years, killing nearly 6 million people.

An estimated 300,000 to 500,000 women were raped there.

During my first few weeks at Panzi Hospital, I sat with women sitting side by side each day to tell me stories.

Their stories were so terrifying, shocking, and about the underside of human existence that, to be honest, I was blown away.

And as for what happened, I will listen to stories of 8-year-old girls who have been gutted, pierced with guns, bayonets, etc., and literally have holes all over their bodies from which pee and poo come out, and I will tell you what happened when they were pulverized.

I've heard stories of an 80-year-old woman being chained up in a circle and periodically being raped by a group of men. All in the name of economic exploitation, with Western countries stealing minerals in order to obtain them and make a profit.

My heart was so broken.

But what happened to me was that crushing actually encouraged me in ways I had never been encouraged before.

That shattering, that women's cell opening, that big breakthrough made me braver, braver, and actually smarter than I had ever been in my life.

What I mean is that I think those in power know that empire-building is in fact an emotion that gets in the way of empire-building.

Emotions get in the way of mass acquisition of Earth, excavation of Earth, and destruction of objects.

For example, I remember when my very violent father used to beat me.

And in fact, he hit me and said, "Don't cry. Don't you dare cry."

Because my crying somehow exposed him to his brutality.

And even at that moment he didn't want to be reminded of what he was doing.

I know we systematically exterminated the girl cells.

And I want to say that we have eradicated it not only in women, but also in men.

And in a way, I think we've been tougher on men in killing off the female cells.

(Applause.) I look at how boys have been raised and I see this all over the planet. It is strict, stubborn, distanced from kindness, and not crying.

I actually realized once in Kosovo, when I saw a man broken down, that the bullets were actually hardened tears, and that if a man doesn't allow himself to be a girl, to be vulnerable, to be compassionate, to have a heart, he becomes hardened, hurtful and violent.

And I think we've taught men to feel safe when they're insecure, to pretend to know things when they don't, or why we're in this place.

Pretend not to be confused when you are confused.

And tell a very funny story.

On my way to get here by plane, I was walking up and down the aisle of the plane.

And literally at least 10 guys all watching chick movies in tiny seats.

And since they were all alone, I thought, "This is the secret life of a man."

(Laughter) Like I said, I've traveled to so many countries and I've seen that if we're doing what we're doing to the girl inside us, it's obviously scary to think about what we're doing to girls all over the world.

Yesterday we heard from Sunita and then from Kavita about what we are doing with the girls.

But all I can say is that I've met girls with knife wounds and cigarette burns who are literally treated like ashtrays.

I've seen girls treated like trash.

I have seen girls abused by their mothers, brothers, fathers and uncles.

I have seen girls starve to death in institutions in America to pretend to be their idealized selves.

I've seen us cut girls down, control them, leave them illiterate, or embarrass them for being too smart.

we silence them. We make them feel guilty for being smart. We instruct them to moderate their demeanor, not to be too violent.

We sell them, kill them as fetuses, enslave them, and rape them.

We are so accustomed to depriving girls of being the subject of our lives that we are now actually objectifying them and turning them into commodities.

The sale of girls is rampant all over the planet.

And in many places they are worth less than goats and cows.

But I also want to talk about the fact that if 1 in 8 people on the planet is a girl between the ages of 10 and 24, then they are the very key to the future of humanity, both in the developing world and in the whole world.

And if girls are troubled by the systemic disadvantages that keep them where society wants them: lack of access to health care, education, healthy food and labor force participation.

The burden of all household chores usually falls on girls and younger siblings, so they can never overcome these barriers.

In my belief, the state of the girl, the state of the girl, be it the girl in us, the girl in the world, determines whether the species survives.

And what I want to suggest is, I've been talking to girls for five years because I just finished writing a new book called I'm an Emotional Creature: The Secret Lives of Girls Around the World. And one thing that applies everywhere is that the verb that is forced on girls is the verb "please".

Girls are trained to please.

I want to change the verb.

Let's try changing the verb together.

I would like the verb to be "educate", "activate", "engage", "confront", "rebel" or "create".

If we teach girls to change verbs, we are actually forcing girls in us and girls in them.

And I now have to share some of the stories I've seen around the world of girls who, despite all the circumstances around them, got engaged to her and accepted her.

For example, I know a 14-year-old girl in Holland who wants to go around the world on her own boat.

A recently out-of-town teenage girl finds out she needs 56 star tattoos on the right side of her face.

There is a girl, Julia Butterfly Hill, who lived in a tree for a year because she wanted to protect a wild oak tree.

There is a girl I met in Afghanistan 14 years ago who was killed, so I took her in as her daughter. Her mother was a revolutionary.

And when this girl was 17 years old, she wore a burqa in Afghanistan, entered a stadium, and documented on video the atrocities being committed against women under the burqa.

And that video was shown around the world as a video of what was happening in Afghanistan after 9/11.

I would like to talk about Rachel Corrie when she was a teenager. She stood in front of an Israeli tank and said, "Stop the occupation."

And she knew she was in mortal danger, and she was literally shot down by that tank and rolled over.

And I want to talk about a girl I met recently in Bukavu who was impregnated by a rapist.

And she was holding a baby.

And I asked her if she loved her baby.

And she looked into the baby's eyes and said, "Of course I love my baby. How can I not love my baby?"

It's my baby and it's full of love. ”

To me, the girls' ability to overcome situations and level up is amazing.

There is a girl named Dorcas. I just met her in Kenya.

Dorcas was 15 years old and trained in self-defense.

A few months ago, she was picked up on the street by three elderly men.

They kidnapped her and put her in a car.

Then, in self-defence, she grabbed their larynx and punched them in the eye, and she got out of the car free.

In August in Kenya, I visited one of the V-Day Safe Houses for Girls, a house that opened seven years ago with a wonderful lady named Agnes Paleio.

Agnes was a woman who had her female genitals mutilated when she was young.

And she, like many women on Earth, made the decision that what was done to her would not be forced, nor would it be done for any other woman or girl.

So Agnes continued walking through the rift valley for many years.

She taught the girls what a healthy vagina looks like and what a severed vagina looks like.

And during that time she saved many girls. And when we met her and asked what we could do for her, she said: "If you bought me a jeep, I could move faster."

So we bought her a jeep. And she saved 4,500 girls.

And we asked her, "Okay, what else do you need?"

And she said, "Well, now I need a house."

That's why Agnes built the first V-Day Safe House seven years ago on Masai land in Narok, Kenya.

And it was a house where girls could run away, protect their clits, not get cut, and go to school.

And after several years of Agnes owning the house, she changed the circumstances of the house.

She literally became the deputy mayor.

She changed the rules.

The whole community bought into her work.

When we were there she was performing a ceremony to reconcile runaway girls with their families.

And then there was a young girl named Jacqueline.

Jaclyn was 14 years old and was in a Maasai family, but Kenya is experiencing a drought.

So the cow is dying, and the cow is the most precious possession.

And Jacqueline hears her father talking to an old man about selling her in exchange for a cow.

And she knew it meant she would be cut.

She knew it meant she would stop going to school.

She knew it meant she had no future.

She knew she had to marry the old man, and she was fourteen.

So one afternoon, when she heard of a safe house, Jacqueline left her father's house and walked for two days through the Maasai lands.

She slept with hyenas. She hid at night.

On the one hand, she imagined her father killing her and her mother Agnes greeting her, expecting to greet her when she got home.

And when I got home, she was there to greet me.

Agnes took her in, Agnes loved her, and Agnes supported her for a year.

She went to school, found her voice, found her identity, found her heart.

Then, a year later, the time came when she had to go again to tell her father about the reconciliation.

When she was reunited and reconciled with her father, I had the privilege of being in that cabin.

When we entered the hut, her father and his four wives were sitting there. There sat her sisters who had just returned because they had all fled when she fled, and her first mother who had stood up for her with the elders and had been beaten.

Her father looked at her, and when he saw her completely turned into a little girl, he held his arms to her and broke down in tears.

He said, "You are beautiful. You have grown into a beautiful woman."

we won't cut you

And I promise you here and now, we will not hurt your sisters either. ”

And she said to him, "You sold me for four cows, one calf, and some blankets.

But I promise I will always take care of you now that I am educated, and I will come back and build a house for you.

And I will be in your corner for the rest of your life. ”

For me, it's girl power.

And that is the power of change.

I would like to finish today with a new part of my book.

And tonight, I want to do it for all the girls here.

And I want to do it for Sunita.

And I want to do it for the girls that Suneetha spoke to yesterday, the girls who will survive, the girls who can be someone else.

But I really want for each one of us here to cherish the girl in us, cherish the crying part, cherish the emotional part, cherish the vulnerable part, and understand that there is a future out there.

This is called "I am an emotional creature".

And it happened because I met a girl at Watts in Los Angeles.

I asked the girls if they liked being girls, and they all said, "No, I don't. I can't stand it."

It's all bad. My brothers got it all. ”

And this girl just got up and said, "I love being a girl.

I am an emotional creature! ”

(Laughter) That's my word for her. i love being a girl

I can feel what you are feeling, just as you are feeling in your previous emotions.

I am an emotional creature.

Things don't come to me as intellectual theories or hard ideas.

They pulse my organs and legs and burn out my ears.

Oh, you know when your girlfriend is really pissed off, even if it seems like she gave you what you wanted.

I know when the storm will come.

Feel the invisible vibrations of the air.

You can tell he won't call you back. That's the vibe I share.

I am an emotional creature.

I love how they don't take things lightly.

The way I walk down the street, the way my mom wakes me up, the intolerance of losing, the way I hear bad news, everything is intense for me.

I am an emotional creature.

I am connected to everything and everyone. I was born that way.

Are you saying negative things about being a teenager or being a girl?

These feelings keep me going.

they make me exist. they prepare me. they make me strong

I am an emotional creature.

There is a certain way of knowing.

The older woman seems to have forgotten why.

I am happy that it is still in my body.

Oh, I know when coconuts are about to fall.

We know we pushed the Earth too far.

I know my father won't be back and no one is prepared for fire.

I know lipstick is more than a pretense, boys are hyper-anxious, and so-called terrorists are made, not born.

I know that one kiss can take away all my decision-making ability.

(laughter) And what do you know? sometimes you should.

This is not extreme. It's about girls, what would happen to us if the big door inside us opened.

Don't tell me don't cry, calm down, don't be extreme, be rational.

I am an emotional creature.

That's how the Earth is made and how the wind keeps it pollinated.

I'm not telling the Atlantic to behave themselves.

I am an emotional creature.

Why do you want me to shut down or turn off?

I am your remaining memory.

I can bring you back

Nothing diluted.

nothing is leaking.

I love you, hear me, I love being able to feel the emotions inside you, even if it stops my life, breaks my heart, even if I go off track, they hold me accountable.

I am an emotional, emotional, unforgiving, and devoted creature.

And I love being a girl, listen, love, love, love.

Can you say it with me?

I love, love, love, love being a girl!

thank you very much.

(applause)

Close your eyes and spread your hands.

Now imagine what you can put in your hand. It could be an apple, or maybe a wallet.

Now open your eyes.

what about life?

What you see here is a premature baby.

They look like they are resting peacefully, but in fact they are struggling to survive because they cannot regulate their body temperature.

This baby is so small that his body doesn't have enough fat to keep him warm.

Sadly, 20 million such babies are born each year around the world.

Four million of these babies die each year.

But the bigger problem is that those who survive grow up with serious long-term health problems.

The reason is that during the first month of life, the baby's only job is to grow.

If you're battling hypothermia, your organs can't develop normally, resulting in a variety of health problems, from diabetes to heart disease to a low IQ.

Imagine: Many of these problems can be prevented by simply keeping these babies warm.

That is the main function of the incubator.

But traditional incubators require electricity and cost up to $20,000.

Therefore, you cannot find them in rural areas of developing countries.

As a result, parents turn to local solutions, such as wrapping hot water bottles around their babies or placing them under light bulbs like the one seen here, which are ineffective and unsafe.

I have seen this firsthand many times.

On one of my first trips to India, I met a young woman, Sevisha, who had just given birth to a small premature baby, Rani.

She took the baby to the nearest village clinic and the doctor advised Rani to be taken to the city hospital and placed in an incubator.

But the hospital was more than four hours away and Cevisa had no means of getting there, so the baby died.

Inspired by this story and dozens of others like it, my team and I realized what was needed was a local solution that worked without electricity and was simple enough for mothers and midwives to use, considering that the majority of births still take place at home.

We needed something that was portable, sterilizable and reusable for multiple babies, and super low cost compared to the $20,000 US incubator price.

So here is what we came up with.

What you have here doesn't look like an incubator.

It looks like a small sleeping bag for babies.

You can open it completely. Waterproof.

No internal seams for easy sterilization.

But the magic is inside this bag of wax.

It is a waxy substance with a melting point of 37 degrees Celsius, the melting point of human body temperature.

It dissolves easily with just hot water, and once melted, it maintains a constant temperature for 4-6 hours at a time, then simply reheat the pouch.

So putting it in this little pocket right here creates a warm micro-environment for your baby.

It seems simple, but we've been out in the field talking to doctors, mothers and clinicians and doing this dozens of times to make sure this really meets the needs of our communities.

The company plans to launch the product in India in 2010 with a target price of $25, less than 0.1 percent of the cost of traditional incubators.

Over the next five years, we hope to save the lives of nearly one million babies.

However, the long-term social impact is reduced population growth.

This seems counterintuitive, but we found that population size decreased when infant mortality decreased because parents did not have to expect their babies to die.

We hope that the Embrace infant warmer and simple innovations like this will become a new trend in the future of technology: simple, localized and affordable solutions with the potential to make a big impact on society.

We followed a few basic principles when designing this.

We really tried to understand our end users, in this case people like Sevisa.

We tried to understand the root of the problem rather than prejudicing what already exists.

And I thought of the simplest solution to deal with this problem.

By doing so, we believe we can truly bring technology to the masses.

And we can save millions of lives through the simple warmth of a hug.

So imagine that you are standing on a street somewhere in America and a Japanese man approaches you and asks, "Excuse me, what is the name of this block?"

And you say, 'I'm sorry, well, this is Oak Street and that's Elm Street.

This is the 26th, that is the 27th. ”

He said, "Okay, but what's the name of that block?"

You say, "Blocks don't have names.

Streets have names. A block is just an unnamed space between streets. ”

He walks away slightly confused and disappointed.

So now imagine that you are standing on a street anywhere in Japan. You ask the person next to you, "Excuse me, what is the name of this street?"

They say, "Oh, that's block 17 and that's block 16."

And you say, "Okay, what's the name of this street?"

And they say, "Street has no name.

Blocks have names.

See Google Maps here. I have blocks 14, 15, 16, 17, 18 and 19.

All these blocks have names, and the streets are just the unnamed spaces between them.

And you say, "So how do you know your home address?"

He said, "Well, it's easy, this is District 8.

We have block 17, house number 1. ”

“Okay, but as I was walking around my neighborhood, I noticed that the house numbers were out of order,” you say.

He says, "Of course it will. Go in the order they were built.

The first house built on the block is house number 1.

The second house ever built is house number two.

The third is the third house. It's easy. it is clear. "

So I love that sometimes we need to go to the other side of the world and realize assumptions we didn't even know we had and realize that the reverse can also be true.

For example, there are doctors in China who believe it is their job to keep people healthy.

I mean, you pay them whenever you have a healthy month, but you don't have to pay them when you're sick because you failed at work. If you are healthy and not sick, they will be rich.

(Applause.) In most music, the "1" is thought of as the downbeat, or the beginning of a musical phrase: 1, 2, 3, 4.

However, in West African music, "one" is considered to be the end of a phrase, like the period at the end of a sentence.

So you can hear it not only in the phrasing, but also in the way they number their music 2, 3, 4, 1.

And this map is also accurate.

(Laughter) There is a saying that whatever can be said about India, the reverse is also true.

So whatever great ideas you have or hear, whether at TED or anywhere else, never forget that the opposite can also be true.

Domo arigato gozaimashita.

As a researcher, I sometimes come across things that are a little disconcerting.

And this will change your understanding of the world around you and tell you what you really firmly believed you were very wrong about.

And these are unfortunate moments. Because that night you go to sleep dumber than when you wake up.

So that's the real purpose of my talk, to have Mr. A pass that moment on to you and Mr. B, and leave this session a little more sober than when he entered.

So I really hope we can achieve that.

So this event, which I am about to describe, actually started with diarrhea.

Well, the cause of diarrhea has long been known.

That's why there's a cup of water in there.

For those in this room, it's a problem.

For babies, it's deadly.

Poor nutrition and diarrhea can lead to dehydration.

Massive deaths result.

In 1960 India had an infant mortality rate of 24 percent and many did not survive. This is very unfortunate.

One of the big reasons this happened was diarrhea.

Well, a lot of effort went into solving this problem and there was actually a great solution.

Some have called this solution "potentially the most important medical advance of the century."

Well, it turns out the solution is simple.

It was an oral rehydration salt.

Many of you may have used it before.

wonderful. This is a way to bring sodium and glucose together, which when added to water can be absorbed by children even in diarrhea situations.

Noticeable impact on mortality.

Large scale solution to the problem.

Flashforward: Child mortality has fallen from 24 percent in 1960 to 6.5 percent today.

Still a big number, but a significant reduction.

The technical issue seems to have been resolved.

But research shows that even today, about 400,000 people in India alone die from diarrhea-related deaths.

what's going on

The short answer is that we just don't get those salts to those people.

That's actually not true.

Looking to areas where these salts are fully available and have low or no prices, these deaths are still declining.

Maybe there is a biological answer.

Perhaps these are deaths that cannot be resolved with simple hydration alone. That's not true either.

Many of these deaths were completely preventable, but I consider this to be what I like to call the perplexing or "last mile" problem.

To solve important social problems with technological solutions, we have expended a great deal of energy in many areas: technology, science, hard work, creativity and human ingenuity.

That's the discovery of the last 2,000 years, and humanity is moving forward.

However, in this case, we were able to solve it, but the majority of the problems still remain.

The 999 miles went well, but the last mile was incredibly tough.

Now, about oral rehydration therapy.

Maybe it's diarrhea specific.

Actually, this is where the real bewilderment is, that this is not specific to diarrhea.

It's not even unique to the poor in India.

Here are some examples from different situations:

I have included many examples here.

We'll start with insulin, the US anti-diabetic drug.

Yes, I am an American citizen.

With Medicaid, if you're pretty poor you get Medicaid, and if you have health insurance, insulin is pretty easy to administer.

It can be taken in tablet form or as an injection. It must be taken daily to maintain blood sugar levels.

Massive advances in technology: An incredibly deadly disease has become solvable.

compliance rate. How many people take insulin every day?

On average, the typical person consumes it 75% of the time.

As a result, 25,000 people go blind and hundreds of thousands lose limbs each year due to some reversible cause.

There are plenty of other examples, but they all suffer from the last mile problem.

Not just drugs.

Another example of technology is agriculture. Think there is a food problem and create a new seed.

We believe that there is an income problem, so we create new farming methods that increase income.

Well, look at some old ways, some ways we've already broken.

intercropping. Intercropping really increases income.

In rice, we have sometimes found that mixing different varieties side by side yields a surprising increase in yield.

Some do, but many don't. what happened?

This is the last mile.

The last mile has problems everywhere.

Well what's wrong?

The problem is this little 3-pound machine behind your eyes and between your ears.

This machine is really weird, and one of the consequences is that people get weird.

They do a lot of contradictory things.

(Applause) They do a lot of contradictory things.

And that contradiction is fundamentally what causes this last-mile problem.

You see, when we were dealing with biology, bacteria, genes, what's here, blood?

It's complicated, but manageable.

What do you do when dealing with people like this?

Mind is more complicated.

It's not very manageable and that's what we struggle with.

Let's go back to diarrhea for a moment.

This is a question in a national sample survey of a large number of Indian women. "Your child has diarrhea.

Should I increase, maintain, or reduce my water intake?"

To avoid embarrassment, I will tell you the correct answer. it is an increase.

Now, diarrhea is interesting because it's been around for thousands of years, since humans actually coexisted enough to pollute the water.

One very interesting Roman strategy is that it actually gave them a comparative advantage. It was to prevent soldiers from drinking muddy water, even if it was far away.

Because if part of your army gets diarrhea, it won't be very effective on the battlefield.

So if you think about Rome's comparative advantage, part of it was breastplates and breastplates, but part of it was drinking proper water.

So here are the women. They've seen their parents suffer from diarrhea, they've suffered from diarrhea too, and they've seen a lot of death. How would they answer this question?

In India, 35-50 percent said they would "reduce."

Let's take a moment to think about what that means.

Thirty-five to fifty percent of women forget oral rehydration therapy, and that number is increasing. In fact, the act is increasing the likelihood that the child will die.

Is there such a thing?

Well, one possibility, and I think most people would react to this, is, "That's silly."

I don't think it's stupid.

I think there is a very deep sense of what is right in what these women are doing.

Don't put water in a leaky bucket.

So let's consider the mental model behind eating less.

It just doesn't make sense.

Well, this model is intuitively correct.

That doesn't happen to be true about the world.

But it makes a lot of sense on some deep level.

And that, to me, is the fundamental challenge of the last mile.

This first task is what I call the persuasion task.

Persuading people to do something, be it oral rehydration therapy or intermittent therapy, is not an act of information: “Give me the data, I will do the right thing if I have the data.”

It's even more complicated than that.

If you want to understand how complicated it is, let's start with the interesting stuff.

I'm going to give you a little math problem, so shout out the answer as fast as you can.

The bat and ball together are $1.10.

A bat costs a dollar more than a ball.

What is the price of the ball? quick.

So someone says "five".

Many of you said "10".

Think about ten for a moment.

If the ball costs 10, the bat costs...

It's easy, $1.10.

yes. So both together cost $1.20.

Now, all of you here are ostensibly educated people.

Most of you look smart.

When you combine them, you really get something. This is wrong.

Is there such a thing? Let's go to other things.

I know algebra can get complicated.

So let's dial this back. that? 5th grade? Fourth grader?

Let's go back to kindergarten. OK?

American television has some great shows to watch.

The title is "Are you smarter than a 5th grader?"

I think we learned the answer here.

Let's move to kindergarten. Let's see if you can beat a 5 year old.

Here's what we're going to do: Arrange objects on the screen.

I just want you to tell me the name of the color of the object.

That's all. OK?

I want you to do it quickly, say it out loud together, I want you to do it quickly. I will briefly describe the first one.

Ready? black.

Now do the following and say it out loud.

Ready? go.

Audience: Red. green.

yellow. green. red.

(laughter) Sendhil Mullinathan: That's very good.

I will be graduating from kindergarten soon.

What does this tell us?

What's going on here, and the bat-and-ball problem, is that there are some intuitive ways of interacting with the world, some models that we use to make sense of the world.

These models work well in most situations, as do leaky buckets.

I suspect that most of you are pretty good at addition and subtraction in the real world. I hope that applies to everyone else as well.

i found the problem. It's the specific problem that actually found the error.

So are diarrhea and many last-mile problems.

A situation where the mental model does not match reality.

Same here. You gave a very quick and intuitive reaction to this.

Even though I knew my task was red, I read it as 'blue' and wanted to say 'blue'.

Now I do this job because it's fun.

But it's more profound than fun.

Here's a good example of how that can affect persuasion in practice.

BMW is a fairly safe car.

And they are trying to understand that "safety is good."

I want to promote safety. How should safety be advertised? ”

"You can teach people numbers. We do well in crash tests."

But the truth is, when you look at that car, it doesn't look like a Volvo or a Hummer.

So, I would like you to think a little about how to convey the safety of BMW. have understood?

Now, while we're thinking about that, let's move on to the second task.

The second issue is fuel consumption. have understood?

Now I'd like to introduce you to another puzzle.

A person walks into a parking lot and is considering buying this Toyota Yaris.

They say, "This is 35 miles per gallon. I'm going to do the right thing environmentally. I'm going to buy a 50 miles per gallon Prius."

Another person walks into the parking lot looking to buy a fully-equipped luxury car, a Hummer at 9 miles per gallon.

And they say, "You know what? Do you want a turbo? Do you want this heavyweight car?"

I'm going to do something good for the environment.

I'm going to drop that weight a bit and buy a Hummer with 11 miles per gallon. ”

Which of these people are doing more for the environment?

See, you have a mental model.

50 to 35, that's a big move. 11 to 9? Come on.

When you get home and do the math, you'll find that 9 to 11 is the bigger change. That person saved even more gallons.

why? I don't care about miles per gallon, I care about gallons per mile.

Consider how powerful it is if you're trying to improve your gas mileage.

Miles/gallons is how we describe things.

Gallons/miles are much more effective if you want to encourage behavioral change.

Researchers have found this type of anomaly.

Now back to BMW. what should they do?

The problem BMW faces is that the car looks safe.

This car is my mini but it doesn't seem very safe.

Here's BMW's great insight, which they embodied in their advertising campaign.

They showed me a BMW driving down the street.

There is a track on the right. A box falls from the truck.

The car turned around to avoid it, so the accident did not occur.

BWM enables people's emotional safety in two ways.

It can be said that it is safe because it can survive even if it collides, or it is safe because it avoids accidents.

A very successful campaign, but be aware of its power.

It takes advantage of what you already believe.

Now, even if they persuade you to do something, it can be difficult to actually act on it as a result.

You were probably going to wake up at 6:30 or 7:00, I don't know.

This is a battle we all fight every day, just like going to the gym.

Now, this is an example of that battle, making us realize that intentions don't always translate into actions. So one of the fundamental challenges is how to actually do that. OK?

Now, I would like to talk about the last mile problem.

Up until now, I've been pretty negative.

I have tried to show the strangeness of human behavior.

And I think maybe I'm being too negative.

Maybe it's diarrhea.

Perhaps the last mile problem should really be considered a last mile opportunity.

Let's go back to diabetes.

This is a typical insulin injection.

Now, carrying this around is a hassle.

I have to carry a bottle and a syringe.

It hurts too.

Now you might be thinking: "If my eyes depended on it, I would obviously use it every day."

But pain and discomfort is something to be aware of and remember to put in your bag when going on long trips. These are in everyday life and cause problems.

Here is innovation, design innovation.

It's a pen, it's called an insulin pen, and it's preloaded.

The needle is especially sharp.

Just carry it around with you.

Very easy to use and less painful.

This results in a 5-10 percent increase in adherence.

That's what I'm talking about as a last mile opportunity.

You know, we tend to think that when we solve a technology problem, we also solve the problem.

But human innovation, human problems still remain, and that is the great frontier we have left.

This is not about human ecology. This is now about the brain, the psychology of people, and innovation must continue until the last mile.

Here's another example of this:

This is from a company called Positive Energy.

This is about energy efficiency.

We spend a lot of time on fuel cells now.

What the company does is send a letter to each household saying, "Here's your energy usage, this is your neighbor's energy usage. You're fine." smile.

"You're doing worse." He frowns.

And what they found was that this letter, and nothing else, reduced power usage by 2-3%.

And think about its social value in terms of carbon offsets, electricity savings, and $900 million a year.

why? Because if it's free, it's not a new technology, it's a letter. We are doing a big bang in action.

So how do you tackle the last mile?

I think this shows that there is an opportunity.

I think we need to combine psychology, marketing and art to tackle it. That's what we experienced.

But do you know what you need to combine it with?

We need to combine this with the scientific method.

For me, what's really puzzling and frustrating about the last mile is that the first 999 miles are all about science.

No one will say, "Hey, I think this medicine works, go ahead and use it."

Test, go to lab, retry, refine.

But do you know what we do in the last mile?

"Oh, that's a good idea. People will love this. Let's put it out there."

The amount of resources we put in is different.

We invest billions in fuel efficient technology.

How much effort do we put into changing energy behavior with reliable and systematic testing methods?

I think we are now on the brink of something big.

We are on the brink of a whole new social science.

It is a social science that recognizes the complexity of the human mind in the same way that science recognizes the complexity of the body and biology recognizes the complexity of the body.

Careful testing, retesting, and design opens the door to understanding, complexity, and hardship.

And those vistas will give rise to new science in the next 100 years and fundamentally change the world as we see it.

have understood. thank you very much.

(Applause) Chris Anderson: Thank you very much, Sendil.

Therefore, this whole area is very attractive.

So sometimes listening to behavioral economists feels like they are doing academically something that great marketers have intuitively known for a long time.

How often do you talk to great marketers about insights into human psychology in your field?

Because they've seen it in action.

Sendhil Mullainathan: Well, we spend a lot of time talking to marketers, and I'd say 60% of it is exactly what you say. There are insights to be gleaned there.

40% of them are about what marketing is.

Marketing is selling advertising to companies.

So, in a way, a lot of marketing is about convincing the CEO, "This is a good advertising campaign."

Therefore, it will slide a little.

It's just a caveat. That's different from actually running an effective advertising campaign.

One of the new movements in marketing is, "How do we really measure effectiveness?" are we effective?

CA: How do you integrate the insights you get here into a business model that actually works in the field, for example in an Indian village?

SM: So the scientific method I alluded to is very important.

We work closely with businesses that have the ability to operate, or non-profit organizations that have the ability to operate.

And we say, 'Well, you want to change this behavior.

Come up with some ideas, test them to see which ones work, then go back and synthesize them and come up with what works. ” Then we will be able to scale with our partners.

This is the kind of model that worked in other situations as well.

If there is a biological problem, we fix it, see if it works, adjust the scale.

CA: Okay, Senthil, thank you so much for coming to TED. thank you.

(applause)

When my brother called me in December 1998, he said, "The news doesn't look good."

Here is him on screen.

He had just been diagnosed with ALS, which has a life expectancy of 3 years.

it paralyzes you. It begins by killing motor neurons in the spinal cord.

And you go from being a healthy, strong, 29-year-old man who can't breathe, can't move, can't speak.

This was actually a gift for me as we began a journey of learning new ways of thinking about life.

Stephen passed away 3 years ago, but we had a great trip as a family.

I don't think adversity is the right word.

We saw this and said, "Let's do something about this in an incredibly positive way."

And today I'd like to talk about one of the things we decided to do: come up with new ways to approach healthcare.

Because, as we all know here today, it doesn't work very well.

I would like to tell you along the story.

This is my brother's story.

But that's just the story. And beyond the story, I want to go to something more.

“Given my position, what is the best result I want to achieve? How can I get there?”

That's what we do in the medical world, and that's what everyone should do.

And all these questions have variables.

All our statuses are different.

We all have different hopes, dreams, and aspirations, and we all have different paths, but they are all stories.

But this is until we turn it into data, what we do, this concept we had was to get Steven's status, "What is my status?"

Then we start with the concept of walking, breathing, and hands, talking, and finally well-being and functioning.

So the first set of ailments ends up being a stick figure on the icon, but it's the rest that really matters here.

Despite being paralyzed, Steven was unable to walk or use his arms while in the pool. That's why I was wearing little floats, did you see them? - He was happy. We were on the beach, he was raising his son, and he was productive.

I converted this to data.

But that's not the data point of the moment.

This is Steven's data point for context.

Here he is in the pool. But here he is healthy as a builder. Tall, strong, wins all women and is a great man.

Here he is walking down the aisle, now he can barely walk and is handicapped.

And although he could still hold his wife's hand, he could not button his clothes and could not feed himself.

And here he is, completely paralyzed, unable to breathe or move, continuing this journey through time.

A digitized story of his life.

He renovated my carriage house, which was completely paralyzed and unable to speak or breathe, and won an award for historic restoration.

Here Stephen alone shares this story with the world.

And here's the insight and what we're excited about. Because we have moved away from the community we are in and the fact that we really love each other and want to care for each other.

We need to give to others in order to be successful.

Stephen shares this story, but he's not alone.

Many others share their stories.

Not a story to tell with words, but a story to tell with data and words.

And we will be able to transform that information into structure, understanding, and the ability to turn stories into computables that will change the way healthcare is practiced and delivered.

We did this for ALS. This is also possible for depression, Parkinson's disease and HIV.

They are not simple and not scalable to the Internet. Finding meaningful information about disease requires thought and process.

So, when you access the website, it looks like this.

And let me introduce you to Patients Like Me, a company founded by me, my youngest brother, and a good friend at MIT.

Here are real patients. Currently 45,000 people share patient stories as data.

This is MS. Patient.

His name is Mike and he is uniformly impaired in cognition, vision, locomotion and senses.

It depends on each MS. Patient.

Each can have different properties.

You can see fibromyalgia, HIV, ALS, depression and more.

Look at the HIV patients here, Ginny.

I have had this disease for two years. Not all symptoms are present.

However, he strives to keep his CD4 count high and his viral levels low in order to make his life better.

But when we put this together, we can make discoveries about treatments.

Look at this, nearly 2,000 people are talking about Copaxone.

These are patients who are currently on medication and are sharing data.

I love some of these, exercise, prayer.

Anyone want a comparative study of the efficacy of prayer for something? Let's look at prayer.

What I like about this is kind of an interesting design problem.

These are the reasons people pray.

The schedule for how often to administer is as follows: It's dosage.

So who wants to look at 32 patients praying for 60 minutes a day and see if their symptoms improve? You probably do.

please. This is an open network, shared by everyone. you can see everything.

Or I want to focus on anxiety because people pray for it.

Here is data on the current anxiety of 15,000 people.

Treatments, drugs, their constituents, side effects, etc. can all be explored in an environment rich with individuals.

This amazing data will allow us to dig deeper and see what this drug is good for. I think there are 1,500 people taking this drug. yes.

I would like to speak here with 58 patients who are taking 4 milligrams per day.

And I want to talk to people who have been doing it for 2+ years.

So we know the duration.

All open, all available.

Try logging in.

And this is my brother's profile.

And this is the new version of our platform that we are currently launching.

This is the second generation. It's going to be flash.

And since this is animated, you can see Steven's actual data against all the other patient backgrounds, this information.

The blue band is the 50th percentile. Stephen is in the 75th percentile and has non-hereditary ALS.

Scroll down this profile to see all of his prescriptions, but more than that, the new version now lets you see this interactively.

Wait, my spinal capacity is low.

Doesn't this remind you of a great stock program?

Wouldn't it be great if the technology we use to take care of ourselves was as good as the technology we use to make money?

Detrol. Among the side effects of his medication was the world's first stem cell transplant he underwent, shared publicly with anyone who wanted it.

My favorite here is the cyberkinetic implant. Again, this was the only patient data available online.

You can adjust the time scale. Symptoms can be adjusted.

See my interaction with ALS treatment.

So click on the ALS tab.

I take 3 different medications to cope. Some of them are experimental.

Observe your own constipation and know how to deal with it.

We see magnesium citrate and the side effects of that drug all integrated into meaningful time.

But I want more.

We want to not just look at this cool device, but use this data to make it even better.

I want to put my brother's center of the universe, his symptoms, his medications, and everything that interacts between them, side effects, into this beautiful galaxy of data that we can look at in any way we want to understand, and use this information to go beyond the simple model of what a record is.

I don't even know what a medical record is.

I want to solve the problem. I would like an application form.

So, can we take this data -- sort it, put symptoms on the left, drugs on top, and tell us everything we know about Steven and everyone else, and what interacts?

It had been many years since he had taken these medications, and I learned that everything he had done to manage his excess saliva, including side effects from other medications, was making his constipation worse.

And if anyone has ever suffered from severe constipation and didn't realize how much it can affect your life, yes, it was a pun.

you are trying to manage these. This grid is available here. we want to understand that.

No one had this kind of information.

So the patient has this. We are there for our patients.

This was all about patient care and we had no doctors in our network.

This is the patient.

So how can we take this and give them the tools they need to come back and participate in the health system?

And we worked hard, we thought, and we thought, 'What is it that we can always use, that we can use in our healthcare system, that everyone can understand?

Patients print it because hospitals usually block us because they believe we are a social network.

In fact, this is the most used feature on the website.

In fact, doctors love the sheet and are enthusiastic about it.

So we put Steven and his history down to data, then went back to paper and tackled the healthcare system.

And here is another paper.

This is a magazine called PNAS. Proceedings of the National Academy of Sciences of the United States of America.

Too many times today, we've all seen people bragging about the great things they've done.

This is a report on a drug called lithium.

Lithium, a drug used to treat bipolar disorder, has been published by an Italian group that found it slowed the progression of ALS in 16 patients.

I will refrain from criticizing this article.

But simply put, if you're a patient, you want to ride the blue line.

I don't want to ride the red line, I want to ride the blue line.

Because the blue line is the better line. The red line is pretty downhill and the blue line is a good line.

So, like we said, we looked into this and what I love is people are always accusing these internet sites of promoting bad medical care and making people act irresponsibly.

So this is what happened when PNAS published this.

Ten percent of the people in our system have taken lithium.

Based on badly published data from 16 patients, 10 percent of patients started taking lithium.

And they call the internet irresponsible.

Here's what happens:

There is a guy named Umberto from Brazil who unfortunately passed away 9 months ago. he said: "Hey, listen. Can you help me answer this question?"

I don't want to wait until the next trial, it will take years.

I want to know now Can you help me? "

So we launched some tools and let them track blood levels.

Share and exchange data.

You know, data networks.

And they said, "Jamie, PLM, can you tell me if this works?"

And we went around and talked to people and they said, 'You can't do clinical trials like this. You know what?'

No blinding, no data, no scientific method followed.

It never works. You can't do that. ”

So I said, "Okay, we can't do that. Then let's do something harder."

(Laughter) I can't say if lithium works for everyone with ALS, but I can say if it works for Umberto.

I bought a Mac about two years ago and switched to Mac. I was very excited about this new feature of Time Machine in Leopard. And we said, This is really cool, so you can go back in time and explore the entire history of computers and find everything that was lost. I loved it.

And I said, "What if we built a time machine for our patients, but not backwards, forwards?

Can you find out what happens to you so you can change that? ”

So we did. We took all patients like Umberto. That's Apple's background, and they didn't have time to build their own, so they stole it. By the way, this is a real app.

This is more than just graphics.

And when you get those data, we find patients like him and consolidate their data. And we're bringing their history there.

And then you think, "So how do I line them all up?"

So we integrate everything we know about the patient and line them all up around a meaningful point.

Complete information, full course of the disease.

And unless Humberto does something, that's what happens to him.

And then he took lithium and got the worst of it.

And it works almost every time.

Well, what it doesn't work is interesting.

But it almost always works.

I'm actually scared. beautiful.

So we couldn't do a clinical trial or figure it out.

But I could see if it would work for Humberto.

And yes, all the clinicians in the audience will talk about power and all standard deviations. We'll do that later.

But here is the average answer for patients who actually decided to take lithium.

These are all patients started on lithium.

It's the intent-to-treat curve.

As you can see here, the blue dots above, the bright dots, are the people who were in the PNAS study that you wanted to be a part of. And the red ones are the ones you don't want to be and the pink ones below are the ones you didn't want to be.

In the middle are all patients going forward from the start of lithium administration at time zero and then going backwards.

So you can see it's a perfect, perfect match.

A terrifyingly accurate match.

And in the future, I don't want to be a lithium patient again.

Actual grades are slightly worse. Not significantly, but slightly worse. I don't want to be a lithium patient again.

But you know, a lot of people have dropped out, trial, too many drop outs.

Can we do something more difficult? Could you go to a patient who actually decided to stay on lithium because he was so sure he was getting better?

We noticed that the control algorithm had 69 patients, four times the number of patients in the clinical trial, but we looked at these patients and asked, "Can we use the time machine to match other patients like them, and what happens?"

Even those who believed they were getting better found the controls to match exactly. that's right.

That little line? That's the power.

So you can't say lithium doesn't work. I don't know if they did it at a higher dose or did the study properly, but for the 69 people who took lithium, they didn't do better than people exactly like them, people just like me, and I would say we had the ability to detect it at about a quarter of the intensity reported in the first study.

The first multi-million dollar NIH-funded clinical trial failed needlessly last week, and we did it a year ago, a year before we announced it.

So remember I told you about my brother's stem cell transplant.

I had no idea if it would work.

And I put 100 million cells in his cisterna magna in his lumbar spinal cord, filled out the Institutional Review Board, did all this work, and I didn't really know.

How come I didn't know

I mean, I didn't know what would happen to him.

I actually asked Tim, the quant for our group. In fact, I searched for about a year to find someone who could do mathematics, statistics, and modeling in the medical field, but I couldn't find anyone. So I went into the financial industry.

And then there are those who were modeling the future of interest rates and so on.

and some of them were available. So we hired one.

(Laughter) We hired them, set them up, helped them with the lab.

I I.M. That's how I communicate with him, like the little guy in the box. I sent Tim a message. I said, "Tim, can you tell me if my brother's stem cell transplant went well?"

And he sent me this two days ago.

There were small outliers there. Can you see that man who lived a long life?

we have to go talk to him. Because I want to know what happened.

because something was wrong.

But my brother didn't. My brother went straight ahead.

Only works for about 12 months.

First version of Time Machine.

Tried it for the first time. I'll try to improve it later, but so far it's been 12 months.

And you know, I get really emotional when I see this.

You can look at the patient, drill down into all controls, observe, and ask questions.

And then I found her, which was weird because she had data after she died.

Then her husband came in and entered her final functional score. Because he knew how much she cared.

And thank you.

Years after my brother died, I can't believe these people answered the question if the million-dollar surgery I had done years ago had worked or hadn't worked.

I wish it was there when I first did it, but I'm really excited to be here now. Because the lab I founded has data on drugs that might work, and I want to show them that.

I want to show it in real time. And we want to do it for every disease we can.

We have to thank the 45,000 people who are doing this social experiment with us.

We are going back to being human, being part of the community again, sharing ourselves and being underprivileged, and it's been an amazing journey and it's been so exciting. Thank you very much.

(applause)

I would like to start with a little experiment.

Immediately, close your eyes and ask if you can understand the feelings you are feeling.

Well, you're not going to say anything to anyone.

The purpose is to see how easy or difficult it is to pinpoint exactly what you're feeling.

And I thought I'd give it 10 seconds to do this.

OK？

So let's get started.

OK, that's it, time is up.

how was it?

You were probably suspicious of the person next to you and you were feeling a little pressured.

Are they sure they had their eyes closed?

Perhaps you felt some strange unease about the email I sent this morning, or some excitement about what you have planned for tonight.

Maybe you felt the exhilaration when you gathered in a large group like this. The Welsh called it 'High Will', from the word for the sail of a ship.

Or maybe you felt all these things.

There are emotions that paint the world in color, like the fear you feel when your car skids.

But more often than not, our emotions crowd and shove, and it actually becomes very difficult to distinguish between them.

Some things pass by so quickly that you barely notice them, like the nostalgia that makes you want to reach for a familiar brand at the supermarket.

And some, like the jealousy that makes us rummage through the pockets of our loved ones, for fear of them coming upon us, we scurry away.

And, of course, there are some emotions that are so unique that I don't even know what to call them.

Perhaps you, sitting there, have felt a slight tingle for that feeling of delirium that accompanies a little act of confusion, what the eminent French sociologist called 'Ilinx'.

For example, let's say you just got up and dumped the contents of your bag all over the floor.

Perhaps you have experienced a strange, untranslatable feeling for which there is no obvious English equivalent.

You may have experienced what the Dutch called 'gesellligate' - it's cold and damp outside, but cozy and warm with friends inside.

Perhaps if you're really lucky, you've experienced "basolexia," a sudden urge to kiss someone.

(Laughter) We live in an era where emotional knowledge is a very important commodity. Emotions are used to describe many things, exploited by politicians, and manipulated by algorithms.

Emotional intelligence, the skill that allows you to recognize and name your own and others' emotions, is considered so important that it is taught in schools and businesses and encouraged by health services.

However, despite all this, I sometimes wonder if our perception of emotions is getting poorer.

Sometimes it's not even clear what an emotion is.

You've probably heard the theory that our entire emotional life can be boiled down to a few basic emotions.

Although this idea is actually about 2,000 years old, some evolutionary psychologists have suggested that the six emotions—happiness, sadness, fear, disgust, anger, and surprise—are expressed in exactly the same way by everyone around the world, and thus represent the building blocks of our entire emotional life.

When you see an emotion like this, it looks like a simple reflex. It is caused by external predicaments, it is hardwired, and it is there to protect us from harm.

When you see a bear, your heart rate increases, your pupils dilate, you feel fear, and you run very fast.

The problem with this photo is that it doesn't quite capture what the emotion is.

Of course, physiology is very important, but it's not the only reason we feel that way in the moment.

What if we say that in the 12th century, some bards considered yawning to be a symbol of the deepest love, not caused by fatigue or boredom as it is today?

Or is it that in the same period the brave men, the knights, usually fainted in dismay?

What if I told you that some early Christians who lived in the desert believed that flying demons, who appeared mainly at lunchtime, could infect a kind of lethargy they called "acidhi"?

Or was the boredom we know and love today really only felt in the Victorian era in response to new ideas about leisure and self-improvement?

What if we thought again about these strange, untranslatable words for emotion, and wondered if, like the Russian “Tosca,” the insane dissatisfied emotion that some cultures are said to breathe in from the great plains, we might feel that emotion more intensely just because we bother to name it and talk about it?

The latest developments in cognitive science show that emotions are not simple reflexes, but highly complex and resilient systems that respond to both our inherited biology and the culture in which we live today.

They are cognitive phenomena.

They are shaped not only by our bodies, but by our thoughts, concepts and language.

Neuroscientist Lisa Feldman Barrett is very interested in this dynamic relationship between words and emotions.

She argues that learning new words for emotions always creates new emotions.

As a historian, I have long wondered that as languages ​​change, so do our emotions.

Looking back, it is easy to see that sentiment has changed, sometimes very dramatically, in response to new cultural expectations, religious beliefs, new ideas about gender, ethnicity, age, and even new political and economic ideologies.

Emotions have a history, and we've only recently begun to understand them.

So while I completely agree that learning new words to describe emotions is a good thing, I think we need to go further.

To be truly emotionally intelligent, I believe, we need to understand where those words come from and what ideas about how we should live and how we should act sneak with them.

let me talk

It started in an attic in the Swiss university city of Basel in the late 17th century.

Among them are dedicated students who live about 90 miles from home.

He stopped attending lectures, and when friends came to visit, they found him depressed, feverish, with palpitations, and strange sores on his body.

A doctor was called in and determined it was so serious that a prayer was held for him at the local church.

And it wasn't until I was preparing to bring this young man home to death that I realized what was happening. Because once you lift him onto the stretcher, his breathing will be lessened.

And by the time he reaches the gates of his hometown, he's almost completely recovered.

And that's when they realized he was suffering from a very powerful homesickness.

It's so powerful it could have killed him.

In 1688, a young doctor, Johannes Hofer, heard of the incident, and others like him dubbed the disease "nostalgia."

This diagnosis quickly spread to the medical community throughout Europe.

The British actually thought they were probably immune thanks to travel within the empire and so on.

However, cases soon followed in the UK as well.

The last person to die of nostalgia was an American soldier who fought in France during World War I.

Is it possible to die nostalgic for less than 100 years ago?

Today, however, not only does the word mean something else, the discomfort of lost time rather than lost place, but homesickness itself is seen as less serious, downgraded from something that might kill you to something that worries children to suffer, mainly at sleepovers.

This change seems to have taken place in the early 20th century.

but why?

Was it the invention of the telephone or the extension of the railroad?

Perhaps it was the advent of the modern era, which celebrates restlessness, travel and progress, making it seem rather unambitious to those who are used to feeling sick?

Both you and I have inherited a massive shift in that value. That's one reason why we don't feel as homesick today as we used to.

It is important to understand that these major historical changes affect our emotions in part.

Today we celebrate happiness.

Happiness should make us better workers, parents and partners. It should keep us alive.

In the 16th century, grief was thought to cause most of those things.

It is even possible to read self-help books of the time that try to encourage grief in their readers by giving them lists of reasons for disappointment.

(Laughter) These self-help authors thought grief could be cultivated as a skill. Because the more you know it, the more resilient you will be when something bad happens, as it always does.

I hope we can learn from this today.

You may feel sad today, impatient, and a little embarrassed.

If you feel the loneliness of the 16th century, you may get a little smug.

Of course, not only do our emotions change over time, they also change from place to place.

The Vining tribe of Papua New Guinea talk about the lethargy that hits when guests finally leave, "Aumbuk."

(Laughter) Now, you and I may feel a sense of relief, but in Bai Ninh culture, in order to make the journey easier, it is believed that the traveling passenger removes some kind of weight, and that weight infects the air and causes this aumbuk.

So they leave a bowl of water overnight to soak up this air, and get up early the next morning to perform a ritual to throw out the water.

Now, this is a great example of how spiritual practices and geographic realities combine to bring a unique feeling to life and then make it disappear again.

One of my favorite emotions is the Japanese word "amae".

"Amae" is a word that is often used in Japan, but it is actually a very difficult word to translate.

It means the kind of joy you get when you can temporarily entrust the responsibility of your life to someone else.

(Laughter) Now, anthropologists suggest that one of the reasons the word was named and celebrated in Japan is because of the country's traditional collectivist culture, whereas feelings of dependence may be more troubling among English speakers who have learned to value self-sufficiency and individualism.

This may be a little simple, but it's charming.

What does our emotional language tell us about what we value most, not just what we feel?

Most people who tell us to pay attention to our health talk about the importance of naming our emotions.

But these names are not neutral labels.

They reflect the values ​​and expectations of our culture and convey ideas about who we think we are.

Learning new and unusual words to describe emotions helps us tune into the more nuanced aspects of our inner lives.

But more than that, I think these words deserve attention. Because these words remind us of how powerful a connection there is between what we think and how we ultimately feel.

Realizing true emotional intelligence requires understanding the social, political, and cultural forces that have shaped what we come to believe about our emotions, and how happiness, hate, love, and anger are still changing today.

Because if we want to measure our emotions, teach them in schools, and hear politicians say how important they are, I think it's good to understand where our assumptions about emotions come from and whether they still really speak to us.

I would like to end with a sentiment I often feel when working as a historian.

In French it is "dépaysement".

It causes dizzying disorientation felt in unfamiliar places.

One of my favorite things about being a historian is when something I took for granted, a very familiar part of my life, suddenly seems strange again.

Depeysman is anxious, but it's also fun.

And I hope you get a little glimpse of it now.

thank you.

(applause)

I work with a species called "Bonobo".

And I'm happy most of the time because I think this is the happiest species on earth.

It's like a well-kept secret.

This species lives only in the Congo.

And because of their sexual behavior, they are not in too many zoos.

Their sexual behavior is too human for most of us to be comfortable with.

(Laughter) But -- (Laughter) we actually have a lot to learn from them. Because they are a very egalitarian society, a very empathetic society.

And sexual behavior is not confined to one aspect of life they set aside.

It permeates their entire lives.

It is also used for communication.

And it is used for conflict resolution.

And maybe somewhere in our history, we divided our lives into parts.

We have divided the world into many categories.

And everything has a place for it.

But I don't think we were that way to begin with.

Many people think that the animal world is solid and that there is something very special about humans.

Perhaps it is because of his capacity for causal thinking.

Perhaps it has something special that allows him to have language in his brain.

Maybe there's something special about his brain that allows him to make tools or understand math.

Well, I don't know. Discovered around the 1600s, the Tasmanians had no fire.

They didn't have stone tools.

As far as we know they had no music.

In other words, compared to bonobos, bonobos have a little more hair.

He doesn't stand so straight.

But there are also many similarities.

And I think when you look at the culture, you kind of get a sense of how we got here.

And I really don't think it's in our biology. We think we attribute it to our biology, but I really don't think so.

So what I would like to introduce next is to introduce you to a species called bonobos.

It's Kanji.

he is a bonobo

Now he's in the woods of Georgia.

His mother was originally from the forests of Africa.

And she came to us when she was just adolescent, about six or seven years old.

Now you should see a bonobo on the right and a chimpanzee on the left.

Clearly, chimpanzees are a little more difficult to walk.

Bonobos are shorter than us and still have long arms, but they stand upright like us.

This compares bonobos to australopithecines like Lucy.

As you can see, the gait of bonobos and early australopithecines is not much different.

As they turn toward us, we can see that the pelvic region of early Australopithecus was a bit flatter and didn't need to rotate as much from side to side.

This makes bipedal walking a little easier.

And now all four are visible.

Video: Narrator: Bonobos in the wild live in the jungles of Central Africa, surrounded by the Congo River.

The area is densely populated with trees with canopies as high as 130 feet (40 meters).

About 30 years ago, a Japanese scientist was the first to undertake a full-scale field survey of bonobos.

Bonobos are slightly smaller than chimpanzees.

Bonobos with slim bodies are naturally very gentle creatures.

Long and carefully conducted studies have reported many new findings about them.

One finding was that bonobos in the wild are often bipedal.

In addition, they can walk upright for long distances.

Susan Savage Rambeau (Video): Let's go say hello to Austin first, then go to the A-frame.

SS: This is Kanji and I in the forest.

None of the things you see in this particular video are trained.

None of them are tricks.

They all happened to be filmed spontaneously by Japan's NHK.

We have 8 bonobos.

Video: See everything we have here for your campfire.

SS: The whole family is in our research center.

Video: Can you help me get a stick?

good.

I need more sticks.

I have a lighter in my pocket if needed.

It's a wasp's nest.

can be taken out.

I wish I had a lighter.

You can start a fire using a lighter.

SS: So you are very interested in fire.

He hasn't done it without a lighter yet, but if he sees someone doing it, I think he might be able to start a fire without a lighter as well.

He's learning how to keep the fire going.

He's learning how to use fire just by watching how we handle it.

(Laughter) This is a bonobo smile.

These are happy utterances.

Video: You are happy

I am very happy with this part.

You have to put water in the fire. can you see the water?

well done.

SS: I forgot to zip the back half of my backpack.

But he likes to carry things around.

Video: Austin, I hear you say "Austin".

SS: He's talking to other bonobos in the lab over long distances, farther than we can hear.

this is his sister

She tries driving a golf cart for the first time.

Video: Goodbye.

(laughter) SS: She's pedaling, but not the steering wheel.

She switches from reverse to forward, gripping the steering wheel instead of turning it.

(Laughter) Like all of us, she knows that person in the mirror is her.

(music) Video: Narrator: By raising bonobos in both bonobo and human cultures and documenting their development over 20 years, scientists are investigating how cultural forces (laughter) played a role in human evolution.

His name is Nyota.

Means "star" in Swahili.

(Music) Panbanisha tries to get Nyota to cut his hair with scissors.

In the wild, parent bonobos are known to groom their offspring.

Here Panbanisha uses scissors instead of hands to groom Nyota.

very impressive.

Performing such delicate work requires subtle hand manipulation.

Nyota imitated Panbanisha and tried using the scissors himself.

Realizing that Nyota might get hurt, Pambaneesha carefully pulls her scissors to retrieve it, just like her human mother would.

He can now cut through hard animal hides.

SS: Kanji is learning how to make stone tools.

VIDEO: Kanji is now holding rocks in both hands and banging one against the other to make tools, just like our ancestors might have made 2.5 million years ago.

He learned that he could make larger, sharper flakes by using both hands to aim and strike.

Kanzi selects flakes that are deemed sharp enough.

Hard skin is difficult to cut even with a knife.

The rock Hiroko uses is extremely hard and ideal for making stone tools, but it is difficult to handle and requires skill.

Kanji rocks are from Gona, Ethiopia and are the same ones used by our African ancestors 2.5 million years ago.

These are the stones Kanzi used and these are the flakes he made.

The flat, sharp edge resembles a knife blade.

Compare with the tools our ancestors used. They are strikingly similar to Kanzi's.

Panbanisha longs for a walk in the forest.

She keeps staring out the window.

SS: This is -- let me show you something they didn't think they were going to do.

VIDEO: Panbanisha hasn't been out in the last few days.

SS: I usually talk about languages.

Video: Panbanisha then does something unexpected.

SS: But I'm not saying that this ape has a language, because we've been advised not to do what we normally do.

It's a geometric language.

Video: She picks up a piece of chalk and starts writing something on the floor.

what is she writing

SS: She even says the name aloud.

Video: Now she comes to Dr. Su and starts writing again.

SS: These are the symbols on her keyboard.

(music) When she touches them they talk.

Video: Panbanisha tells Dr. Su where she wants to go.

"Frame" represents a hut in the forest.

Compare your chalk writing with the dictionary on your keyboard.

Panbanisha began writing a dictionary on the forest floor.

SS (video): It was great. You are beautiful, Panbanisha.

SS: At first I really didn't know what she was doing until we stopped and looked at it and rotated it.

Video: This dictionary also mentions places in the forest.

Curves are very similar to dictionaries.

The next symbol Panbanisha writes stands for 'collar'.

This shows the collar that Panbanisha must wear when going out.

SS: It's an institutional requirement.

Video: This symbol isn't as clear as the others, but you can see Panbanisha trying to generate curves and some straight lines.

The researchers wrote a dictionary on the floor with chalk and began recording Panbanisha's remarks.

Panbanisha watched.

Soon she also started writing.

The bonobo's abilities have amazed scientists around the world.

how did they develop?

SS (video): It turns out that the most important thing in getting a bonobo to learn a language is not to teach it.

The driving force behind language acquisition is understanding what other people who are important to you are saying to you, so it's simply about using language around them.

Once you have that ability, the ability to produce language becomes quite natural and quite free.

Therefore, we want to create an environment where bonobos can enjoy themselves, just as they do with all individuals they interact with. We also want to create an environment in which bonobos are meaningful individuals to them.

Narrator: This environment brings out unexpected possibilities for Kanji and Panbanisha.

Panbanisha enjoys playing the harmonica, but one year old Nyota steals it.

He then eagerly looks into his mother's mouth.

Is he looking for where the sound came from?

Dr. Hsu believes it is important to let such curiosity blossom.

Panbanisha is playing the electric piano this time.

She wasn't forced to learn to play the piano. She was intrigued when she saw a researcher playing the instrument.

Researcher: Please. please. I'm listening

Do the really fast part you did. Yes, that part.

Narrator: Kanzi plays the xylophone. Using both hands, he enthusiastically accompanies Dr. Su's song.

Kanji and Panbanisha are stimulated by this convivial environment to promote the expression of their cultural capacities.

(laughter) Researcher: OK, let's catch the monster. get them.

Take a cherry, too.

Be careful and stay away from them now.

Now you can follow them again. It's time to go after them.

I have to keep my distance now. run away.

run away. Run.

Now you can follow them again. Please go get it.

Oh my god!

Good feeling. very good. Thank you very much.

Narrator: Bonobos, humans, none of us can even imagine?

SS: So we have two environments, which we call 'pan-culture'.

We are learning how to be like them.

We are learning how to communicate with them in a very high pitched voice.

We are learning that they probably have wild languages.

And they are learning to be like us.

Because we believe it's not biology. It's culture.

So we share tools, technologies and languages ​​with another species.

thank you.

The question I want to talk to you about is precisely how to deliver healthcare in a world where cost is everything.

How do you do that?

And the basic paradigm that we would like to propose to you, and I would like to propose to you, is that in order to treat an illness, you must first know what you are treating, the diagnosis, and then you must do something.

The program we are working on is called "Diagnostics for All" or "Zero Cost Diagnostics".

How can we provide healthcare-related information at as little cost as possible?

how do i do that?

Let me give you just two examples.

The rigor of military medicine is not much different from that of the Third World. Scarce resources, harsh environments, a series of problems, lightness, etc.

And it's not all that different from the world of home health care and diagnostic systems.

So the technology I want to talk about is for the third world, or developing countries, but I think it has a wider range of applications because information is so important in the healthcare system.

Here are two examples.

One is actually a pretty high end lab in Africa.

The second is basically an entrepreneur, an entrepreneur doing who-knows-what at the market table.

I don't know what kind of medical care is provided there.

But it's actually probably not the most efficient one.

what is our approach?

Usually, the way to approach the problem of cost reduction from the US perspective is to take US solutions and try to cut costs from there.

No matter what you do, you can't start with a $100,000 instrument and make it free.

It doesn't work.

So we took the opposite approach and asked, "What's the cheapest possible way to create a diagnostic system, get useful information, and add functionality?"

And we chose paper.

Shown here is a prototype device.

About 1 cm across.

It's about the size of your fingernail.

The line around the edge is polymer.

Made of paper.

And, of course, paper absorbs liquids. As you know, paper and cloth soak everything when you drop wine on the tablecloth.

Putting it on your shirt will ruin it.

That's how hydrophilic surfaces work.

So the idea is to have this device drip a drop of urine, in this case, at its lower end.

Liquid percolates into the upper chamber.

Brown indicates the amount of glucose in the urine and blue indicates the amount of protein in the urine.

And the combination of these two can, in the first order, achieve many useful things you need.

Here is an example of a device made out of simple paper.

So how easy can it be?

Why choose paper?

I have an example of the same thing on my finger to show you what it basically looks like.

One of the reasons we use paper is that it is everywhere.

We made devices like this out of napkins, toilet paper, plastic wrap, and everything else.

So we have production capacity.

Second, you can put too many tests in too little space.

I'll show you in a second, but there are probably 100,000 tests stored in that stack of paper.

And finally, a point that is rarely considered in medical care in developed countries is the elimination of sharp objects.

And sharp means a needle, something that sticks.

If you take someone's blood sample and you think they might have hepatitis C, you don't want to make the mistake of putting it in yourself.

You wouldn't want to do that.

So how do you dispose of it?

That's a problem everywhere, but here it simply burns.

So this is kind of a hands-on approach to getting things started.

Now, you say, "If paper is a good idea, I'm sure other people are thinking it too."

And the answer is, of course, yes.

Half of you are female, and you may have taken a pregnancy test at some point.

The most common of these are found in devices like the one on the left.

It's called a lateral flow immunoassay.

This particular test determines whether or not your urine, which contains a hormone called hCG, runs on paper.

And there are two bars. One bar indicates that the test is working, and a second bar indicates that you are pregnant.

It's a great kind of test in a binary world, and the nice thing about pregnancy is that you're either pregnant or you're not. You are not in the second trimester of pregnancy or contemplating pregnancy or anything of the sort.

So it works very well in this case, but not so well when you want more quantitative information.

There are also dipsticks, but if you look at dipsticks, they are for a different kind of urine analysis.

There are so many colors and things like that.

In a difficult situation, what do you actually do about it?

So the approach we started with is asking, "Is it really practical to build this kind of thing?"

And that problem is now being solved in a purely engineering way.

And our procedure simply starts with paper.

Print using a new kind of printer called a wax printer.

Wax printers do what looks like printing.

Printing.

After putting it on and warming it up a bit, the wax prints and absorbs into the paper, completing the desired device.

The printer is currently priced at $800.

It is estimated that about 10 million tests are performed annually when run 24 hours a day.

So it's a solved problem. That particular issue has been resolved.

And there are examples of what you're looking at.

It is written on an 8x12 piece of paper.

It takes about 2 seconds to create.

So I consider it done.

There is a very important issue here. The printer is a color printer, so it prints color.

This is actually very useful, so I'll show you soon.

Well, the next question is: What do you want to measure? What do you want to analyze?

And what you want to analyze most, we're pretty far from there.

It's called "fever of unknown origin".

Someone comes to the clinic, has a fever and feels sick.

Do they have tuberculosis? Do they have AIDS? do they have a cold?

problem of triage.

It's a hard problem, so I won't do it.

There are many things I would like to distinguish.

But there is also a chain of things like AIDS, hepatitis, malaria, tuberculosis, and simpler things like medical advice.

Well, even that is more complicated than you might think.

A friend of mine works in cross-cultural psychiatry and is interested in why people do or don't take drugs.

So Dapson or something like that should be taken for a while.

He has a great story of addressing an Indian villager, "Have you taken Dapsone?" "yes."

"Did you drink every day?" "Yes."

"Did you drink for a month?" "Yes."

What the man actually meant was that he gave the dog 30 days of dapsone that morning.

(Laughter) And he was telling the truth. Because in other cultures dogs are human substitutes. "Today", "this month", "after the rainy season" -- there are many possibilities for misunderstanding.

(Laughter) So the problem here is, in some cases, how to deal with seemingly uninteresting issues like compliance.

Now let's see what a typical test looks like.

A finger prick collects about 50 microliters of blood.

You can't use normal kind of systems, so that's all you get.

You can't manipulate it well. More on that later.

So you take a drop of blood and without further manipulation put it in a small device. As the device filters the blood cells and lets the serum through, you get a series of colors on its bottom.

And the color indicates "sick" or "normal".

But even that is complicated. To me, color may indicate 'normal', because at the end of the day, we all probably suffer from over-education.

What about those that require quantitative analysis?

So the solutions we and many others have in mind are seeing a dramatic upsurge at this point, creating a universal solution for all things modern. That's your cell phone. In this particular case, it's a camera phone.

They are everywhere, 6 billion per month in India.

And the idea is, all a person does is take out the device, dip it in, develop the colors, take a picture, and the picture is sent to the central lab.

You don't have to send a doctor, just send someone to take the sample and the clinic will do the analysis for you, or ideally a computer in this case.

In fact, I've found it works quite well, especially when printing color bars that show how a color printer works.

So my view of the future health care professional is not a doctor, but an 18 year old with two things and otherwise unemployed. One is a backpack full of these tests, an occasional lancet to take a blood sample, and an AK-47.

And these are the things that help him get through the days.

(Laughter) There's another very interesting connection here. It's that you want useful information to pass through a phone system that is generally very bad.

It turns out that a huge amount of information is already available on the subject of the Mars rover problem.

How can we get an accurate representation of the colors of Mars if we are using such terrible bandwidth?

The answer isn't complicated, but I don't want to go into it here other than to say that the communication system for doing this is actually pretty well understood.

Also, what you may not know is that the computing power of this thing is not much different than that of a desktop computer.

This is a great device that is just beginning to be put to practical use.

I'm not sure if the idea of ​​one computer and one child makes sense.

This is the computer of the future. Because this screen is already there and everywhere.

Now let's talk a little bit about advanced devices.

And start by raising a small problem.

Here is another centimeter-sized device, with different colors of dye.

And you may find it a little interesting. That is, yellow seems to disappear and pass through blue and then through red.

How does that happen?

How do you make something flow through something?

And of course the answer is "no".

You let it flow over and over again.

But the problem here is how to make it flow up and down in the paper.

The answer is that what you're doing is building something more elaborate. Take several different layers of paper, each containing a small fluid system, and literally separate them with the double-sided carpet tape that you use to stick the carpet to the floor.

And the fluid flows from one layer to the next.

It disperses itself and even flows through the holes and disperses itself.

And right down there is a sample where a single blood sample was placed on top and it was dispensed through these 16 holes at the bottom of a piece of paper. Basically, it looks like a chip and is two sheets of paper thick.

And in this particular case we were only interested in its reproducibility.

But in principle, this is how you solve the "unexplained fever" problem. Because each of these spots is a test for a specific set of disease markers, which will eventually work.

Here's an example of a slightly more complicated device.

There's a chip in there.

you will be slumped in a corner.

Liquid enters the center.

Dispersed in various depressions and holes to change color, all done with paper and carpet tape.

So I think it's as low cost as we are likely to be able to come up with and make things.

Well, I'd like to finish this job with two small tidbits.

This is one. One thing you need to do from time to time is to separate the blood cells from the serum.

And the problem was, here we do it by taking a sample, putting it in a centrifuge, spinning it, and taking out the blood cells.

very.

What would happen without electricity, centrifuges, etc.?

And we thought for a while how to do this. Here's how to actually do it.

Get a ubiquitous whisk and cut off the blade, take a tube and stick it to it.

You put the blood in, and someone sits there and circulates the blood.

It works really well.

And then we sat down and did some physical work, like whisks and self-adjusting tubes, and posted it in the journal.

We were very proud of this, especially the title 'The egg beater as a centrifuge'.

(Laughs) So I sent it out and it came back in the mail.

I called my editor and said, "What's going on? How is that even possible?"

With great contempt, the editor said, "I read this.

We are not going to publish it because we only publish science. ”

(Laughter) And this is an important question. Because that means we have to think about what we value as a society.

If it's just papers and physics. A letter from a pastor, I have a problem.

Here is another example. This is a small spectrophotometer.

Measures the absorption of light within the sample.

The nice thing about this is that you have a light source that blinks at about 1000 Hertz and another light source that detects that light at 1000 Hertz, so you can run this system in broad daylight.

It performs nearly as well as systems in the $100,000 range.

It costs $50.

If you do your best, you can make it for 50 cents.

why doesn't anyone do it?

The answer is how to make a profit in a capitalist system.

Interesting question.

Finally, I would like to mention that I have considered this as a kind of engineering problem.

And we asked: What is the scientific unifying concept here?

And we decided that we needed to think of this in terms of simplicity, not in terms of cost.

Simple is a nice word.

We have to think about what simplicity means.

I know what it is, but I don't know what it actually means.

So I was actually interested enough in this that I formed some groups.

A recent incident involved several people from MIT, one of whom was a very bright kid and one of the few people I consider a true genius.

We all struggled all day to think about simplicity.

And I want to give you the answer of this deep scientific thought.

[What is simple?

"It's impossible to screw it up."] (Laughter) So, in a way, you get what you pay for.

thank you very much.

(applause)

I'm an oncology doctor, and three or four years ago when I walked out of my office and passed by the pharmacy in the hospital, this was the cover of Fortune magazine in the pharmacy window.

So, as a cancer doctor, you'll be a little disappointed when you see this.

But when you start reading Cliff's article, Cliff, a cancer survivor himself, whose life was saved at the time by a clinical trial that drove his parents from New York City to upstate New York for an experimental treatment for Hodgkin's disease, makes a point here.

And the point of this article was that our view of biology and cancer has become reductionist.

For the past 50 years, we have focused on individual gene therapy to understand cancer rather than cancer control.

Well this is an amazing table.

This clearly shows that we have a noticeable impact on cardiovascular disease, but look at cancer. Cancer mortality has remained unchanged for more than 50 years.

We've had small victories in diseases like chronic myelogenous leukemia, where there are drugs that can put 100 percent of people in remission, but in the fight against cancer in general, they're making no difference.

So what I'm going to talk to you about today is a little bit of why I think so, and then I'm going to step outside my comfort zone and talk about where I'm going, where new approaches are, and what we want to move forward when it comes to treating cancer.

Because this is wrong.

So what is cancer in the first place?

Well, if you have a mass or abnormal blood values, go to the doctor and get a needle.

The way we make diagnoses today is through pattern recognition. "Does it look normal?" Does it look abnormal?

So the pathologist is like looking at this plastic bottle.

This is a normal cell. These are cancer cells.

That is the state of the art in cancer diagnostics today.

No molecular testing, no sequencing of the genes mentioned yesterday, no looking at the chromosomes.

This is state of the art and how we do it.

As an oncologist, I am well aware that advanced cancer cannot be cured.

As an aside, I am a strong believer in the field of early cancer detection.

The only way to start fighting cancer is to find it early.

Most cancers are preventable.

As you know, the previous talk referred to heart disease prevention.

Cancer can do the same.

I co-founded a company called Navigenics. You can spit in a tube and look for 35 to 40 genetic markers of disease. All of these can be delayed in many cancers. You can start identifying what can happen and then start working on prevention.

The problem is, as the statistics imply, if you have advanced cancer, you can't do much about it today.

In other words, cancer is a disease of the elderly.

Why is it an old man's disease?

Because evolution doesn't care what happens after we have children.

You see, evolution protected us while we had children, but after 35 or 40 or 45, it says, 'It doesn't matter anymore because they have offspring.'

Therefore, when we focus on cancer, it is very rare for children to get cancer, only a few thousand cases per year.

as you get older? Very, very common.

Why is it so difficult to treat?

Because it is heterogeneous, it is the perfect substrate for evolution within cancer.

It begins to select for bad aggressive cells, called clonal selection.

But as we begin to understand that cancer is much more than just a molecular defect, we will find new ways to treat it, as we will show.

So one of the fundamental problems we have with cancer is that we now describe it with adjectives and symptoms such as “tired, bloated, painful, etc.”

After some anatomical explanations, a CT scan revealed a 3-centimeter mass in my liver.

Then there are some descriptions of the parts of the body "in the liver, in the chest, in the prostate".

That's it.

Therefore, our dictionary for describing cancer is very poor.

It's basically a symptom.

It's a symptom of an illness.

Interestingly, over the last couple of years, the government has spent $400 million on what it calls the Cancer Genome Atlas Project, and has allocated another billion dollars.

In other words, the idea is to analyze the sequences of all genes contained in cancer and provide a new dictionary, a new dictionary, to explain it.

As you know, in the mid-1850s, France began describing cancer by body part.

It hasn't changed in over 150 years.

Calling cancer by prostate, breast and muscle is completely outdated.

Come to think of it, it doesn't make sense.

So obviously the technology exists now and will change in the years to come.

I will never go to a breast cancer clinic again.

We go to a HER2 amplification clinic and an EGFR activation clinic to look at some of the pathogenic lesions that contributed to the development of this individual cancer.

So, hopefully, we can go further from the art of medicine to the science of medicine and be able to do what we're doing with infectious diseases, and look at that organism, that bacterium, and say, "This antibiotic makes sense because there are certain bacteria that react to it."

If you've been exposed to H1N1, taking Tamiflu can greatly reduce the severity of your symptoms and prevent much of the illness from developing.

why? Because we know what you have and how to treat it. However, we can't make a vaccine in this country, but that's another story.

The Cancer Genome Atlas is now published.

The first surgery was for a brain tumor.

The following month, at the end of December, ovarian cancer develops, and a few months later lung cancer develops.

There is also the field of proteomics. I'll talk about this in a few minutes, but I think this is the next level in terms of understanding and classifying diseases.

But remember, I am not imposing reductionism on genomics or proteomics.

We are doing it so that we can identify what we are up against.

And there's a very important difference there, which I'm going to explain.

In today's medicine, most money is spent in the last two years of life when it comes to treating illness.

We spend very little, if any, money to identify what we are up against.

Things will go a lot better if you can start to set it in motion to identify what you are up against.

If we can take it a step further and prevent disease, we can go in a very different direction, and obviously that's where we're going.

This is the website of the National Cancer Institute.

And I want to tell you, it's wrong.

In other words, the National Cancer Institute website says cancer is a genetic disease.

"When you look it up, you have individual mutations, maybe a second or third mutation, and that's cancer," the website says.

But as an oncologist, this is what I see.

This is not a genetic disease.

As you can see, this is a liver with colon cancer, and under the microscope you can see cancer-infiltrated lymph nodes.

A CT scan revealed cancer in the liver.

Cancer is an interaction between cells and the environment that are no longer under growth control.

It's not abstract. It's an interaction with the environment.

That's what we call the system.

My goal as an oncologist is not to understand cancer.

I think the fundamental problem of the last 50 years has been our efforts to understand cancer.

The goal is to control cancer.

And that's a completely different optimization scheme and a completely different strategy for all of us.

I stood up at one of the big 20,000 cancer research conferences, the American Association for Cancer Research, and said, "We made a mistake.

All of us, myself included, have made mistakes by losing focus or becoming reductionist.

we need to take a step back. ”

And, believe it or not, I heard a whoosh from the audience.

People were upset, but this is the only way we can move forward.

As you know, I was very lucky to meet Danny Hillis a few years ago.

We were pushed against each other and neither wanted to see the other.

I said, "Do you really want to meet the Disney guy who designed the computer?"

And he said, "Does he really want to see another doctor?"

But people prevailed over us, we united, and it changed what I do, absolutely transformative.

We have designed and worked to model cancer in the body as a complex system. Many of these ideas came from Danny and his team.

And here are some data and new ways to approach it that I really think can make a difference.

The point is that you need to understand the data input when looking at these variables and data.

If you take your temperature for 30 days and ask, "What is your average temperature?"

And I'm back to 98.7 points, so I think it's great.

But if later in the day my temperature went up to 102 degrees for 6 hours and I took Tylenol and things got better, I would totally miss it.

One of the problems, the fundamental problem in medicine, is that you and I and all of us go to the doctor once a year.

There are separate data elements. No time function.

Earlier, I mentioned this direct life device.

By the way, I've been using it for about two and a half months.

This is an amazing device. Not because it tells me how many calories I eat each day, but because it shows me what I did in a day, 24 hours a day.

And I sat at my desk for three hours and didn't realize it wasn't moving at all.

And many of the functions in the data we have here as an input system are really different from what we understand. This is because we are not measuring them dynamically.

Therefore, if we consider cancer as a system, there are inputs, outputs, and intermediate states.

That is, states are equivalent classes of history, and input cancer patients are environment, diet, treatment, and genetic mutations.

The output is our symptom. "Do you have pain?" Is the cancer growing? Do you feel bloated or anything like that?

Its state is largely hidden.

So what we do in our field is change and input, give aggressive chemotherapy and say, "Did that output get better? Did the pain get better?"

The problem is that it's not just one system, it's multiple systems at multiple scales.

It's a system of systems.

So when we start looking at emergent systems, we can look at neurons under a microscope.

Under the microscope, neurons, little things sticking out, little things here, they're very elegant, but when you start putting them together into complex systems, you start to see that it becomes the brain, and that brain can produce intelligence, what we're talking about inside our bodies. And cancer is beginning to model it like a complex system.

The bad news is that these robust (and robust is the key word) emerging systems are very hard to understand in detail.

The good news is you can manipulate them.

Even without a basic understanding of all the components, you can try to control them.

One of the most groundbreaking clinical trials on cancer, published in February in the New England Journal of Medicine, included premenopausal women with breast cancer.

So about the worst kind of breast cancer you can get.

They were receiving chemotherapy and were then randomized, with half receiving a placebo and the other half receiving a bone-forming drug called zoledronic acid.

It was used to treat osteoporosis and was given twice a year.

The researchers found that giving these 1,800 women a bone-building drug twice a year reduced cancer recurrence by 35%.

We suppress the occurrence of cancer with drugs that do not even touch cancer.

The idea is that if you change the soil, the seeds will not grow well.

Altering that system could have a noticeable effect on cancer.

No one has ever shown that most chemotherapy actually affects cancer cells. This would be shocking.

It has never been shown.

Tissue culture dishes do all the sophisticated work to bring this anticancer drug to these cells, but the doses these dishes contain are far from the doses that occur in the body.

When women with breast cancer are given a standard drug called taxol every three weeks, about 40 percent of women with metastatic disease respond well to the drug.

And the response is 50% contraction.

Well, it's not an order of magnitude, but remember that's another story.

Then it relapses, so I give the same medicine every week.

Another 30% respond.

They then relapse, but an additional 20 to 30 percent respond when the same drug is given as a continuous infusion over 96 hours.

Therefore, it cannot be said that the same mechanism works for all three sizes.

it's not. I don't understand the mechanism.

So the idea that just as building bone destroys that system and reduces recurrence, chemotherapy might just be destroying that complex system, chemotherapy could work in exactly the same way.

The amazing thing about this trial was that the number of new primary diseases, new cancers, was also reduced by 30%.

The problem is, you and I, our systems are all changing.

they are dynamic.

So this is a horrible slide. It's not an aside, but I researched about obesity in the world.

Sorry if the numbers are too small to read.

But if you look at that red, that dark color, over 75 percent of the population in those countries is obese.

10 years ago and 20 years ago are markedly different.

Therefore, today's system is very different from the system of 10-20 years ago.

So the diseases we have today reflect the patterns of the system over the past few decades, but based on things like this, they will change dramatically in the next decade or so.

This photo is beautiful, but it's a 40 Gigabyte photo of the entire proteome.

This is a drop of blood that has passed through a superconducting magnet, giving us a resolution that allows us to see all the proteins in our body.

The system begins to appear.

Each red dot is where the protein was actually identified.

The power of these magnets, the power of what we can do here, is that we can use this technique to observe individual neutrons.

Again, this is what we're working on with Danny Hillis and a group called Applied Proteomics. There you will begin to see the difference between individual neutrons, allowing you to observe the system in ways never before possible.

So it's a step back rather than a reductionist view.

This is a 46-year-old woman with recurrent lung cancer.

It was in her brain, lungs and liver.

She was getting carboplatin taxol, carboplatin taxotere, gemcitabine and navelbine. She got all the medicines we had, but the disease spread even more.

She had three children under the age of twelve. Here is her CT scan.

So what this means is, here's a cross-section of her body, with her heart in the middle, and on the left side of that heart, there's a big tumor that's invading, and if it's not treated, she's going to die in a few weeks.

She takes a daily pill that targets one pathway. Again, I don't know if this pathway is in the system or in cancer, but it was targeting a pathway. And a month later the cancer was gone.

It's been half a year and it still hasn't gone away.

The cancer recurred and she died of lung cancer three years later, three years after being put on drugs that mainly caused her acne.

That's it.

So the problem is, there were clinical trials, and we were part of them, but in the basic clinical trials, the pivotal clinical trials called Phase 3, we refused to use placebos.

If your mother/brother/sister had advanced lung cancer and only a few weeks to live, would you want them to be given a placebo?

And the answer is clearly not.

So it was done with this group of patients.

Ten percent of trial participants had the dramatic response shown here, and the drug was sent to the FDA. The FDA said, "Without a placebo, how would we know that patients actually benefited from the drug?"

This was an editorial in the Wall Street Journal the morning the FDA was scheduled to meet.

(Laughter) So, you know, the drug was approved.

What's amazing is that another company did the correct scientific trial, half placebo and half drug.

And we learned something important there.

Interestingly, they did so in South America and Canada, where "it is more ethical to give a placebo."

I think there were three American patients in upstate New York who were in clinical trials because it had to be administered in the United States as well to get approval.

But they did, and found that 70 percent of those who didn't respond lived much longer and performed better than those who received the placebo.

In short, this called into question everything we knew about cancer. That means you don't need to get a reaction.

No need to shrink the disease.

Slowing disease progression can have greater benefits to patient survival, patient outcomes, and patient well-being than curtailing disease.

The question is, if I were this doctor and I had a CT scan today and had a 2cm mass in my liver, and I came back in 3 months and it was 3cm, did the medicine help or not?

How do I know?

Would ten centimeters have been better, or am I administering you a drug that costs a lot for no benefit?

So, it's a fundamental problem.

And then again, we could see these new technologies there.

So the goal is clearly to see a doctor. The ultimate goal is to prevent disease, right?

The ultimate goal is to prevent these things from happening.

That's the best, most effective, cost-effective way we can do it today.

But if you are unlucky enough to fall ill, go to the doctor's office, have a drop of blood drawn, and we will begin to know how to treat your ailment.

The way we approached this is in the field of proteomics, which is also systems focused.

It looks big.

The problem with such techniques is that when we look at proteins in the body, there are 11 orders of magnitude difference between abundant and poor proteins.

In other words, there is no technology in the world that scales to 11 digits.

So a lot of what's been done with people like Danny Hillis and others is trying to implement engineering principles, trying to implement software.

You can start looking at different components along this spectrum.

So, earlier you talked about cross-disciplinary collaboration, collaboration.

And I think one of the exciting things that's starting to happen now is people from those fields coming in.

Yesterday, the National Cancer Institute announced a new program called "Physical Sciences and Oncology." The program invites physicists, mathematicians and others who have never thought about cancer before to think about it.

As announced yesterday, Danny and I won $16 million to help solve this problem.

It's a completely new approach that uses technology to understand what's really going on in the body, instead of using high-dose chemotherapy with different mechanisms.

So I'll give you two seconds to explain how these technologies work. Because I think it's important to understand that.

What happens is that every protein in the body is charged, so the protein is sprayed, the magnet spins the protein, and finally there is the detector.

When hit, the detector is mass and charge dependent.

So if the magnet is big enough and the resolution is high enough, we can actually detect every single protein in the body and start to understand individual systems.

So, as a cancer doctor, instead of putting paper in my chart, instead of putting paper in your chart, with paper this thick, this is how the data flow in our offices is starting to happen, and that drop of blood is creating gigabytes of data.

Electronic data elements describe all aspects of the disease.

And indeed, the goal is to start learning from every encounter so that you can actually move forward, rather than just going from encounter to encounter without basic learning.

In conclusion, we need to move away from reductionist thinking.

We need to start thinking differently and fundamentally.

So I would like to ask everyone here to change the way you think. Come up with new ideas.

Tell me or anyone else in our field, because nothing has changed in the last 59 years.

A radically different approach is required.

As you know, Andy Grove has stepped down as Intel's Chairman of the Board. Andy was one of my mentors and a tough guy.

As Andy resigned, he said, "No technology can win. Technology itself will win."

And I strongly believe that in medicine, especially oncology, it will be a platform for a broad range of technologies that will help us advance and hopefully help patients in the short term.

thank you very much.

John Hockenberry: It's great to be here with you, Tom.

And I'd like to start with a question that's been bothering me since I first learned of your work.

There is always this kind of hybrid nature of natural forces in your work, in creative forces and some kind of interaction.

When you look at your work, do they ever balance out?

Tom Shannon: Well, the subject I'm looking for is usually solving questions.

A question came to my mind: what would it look like if the cone connecting the sun and the earth could be joined by two spheres?

What would be the proportional size and length of the sphere and its taper to the Earth?

So I made the sculpture out of solid bronze.

And I built one about 35 feet long.

The Sun's edge was about 4 inches in diameter, tapering from about 35 feet to about 1 millimeter at the Earth's edge.

So for me, it was really exciting just to see what it would look like if you could go out and step into a larger context and see these two things as one object, as if you were an astronaut. Because the two are so closely linked that one is useless without the other.

JH: Do you find comfort in playing with these powers?

And I wonder how much sense of discovery there is in playing with these powers.

TS: Well, like the maglev object, like the silver object there, it was the result of hundreds of experiments with magnets trying to figure out how to levitate the object with minimal contact with the ground.

So we decided to have only one tether that could support it.

JH: Now, is this electromagnetic or static here?

TS: Oh, those are permanent magnets.

JH: If the power goes out, it just makes a lot of noise.

TS: Yes.

Having plugin art is really lacking.

JH: I agree.

TS: Magnetic work is a combination of gravity and magnetism, so it's a kind of mixture of these surrounding forces that affect everything.

The sun has a vast magnetic field that extends far beyond the planet, and the earth's magnetic field protects us from the sun.

In other words, there is a huge invisible shape structure brought about by magnetism in the universe.

But a pendulum can reveal an invisible force holding the magnets together.

My sculptures are usually very simplistic.

I'm trying to refine them to a very simple form.

But painting becomes very complicated. Because I think there are fields, undulations, interpenetrations and interference patterns that support paintings.

JH: And they are non-deterministic.

In other words, you can calculate the force, but you don't necessarily know where it's going when it starts.

This is how it evolved, but I don't think this is the first pendulum.

TS: No. (JH: No.) TS: My first one was in the late 70's and had a simple cone with a spout at the bottom.

I threw it into orbit and it only had one color and when I got to the center it kept running out of paint so I had to run there. It was not possible to control the spigot remotely.

So I immediately thought, "I need a remote control device."

But then I started dreaming of having 6 colors.

I think of it like DNA. These colors are red, blue, yellow, primary colors, and white and black.

And when you put them together in various combinations and put them under a certain force to rotate them, to pass them back and forth, to draw them, in a way similar to printing, as the colors of magazines are printed, these amazing things began to appear.

JH: Sounds like you're ready for bears here.

TS: Yes, let's put some canvases.

I will ask some of my sons to set up canvases here.

Just to say, this is Jack, Nick and Louis.

JH: Thank you.

TS: So this is -- JH: Okay, let's not get in the way here.

TS: I'd love to get this on track and see if I can paint everyone's shoes in front.

(laughs) JH: Wow. That is ...

Oh that's nice.

TS: So it looks like this.

I'm doing this as a demo, so it's kind of playful, but inevitably, you can use them all.

You can get this painting back by just layering and continuing to work.

And I'm going to hold onto it for a few weeks, ponder it, do another session with it, and take it to another level. There all this becomes the background, the depth.

JH: That's great.

So the valves at the bottom of these tubes are like the valves on radio controlled airplanes.

TS: Yes, it's a servo with a cam that clamps a rubber tube.

You can tighten it up and stop it, or you can leave it wide open.

And all colors come out from one central port at the bottom.

You can always change the color, paint the aluminum, or put anything in it.

It can be tomato sauce, sand or powder, or anything else.

JH: There are so many forces.

There is gravity, centrifugal force, and fluid mechanics.

Is each of these beautiful paintings an image in itself, or a record of a physical event called a pendulum approaching the canvas?

TS: Well, this painting was very simple, I wanted to create a simple, symbolic image of two interfering ripples.

So the one on the right ran first, then the one on the left ran above it.

And I left a gap so that I could see what I did before.

And when I made the second piece, it really messed up the piece, with a big blue line going through the center of the piece. And it created a kind of tension and overlap.

There is a line in front of the line on the right and a line behind the line on the left, so they are captured in different planes.

It's also about small events, interpenetrating events -- JH: two stars, or -- TS: two things that happened -- there's an interference pattern, and then a third thing.

There is a shape that is born by fusing two events that are happening, and I am very interested in that.

Moiré occurs.

Like this green one, this is a drawing I did about 10 years ago, but in the top third there are some moire and interference patterns of radio wave-like images.

And that's something I've never seen before in the painting world.

I have never seen a representation of some kind of radio interference pattern so ubiquitous and such an important part of our lives.

JH: Is it literally part of the image, or are my eyes creating that interference pattern -- are my eyes completing that interference pattern?

TS: It's actually paint and it makes it real.

It's right there.

Throwing very concentric circles or concentric ellipses dutifully creates these evenly spaced lines that come closer and closer, representing how gravity works.

There is something very fascinating about the accuracy of science, and I enjoy it a lot.

And I love scientific observations and instrumental shapes, especially celestial shapes, and the concept of vastness and scale is very interesting to me.

In recent years my focus has shifted towards biology.

In some of these paintings, if you look very closely, strange things appear that really look like horses, birds, crocodiles and elephants.

There are many that appear.

If you look into it, it's like looking at cloud patterns, but they are very modeled and sometimes highly rendered.

And I don't know what they are, but they are equally well resolved and have complex forms.

So I think maybe they could be predictable.

Because in biology they have the ability to make shapes similar to those we are familiar with, they can also make other shapes that we are not familiar with.

And maybe it's a form like the one found under the surface of Mars, and perhaps there's a lake with fish swimming under the surface.

JH: Oh, I hope so. Oh my god, let's do that.

oh please yes Oh there you are

You know, at this stage in your life, you, personally, seem to be facing some kind of dissonance. I think maybe it's the electromagnetic force that somehow governs your Parkinson's disease, and this creative force that's both the artist you're here with and this kind of arc throughout your life.

Does it relate to your job?

TS: After all, this device is useful in a way. Because it doesn't require fine motor skills and allows you to manipulate the slides closer to a mental process.

I am looking at it and making a decision. I need more red, I need more blue, I need a different shape.

So I can make these creative decisions and do them in a much easier way.

It means you have symptoms.

I think Parkinson's disease develops gradually over the years, but at some point symptoms start to appear.

In my case, my left hand shakes a lot and my left leg also shakes.

I'm left-handed, so I draw.

All my work starts with thousands of small drawings. This is my way of thinking.

I draw with simple pencils and at first I was really upset having Parkinson's because I couldn't keep the pencil still.

JH: So you are not the gatekeepers of these factions.

You do not consider yourself the master of these forces.

You think of yourself as a servant.

TS: Nature is, well, a godsend.

There are so many things in it.

And nature wants to express itself in the sense that we are nature and humans are part of the universe.

The universe is in our mind and our mind is in the universe.

And we are basically the expressors of the universe.

As humans, ultimately part of the universe, we are like spokespersons or observers of its constituents.

And working with these ubiquitous forces to show what is possible and working with them like an artist with a device that gives pigments and paints is a good ally.

A great studio assistant.

JH: Well, I love the idea that somewhere in the idea of ​​fine movement and control with traditional hand-held skills, some kind of more fundamental power is revealed and that's the beauty here.

Thank you very much Tom. It was really really great.

TS: Thank you, John.

(applause)

I'm going to talk about corruption, but I want to talk about two different things side by side.

One is the large world economy, a large globalized economy, and the other is that the capacity of traditional governments and their international institutions to govern and shape this economy is small and very limited.

Because this asymmetry exists and basically creates governance failure.

Governance is failing in many areas. In the areas of corruption and environmental destruction, the exploitation of women and children, climate change, and all those areas where the ability to reintroduce political primacy into an economy operating on a global scale is really needed.

And I think corruption, fighting corruption, the impact of corruption is probably one of the most interesting ways to explain what I mean about this governance failure.

Let me tell you about my own experience.

I previously worked as the Director of the World Bank East Africa Office in Nairobi.

That's when I realized that corruption, that massive corruption, that systemic corruption, was screwing up everything we were trying to do.

So I started thinking, "We need a system to protect the people of this part of the world from the scourge of corruption, not just trying to protect the World Bank's operations, our own projects, our own programs, from corruption."

And as soon as I started this job, I received a memorandum from the World Bank, first from the legal department, which said:

You are interfering in the internal affairs of our partner countries.

This is prohibited by the World Bank Charter and should be stopped. ”

During that time, I chaired various donor conferences, for example. It attracts a wide variety of donors, many of whom prefer to be in Nairobi. Sure, Nairobi is one of the least safe cities in the world, but they prefer to be in Nairobi because other cities are even less comfortable.

And in my meetings with these donors, I've noticed that many of the worst projects have been proposed by our customers, governments and promoters, many representing suppliers from North Korea. The worst projects came first.

Let me give you an example. A massive $300 million power generation project will be built in one of the most vulnerable and most beautiful areas of western Kenya.

And we all quickly realized that the project had no financial benefits. There were no customers, no one buying electricity there, no one interested in irrigation projects.

On the contrary, we knew this project would destroy the environment. It will destroy the riparian forests that are the basis for the survival of the Samburu and Turkana nomadic groups in the region.

So everyone knew that this was not a useless project, but an absolutely harmful and terrible one. Not to mention hundreds of millions of dollars in future national debt, not to mention siphoning scarce economic resources from more vital activities such as schools and hospitals.

Still, we all rejected this project and none of our donors wanted their names tied to this project, so this was the first project to be run.

All too often the good projects that we support as a donor community took years, had too much research, and didn't succeed.

But these bad projects, which did absolute damage to generations of economies, the environment, and thousands of displaced families, came back very quickly, like Germany and Hermes, suddenly put together by a consortium of banks, supplier agents, and insurance agents, and driven by an unholy alliance between the powerful elites of those countries and suppliers from the north.

Well, these suppliers were our big business.

As I said at the beginning, they were the main players in this global market.

They were the Siemens of this world from France, England, Japan, Canada and Germany, systematically driven by systematic and massive corruption.

We're not talking about $50,000 here, $100,000 there, or $1 million there.

No, we are talking about $10 million, $20 million in bank accounts in Switzerland, bank accounts in Liechtenstein, presidential cabinet ministers, senior officials in the sub-state sector.

This was the reality I saw, and it wasn't the only such project. Over the years I have worked in Africa, I have seen hundreds of such projects.

I have become convinced that it is this systemic corruption that distorts economic policy-making in these countries, and that it is the main cause of misery, poverty, conflict, violence and despair in many of these countries.

Today, there are over 1 billion people below the absolute poverty line, double that in the world, over 1 billion without adequate drinking water, over 2 billion without sanitation, and as a result, more than 10 million infants still die each year from maternal and child illnesses, many of which die before the age of 5, largely due to large-scale corruption.

Now, why didn't the World Bank let me do this job?

After I left, I learned later that there was a big dispute with the World Bank.

The reason is that World Bank members thought that bribery from foreign countries, including Germany, was okay.

Foreign bribery was allowed in Germany.

It is also tax deductible.

No wonder most of the most important international operators, not only in Germany, but also in France, the UK and Scandinavian countries systematically took bribes.

Not all, but most do.

This is what I call governance failure. Because when I came to Germany and started this little NGO here at Villa Borsig in Berlin, we were told: "You can't stop bribing German exporters because you're going to lose the contract.

We will lose to the French, we will lose to the Swedes, we will lose to the Japanese. ”

So there really was a prisoner's dilemma, making it very difficult for individual companies, individual exporting countries, to say they were not going to continue this deadly and disastrous bribery practice of large corporations.

So this is what I mean about failing governance structures. Because even the relatively powerful government in Germany could not say, "We will not allow our companies to take bribes abroad."

They need help, and big companies themselves face this dilemma.

Many of them did not want to accept bribes.

For example, many German companies believe they actually produce quality products at affordable prices, which makes them very competitive.

They are not as good at bribery as many of their international competitors, but they were not allowed to play to their advantage as the world was plagued with epic corruption.

This is why I want to tell you this. Civil society has stepped into this situation.

There was a small NGO called Transparency International.

They started thinking about how to get out of this prisoner's dilemma, and we developed the concept of collective action, basically gathering various competitors around the table, explaining to them all at the same time how much it would benefit them if they stopped bribing, and in short, we finally managed to get Germany signed with the other OECD countries and a few other exporters.

In 1997, under the auspices of the OECD, a convention was enacted that required everyone to change the law and criminalize foreign bribery.

(Applause) Yes, thank you. Interestingly, we had to work with companies to do this.

We held a session here at the Aspen Institute on the Wannsee River in Berlin with about 20 industry leaders to discuss what should be done about international bribery.

The first session had three sessions over two years.

By the way, President von Weizsäcker chaired one of the sessions, the first, to ease the anxiety of entrepreneurs unfamiliar with dealing with non-governmental organizations.

And in the first session everyone said, "This is not bribery, it's what we do." This is customary there.

This is what other cultures demand.

They even praise it.

In fact, [unintelligible] still says this.

Therefore, there are still many people who are not convinced that bribery must stop.

But at the second session they already admitted that they would never do what they are doing in other countries, here in Germany, the UK, etc.

Ministers will recognize it.

And in the final session at the Aspen Institute, we asked everyone to sign an open letter asking the then-Kohl administration to join the OECD treaty.

In my opinion, this is an example of soft power. Because we were able to persuade them that they had to cooperate with us.

We had a long-term view.

The constituencies we were trying to defend were more geographically spread out.

And that's why the law changed.

That's why Siemens is in trouble now, and why MIN is in trouble.

Some other countries have not yet properly implemented the OECD Convention.

And once again, civil society is putting pressure on the establishment.

In London, for example, the BAE escaped a massive corruption case that the Serious Fraud Bureau sought to prosecute, giving £100 million each year to certain officials of certain friendly nations for ten years, after which they bought £44 billion of munitions.

The case has not been prosecuted in the UK.

why? They believe this is against the national security interests of the British people.

Both in the UK and in Japan, which is not properly policing, civil society is trying to solve the problem and find solutions.

Germany is in the process of ratifying the subsequent UN Convention.

We, Germany, have not ratified.

why? Because it will be necessary to criminalize parliamentary corruption.

Germany does not allow bribery of civil servants, but has a system in which it is permissible to bribe parliamentarians.

This is allowed by German law, our parliamentarians do not want to change this, and this is why we cannot sign the UN Convention against Foreign Bribery - we have managed to conclude agreements with about 160 countries around the world, being one of the very few countries that have failed to ratify the Convention, despite preaching honesty and good governance everywhere in the world.

I can see the time passing.

Let's draw some conclusions from what happened.

I believe that what we have achieved in fighting corruption, we can achieve in other areas of failed governance.

The United Nations is now completely on our side.

The World Bank has changed from Saurus to Paulus. Under Wolfensohn, they have become the strongest anti-corruption agency in the world.

Most of the big companies are now fully convinced that they need to put in very strong policies against bribery and such.

And this has been possible because civil society has joined businesses and joined governments in analyzing problems, developing remedies, implementing reforms, and then monitoring reforms.

Of course, if civil society organizations want to play that role, they need to grow to assume that responsibility.

Not all civil society organizations are great.

The Ku Klux Klan is an NGO.

We must therefore recognize that civil society must shape itself.

They must have more transparent financial governance.

We must have more participatory governance in many civil society organizations.

We also need more capacity for civil society leaders.

This is why we founded the Governance School and the Center for Civil Society here in Berlin. Because we believe that most of our educational and research institutions in Germany and across continental Europe are not yet sufficiently focused on empowering civil society and training civil society leadership.

But what I would like to say, from my very practical experience, is that if civil society does the right thing and works with other actors, especially governments, national governments and their international institutions, but also large international actors, especially those committed to corporate social responsibility, then in this magical triangle between civil society, governments and the private sector, we all have a great chance to create a better world.

thank you.

(applause)

Sadly, in the next 18 minutes I chat, 4 living Americans will die from food.

My name is Jamie Oliver.

I am 34 years old.

I'm from Essex, England, and I've spent the last seven years working pretty hard to save lives in my own way.

i am not a doctor I'm a chef, so I don't have expensive equipment or medicines.

Use information, education.

I am a deep believer that the power of food has a central place in our homes and that it connects us to the best parts of life.

We are facing a terrible, terrible reality right now.

America, you are on top of the game.

This is one of the most unhealthy countries in the world.

Could you please raise your hand how many children are in this room today?

please raise your hand

Uncles and aunts, please continue to raise your hands.

most of you. OK.

For the past four generations, we adults have destined our children to live shorter lives than their parents.

Your child will live a life ten years younger than you because of the food landscape we have built around them.

Today in America, two-thirds of this room is statistically overweight or obese.

Everyone is fine. But don't worry, I'll come pick you up someday.

(Laughter) The statistics on poor health are clear. Very clear.

We spend our lives delusional about death, murder, murder, whatever. It's on the front page of every paper, CNN.

Take a look at the murders at the bottom just in case.

right?

(Laughter) (Applause) Anything in red is a diet-related disease.

Any doctor, any expert will tell you that.

Fact: Diet-related illnesses are now the number one killer in the United States here today.

This is a global problem.

It's a disaster.

As usual England is right behind you.

(Laughter.) I know they were close, but not that close.

Mexico, Australia, Germany, India and China all have major problems of obesity and poor health.

Consider smoking.

Now it costs a lot less than obesity.

Obesity costs Americans 10% of healthcare costs, or $150 billion annually.

It will double to $300 billion a year in 10 years.

Let's be honest, folks, we don't have that kind of cash.

(Laughter) I'm here to start a food revolution that I deeply believe in.

I need it. Now is the time.

We are in a tipping moment.

I have been doing this for 7 years.

I have been working in America for 7 years.

Now is the time to ripen and pick.

I went to the eye of the typhoon.

Or was it last year?

We prepared a new one this year, but we plan to work on it next season.

(Laughter) Huntington, West Virginia. beautiful city.

I wanted to cherish hearts and souls, people, people, around the statistics that we are all familiar with.

I would like to introduce you to some people I care about: the public and children.

she is 16 years old.

She has six years left to live because of the food she ate.

She is not a third-generation American who grew up in a food environment where she was taught to cook at home, at school, by her mother and her mother's mother.

She has six years left to live.

She dies by eating her liver.

This is a normal family, folks.

Stacy is trying her best, but she's also a Sansei. She was never taught to cook at home or at school.

Justin here is 12 years old and weighs 350 pounds.

Luckily he is bullied.

There daughter Katie is 4 years old.

She has been obese since she entered elementary school.

Marissa, she's okay, she's your destiny.

Her father, who was obese, died in her arms, then her uncle, the second most important man in her life, also died of obesity, and now her stepfather is also obese.

As you know, obesity and diet-related illnesses don't just harm those who are affected. It's all their friends, family, brothers and sisters.

Pastor Steve: An inspiration and one of my early allies in Huntington, WV.

He has to bury people, okay?

He is tired of burying his friends, family and community.

Three times as many people die in winter.

he's fed up

By the way, this is what it looks like buried.

we are not ready to do this.

I can't even kick them out the front door, and I'm serious.

I can't even take you there. forklift.

This is our food landscape.

I want you to understand that.

You've probably heard all of this before.

What happened in the last 30 years that broke the heart of this country?

Speak openly and honestly.

Let's start with Main Street.

Big brands are some of the most important and powerful forces in this country.

(sighs) The supermarket too.

Big business. Big business.

Thirty years ago most of the food was locally sourced and mostly fresh.

Now it's mostly processed, full of all kinds of additives and extra ingredients, and you know what happened next.

Portion size is obviously a big issue.

Labeling is a big issue.

The labeling of this country is shameful.

The industry wants to self-regulate.

What in this climate? they don't qualify for that.

How can you say it's low fat when it's full of sugar?

Home.

The biggest problem with the family is that it was once central to the inheritance of the food culture that has shaped our society.

It's not happening anymore.

And you know, when we go to work, when life changes, and as life evolves all the time, we have to kind of look at it holistically. We have to pause for a moment and re-address the balance.

It hasn't happened in 30 years, right?

Now I would like to show you a very normal situation. Edwards family.

(Video) Jamie Oliver: Let's talk.

This substance passes through your and your family's bodies every week.

And be aware that this will kill your children prematurely.

how are you feeling?

Stacey: I'm really sad and depressed right now.

But I want my kids to be successful in life, and this is not going to get them there.

But I will kill them.

Joe: Yes, that's right. you.

usually.

Think about a school that I'm pretty specialized in.

ok school.

Schools were always invented to give us the tools to be creative, to do great things, and to make a living.

It's been stored in such a small box for a long time.

But we didn't really evolve it to address America's health crisis, okay?

School meals are eaten twice a day by most children (actually 31 million a day), more often at breakfast and lunch, 180 days a year.

So, judging by the circumstances, we can say that school lunches are very important.

(laughter) I'm sure you're all waiting before I rant -- (laughter) I have to say one thing. That's very important to the magic that will hopefully happen and unfold in the next three months.

America's lunch ladies, lunch cooks, I am their ambassador.

I don't despise them.

they are doing the best they can.

they are doing their best

But they are doing what they are told to do, and what they are told to do is wrong.

The system is highly run by accountants. There are not enough or no food savvy people in the industry.

There is a problem. If you're not a food expert and your budget is tight and getting tighter, you can't be creative and you can't bend down and dive in and write all sorts of things in relation to things.

If you are an accountant and a ticket seller, the only thing you can do in this situation is buy something cheaper.

Now, the reality is that the food our kids get every day is fast food, highly processed, and there just isn't enough fresh food out there.

You know, the amount of additives, the E number, the incredible ingredients, and the lack of veggies at all.

French fries are considered vegetables.

knife and fork? No, it's too dangerous.

We have scissors in the classroom, but do we have knives and forks? no.

Here's how I see it: Without knives and forks in schools, at the state level, we are genuinely advocating hand-held fast food.

Yes, by the way, it's fast food. It's sloppy jaws, it's burgers, it's wieners, it's pizza, it's everything.

(sighs) Like I said earlier, 10 percent of the money we spend on healthcare is on obesity, and that's going to double.

We are not teaching children.

We have no legal right to teach children about food in elementary and middle school.

We don't teach our children about food, do we?

This is a small clip at primary school which is very common in England.

(Video) No one knows what this is.

Children: potatoes.

Jamie Oliver: Potato? So you think this is a potato?

do you know what it is?

Child: "Broccoli?"

Joe: How is this? our good old friend.

Children: Celery.

Children: onions. Joe: An onion? no.

JO: It quickly becomes clear that 'do kids know anything about where their food comes from?'

who knows what it is? Child: Uh, pear?

Joe: What do you think this is? Child: I don't know.

JO: If kids didn't know what it was, they would never eat it.

(laughs) Joe: It's normal. England and America, England and America.

Guess what fixed it.

We have to start teaching children about food in schools.

(Applause.) I'd like to talk about something that kind of epitomizes the problem we're in, do you get it, folks?

I want to talk about something as basic as milk.

All children have the right to drink milk at school.

Do your children drink milk at school, breakfast and lunch?

They're going to drink two bottles, right?

But milk alone is not enough.

Don't get me wrong, I support milk. But maybe someone on the milk board paid a fortune for the geeks that the more flavorings, colorings and sugars you put into your milk, the more kids will drink it.

yes.

Clearly, the apple committee took note of this, and if we made toffee apples, they'd eat more.

you see?

I don't need to flavor my milk.

have understood? Everything has sugar in it.

I know the details of those ingredients.

Even milk is not immune from modern-day problems.

We have our milk there. There you will find our cartons.

It contains about the same amount of sugar as one can of their favorite soda, so they're drinking two a day.

Here's a kid who gets 8 tablespoons of sugar a day.

This week is over.

I have your moon

And I freely put sugar in 5 years of elementary school, only milk.

Now, I don't know about you, but judging by the circumstances, yes, any judge in the world, looking at the statistics and the evidence, would find any old government guilty of child abuse.

That's my belief.

(Applause) (End of applause) Now, if I came here and wished I could come here today and cure AIDS and cancer, you would be fighting and scrambled to get to me.

All this bad news can be prevented.

That's good news.

It's very, very preventable.

So let's think for a minute. Something went wrong here and you need to reboot.

The point here is that it doesn't come from just one source.

To reboot and to make a real change, to make a real change, I can look you in the eye and say, "In 10 years, your children's life history, happiness, and remember, eat well and you'll be smarter, you know you'll live longer, all of that, it'll look different. Got it?"

So, supermarket.

Where else do you shop so diligently?

How much money do you spend in supermarkets in your life?

love them

They oblige us to have food ambassadors in every major supermarket.

They need to help us with our shopping.

They need to teach us how to make quick, delicious seasonal meals for busy people.

It's not expensive.

It's being implemented in some areas, but it needs to be implemented across the United States as soon as possible.

Big brands, food brands, need to put food education at the center of their business.

I know, easier said than done.

It's the future. It's the only way.

fast food.

As you know, the fast food industry is very competitive.

I have done many secret documents and deals with fast food restaurants.

So basically, they kept us away from sugar, salt, fat, and x, y, z hits, and everyone loves them, right?

So these guys will be part of the solution.

But we need the government to work with all the fast food and restaurant industries to cut out extreme amounts of fat, sugar and all other non-food ingredients over five, six, seven years.

Now, back to the big brands, as I said earlier, the labeling is a complete farce and needs to be sorted out.

Clearly, schools have a duty to ensure that children from the small precious age of 4 years old, to 18, 20 and 24 years of age, have 180 days of the year, properly prepared and fresh food from local producers on site.

Kids need a new standard of fresh and proper food, right?

(Applause.) In times like these, it's so important that every child in America leaves school knowing how to cook 10 recipes that will save their lives.

life skills.

(Applause.) I mean, they're students, they're young parents, and whatever recession hits next, they'll manage to escape and learn the basics of cooking.

Recession money doesn't matter if you can cook.

We didn't talk much about work.

You know, it's time for corporate responsibility to take a serious look at what we feed and serve our employees.

The staff are moms and dads of American children.

Marissa's father died in her hands. Marissa would be very happy if American companies could provide proper meals to their employees.

They should never be left behind.

See, if you do this much, it's very achievable.

absolutely.

But households certainly need to start inheriting the cuisine again.

Of course, convey it as a philosophy.

To me, this is very romantic, because if one person teaches three people how to cook something, and his friend teaches three people, it only needs to be repeated 25 times, and that's the entire population of America.

Romantic, yes, but most importantly, try to make people understand that every single personal effort you make makes a difference.

What was lost must be restored.

Huntington's Kitchen.

In Huntington, where I produced this show, there are primetime shows that encourage people to take this change seriously.

I truly believe that change will happen.

Huntington's Kitchen. I work in partnership with the community.

I found a local, sustainable fund to provide junk-to-fresh produce for every school in the area. 6.5 grounds per school.

(Applause) That's all we need, 6.5 grand per school.

The kitchen is $250,000 a month. have understood?

It can do the work of 5,000 people a year, or 10 percent of the population, and it's person-to-person.

Local chefs are teaching locals.

It's a free cooking lesson on Main Street.

This is a concrete change in reality, a concrete change in reality.

There are so many wonderful things happening around America, even just looking back now.

A lot of beautiful things are happening.

There are angels all over America doing great things in schools -- setting up farms to schools, setting up gardens, teaching -- there are great people doing this already.

The problem is they all want to extend what they're doing to the next school, but they don't have the cash.

We need to quickly recognize and identify experts and angels, and be able to easily find resources to continue to roll out what they are already doing and make it work.

American corporations need to help Mrs. Obama achieve what she wants.

(Applause.) So, you see, I know it's strange that an Englishman is standing here in front of you talking about this.

All I can say is "I care".

I am a father and I love this country.

And I truly believe that if we can make a difference in this country, great things will happen around the world.

If America does it, other countries will follow.

It's very important.

(audience) Yes!

(Applause.) When I was in Huntington, trying to make some things work when things were going wrong, I thought, "If I had a magic wand, what would I do?"

And so I thought.

I want to stand before some of America's greatest movers and shakers. ”

I am here.

So my wish.

I'm dyslexic so it's a little slow.

My hope is to educate every child about food, inspire families to cook again, and support a strong and sustainable movement to empower people around the world to fight obesity.

(Applause.) Thank you.

(applause continues)

About a year and a half ago, Stephen Lawler, who gave a talk on Virtual Earth here at TED in 2007, brought me to be the architect of Bing Maps, Microsoft's online mapping effort.

Over the past two and a half years, we've been hard at work redefining how online maps work.

And we're looking at this in a very different light than the maps and directions sites we're used to.

So the first thing you notice about the mapping site is the fluidity of zooming and panning. If you're even slightly familiar with Seadragon, that's where you're coming from.

Of course, mapping is not just cartography, imagery is also important.

So zooming in beyond a certain level resolves to a 45 degree sort of SimCity-like virtual view.

It can be viewed from any cardinal direction and can show the 3D structure of the city, all facades.

Now, we see this space, this three-dimensional environment, as a canvas on which we can run all sorts of applications, and map orientation is really just one of them.

Click here to see some of what we've released in the last few months since launch.

For example, days after the disaster in Haiti, a seismic map was produced showing before and after photos taken from the air.

I don't have time to show you, but this cool stuff takes hyperlocal blogs in real time and maps those stories and entries to where they are referenced in the blog.

That's excellent.

But I will introduce something a little more like sweets.

So the images we see, of course, don't just stay empty.

These little green bubbles represent a user-made photosynthetic apparatus.

I won't go into detail on these either, but the photosynthesis apparatus is integrated into the map.

All areas circled in blue are areas that were also imaged on the ground.

So when you jump off -- (applause) thank you. When you come down to the ground and see this kind of panoramic image, the first thing you notice is that it's not just a photograph, it's just as much a three-dimensional understanding of the environment as a three-dimensional city from above. So if you click on something and take a closer look, the fact that that transition looks that way is all a function of the geometry and the 3D understanding behind this model.

Well, let me introduce you to a fun app. We are collaborating with our friends at Flickr.

It takes a geo-registered image, Flickr, and uses a photosynth-like process to connect that image to ours. I mean, I don't know if that's what I was actually going to get, (laughter) but be careful. Of course, this is a popular tourist destination and there are many pictures around this place, all taken at different times.

So this was taken around 5:00.

It's a Flickr photo, it's our image.

You can see how this kind of crowdsourced imagery is integrated into the map itself in a very deep way.

(Applause.) Thank you.

(Applause) This is interesting for several reasons, one of which is, of course, time travel.

I'm not going to show you some of the great historical paintings here, but there are some that depict horses, carriages, etc.

But the beauty of this is that it not only augments the visual representation of the world with what is sent by the user, it is also the basis for augmented reality. More on this later.

I have now moved indoors. That's interesting too.

OK, notice the roof above.

We are inside Pike Place Market.

And since this is something you can do with a backpack camera, I'm not just shooting around town with this camera on top of the car, but I'm also shooting inside the car.

From here, you will be able to register not only still images but also videos in the same way.

This is the first time we're trying to do it live and this is really, really, really scary.

(laughter) Okay.

(rings ring) Okay, are you guys there?

(noisy) Okay. It hits me. I play punching.

I'm alive have understood. Let's go.

Well, these are Pike Place Market, Lab friends.

(Applause) So they're broadcasting this live.

Okay George, can you go back to the market on the corner?

I want to show you the points to pay attention to.

no no Conversely.

Yes, yes, back to the corner and back to the corner.

I don't want to see you yet

OK, OK, back in the corner, back in the corner, back in the corner.

Alright, never mind.

What I wanted to show you are these interesting points on the image. Because it gives you the feeling that you can think about this if you're actually there. This is a step up on top of augmented reality.

What the hell are you guys -- oh sorry.

(Laughter) We're doing two different things -- OK, hang up now.

We're doing two different things here.

One of them is the real...

(Laughter) Okay, I'd like to take a moment to thank the team.

They did a great job putting this together.

(Applause.) I'm going to abandon them now and go back outside.

Just to let you know when you're walking outside, we're using this for telepresence here, but you could just as well use it on the fly for augmented reality.

Using it in the field means you have all the metadata and information in the world.

So here we take the extra step of broadcasting more.

By the way, it was broadcast on 4G networks from the market.

Well, that's the last TED talk that Microsoft has given in the last few years.

That's Curtis Wong of Worldwide Telescope.

So, after a long day at the market, we traditionally head to the dumpster to take a break and look up at the sky.

This is an integration of the Worldwide Telescope into the map.

(Applause) This is the time now -- thank you -- this is the time now. Scrubbing the time gives you an idea of ​​what the sky looks like at different times and gives you all the very detailed information for different times, different dates. Let's move the moon a little higher in the sky and change the date.

I would like to zoom in on the moon.

In other words, it is an astronomically perfectly integrated representation of the Earth's sky.

Well, I've run out of time and I have to stop.

Everyone Thank you very much.

(applause)

Today we will talk about energy and climate.

This may come as a bit of a surprise, as my full-time job at the Foundation is primarily about vaccines and seeds, things that need to be invented and provided to help the poorest 2 billion people have a better life.

But energy and climate are very important to these people. In fact, it matters more than anyone else on the planet.

Bad weather means years of crop failure. Too much rain, not enough. Things will change in ways that are unsupportable in fragile environments.

And that leads to hunger, which leads to uncertainty and anxiety.

So climate change will be terrible for them.

Also, the price of energy is very important to them.

In fact, if I had to pick just one thing to lower prices to reduce poverty, it would be energy.

Now the price of energy is going down over time.

Truly advanced civilizations are based on advances in energy.

The coal revolution fueled the industrial revolution, and even in the 1900s, electricity prices plummeted. That's why we have refrigerators and air conditioners. We can create state-of-the-art materials and do so many things.

So in a world of abundance, we are in a great position with electricity.

But when you make the price cheaper, let's say you try to make it twice as cheap, you have to meet a new constraint, and that constraint has to do with CO2.

CO2 is warming the planet, and the equation for CO2 is actually quite simple.

The total CO2 emitted leads to an increase in temperature, and that increase in temperature has a very negative impact, including the impact on the weather. Perhaps even worse, the indirect impact is that natural ecosystems will not be able to adapt to these rapid changes, leading to ecosystem collapse.

Now, there is some uncertainty as to exactly how to map what the temperature will be from a constant increase in CO2, and where the positive feedback is, but not too much.

And although there is certainly uncertainty as to how bad those effects will be, they will be very bad.

I've asked top scientists about this several times: do we really need to bring it down to near zero?

Is it possible to cut it in half or quarter?

The answer is that the temperature will continue to rise until it approaches zero.

That's a big challenge.

That's a lot different than saying, "We're going under a 12-foot-tall truck under a 10-foot-tall bridge, and we can get under it."

This should be zero.

Today, we emit a large amount of carbon dioxide every year, amounting to over 26 billion tons.

For each American, that's about 20 tons.

For people in poor countries, that's less than a ton.

This equates to about 5 tons on average for everyone on Earth.

And somehow you have to make a change that makes it zero.

It keeps going up.

It's the only economic change that's even flattened out at all, so it has to go from a rapid rise to a decline to zero.

This equation has four elements and a few multiplications.

On the left we want zero CO2, which is based on the number of people, the services each person uses on average, the average energy of each service, and the CO2 emitted per unit of energy.

So let's look at each of these and see how we can make this zero.

Perhaps one of these numbers should be fairly close to zero.

(Laughter) This is high school algebra.

But let's see.

First, there is the population.

There are 6.8 billion people in the world today.

The amount is said to reach about 9 billion.

If we do a really great job with new vaccines, medicine, and reproductive health services, we could probably bring it down by 10 or 15 percent.

But there we see an increase of about 1.3.

The second element is the service to use.

This includes everything we eat, clothing, televisions, heating, and more.

These are very good things.

Ending poverty means providing these services to nearly everyone on the planet.

And it's great to see this number go up.

Perhaps in a wealthy world of top billion people, we could cut back and use less. However, this number increases on average every year, so that overall, the services provided per capita more than double.

Here are some very basic services. Do you have lights in your home to read your homework?

And really, these kids aren't, so they go outside and read their school assignments under streetlights.

Now, efficiency, "E", energy for each service -- here's the final good news.

It may not go up.

Through various inventions and new ways of lighting, different types of vehicles, different ways of building buildings, etc., there are many services that can significantly reduce the energy cost of their services.

Some individual services offer a 90% reduction.

Some services have far less room for improvement, such as fertilizer manufacturing methods and air transportation.

So overall, if you're optimistic, you have the potential to reduce by a factor of 3 to 6.

But these first three factors are more than just 13 billion tonnes, up from 26 billion tonnes today.

Now let's take a look at this fourth element. This becomes an important factor. This is the amount of CO2 emitted per unit of energy.

So the question is, can it really be zero?

If you burn coal, no.

If you burn natural gas, no.

With the exception of emerging renewables and nuclear power, nearly every way we make electricity today emits carbon dioxide.

So what we have to do on a global scale is to create a new system.

Therefore, we need an energy miracle.

Now, when I use the word "miracle," I don't mean impossible.

Microprocessors are miracles.

The Internet and its services are miracles.

Thus, people here have participated in the creation of many miracles.

There is usually no deadline by which a miracle must be obtained by a certain date.

Usually you just sit on the sidelines, some participate, some don't.

This is a case where you really have to drive full speed ahead and do miracles within a pretty tight timeline.

Well, this is what I thought. "How can we really capture this?"

Are there any natural illustrations or demonstrations here that capture people's imaginations? ”

I remember a year ago when I brought in mosquitoes and somehow people enjoyed it.

(Laughter) It really got them into the idea that there are people living with mosquitoes.

This is the only energy I can think of.

This year, I decided to release fireflies to contribute to the environment here.

There are natural fireflies here.

They are said not to bite. In fact, they may not even leave the jar.

(Laughter) Well, there are all sorts of gimmicky solutions like this, but they don't really make much sense.

You need one or more solutions with incredible scale and incredible reliability.

There are many directions people are looking for, but I believe only five can achieve big numbers.

I omitted tidal currents, geothermal, nuclear fusion, and biofuels.

They might contribute something, and if they can do better than I expected, that would be great.

But my point here is that each of these five needs to be addressed, and they all have significant challenges, so you can't abandon any one just because it looks hard.

First, let's look at burning fossil fuels, i.e. burning coal or burning natural gas.

It sounds easy to do there, but it's not.

It's all about capturing all the CO2 after you've burned it out of the flue, pressurized it to make a liquid, put it somewhere, and hoped it would stay there.

There are currently some pilots doing this at 60-80 percent levels.

But reaching that perfect percentage is very difficult.

And while it would be difficult to agree on where to put these amounts of CO2, it is this long-term issue that is most difficult here. Who can be sure?

Who guarantees literally billions of times more waste of any kind you think in terms of nuclear or otherwise?

This is quite a volume.

That's a big deal.

Next will be the nucleus.

There are also three big problems. Costs are high, especially in countries with strict regulations. Safety concerns, the reassurance that nothing will go wrong, the fuel not being used in the weapon despite having a human operator.

Then what do you do with the waste?

It's not that big of a deal, but there are a lot of concerns about that.

People have to feel good about it.

So we have to tackle three very difficult problems that we might be able to solve.

We grouped the last 3 out of 5.

These are what people often call renewable resources.

And really, not needing fuel is great, but it has some drawbacks.

One is that the energy densities harvested by these technologies are significantly lower than power plants.

Since this is energy agriculture, we are talking about many square miles, or thousands of times the area that is normally thought of as an energy plant.

Also, these are intermittent sources.

The sun doesn't shine all day, and it doesn't shine every day. Likewise, the wind is not always blowing.

Therefore, if you rely on these sources of energy, you should have some way of getting energy during times when energy is not available.

So there is a big cost challenge here.

We have transmission challenges. For example, let's say this energy source is outside your country. In that case, not only do we need the technology, but we also have to deal with the risks of energy supplied from other countries.

And finally, this storage issue.

To dimension this, I looked at all kinds of batteries used in cars, computers, phones, flashlights, etc. and compared that to the amount of electrical energy the world uses.

What I have discovered is that all batteries manufactured today store less than 10 minutes of total energy.

So really, we need a big breakthrough here and it would be 100x better than the current approach.

Not impossible, but not that easy.

Now, this happens when you try to have an intermittent source, say 20-30 percent more than your source.

If you trust 100%, you need an incredible miracle battery.

So how do we proceed with this problem? What is the right approach?

Is it the Manhattan Project? What can get us there?

Well, we need a lot of companies working on this, hundreds of companies.

Each of these five roads requires at least 100 personnel.

Many of them will look and say "they are crazy".

that's good.

And I think there are a lot of people here in the TED group already pursuing this.

Bill Gross runs several companies, including eSolar, which has excellent solar thermal technology.

Vinod Khosla is doing great things and has invested in dozens of companies with interesting potential, and I'm trying to back him up.

Nathan Myrvold and I, perhaps surprisingly, are actually backing companies that are taking a nuclear approach.

There are several innovations in nuclear power, such as modular, liquid.

It's been a long time since innovation really stopped in this industry, so the idea that good ideas are dormant isn't all that surprising.

TerraPower's idea is that instead of burning some of the uranium (U235, which is 1 percent), they decided to "burn 99 percent, U238."

That's kind of a crazy idea.

In fact, people have been discussing it for a long time, but haven't been able to properly simulate if it works. So with the advent of modern supercomputers, it is now possible to simulate and confirm that with the right materials approach this seems to work.

And since you consume 99% of it, your cost profile is greatly improved.

You can actually burn the waste and actually use all the leftover waste from today's nuclear reactors as fuel.

So instead of worrying about them, just embrace it, it's great.

This uranium is produced as it progresses, so it's kind of like a candle.

It's a log called a traveling wave reactor.

As for fuel, this really solves the problem.

I have a picture of a place in Kentucky.

This is the remaining 99 percent, which is the part that is currently being burned, and is called depleted uranium.

It will power the United States for hundreds of years.

And just by filtering sea water through a cheap process, we could have enough fuel for the rest of the planet to last a lifetime.

As you know, there are many challenges ahead, but this is just one example of the hundreds of ideas we need to move forward.

So let's think about it. How should you measure yourself?

What should the report card look like?

Now, let's get to where we really need to get to, and then look in-between.

You've probably heard a lot of people talk about this 80% reduction by 2050.

Getting there is really very important.

And 20 percent of that will be used up by what is happening in poorer countries: still some agriculture. Hopefully I can clean forestry and cement.

So to reach that 80 percent, developed countries, including countries like China, would have to switch generation across the board.

Another grade is whether we have implemented this zero-emission technology, or have it been deployed in all developed countries and are in the process of deploying it in others.

It's very important.

It is an important element in creating a report card.

From there, what should your 2020 report card look like?

Again, we need two elements.

To start reducing, you need to implement these efficiency measures. Less emissions means less total CO2 and therefore less temperature.

But in a way, the performance that gets there by doing things that don't lead to significant reductions is just as important, or even slightly less important, than the other performance that is part of the innovation in these breakthroughs.

We need to drive these breakthroughs at full speed, and we can measure it in terms of companies, pilot projects, changed regulations, and more.

There are many great books written about this.

"Our Choice" by Al Gore and "Sustainable Energy Without the Hot Air" by David McKay.

They have considered it thoroughly and created a framework within which this can be widely discussed. Because this requires widespread support.

There are many things that must be united.

So this is my wish.

It is a very specific wish that we invent this technology.

If you could give me one wish for the next 50 years--who would be president, my favorite vaccine, or that this thing be invented that would cost half the cost and be CO2-free. This is the wish I choose.

This is what had the biggest impact on me.

If we fail to fulfill this wish, the divide between short-term thinkers and long-term thinkers will grow worse between America and China, between poor and rich countries, and above all, the lives of 2 billion people.

So what do we have to do?

What am I asking you to go ahead and drive?

We need to get more research funding.

When countries gather in a place like Copenhagen, we shouldn't just be talking about CO2.

They should discuss this innovation challenge.

You'll be surprised at the surprisingly low level of spending on these innovative approaches.

We need market incentives such as CO2 tax and cap-and-trade to send out price signals.

You have to get your message across.

It is necessary to make this dialogue more rational and easy to understand, including government measures.

This is an important wish, but I believe we can achieve it.

thank you.

(Applause) (End of applause) Thank you.

Chris Anderson: Thank you. thank you.

(Applause) CA: Thank you.

First of all, can you tell us how big an investment this is?

Bill Gates: We've done this to actually develop software, buy supercomputers, hire all the great scientists, and it's only tens of millions of people.

And even testing the material in a Russian nuclear reactor to make sure it works properly would only cost hundreds of millions of dollars in that case.

The hard part is building a pilot reactor. Find billions of reactors, find regulators, and actually find out where to build the first reactor.

If the first reactor is completed and it works as advertised, that's obvious. This is because the economy and energy density are very different from nuclear power as we know it.

CA: So, if I understand correctly, this means that you build this spent uranium deep underground, like a vertical column of nuclear fuel, and then the process starts at the top and works your way down?

BG: That's right.

Now that we are constantly refueling the reactor, many personnel and controls can fail when opening the reactor or taking things in and out, which is not good.

So if you have very (laughter) very cheap fuel that will last you 60 years, think of it as logs. Leaving it aside, similar complications do not arise.

And it just sits there, burns for 60 years, and it's done.

CA: A nuclear power plant is itself a waste disposal solution.

BG: Right. As for what happens to the waste, it can be left alone. This approach produces much less waste. Then you can actually take it out and put it in another waste and burn it.

And in fact, we start by removing the existing waste that is dormant in the cooling pools and reactor dry cask kings. That's our fuel in the first place.

So what's at stake in these reactors is actually what's feeding our reactors, and the amount of waste is being reduced pretty dramatically as we go through this process.

CA: You talk to different people around the world about possibilities.

Where would you be most interested in actually doing something with it?

BG: Well, we haven't picked a specific location, but there are all these interesting disclosure rules for something called 'nuclear'.

So we have a lot of interest.

The company's employees are located in Russia, India and China.

I'm back here to see the Energy Secretary and talk about how this fits into energy policy.

So I am optimistic.

This is a variation of what has already been done.

This is an important advancement, but this is like a fast reactor, and many countries are building fast reactors, so whoever builds a fast reactor becomes a candidate for the first reactor to be built.

CA: So, do you have any idea about the timescales and possibilities of actually doing something like this live?

BG: Well, it takes 20 years to invent and then 20 years to deploy to develop a very cheap, large-scale electricity generator.

It's like a deadline that we have to meet, given by the environmental model.

And TerraPower wants a lot when things go well, but it's easy to meet.

And fortunately, there are now dozens of companies, there should be hundreds, but likewise, if the science works, if the pilot plant funding works, they will be able to compete.

And it's best that more than one thing succeeds. Because then you can use these things in combination.

You certainly need it to be successful.

CA: In terms of massive game-changer potential, is this the biggest you know of?

BG: Energy breakthroughs are paramount.

It would have been so even if there were no environmental constraints, but environmental constraints make it even greater.

There are other innovators in the nuclear field.

You know, we don't know as much about their work as this one, but the modular guys take a different approach.

There is a liquid reactor, and it seems a little difficult, but maybe that's what we are talking about.

There are many, but the beauty of this one is that a molecule of uranium has a million times more energy than a molecule of coal, for example.

So if you can inherently deal with the downsides of radiation, footprint, cost, etc., it's almost a different class of potential in terms of impact on land and various things.

CA: What if this doesn't work?

Should urgent measures be taken to keep the Earth's temperature stable?

BG: If you're in that situation, you're about to overeat and have a heart attack.

Then where are you going?

There's been a body of research on something called geoengineering, which is a variety of technologies that slow heating down and take 20 or 30 years to act.

Well, this is just insurance. I hope you don't have to.

Some people say you shouldn't buy insurance because you might be lazy, and you'll keep eating because you know heart surgery will save you.

I'm not sure if that's sensible given the importance of the issue, but there are discussions about geoengineering going on right now. Should it be in the back pocket in case things happen sooner, or is this innovation much later than expected?

CA: Climate Change Skeptics: If you had a word or two to say to them, how would you convince them they were wrong?

BG: Well, unfortunately, the skeptics are in different positions.

Very few people make scientific arguments.

Are they saying that there is a negative feedback effect associated with clouds that cancels out?

Very few out of a million have a chance.

The main problem we have here is something like AIDS. Make a mistake now and pay the price later.

So I think about the idea of ​​taking pain now to reap benefits later, and somewhat uncertain pain, when you have all sorts of urgent issues.

In fact, the IPCC report is not necessarily the worst case. Some wealthy people look at the IPCC and say, "Well, that's no big deal."

In fact, it's that uncertainty that should lead us in this direction.

But my dream here is if we can make it economical and meet the CO2 constraint, the skeptics will say:

But I think I'll accept it because it's cheaper than the previous one. ”

(Applause) CA: That's your response to Bjorn Lomborg's argument. Basically, if we spend all this energy on solving the CO2 problem, we will have no other goals to eradicate poverty, malaria, etc. from the world. It's a stupid waste of the earth's resources to spend money on things that could be done better.

BG: Well, the actual spending on the R&D part, say the US should spend $10 billion more a year than it does now, is not that dramatic.

Don't take away other things.

People get a lot of money, sensible people might object, when they have non-economic things and are trying to fund them, and to me it's mostly a waste.

I think you should try more things that can be a lot cheaper unless you're pretty good and just throwing the money into the learning curve is going to be very cheap.

If the trade-off you make is to make energy super expensive, the rich can afford it.

So all of us here pay five times more for energy without having to change our lifestyles.

The disaster will reach that 2 billion people.

And even Lomborg changed.

His favorite phrase now is, "Why isn't research and development being discussed more?"

He's still associated with skeptics because of his previous activism, but he recognizes that it's a fairly lonely camp, where he makes his R&D claims.

So here's a thread of what I think is appropriate.

The R&D part -- too little funding is ridiculous.

CA: Well, Bill, on behalf of most people here, I really hope that your wishes come true.

Thank you very much.

(applause)

Someone once said that politics is, of course, “entertainment for ugly people.”

In that sense, I feel like I've really come this far.

Another thing to think about is how honored it is to be a politician, especially here in the UK where the cost scandal has made politics very unpopular.

Recently, there was even talk that scientists were actually thinking of replacing rats with politicians in experiments.

Then someone asked, "Why?"

“There is no shortage of politicians, no one cares what happens to politicians, and after all, there are some things rats can’t do,” they said.

(Laughter) Well, I'm sure you guys love data, so let's start with the data-rich slides.

I think this is the most important fact to keep in mind in British and American politics. It means "I'm out of money".

We have huge budget deficits.

This is my world public debt clock, and as you can see, it's 32 trillion and it keeps growing.

And what this leads to is a very simple realization. There is one problem in current politics that is more important than anything else. The question is, "How can we improve the situation without spending more money?"

Because it doesn't take a lot of money to improve public services, or improve government, or improve a lot of the things politicians say.

If you think it all comes down to money, the success of public services like health care, education, police can only be measured by spending more money, progress can only be measured by spending money – you are going to have a pretty miserable time.

But if you consider family relationships, friendships, community, values, and many other things that lead to happiness to be important, then in fact, this is an incredibly exciting time to get involved in politics.

And the really simple argument I want to make tonight, the really simple argument, is this: Combine the right political philosophy, the right political thinking, and the incredible information revolution that has happened, and you know so much more than I do, and I think there's a great opportunity to actually remake politics, remake government, remake public services, and achieve what's on that slide. It will greatly enhance our happiness.

That's the argument I want to make tonight.

So let's start with political philosophy.

Now, I'm far from saying that British conservatives have all the answers.

Of course not.

But there are two fundamental things that I think drive conservative philosophy that are really relevant to this whole discussion.

First, we believe that if we give people more authority and control over their lives, give them more choices, put them in the driver's seat, we can actually create a stronger and better society.

And I think that if you combine this fact with the incredible wealth of information in the world today, you can, as I said, completely remake politics, remake governments, remake public services.

The second thing we believe in is that we believe in acting according to human nature.

Politics and politicians will only succeed if they try to treat people as they are, not as they want them to be.

Now, if you combine this very simple, very conservative idea, the idea of ​​following human nature, with all the advances in behavioral economics, some of which we just heard about, and again, I think we can achieve real increases in happiness and well-being in stronger societies without necessarily having to spend more money.

So why do I think now is the time to have this discussion?

Unfortunately, you will receive a brief and condensed history lesson about three passages of history: the pre-bureaucratic era, the bureaucratic era, and the era we live in now (the post-bureaucratic era, I believe).

More simply, we moved from a world of local control to a world of central control, and now we are in a world of people control.

Local power, central power, and now people's power.

Now, here is King Canute, the king of a thousand years ago.

he thought he could turn the wave back. The wave could not be turned back.

There really wasn't much to turn back. Because if you were king a thousand years ago, you wouldn't have much to do, even though it still took hours and hours and weeks and weeks to cross your country.

You were not in charge of police, justice, education, health or welfare.

A war might start, that's all.

This was a pre-bureaucratic era, a time when everything had to be local.

Travel was so restricted that no nationally available information had to be managed locally.

So this was the pre-bureaucratic era.

The next part of our cold history lesson is a beautiful picture of the British Industrial Revolution.

All of a sudden, all kinds of transportation and travel information became available, and this gave birth to what I like to call the 'age of bureaucracy'.

And I hope this slide transforms beautifully. there you are

Suddenly there was a big and powerful central state.

It could organize medicine, education, the police, the judiciary, but that was all it could do.

And, as I say, it was a world of central power, not local power.

It was sucking all the power out of the countryside.

It has done itself.

The next big step is the massive information revolution that you are all familiar with.

Consider this one fact. 100 years ago it would have cost $50 to send those 10 words.

Now we are linked here to Long Beach and everywhere else and all these secret places for a fraction of the cost, allowing us to send and receive vast amounts of information at no cost.

So we are now living in a post-bureaucratic era where true people power is possible.

So what does this mean for our politics, public services and governments?

I don't have time to give too many examples, but let me give you a few of the ways your life can change.

This is, in a way, very obvious. Because it makes sense given how you've changed the way we shop, travel, and do business.

it's already happening. The information and internet revolution has indeed permeated our society in so many different ways, yet it has not yet affected our governments in every way.

So how does this happen?

Well, I think there are three main ways to bring about big change. It's about transparency, greater choice and accountability, and empowering real people.

Speaking of transparency, I'd like to introduce you to one of my favorite websites, the Missouri Accountability Portal.

In the old days, only governments could hold information, and only an elected minority could get hold of it and question or challenge it.

Here, on one American website, one state, every dollar spent by that government is searchable, analyzable, and checkable.

Think about the big changes this means. Businesses wishing to bid on government contracts will be able to see what is currently being spent.

Anyone who thinks 'I can do that service better, I can offer it cheaper', everything is available there.

In government and politics, the information revolution has only scratched the surface of what people do in the world of commerce.

So full transparency makes a big difference.

In this country, if we win the election, all government spending over £25,000 will be transparent, searchable online and available for anyone to see.

We plan to publish all contracts on the Internet so that anyone can check the terms and conditions of the contracts. I believe this will not only make it much more cost effective, but it will also make you much happier.

Selection. You shop online, you compare online, you do everything online today, but you're going to see big changes because this revolution has barely touched the surface of public services like education, health care, and police.

We need to make this change with our country's information revolution, with searchable medical sites that allow us to see what surgeries are being performed properly, what records doctors have, how clean hospitals are, who is best at controlling infections, and more. All the information that was once locked up in the Ministry of Health is now available for all of us to see.

And the third of these big changes is accountability.

I think this is a big change.

Crime map. This is a crime map of Chicago.

So instead of only the police having information about what crimes were committed and where and having to hire people in government to hold the police accountable, suddenly we have a vast opportunity of the people's power to see what crimes were committed when, where and by whom, and to hold the police accountable.

This looks like a chef's hat, but really, the blue hat is the raid.

You can see where and what crimes have been committed and have the opportunity to hold the police accountable.

So transparency, accountability, and choice are three things that make a big difference.

Now, I also said that another principle that I think we should work on is understanding people and recognizing that we can achieve more by acting in line with human nature.

We are in the midst of a major revolution in understanding why people behave the way they do, and we have a great opportunity to do more with that knowledge and information.

We work with some of these people.

We have been advised by some of these people to try to bring the whole experience into booking as was said earlier.

Let me just give you one example that is incredibly simple and my favorite.

We want people to be more energy efficient.

why? It reduces fuel poverty, lowers their bill, and cuts their carbon footprint at the same time.

how do i do that?

Well, for years the government has been conducting information campaigns telling people to turn off the lights when they leave the house.

A government minister once told us to brush our teeth in the dark.

I don't think it lasted very long.

See what this does. This is a simple part of behavioral economics.

The best way to get someone to cut your electricity bill is to show you how much you spend, how much your neighbors spend, and how much your energy-sensitive neighbors spend.

This kind of behavioral economics can change people's behavior in ways that all the bullying, all the information, all the harassment from the government cannot achieve.

Another example is recycling.

We all know we need to recycle more.

How can we do that?

What America is proving is that paying people to recycle and giving them carrots instead of sticks can actually change their behavior.

So what does all this add up to?

Here are two of my favorite US speeches from the last 50 years.

Clearly, JFK has an incredibly simple and powerful expression here: "Ask not what your country can do for you, but what you can do for your country."

But what can he do to build a stronger and better society when he gives that speech?

I could have fought for my country, I could have died for my country, I could have been a civil servant for my country, but I didn't really have the information, knowledge, or ability to build a stronger society than we have today.

And I think it's an even better speech. You'll read most of it, which summarizes what I said at the beginning about believing that there is more to life than money, and that there is more to strive for and measure than money.

And this is Robert Kennedy's beautiful explanation of why Gross National Product can earn so little. "It does not enable the health of our children, the quality of their education, or the joy of their play.

It does not include the beauty of our poetry or the strength of our marriages or the intelligence of our public debates.

It does not measure our resourcefulness or courage, our wisdom or our learning, our compassion or our devotion to our country.

In short, it measures everything but what makes life worthwhile. ”

Again, 40 years ago it was a very noble and beautifully expressed sentiment, 40 years ago it was a beautiful dream, but given all we know about how to promote well-being, with the massive advances in information technology and massive shifts in behavioral economics, if you combine the insight of using information to empower and enable people to do so, with the insight of following human nature, it becomes a dream that is easier to achieve than it is today, while at the same time understanding why people act the way they do. It was 40 years ago when he said it in that beautiful speech.

thank you.

(applause)

I would like to share with you what I discovered while writing for Wired in Italy a few months ago.

I always have a thesaurus handy when I write something, but I realized that I had already finished editing the piece and had never in my life searched for the word “disability” to see what came up.

Read the entry.

"Disabled, adjectives: crippled, helpless, useless, beaten, stranded, crippled, wounded, tattered, lame, amputated, tattered, worn out, emaciated, helpless, castrated, paralyzed, handicapped, decrepit, decrepit, rested, accomplished, accomplished, accomplished, cracked, countless, wounded See also , useless and weak.

Antonyms are healthy, strong, capable. ”

I was reading this list aloud to a friend and at first I was laughing because it was so silly, but my voice broke just past "messed up" and I had to stop and recover from the mental shock and shock unleashed by these words.

Of course, this is my battered old thesaurus, so I'm assuming this must be an old print date, right?

But in reality, the printed date was the early 1980s, when I should have started elementary school and formed an understanding of myself outside the family unit, in relation to other children and the world around me.

And, of course, thank God we weren't using a thesaurus back then.

So, while this entry makes it seem like I was born into a world where people like me don't seem to be doing anything good, in fact today I'm being celebrated for the opportunities and adventures I've had in life.

So I quickly looked at the 2009 online version, hoping to find a noteworthy revision.

Here's an updated version of this entry:

Unfortunately it's not that good.

The last two words of "almost antonym" are especially disturbing. “Whole” and “Healthy”.

So it's not just a matter of language.

We believe so about a person when we name them with these words.

It's about the values ​​behind the words and how we build those values.

Our language influences the way we think, the way we see the world, and the way others see us.

In fact, many ancient societies, including the Greeks and Romans, believed that uttering a curse orally was very powerful.

What kind of reality do we want to exist? Are you a limited person or an empowered person?

By casually doing something as simple as naming a person or a child, we may be masking and overshadowing that person's power.

Wouldn't you rather we open the door for them instead?

One such person who opened the door for me was a doctor who worked at an AI hospital during my childhood. DuPont Laboratories, Wilmington, Delaware.

His name was Dr. Pizztillo, an Italian-American, apparently called Dr. P because the name was difficult to pronounce for most Americans.

And Dr. P always wore really colorful bow ties and had a very perfect temperament for working with children.

I loved almost all of my time spent at this hospital, with the exception of my physical therapy session.

I had to do countless exercises with thick rubber bands of different colors to strengthen my leg muscles, but I hated them more than anything else. I hated it so much that I even had a name for it. i hated them.

And as you know, since I was a child of 5 years old, I have been negotiating with Dr. P to stop these practices, and of course I failed.

And then one day he came to my session - it was an exhausting and unforgiving session - and he said to me, "Wow, Amy, you're such a strong, powerful girl, I think you're going to break one of them.

If you break it, I'll give you a hundred dollars. ”

Now, of course, this was Dr. P's simple ruse to get me to do the exercise I didn't want to do before the prospect of becoming the richest 5-year-old on the upstairs ward. But what he did effectively for me was transforming a terrible daily occurrence into a new and promising experience for me.

And I wonder today how much his vision and his declaration of me to be a strong, powerful girl shaped my own view of myself as an inherently strong, powerful, athletic human being well into the future.

This is an example of how adults in positions of power can ignite the power of children.

But in previous examples of these thesaurus entries, our language has not allowed us to evolve into the reality we all want: the potential for individuals to consider themselves competent.

Our language has not kept up with social changes, much of which is driven by technology.

Indeed, from a medical point of view, my legs, laser surgery for vision problems, titanium knees and hip replacements for aging bodies are helping people reach their full potential and exceed the limits imposed by nature. Needless to say, social networking platforms have enabled people to become self-aware, claim their own account, and collaborate with global groups of their choosing.

So perhaps technology is revealing to us more clearly what has always been true. That means everyone has something rare and powerful to offer our society, and our human ability to adapt is our greatest asset.

Human adaptability, this is an interesting one. Because people constantly want to talk to me about overcoming adversity. And I admit. The word never felt right for me. And I've always felt uncomfortable answering people's questions about it, and I think I'm beginning to understand why.

Implicit in this phrase "overcoming adversity" is the idea that success or happiness is emerging on the other side of a difficult experience, unscathed or unmarked by it. It's as if my success in life came from my ability to avoid or circumvent life's supposed pitfalls, prosthetics and others perceiving me as an obstacle.

But in fact we are different. Of course, we are subject to physical, emotional, or both challenges.

And I would like to suggest that this is a good thing.

Adversity is not an obstacle that must be avoided in order to resume life.

it's part of our lives.

And I tend to think of it like my shadow.

Sometimes I see it a lot, other times I see it very little, but it is always with me.

And of course, I'm not trying to downplay the impact or weight of human struggle.

Life has its adversities and challenges, all very real and relative to everyone, but the question is not whether you encounter adversity, but how you deal with it.

Therefore, our responsibility is not simply to protect our loved ones from adversity, but to prepare them to cope with it.

And it affects them negatively when we make them feel incapable of adapting.

There is an important difference and distinction between the objective medical fact that I am an amputee and the subjective societal opinion of whether I am disabled.

And to tell the truth, the only real and consistent obstacles I've had to face are the worlds I've thought could be explained by those definitions.

Those of us who wish to protect our loved ones by telling them the cold, hard truths about their medical prognosis, or prognosis about their actual expected quality of life, must avoid putting the first brick in the wall that actually puts someone in the way.

Perhaps the existing model of thinking only about what's broken within us and how to fix it is even more disabling for the individual than the medical condition itself.

By not dealing with a person's wholeness and not acknowledging his potential, we are creating another disease on top of the natural difficulties he will have.

We are effectively assessing someone's worth to our community.

Therefore, we need to see through the pathology and discern the range of human capabilities.

And most importantly, there is a partnership between perceived flaws and our greatest creativity.

The point, therefore, is not to dismiss or dismiss these difficult times as something we want to avoid or ignore, but rather to find such opportunities in adversity.

So maybe the idea I want to present there is not so much about overcoming adversity, but about opening yourself up to adversity, embracing it, wrestling with it, and, in wrestling terms, dancing with adversity.

And perhaps seeing adversity as natural, consistent, and helpful will lessen the burden of adversity's existence.

This year we celebrate the 200th anniversary of Charles Darwin's birth, but I think it was 150 years ago when he was writing about evolution that he revealed the truth about human nature.

In other words, it is not the strongest species that survives, nor the smartest species. It is the one that is most adaptable to change.

Conflict is the beginning of creation.

From Darwin's work in particular, we can recognize that man's ability to survive and thrive is driven by the struggle of the human psyche, from conflict to transformation.

So, again, change, adaptation, is the greatest human skill.

And perhaps we don't know what we're made of until it's tested.

Perhaps that is what adversity gives us: a sense of self, a sense of one's own power.

So we can give ourselves a gift.

We can reframe adversity as more than just tough times.

Maybe we can see it as a change.

Adversity is just a change that we have not yet adapted to.

I think the biggest adversity that we have created for ourselves is the idea that it is normal.

Well, who is normal?

It's not normal.

There are common and typical. There's no such thing as normal, and if there was that poor beige guy, would you want to meet him?

(Laughter) I don't think so.

If we can shift this paradigm from that of achieving normalcy to something even a little less dangerous, we can empower more children and encourage them to engage their scarce and valuable abilities with their communities.

Anthropologists say that one of the things we humans have always asked for in our community members is that they can be helpful and contribute.

There is evidence that Neanderthals 60,000 years ago were carrying the elderly and the seriously injured, perhaps because the surviving life experiences of these people proved valuable to the local community.

They did not see these people as broken and useless. They were considered rare and valuable.

A few years ago, I was at a food market in a town I grew up in in northeastern Pennsylvania's Red Zone, standing over a bushel of tomatoes.

Since it was summer, I was wearing shorts.

I heard this man's voice behind me. "If only it wasn't for Amy Mullins."

And when I turned around, there was this old man. I don't know who he is.

And I said, "I'm sorry, sir, have we met? I don't remember."

He said, "Well, you don't remember meeting me.

I mean, when we met, I had just brought you out of your mother's womb. ”

(laughs) Oh, that person.

And, of course, it actually clicked.

This man was Dr. Keane, a man I only knew from my mother's story that day. For, of course, I arrived two weeks after my birthday.

And my mother's obstetrician was on vacation, so the man who gave birth to me was a total stranger to my parents.

And since I was born without a fibula, my foot turned inward, and I had a few toes on this foot and a few on that foot, he had to be the messenger. This stranger had to be the one to bring the bad news.

he said to me "I had to tell your parents the prediction that you would never walk, never have the motor skills and independent living that other children have. You've been making me a liar ever since."

(Laughter) (Applause) Amazingly, he said he kept newspaper clippings all through my childhood. It's been with us when we won the sophomore spelling bee, when we marched in the Girl Scouts, when we marched in the Halloween parade, when we won college scholarships, when we won sports, and we incorporated it into the teaching of residents, medical students at Hahnemann and Hershey Medical Schools.

And he called this part of the course the X-Factor, the possibility of human will.

No prognosis can explain how powerful this is as a determinant of a person's quality of life.

And Dr. Keane went on to tell me, "In my experience, children will achieve unless they are repeatedly told otherwise, and even if little support is given, left to their own will."

Dr. Keane made that shift in thinking.

He understood that there is a difference between a medical condition and someone's actions in response to it.

And over time, my mindset has changed, and if 15-year-old me was asked if I would replace my prosthetic leg with a bone-and-flesh leg, I wouldn't hesitate for a second.

At that time, I longed for such a normal life.

But if you ask me today, I'm not too sure.

And that's because of the experience I had with them, not despite the experience I had with them.

And perhaps this change happened to me because more people opened doors for me than those who cast a lid over me.

See, all you really need is one person to show you the spark of your power and that's it.

If you can hand someone the key to their power -- the human mind is so receptive -- and if you can do that and open the door for someone at a crucial moment, you're educating them in the best possible way.

You are teaching them to open the door themselves.

In fact, the exact meaning of the word "educate" comes from the etymology of "educate".

It means “bring out the inner things, draw out the potential”.

So again, what possibilities do we want to draw out?

There is a case study done in England in the 1960s, which was transitioning from grammar school to comprehensive school.

It's called a streaming trial. Here in the US we call it "tracking".

Divide the students into A, B, C, D, etc.

And "A students" are given a stricter curriculum, the best teachers, and so on.

Well, they spent three months taking D-level students, giving them A grades, telling them they were 'A's, and telling them they were smart. And at the end of this three-month period, they had A-level grades.

And, of course, the heartbreaking flip side of this study is that they took "A students" and told them they were "D."

And that's what happened at the end of those three months.

Besides those who have dropped out, those who are still in school.

An important point about this case study is that the teacher was also deceived.

The teachers were unaware that the switch had taken place.

They were just told, "These are the 'A students' and these are the 'D students'," and that was how they were taught and treated.

So I think the only real obstacle is the broken soul. The stricken soul has no hope, sees no beauty, no longer has the natural childlike curiosity and innate imagination of man.

If, instead, we are able to strengthen the human spirit to sustain hope, to see beauty in ourselves and others, and to foster curiosity and imagination, then we are truly harnessing our power.

When spirit possesses these qualities, we can create new realities and new ways of being.

I would like to share with you a poem by a 14th-century Persian poet named Hafiz, which my friend Jacques d'Ambois told me. The poem is called "God Who Knows Only Four Words". "Every child knows God. Not a God of names, not a God of what not to do, but a God who knows only four words and keeps saying 'Let's dance with me' over and over."

Come dance with me Come on, let's dance together." "Thank you.

(applause)

If you want to learn how to play lobster, here are some.

I'm not kidding, I really do.

So I'll come over later and teach you how to play lobster.

So, a few years ago, I started working on something called a mantis shrimp that makes a sound.

This is a recording of a mantis shrimp found off the coast of California.

It sounds very appealing, but in practice it turned out to be a very difficult project.

And while I struggled to understand how and why the mantis shrimp, or stolopods, make sounds, I started thinking about their appendages.

The mantis shrimp is also called mantis shrimp after the mantis, and it also has fast-eating appendages. And I began to think that it might be interesting to understand how these animals can trigger their very fast feeding attacks while listening to their vocalizations.

So today I'm going to tell you about the extreme strotomatopod strike I did with Wyatt Korf and Roy Caldwell.

So, there are two types of mantis shrimp: spearers and smashers.

This is a spear-shaped mantis shrimp, or stomapod.

And he lives in the sand and catches anything that passes overhead.

So, such a haste. Slightly slowed down, this is the same species of mantis shrimp, recorded at 1,000 frames per second and played back at 15 frames per second.

And you can see it's a truly spectacular extension of the limbs, actually exploding upwards to catch the shrimp carcass I provided.

Now, another species of mantis shrimp is the smasher tomatopod. Mantis shrimp make a living by opening snails.

So this guy gets the snails ready and slams them down.

(Laughs) Well, let's play it again.

He wiggles it in place, tugs it by the nose, and smacks it.

And after a few hits, the snail cracked open and had a delicious dinner.

Therefore, the appendages of the Smasher Raptor can be stabbed at the point of the tip or crushed at the heel.

And today we will talk about the bang type.

The first question that came to my mind was how fast could this limb move?

Because this video is moving pretty fast.

And soon ran into problems.

None of the high-speed video systems in Berkeley's biology department were fast enough to capture this movement.

Couldn't capture it on video.

And this has been holding me back for a long time.

Then a BBC news crew toured the biology department looking for stories about new biological techniques.

So we made a deal.

I said, "If you can borrow a high-speed video system that can capture this movement, can you take a picture of us collecting data?"

And believe it or not, they did it. (Laughter) So we got this great video system. This is a very new technology, it only came out about a year ago, but it will allow you to shoot in low light at lightning speed.

Also, low light is an important issue in animal photography. Because if it is too high, the animal will be burned. (laughs) This is a mantis shrimp. Here are the eyes, the raptor appendages, and the heels.

And it's going to swing around and smash the snail.

The snail is wired to the stick, which makes it a little easier to prepare for the shot. And—yes.

(Laughter) I hope there aren't any snail rights activists around here.

(Laughter) This was shot at 5,000 frames per second and played back at 15 frames. So this is 333 times slower.

And if you've noticed, it's decelerated 333 times faster. It's an incredibly powerful move.

The whole limb is stretched. The body bends back - a truly spectacular move.

So what we did was watch these videos and measure how fast the limbs were moving to get back to the original question.

And then we encountered our first surprise.

So we calculated that the limbs were moving from 10 meters per second to 23 meters per second at their top speed.

And for those who like mph, it's over 45 mph in the water. And this is really fast.

In fact, it was so fast that it was able to add new points to the extreme movement spectrum of the animal.

And the mantis shrimp has the fastest feeding attack of any animal system officially measured. Our first surprise there.

(Applause) That was really cool and very unexpected.

So you may be wondering how we do it.

And in fact, this research was done in the 1960s by a famous biologist named Malcolm Burroughs.

And what he showed with the mantis shrimp is that they use something called a "catch mechanism" or "click mechanism."

It basically consists of a large muscle that takes a long time to contract and a latch that prevents anything from moving.

So the muscle contracts, but nothing happens.

And when the muscles are fully contracted, it's all stored up and the latch flies up and you can get the movement.

This is basically what is called a "power amplification system".

It takes a long time for the muscles to contract, but a very short time for the limbs to pop out.

So I thought that was the end of the story.

This is how the mantis shrimp's very fast attack works.

But then we went to the National Museum of Natural History.

If you get the chance, go behind the scenes at the National Museum of Natural History to see one of the world's finest preserved collections of mantis shrimp. And oh my God -- (Laughter) This is a big deal for me.

(Laughter) So this is the beautiful saddle-shaped structure on the top of the limb that I've seen on every mantis shrimp leg, whether it's a spearer or a smasher. And you can see it here.

It looks like a saddle for a horse.

It's a very beautiful structure.

And it is surrounded by a membranous area. And those membranous regions suggested to me that perhaps this was some kind of dynamically flexible structure.

And this puzzled me for a while.

After a series of calculations, we were able to prove that a mantis shrimp needs a spring.

It takes some kind of spring-loaded mechanism to generate the amount of force we observe, the velocity we observe, the output of the system.

So we thought it must be a spring. It is quite possible that the saddle is also spring.

And then, going back to those high-speed videos again, I could actually visualize how the saddle compresses and stretches.

And I'll try it just one more time.

And if you watch the video, it's a little hard to see, but it's bordered in yellow.

The saddle is outlined in yellow. You can actually see it stretched and actually super-stretched in the course of the attack.

So we have very strong evidence that the saddle-shaped structure actually compresses and expands and actually acts as a spring.

This saddle structure is also known as a "hyperbolic paraboloid" or "anticollision surface".

This is well known to engineers and architects as it is a surface that is very resistant to compression.

Since there are two curves, one upward curve and one downward opposite lateral curve, any kind of perturbation will distribute the force over the surface of this type of shape.

Therefore, it is well known to engineers, but less so to biologists.

It is also known by many people who make jewelry because very little material is required to build this type of surface and it is very strong.

Therefore, when building thin gold structures, it is very effective to have a strong shape.

It is now known to architects. One of the most famous architects is Eduardo Catalano, who popularized the structure.

Shown here is the 87-and-a-half-foot-wide saddle roof he built.

It is 2.5 inches thick and has 2 points of support.

And one of the reasons he designed the roof this way was because he was fascinated by the ability to build a very strong structure made from very little material and supported at very few points.

And these are all the same principles that apply to the stomapod saddle springs.

It is important that biological systems do not require large amounts of extra materials to build them.

So there are some very interesting parallels between the world of biology and the world of engineering. And interestingly, it turns out this - the saddle of the protopod turned out to be the first described biological hyperbolic parabolic spring.

It's a little long, but it's very interesting.

So the next and last question was how much force does the mantis shrimp produce if it can split the snail?

So I wired up what is called a load cell.

A load cell measures force. This is actually a piezoelectric load cell with a small crystal inside.

And when this crystal is squeezed, its electrical properties change, proportional to the force applied to it.

So these animals are surprisingly aggressive and always hungry. So all I had to do was actually put a little shrimp paste in front of the load cell and they smashed it.

This is a normal video of an animal bursting out of this load cell.

And I was able to get some force measurements.

And yet again we were in for a surprise.

I purchased a 100 lb load cell, thinking that no animal of this size could produce more than 100 lbs.

And what do you know? They quickly overloaded the load cell.

These are actually old data, and we had to find the smallest animals in the lab to be able to measure well over 100 pounds of force that an animal this big would produce.

And in fact, just last week I ran a 300-pound load cell and measured these animals producing well over 200 pounds of force.

And again, I think this will be a world record.

Needs a little more background reading, but I think this will be the maximum amount of force per body weight that any given animal will produce. A truly incredible force.

And again, it reminds us of the importance of springs, which store and release so much energy in this system.

But the story didn't end there.

Well, things may sound pretty easy, but this is actually a lot of work.

Then I took all these force measurements and looked at the force output of the system.

It's very simple. Time is on the x-axis and force is on the y-axis. And you can see two peaks.

And that was what really puzzled me.

The first peak is clearly the rim hitting the load cell.

However, after 0.5ms there was a very large second peak and I had no idea what it was.

So you would expect the second peak to come for a different reason, but not after 0.5 ms.

Once again, going back to these high-speed videos, there are quite a few hints as to what's going on.

This is the same direction as we saw before.

It has a raptor appendage, it has a heel, and it swings around and hits the load cell.

What I want you to see in this shot is the surface of the load cell as the limbs fly.

And I hope what you can see is actually a flash of light.

Audience: Wow.

Sheila Patek: So if you take just that one frame, what you actually see at the end of that yellow arrow is a bubble of steam.

That's cavitation.

Cavitation is a very powerful hydrodynamic phenomenon that occurs when regions of water move at extremely different velocities.

When this happens, it can create an area of ​​very low pressure, which literally evaporates water.

And when that vapor bubble collapses, it releases sound, light and heat, a highly destructive process.

And here's what's inside the tomato pod. Again, this is a well-known phenomenon for engineers as it destroys boat propellers.

People have struggled for years trying to design a very fast spinning boat propeller that doesn't cavitate and literally doesn't wear or puncture metal as these pictures show.

This is a powerful force in fluid systems, so let's take it a step further and look at a mantis shrimp approaching a snail.

It was shot at 20,000 frames per second and we have to give a full credit to BBC cameraman Tim Green for setting up this shot. Because for me this was never possible in a million years. This is one of the advantages of working with a professional photographer.

It comes in and there's an incredible flash of light and you see all this cavitation spread over the snail's surface.

Really just a great picture slowed down to a very slow speed.

And again, we can see it in a slightly different way, with a bubble forming and collapsing between two surfaces.

In fact, you may have seen cavitation rising at the ends of your limbs.

So to solve this conundrum of two force peaks, what I am thinking is that the first impact is actually the rim hitting the load cell and the second impact is actually the collapse of the cavitation bubble.

And it's very likely that these animals not only harness the force and energy stored in specialized springs, but also extreme hydrodynamics. And it may actually be using hydrodynamics as a second force to destroy snails.

So there is, as it were, a double attractive double suffering from these animals.

One of the most common questions I get after this talk, and I just thought I'd answer it, is, "What happens to the animals?"

Obviously, if you're smashing a snail, its poor limb must be crumbling. And it does.

Both of these images show wear on the heel impact area. In fact, I've seen heels wear down to the flesh.

But one of the nice things about being arthropods is that they have to molt. And these animals molt and build new limbs every three months, and that's fine.

A very very useful solution to that particular problem.

So, I would like to end with a little strange story.

(Laughter) Maybe to people like you, this might seem strange, but I don't know.

(Laughter.) So the saddle, or saddle-shaped spring, was actually long known to biologists not as a spring, but as a visual signal.

And indeed, many species of protopods have a spot of brilliant color in the middle of their saddle.

And this is of great interest to find the evolutionary origin of visual signals about what is actually spring in all species.

And I think one explanation for this could go back to the molting phenomenon.

So these animals enter the moulting stage, are unable to attack, and their bodies become very soft.

And they literally cannot attack or self-destruct.

this is true. And what they do is, until a period of time when they can't attack, they become really nasty and terrible, attacking everything in sight. It doesn't matter who is what.

And the moment they reach a point where they can no longer attack, they only signal. they swing their legs.

And this is one of the classic examples of bluffing in animal behavior.

It's no secret that these animals actually use bluffing. They cannot actually attack, but they pretend to attack.

So I'm very curious if the colored dot in the center of the saddle conveys any information about the saddle's aggressiveness, aggressiveness, and duration of the molting cycle.

It's kind of an interesting oddity to find visual structure in the middle of spring.

Finally, I would like to thank two collaborators who worked closely with me on this matter: Wyatt Corfe and Roy Caldwell.

I am also very grateful to the Mirror Institute for Basic Science for providing three years of funding to help me continue my science. thank you very much.

(applause)

I would like to talk about my research into what technology means in our lives. Not just in our immediate lives, but in a cosmic sense, like the long history of the world and our place in it.

What is this?

What is the importance?

So let me take you through a little bit of my little story about what I discovered.

One of the first things I started looking into was the history of technology names.

In the United States, every president has given a State of the Union address since 1790.

And each of them kind of sums up what was most important to the United States at the time.

If you search for the word "technology," the word wasn't used until 1952.

So technology wasn't in everyone's minds until 1952, when I happened to be born.

And obviously the technology existed before then, but we didn't know it.

And it was like an awakening of this power in our lives.

I actually did some research to find out where the word "technology" was first used.

It was invented in 1829 by a man who was about to start a curriculum, a course that brought together all kinds of arts and crafts and industries, and he called it "technology."

And that is the first use of this word.

So what is it that we are all obsessed with and haunted by?

Alan Kay said, "Technology is something that was invented after we were born."

(Laughter) It's kind of like the idea that we usually have about what technology is. "It's all new".

It's not roads, it's not penicillin, it's not factory tires. it's new.

My friend Danny Hillis said something similar, saying, "Technology is something that doesn't work yet."

(Laughter) This is also the feeling that everything is new.

But we know it's nothing new.

It actually goes back a long time, and what I would suggest is that it goes back a long time.

So another way to think about technology, or technology, is to imagine a world without technology.

If we removed all technology from the world today—everything from blades to scrapers to cloth—we wouldn't live very long as a species.

We will die in billions and very quickly. Captured by wolves, we will be defenseless and will not be able to grow or find enough food.

Even hunter-gatherers used some rudimentary tools.

So they had minimal technology, but they had some technology.

And studying hunter-gatherer tribes and Neanderthals, which are very similar to early humans, reveals something very interesting about this world without technology. This is a kind of curve of their average age.

No Neanderthal fossils older than 40 years have ever been found, and the average age of most of these hunter-gatherer tribes is 20-30 years.

There are very few young babies and very few old people because of the high mortality rate.

So this profile is like your average neighborhood in San Francisco, a lot of young people.

When they go there, they say, "Everyone is really healthy."

Well, they are all young.

The same is true for hunter-gatherer tribes and early humans. I mean, I couldn't live past 30.

In other words, it was a world without grandparents.

And grandparents are very important because they are the carriers of cultural evolution and information.

Imagine a world where basically everyone was 20-30 years old.

How much can you learn?

You can't learn a lot in your life, it's very short, and you don't have anyone to tell you what you've learned.

That's one aspect.

It was a very short life.

But at the same time, anthropologists know that most of the world's hunter-gatherer tribes possessed only that little skill and didn't really spend much time gathering the food they needed—three to six hours a day.

Some anthropologists call it because the original wealthy society basically had banker's hours.

So we were able to get enough food.

But when supplies became scarce, highs and lows and droughts came, people fell into starvation.

And that's why they didn't live very long.

Technology has given us very simple tools, such as the stone tools here, even though they are so small, that when an early group of humans first arrived in North America 10,000 years ago, they actually managed to drive about 250 giant animals to extinction in North America.

So long before the industrial age, we've been impacting the planet on a global scale with just a little bit of technology.

Another thing that early humans invented is fire.

And fire was used to wipe out and affect ecosystems across grasses and continents, and was also used in cooking.

Thanks to that, I can actually eat all kinds of things.

It meant, in a way, McLuhanian terms, an external stomach, cooking food that would otherwise be inedible.

And if it weren't for fire, we wouldn't really be able to live.

Our bodies are adapting to these new diets.

Our bodies have changed in the last 10,000 years.

So, with that little bit of technology, humans suddenly exploded from a small group of about 10,000 people to the same number as Neanderthals around the world.

With the invention of language some 50,000 years ago, human numbers exploded and soon became the dominant species on Earth.

And they migrated to other parts of the world at speeds of two kilometers per year, and within tens of thousands of years, humans had occupied every watershed on Earth, becoming the most dominant species with very little technology.

And even when agriculture was introduced 8,000, 10,000 years ago, we started to see climate change.

Climate change is therefore nothing new. New is just that.

There was also climate change in the agricultural age.

So a small amount of technology was already transforming the world.

What this means, and where I'm headed, is that technology has become the most powerful force in the world.

Everything we see today that is changing our lives can always be traced back to the introduction of some new technology.

So I think it's an unleashed force on this planet, the most powerful force, and to some extent it shapes us.

In fact, our humanity and everything we think of ourselves is invented by us.

So we invented ourselves.

Of all the animals we have domesticated, we are the most important animals.

So, mankind is our greatest invention, but of course we're not done yet.

We are still inventing, and technology makes this possible. It's about continually reinventing yourself.

It's a very, very strong force.

I call this whole thing us humans as technology, everything we make, gadgets in our lives. We call it technium.

That's the world.

My actual definition of technology is "anything useful the human brain produces."

It's not just about gadgets like hammers and laptops.

But it's also the law.

And of course cities are a means of making things more convenient for us.

It comes from our hearts, but its roots are also deep in the universe.

it returns.

As such, technology's origins and roots go back to the Big Bang, and are important in that they are part of a self-organizing thread that begins there, through galaxies and stars, through life, and into us.

And the three major stages of the early universe were energy, and the dominant force was energy. Then, as the dominant force cooled, it became matter. And with the invention of life four billion years ago, information became the dominant force in our neighborhood.

That is life. It is the information process that is being reconstructed and a new order is being formed.

So, Einstein showed that energy and matter are equivalent, but now the new science of quantum computing is showing that entropy and information, matter and energy are all interrelated.

Putting energy into the right kind of system creates wasted heat, entropy, and extropy, and that's order.

This is an increase order.

Where did this order come from?

Its roots go far back.

However, we do know that the trend of self-organization throughout the universe is ancient, starting with things like galaxies. They have maintained order for billions of years.

Stars are basically nuclear fission machines that self-assemble and self-sustain over billions of years. In other words, it keeps order against the extroversion of the world.

And flowers and plants are the same thing, an extension, and technology is basically an extension of life.

One trend we're noticing in all of this is that the amount of energy per second per gram flowing through it is actually increasing.

The amount of energy increases through this small sequence.

And the amount of energy per gram per second flowing through life is actually greater than in stars. Due to the long life of stars, the energy density of life forms is actually higher than that of stars.

And the highest density of energy found anywhere in the universe is actually inside a PC chip.

There's more energy flowing per gram per second than we've ever experienced.

So what I'd suggest is if you want to know where technology is going, continue on that trajectory and say, "Well, technology is going to be more energy dense. That's where it's going."

So what I've done is take a similar thing and look at other aspects of evolutionary life and say, "What are the general trends in evolutionary life?"

And then there are those that move toward greater complexity, greater diversity, greater specialization, perception, ubiquity and, most importantly, evolutionary nature.

Exactly the same thing exists with technology.

Technology is going there.

In fact, technology is accelerating every aspect of life.

And you can see it happening. Just as there is diversity in life, there is even more diversity in what we create.

Things in life start with ordinary cells and progress to specialized tissue cells, muscle cells, brain cells, and so on.

The same thing happens with hammers, for example, which are general at first, but become more specific.

So I would say that although there are six kingdoms of life, technology can basically be thought of as the seventh kingdom of life.

It is a branch of the human form.

But like anything else, technology has its own challenges, like life itself.

For example, three-quarters of the energy we use today is actually used to power the technium itself.

In transportation, the goal is not to move us. It's to move what we make and buy.

I use the word "want". technology wants.

This is a robot that tries to connect itself to get more power.

Your cat wants more food.

Bacteria that have no consciousness at all want to move towards the light.

It has an urge, and technology has an urge.

At the same time, it's trying to give us something, and what it gives us is basically progress.

You can draw all kinds of curves and they all point upwards.

Even after deducting the costs involved, the progress is undisputed.

And what most people are curious about is whether progress is really real, but we wonder and wonder. What are the environmental costs of doing so?

A survey of the types of relics in the house revealed 6,000 types.

When King Henry of England died, he had 18,000 objects in his house, and that was all England's wealth.

(Laughter.) And with all that wealth in England, King Henry couldn't buy antibiotics, he couldn't buy a refrigerator, he couldn't buy a trip of a thousand miles, whereas the Indian rickshaw Waller could save his money and buy antibiotics and he could buy a refrigerator.

He could buy something that King Henry, however rich, could never have.

That is progress.

In short, technology is selfish. Technology is generous.

That conflict, that tension, is with us forever. Sometimes it wants to do what it wants and sometimes it tries to do something for us.

Now the default position when new technology comes out is for people to talk about the precautionary principle. This is very common in Europe and basically says "don't do anything".

When you come across a new technology, stop until it is proven to do no harm. ”

I don't think it really leads to anything.

But a better way is to work with technology, what I call the propulsion principle.

try it.

You obviously do what the precautionary principle suggests, you try to anticipate it, but after you anticipate it you constantly evaluate it, not just once, but forever.

And if it deviates from what you want, we prioritize risk and value the old as well as the new.

we will fix it. But most importantly, rearrange it.

That means we will find a new job for that.

Nuclear energy, or nuclear fission, is a very bad idea for a bomb.

But instead of burning coal, moving power to sustainable nuclear energy could be a pretty good idea.

When you come up with a bad idea, the reaction to a bad idea is not to have no ideas, nor to stop thinking.

A response to a bad idea, for example a tungsten light bulb, is a better idea.

So better ideas actually always come in response to technologies we don't like. It's basically better technology.

And indeed, if you can think of it that way, technology is, in a way, a kind of way to generate better ideas.

Therefore, it may be a very bad idea to spray DDT on crops.

But local households were sprayed with DDT -- nothing beats DDT-soaked mosquito nets to eradicate malaria.

But it's a really good idea. That's a good job for technology.

So our job as humans is to raise our mind children, find good friends, and find good jobs.

So every technology is like a creative force looking for the right job.

Actually here is my son.

(Laughter) Just as there are no bad kids, there are no bad technologies.

We do not say that children are neutral. Children are positive.

You have to find the right place.

So what technology gives us in the long run, what it is constantly giving us, from ancient beginnings, through this broad evolution through the invention of plants and animals, the evolution of life, the evolution of the brain, is increasing difference. It is increasing diversity, increasing choice, increasing choice, opportunity, possibility and freedom.

That's what we always get from technology.

That's why people leave villages and go to cities. Because they are always drawn to increased options and possibilities.

And we know the price. We pay a price for it, we know it, and we generally pay a price for increased freedom, choice and opportunity.

Even technology demands clean water.

Is technology antithetical to nature?

Technology is an extension of life, so it is aligned with the same things that life wants.

So, I think technology loves biology as much as we let it.

A great movement has moved through us that began billions of years ago and continues today. Our choices in technology, so to speak, are really about aligning ourselves with this force far greater than we are.

So technology isn't just in your pocket. It's not just a gadget, it's not just something people invented.

It's actually part of a very long story, a great story that began billions of years ago.

It is moving within us, this self-organization, and we are expanding and accelerating it, and we can be a part of it by tailoring the technology we create.

Thank you for your attention today.

thank you.

I have always been interested in the relationship between formal structure and human behavior.

If you build a wide road on the outskirts of town, people will move there.

Well, laws are also powerful drivers of human behavior.

And what I want to discuss today is the need to overhaul and simplify our laws to free up the energy and passion of Americans so that we can begin to address society's challenges.

Over the last 10-20 years, you may have noticed that the law has gradually become more dense in your life.

If you run a business, it's difficult to do anything without calling your general counsel.

In fact, there is now a phenomenon where the general counsel becomes the CEO.

A bit like Invasion of the Body Snatchers.

There are so many laws that you need a lawyer to run a company.

But it's not just businesses that are affected by this, it's actually affecting the daily lives of ordinary people.

A few years ago I was hiking near Cody, Wyoming.

It was in a grizzly bear sanctuary, but no one told me about it before I went.

And our guide was a local science teacher.

She didn't mind bears at all, but she was afraid of lawyers.

The stories started pouring in.

She had just been involved in an episode in which a parent threatened to sue the school for dropping a student's grades by 10 percent for late submissions.

The principal didn't want to confront the parents because he didn't want to get involved in legal proceedings.

So she had to attend meeting after meeting and have the same arguments over and over again.

After 30 sleepless nights, she finally surrendered and was upgraded.

She said, "Life is too short, don't stay like this."

Around the same time, she was taking two students to a leadership conference a few hours away in Laramie and was going to pick them up in her car, but the school said, "No, I can't let you in the car for liability reasons."

I have to take the school bus. ”

So they arranged a 60-passenger bus and drove the three of them to and from Laramie for several hours.

Her husband is also a science teacher and takes biology classes on hikes in nearby national parks.

However, one of the students in the class was told that he would not be able to participate in the hike this year due to his disability, and the other 25 students were also unable to participate in the hike.

By the end of the day, this one teacher's legal talks would fill an entire book.

Well, we've been taught to believe that law is the foundation of freedom.

But somehow, in recent decades, the land of the free has become a legitimate minefield.

It really changed our lives invisibly. Yet when I pull back, I can always see it.

I changed the way I speak. I was talking to a pediatrician friend from North Carolina. He said, "Well, I don't treat my patients the same way anymore.

You don't want to come up with something that will hurt you. ”

This person is a doctor and taking care of people is life.

My own law firm has a list of questions not to ask when interviewing candidates. For example, a mean question that oozes ulterior motives and innuendos such as "Where are you from?"

(Laughter) Tort reformers have been warning for 20 years that the lawsuit is spiraling out of control.

And sometimes we see crazy lawsuits like this, like the man in the District of Columbia who sued the dry cleaner for $54 million for missing pants.

The lawsuit lasted two years. I think he's still on appeal.

But in reality, such crazy cases are relatively rare. They don't usually win.

And while the country's total direct tort costs are about 2%, double that of other countries, the tax dollars thrown in don't hurt much.

But direct costs are really just the tip of the iceberg.

What is happening here is that, again, almost without our knowledge, our culture has changed.

People are no longer free to act on their best judgment.

So what do you do?

We certainly don't want people to give up their right to seek redress in court when they do something wrong.

We need regulations to keep people from polluting and so on.

We lack even the vocabulary to deal with this problem because we have the wrong frame of reference.

We have been trained to think that every dispute, every view of an issue, is a matter of some kind of individual rights.

So we look into the legal microscope and see everything.

Is it possible that there are extenuating circumstances to explain why Johnny turned in the paper so late in Cody, Wyoming?

Is it possible that the doctor took other measures when the patient's condition worsened?

And of course, hindsight bias is perfect.

Different scenarios can be envisioned in case something could have been done differently.

Nevertheless, we have been trained to squint through the microscope of this law. I hope that all disputes can be judged by the standards of a perfect society. There everyone agrees to be fair, there are no accidents, there are no risks.

Of course, this is utopia. It's not freedom, it's a formula for paralysis.

It is not the basis of the rule of law, nor is it the basis of a free society.

Now there is the first of four propositions which I would like to leave you with as to how to simplify the law. Law must be judged primarily by its broader societal impact, not by individual disputes.

Absolutely important.

So let's step away from the anecdote for a moment and look at our society from high above.

Is it working?

What does macro data tell us?

Well, the healthcare system has changed. These include a culture of pervasive defensive attitudes, a universal mistrust of the justice system, and the universal practice of defensive medicine.

It's very difficult to measure because of the many different motives.

Doctors can make more money by ordering tests, but they don't even know what's right or wrong.

However, reliable estimates range from $60 billion to $200 billion annually.

That's enough to treat everyone in America who doesn't have the disease.

Lawyers at the trial said, "This legal fear is what allows doctors to practice better medicine."

Well, it's being studied in medical laboratories and so on. It turns out that this is not the case.

Thousands of tragic mistakes have been made because fear has chilled professional exchanges and doctors are afraid to ask, "Are you sure you want that dose?"

Because they are not sure and do not want to take legal responsibility.

let's go to school

She appears to be affected by the law, as we saw in the case of a teacher in Cody, Wyoming.

Well, it turns out that the school is literally drowning in law.

You can have a separate section in your legal library for each of the following legal concepts: due process, special education, no abandonment, zero tolerance, labor rules...

it goes on. We researched all the rules that affect a school in New York. The board of education knew nothing.

Tens of Thousands of Cautious Rules, 60 Steps to Suspend a Student from School: This is the formula that causes paralysis.

What are the effects? One is the reduction of order.

Again, research shows that this is directly due to the rise of due process.

A survey several years ago by Public Agenda found that 43 percent of American high school teachers said they spend at least half of their class time maintaining order in the classroom.

This means that those students are getting only half of what they should be learning, because if one child interrupts the class, no one learns.

And what happens when teachers try to insist on order?

They are threatened with legal claims.

We investigated it too. 78% of middle and high school teachers in America have been threatened or sued by students for violating their rights. They are threatening students.

They don't usually sue or win, but this shows a corrupt authority.

And how has this legal system worked for government?

Doesn't seem to work very well, does it?

Not Sacramento, not Washington.

I think we all agree on this goal, as President Obama said in his recent State of the Union address: "From the first railroad to the interstate highway system, our country has always been the first to race.

There is no reason why Europe or China needs the fastest trains. ”

There is actually a reason for this. Environmental review evolved into a process that took the better part of a decade to leave no stone unturned on any large project, followed by years of litigation by those who didn't like the project.

And if you stay on Earth for just one more second, people act stupid all over the country (laughs).

(Applause) You idiots. Broward County, Florida, banned running during recess years ago.

(Laughs) In other words, all boys will have ADD.

So it's totally a formula for failure.

But my favorite is all the warning labels.

Billions of coffee cups were labeled "CAUTION: CONTENTS HOT."

Archaeologists will unearth us in a thousand years, they won't know about defensive medicine or anything like that, but they'll all see the label "content is very hot."

They would think it was some kind of aphrodisiac.

That's the only explanation. I mean, why do we have to tell people it's actually hot?

My favorite warning was the one on the 5 inch fishing lure.

I grew up in the South and spent my summers fishing.

It was a large five-inch fishing lure with a three-pronged hook on the back and "harmful if swallowed" written on the outside.

(Laughter.) I mean, none of these people are doing what they think is right.

Why not? they don't believe in the law. Why don't they believe the law?

Because it has the worst of both worlds. It's random, and anyone can sue almost anything and bring it to a jury without even making an effort to be consistent. And too much detail.

There are more rules in the regulated realm than humans know.

Well, how do you fix it? We could spend 10,000 lifetimes harvesting this legal jungle.

But the hurdle to success is trust, so the challenge here goes beyond just changing the law.

People -- For the law to be the foundation of freedom, people have to trust it.

This is my second suggestion. Trust is an essential condition for a free society.

Life is complicated enough without legal worries.

But law differs from other types of uncertainty because it involves state power.

And the state will be able to intervene.

It actually changes the way people think.

It's like having a little lawyer sitting on your shoulder all day, whispering in your ear, "Can it go wrong? Can it go wrong?"

It drives people out of the smart part of the brain, the dark and deep well of the subconscious where instincts and experience, creativity and all other elements of good judgment reside, and drives us to the thin surface of conscious logic.

The doctor immediately said: “I wonder if the headache is a tumor, but if it is, who will protect me?

$200 billion wasted on unnecessary tests.

Research shows that making people self-conscious about their decisions makes them more likely to make worse decisions.

Even if you tell the pianist to think about how she's striking notes when she plays a piece, she can't play the piece.

Self-consciousness is the enemy of achievement.

Edison said it best. He said, "Well, there are no rules here, we are trying to achieve something."

(Laughter) So how do we restore trust?

Adjusting the law is clearly not enough. Tort reform is a great idea, and if you're a businessman, it can cut costs, but it's like a band-aid that heals the wounds of this great distrust.

Countries undergoing major tort reform still suffer from all these ailments.

What is needed, therefore, is not just to limit claims, but to actually create the dry soil of freedom.

It turns out that freedom actually has a formal structure.

Here it is. Laws set boundaries, and on one side of those lines are all the things you must and must not do. Don't steal and you have to pay taxes. But the same boundaries should define and protect the foundations of dry freedom.

Isaiah Berlin says: “Law is not an artificially drawn boundary, but rather one that sets the boundary within which man is inviolable.”

I forgot the second half.

Those levees broke. People walk around ignoring the law all day long.

So what we need now is to rebuild those boundaries.

And rebuilding for litigation is especially important.

Because what people can sue establishes the boundaries of everyone else's freedom.

If someone sue for a child falling off a seesaw, the seesaw is all gone, regardless of what happens in the lawsuit.

Because no one wants to risk a lawsuit.

And so it happened. There are no seesaws, jungle gyms, merry-go-rounds, climbing ropes, or anything that would be of interest to children over the age of 4. Because it's not dangerous.

So how do we rebuild?

Life is too complicated...

(Applause.) Life is too complicated for software programs.

All these choices involve value judgments and social norms rather than objective facts.

So here is my fourth suggestion.

This is the philosophy we have and the philosophy we must change.

It has two key elements. Laws should be simplified.

We need to move out of this complexity towards general principles and goals.

This constitution is only 16 pages.

Worked well for 200 years.

Laws must be simple enough for people to incorporate into their everyday choices.

If they can't internalize it, they won't trust it.

And how do we keep it simple?

Because life is complicated and here are the hardest and biggest changes. The power to interpret and apply the law must be restored to judges and officials.

(Applause.) We must humanize the law.

To simplify the law so that you feel free, those in charge should be free to exercise judgment and interpret and apply the law according to reasonable social norms.

When you walk on the pavement during the day, you must think that there is someone in society who thinks it is their job to actively protect you if a fight breaks out, if you are acting rationally.

That person does not exist today.

This is the hardest hurdle.

It's actually not that hard. 98% of the time this is easy.

Maybe you can claim $100 in small claims court for lost pants, but not millions in general jurisdiction.

The action was dismissed without prejudice or resubmission to small claims court.

It takes 5 minutes. That's it, it's not that hard.

But this is a difficult hurdle. We fell into this legal quicksand because in the 1960s we woke up to really bad values: racism, sexism, and pollution. Those were bad values. And I wanted to create a legal system where no one could have bad values.

The problem is that we have created a system that excludes the right to have good values.

It doesn't mean that those in power can do whatever they want.

They are still bound by legal goals and principles. Teachers are accountable to principals, judges are accountable to courts of appeal, and presidents are accountable to voters.

But the responsibility for determining the impact of this decision on the impact on everyone, not just those who are disaffected, lies at the highest.

You can't run a society with just the lowest common denominator.

(Applause.) So what is needed is a fundamental shift in philosophy.

A change in our philosophy could solve many of these problems.

We have been taught that authority is the enemy of freedom.

it's not true. In fact, authority is essential to freedom.

Law is a human institution. Responsibility is a human institution.

When teachers do not have the authority to run the classroom and maintain order, learning is disrupted for everyone.

When judges don't have the power to dismiss unjustified claims, we're all going to spend the day over our shoulders.

If the Environment Agency cannot decide that the transmission lines are good for the environment, there is no way to get electricity from the wind farms to the city.

A free society needs a red light and a green light, or it quickly hits a dead end.

That's what happened to America. look around.

What the world needs now is to restore the power to make common choices.

It is the only way to regain freedom, the only way to release the energy and passion needed to meet the challenges of our time. thank you.

(applause)

Does anyone know when the stethoscope was invented?

Any guesses? 1816.

And all I can say is that in 2016, doctors won't be walking around with stethoscopes.

Much better technology is coming and that's part of the change in medicine.

Wireless devices have changed our society.

But the future is digital medical wireless devices.

So to make this more concrete, let me give you some examples.

this is the first one. This is an electrocardiogram.

And as a cardiologist, it's amazing to think that a smartphone anywhere in the world will allow patients and individuals to observe their rhythms in real time, and that's true for us today.

But that's just the beginning.

I'm sitting here checking my email.

In the future, all vital signs will be checked: heart rhythm, blood pressure, oxygen, temperature.

This is already available starting today.

This is Airstrip Technologies.

Now, in hospitals and intensive care units, capturing these aggregates of signals and sending them to doctors' smartphones is wired, or should I say wireless.

If you're a pregnant parent, what if you could continuously monitor your fetal heart rate and uterine contractions so you didn't have to worry too much about whether your pregnancy was going well and you could transition into labor?

And going further, continuous glucose sensors are in use today.

It is currently implanted under the skin, but in the future it will not be necessary.

And of course keeping blood sugar in the desired range, i.e. 75 to less than 200 and checking with a continuous blood glucose sensor every 5 minutes, but we'll see how that affects diabetes.

And what about sleep?

Let's expand it a little.

We are supposed to spend one-third of our lives sleeping.

What if your phone, which is due to be released in the next few weeks, shows you all your sleep hours?

And this, of course, as you can see, it's orange that's awake.

REM sleep, rapid eye movements, and dream states are light green. And the light is gray and the sleep is light. And deep sleep, the best restorative sleep, is that deep green color.

How about counting all the calories?

This is a feature that allows you to actually measure your calorie intake and expenditure in real time via a band-aid.

Well, what I was talking about is physiological indicators.

But what I want to get to soon is the next frontier, and why the stethoscope is being phased out, is that it goes beyond listening to valve sounds and breath sounds. A handheld ultrasound device.

why is this important? Because it is very sensitive.

Here's an example of an abdominal ultrasound and an echocardiogram that can be sent wirelessly. We also show an example of fetal monitoring on a smartphone.

So we're not just talking about physiological indicators, important measurements of vital signs or anything in physiology, but also about all the images you can see on your smartphone.

Now, this is another example of obsolete technology that will soon be buried. Holter electrocardiogram.

24/7 recording, lots of wiring.

This is now a small patch.

You can post it for 2 weeks.

So how does this work? Well, there are smart band-aids and sensors that you wear on your shoes or on your wrist.

And this sends the signal, creating a body area network to the gateway.

A gateway can be a smartphone or a dedicated gateway. Today, many of these are less integrated and therefore dedicated gateways.

That signal can be sent to the web or cloud, then processed and sent to caregivers, doctors, patients, anywhere.

So this is basically a very simplistic technology that shows how this works.

Now I have this device on.

I didn't want to take off my shirt to show it, but I can see it.

This is, as we have already seen, a device that does much more than just measure your heart rhythm.

This is me now. You can also see an EKG.

Below that you'll see your actual heart rate and trends. To its right is the bioconductive material.

It is the state of the body, the state of the body, which is very important when observing a person with heart failure.

And underneath that is body temperature, respiration, oxygen, and positional activity.

This is very surprising because the device measures seven very important vital signs for monitoring heart failure patients. OK?

And why is this important? Well, this is the most expensive bed.

What if we could reduce the need for hospital beds?

Yes you can. First and foremost, heart failure is the number one reason for hospitalization and readmission in this country.

Heart failure costs $37 billion annually, 80% of which is related to hospitalization.

And within 30 days of being hospitalized with Medicare for those 65 and older, 27 percent will be readmitted within 30 days, and more than 56 percent will be readmitted by 6 months.

So can it be improved? The idea is to put this device that I am wearing on 600 randomly assigned heart failure patients and 600 patients who are not actively monitored to see if we can reduce heart failure readmissions, which is very interesting. And we're going to start that trial, and you'll hear more about how we're going to do that, but this is a kind of wireless device trial that could change medicine in the next few years.

why now? Why has this suddenly become a reality and an exciting direction for the future of medicine?

What we have is, in a way, the perfect storm of positivity.

This establishes consumer-driven healthcare.

It all starts from there.

For those of you who don't know, let me explain specifically why this is such a big move. 1.2 million Americans got Nike shoes. Nike shoes are body area networks that connect shoes, soles and iPhones or iPods.

And this Wired Magazine cover story captures a lot of this very thing. Much has been said about Nike shoes and how they were quickly adopted to monitor exercise physiology and energy expenditure.

Here are some guiding principles to keep in mind: "The data-driven health revolution promises to make us all better, faster and stronger. Live by the numbers."

And this is really thought-provoking, and this is this cover story from July. “Personal metric movement goes far beyond diet and exercise. It’s about tracking every aspect of your life 24/7, from sleep to mood to pain.”

Well, I tried this device.

Many of you have Philips Direct Life.

I didn't have them, but I got a Fitbit.

It's like this.

It's like a wireless accelerometer or pedometer.

I wanted to understand consumer behavior, so I'd like to share just the results of that test.

By the way, I hope Philips Direct Life works better. I hope so.

But this one monitors food, monitors activity, and tracks weight.

However, most of these must be entered.

It can actually only track activities on its own, but it's still not perfect.

In other words, when you exercise, exercise works.

Enter your height and weight and it will calculate your BMI, and of course, enter all your food and it will also show you how many calories you have burned and eaten during exercise.

But in reality, I have to enter every activity.

So I went to this and was, of course, happy that you picked up the 42 minute exercise I did, Elliptical, but then I needed more information.

In other words, "I want to record sexual activity.

How long have you been doing this? ”

(Laughter.) And it says, "How hard was it?"

(Laughs) And it says "start time".

Well, it doesn't show -- this doesn't work, which means it doesn't work.

Well then, I think I want to go to sleep.

By the way, who would have thought that you would have your very own EEG in your home tagged with a very nice alarm clock?

This is the headband that comes with this alarm clock.

Continuously monitor your brain waves while you sleep.

So I spent seven days doing this in preparation for the TEDMed.

This is an important part of our lives and we should be sleeping a third of the time.

Of course, how many people here have trouble sleeping?

Usually 90 percent. So you said you slept better than expected.

Well, this week has been a sleep-deprived week in my life, and you get a Z.Q. Score. Scoring instead of I.Q earns Z.Q. Score when you wake up.

You say, "Oh, I see." And since the Z.Q. score is age-adjusted, we want to get as high a score as possible.

So this is sleep by moments, or by minutes.

And we know Z.Q. There were 80 or so.

And the wake-up time is orange.

And as I've learned, this can be a problem.

Because it not only helps you quantify your sleep, but it also lets other people know you're awake.

So when my wife came in, I knew you were awake.

"Eric, I want to talk. I want to talk."

And trying to play possum.

This is very, very impressive.

OK. So it's the first night.

And this person is now 67, which is not a good score.

And this, of course, tells you how much sleep you had during REM sleep, deep sleep, and all other types of sleep.

This was very interesting because it allowed us to quantify all the different stages of sleep.

So you can also see how you compare to your age group.

It's like a controlled sleep competition.

And a really interesting one.

Look at this and say, "I thought I didn't sleep very well, but I actually slept better than the average 50-60 year old." OK?

And the important thing, what I didn't know, was that I was a really good dreamer.

OK. Now let's move from sleep to illness.

80 percent of Americans have a chronic disease, 80 percent of people 65 and older have two or more chronic diseases, 140 million Americans have one or more chronic diseases, and 80 percent of 1.5 trillion spending is linked to a chronic disease.

Well, diabetes is one of the big diseases.

About 24 million people have diabetes.

And here are the latest maps. This article appeared in the New York Times a little over a week ago, but it's not well received.

That means that 29 percent of men over the age of 60 in the country have Type 2 diabetes, and a much lower, if not more, number of women.

But of course, this is important because we now have a continuous method of measuring blood sugar with sensors that can detect hyperglycemia and hypoglycemia that would otherwise be undetectable.

And in this particular patient's case, the red dot turns out to be a finger prick that should have been missing both ends.

But with continuous monitoring, you get all the important information.

The future of this, however, is being able to translate this into a Band-Aid-like phenomenon, and that won't be far off.

So let's quickly list the top 10 goals for wireless healthcare.

All these are possible. Some of them are already available today in some way or form, either very close or, as you may have heard.

Alzheimer's disease: affects 5 million people and checks vital signs, activity and balance.

Asthma: can detect high numbers, pollen count, air quality, breathing rate, and more. Breast cancer, I'll show you an example in a moment.

Chronic obstructive pulmonary disease.

Depression, mood disorders have great approaches.

As I said before, I have diabetes. We have already talked about heart failure. Hypertension: 74 million people could have their blood pressure continuously monitored for better control and prevention.

And while we've already talked about obesity, we've also talked about how to get there.

and sleep disorders.

This is valid worldwide. Today's smart phone and cell phone access is an anomaly.

And this article from The Economist beautifully sums up the health opportunities across the developing world. “Mobile phones have made a huge difference in the lives of more people, more quickly than any previous technology.”

That was before we embarked on the world of M-Health.

Aging population: The problem is enormous, with 300,000 hip fractures occurring each year. But the solution is extraordinary and includes so many different things.

One of the things I just wanted to mention. The iShoe is another example of a sensor that improves proprioception in older people to prevent falls.

One of many ways to use wireless sensors.

So we can transform medicine across the continuum of care, from pregnant women and fetuses to the elderly. The pharmaceutical field changes. I hope you have understood that the whole spectrum of the disease is spread all over the world.

There are two things that can really accelerate this whole process.

One of them, and very fortunate for us, is to develop a dedicated lab, which started with Scripps' work with Qualcomm.

And I was lucky enough to meet Gary and Mary West to help out with this Wireless Health Institute.

San Diego is a special place in this regard.

There are over 650 wireless companies, over 100 of which are working in wireless healthcare.

It's the largest source of commerce and, interestingly, works well with over 500 life sciences companies.

Wireless Institute, West Wireless Health Institute is actually the development of two outstanding people here tonight, Gary and Mary West. And I'd like to give up on them for putting this off.

(Applause.) Their incredible philanthropic investment made this possible. This is truly a non-profit educational center and will open soon. Like this, the whole building is dedicated.

And what the company is trying to do is accelerate this era. It is about embracing, addressing and innovating unmet medical needs. And, as announced on Monday, it has just appointed chief engineer Mehran Mehragani. And we need to move forward with development, clinical trial validation, and the most challenging medical practice changes, paying attention to reimbursement, health policy, and health economics.

Besides having a great lab to facilitate this process, another big thing is guidance. Of course, it depends on the fact that healthcare will go digital.

Understanding biology wirelessly through genomics, omics, and physiological phenotyping would be a huge achievement.

Because it enables unprecedented convergence.

Over 80 major diseases have been elucidated at the genomic level, which is highly unusual. In the last two and a half years, we've learned that there's more to the roots of disease than in human history.

And when you combine this with, say, an iPhone app that contains your genotype to guide drug therapy...

However, in the future, we will be able to tell who will get type II diabetes from all common variants, and the future will be further filled with low-frequency variants.

Different genes tell us who gets breast cancer.

We also know who is prone to atrial fibrillation.

And finally, another example is sudden cardiac death.

Each of these has a sensor.

To prevent diabetes, glucose can be given a sensor for diabetes.

An ultrasound machine provided to a patient can prevent breast cancer or detect it as early as possible.

iPatch for atrial fibrillation, iRhythm.

and vital sign monitoring to prevent sudden cardiac death.

Sudden cardiac death kills 700,000 people in the United States each year.

By now you can see that the impact on hospital care resources is enormous, and the impact on disease is just as impressive for all these different diseases and others.

This really takes personalized medicine to new heights and I think it's very innovative and represents the black swan of medicine.

Thank you for your attention.

First, I want to talk a little bit about what exactly autism is.

Autism is a very large continuum, from very severe children (children remain speechless) to brilliant scientists and engineers.

I actually feel at home here because there is a lot of autism genetics here.

(Laughter) You wouldn't have -- (Applause) It's a series of features.

When do geeks turn into Asperger's (mild autism)?

So Einstein, Mozart, and Tesla would probably be diagnosed on the autism spectrum today.

And one of the things I'm really concerned about is raising kids to invent the next energy thing that Bill Gates talked about this morning.

Now, if you want to understand autism, think about animals.

This time I would like to talk about different ways of thinking.

We must move away from verbal language.

Think in pictures. I don't think in language.

Now, the hallmark of the autistic psyche is attention to detail.

This is a test that requires finding either large or small letters, but an autistic mind finds small letters faster.

And the problem is that the normal brain ignores details.

Well, when building a bridge, details are very important because if you ignore the details the bridge will fall.

One of my big concerns about a lot of today's policies is that things are getting too abstract.

People are moving away from hands-on work.

I am really worried that many schools are abolishing trial classes. Because art and that kind of class is my specialty.

In my work with cows, I've noticed a lot of little things that most people don't notice that make cows flinch.

For example, this flag flies in front of an animal hospital.

This feed farm was to demolish the entire veterinary facility. All they had to do was move the flag.

Fast movement, contrast.

When I started working in the early 1970s, I would drop into the chute to see what the cows were seeing.

People thought it was funny.

A coat on the fence flinched, a shadow flinched, a hose on the floor, and people were unaware of these things.

Hanging chains...

And it's very well represented in the film.

In fact, I loved the movie so much that it recreated all my projects.

That's the nerdy side.

And actually, it's called "Temple Grandin" instead of "Thinking in Pictures."

So what are you thinking about in the picture?

It's literally a movie in your head.

My mind works like Google searching for images.

As a child, I didn't know that I thought differently.

I thought everyone was thinking in pictures.

And when I published my book Thinking in Pictures, I started interviewing people about what they thought.

And I was shocked when I realized that my thoughts were completely different.

For example, when I say, "Think of a church steeple," most people get this kind of generalized generalization.

Maybe that doesn't apply in this room, but it does in many different places.

Only certain photos are displayed.

They flash back to my memory, like searching for photos on Google.

There's a great scene in the movie where the word 'shoes' is used, and a lot of shoes from the 50's and 60's came to mind.

Yes, there is a church where I spent my childhood. it is specific.

Well, what about famous ones?

And they show up like this.

It's as simple as searching for photos on Google.

They come out one at a time, and I think, 'Yeah, it could be snowing, it could be thunderstorming,' and I'm going to hold onto it and turn it into a video.

Now, visual thinking has been a huge asset in my work designing cattle facilities.

And I have worked hard to improve the way cows are treated in the slaughterhouse.

I uploaded the contents on YouTube, so please take a look if you like.

(Laughter) But one of the things that design work has allowed me to do is test-run equipment in my head, like a virtual reality computer system.

This is an aerial recreation of one of my projects used in the movie.

that was so cool.

And there were a lot of people with Aspergers and autism working on the set of the movie.

(Laughter) But one of the things that really worries me is where are the younger versions of those kids going today?

They don't end up in Silicon Valley, where they belong.

(Laughter) (Applause) I wasn't very social, so one of the things I learned early on is that you have to sell your work, not yourself.

And the way I marketed my livestock work was by showing my drawings and showing pictures of things.

Another thing that helped me as a kid was being taught good manners in the 50's.

I was taught not to pull items off the shelves in the store and throw them.

By the time the children reach 3rd or 4th grade, you may find that this child is going to be a visual thinker who draws in perspective.

Now, what I want to emphasize is that not all autistic children become visual thinkers.

Now, when I did this brain scan a few years ago, I used to joke that there was a huge internet trunk going deep into my visual cortex.

This is tensor imaging.

And my gigantic internet trunk is twice as big as the control.

The red line there is me, and the blue line is the gender- and age-matched control.

So I got a huge one, and the control there, the blue one, has a really small one.

And some current research shows that people on this spectrum actually use their primary visual cortex to think.

Now, in fact, the visual thinker is just a kind of mind.

As you know, autistic minds tend to be professional minds. Good at some things, bad at others.

And my weak point was algebra.

And I was never allowed to get geometry or triangles.

big mistake.

I find that there are a lot of kids who need to skip algebra and go straight to geometry and trigonometry.

Now, another kind of mind is the pattern thinker.

more abstract.

They are your engineers, computer programmers.

This is pattern thinking.

The praying mantis is made from a single sheet of paper. No sellotape or notches.

And the background has a pattern to fold it.

The types of thoughts are: A photorealistic visual thinker like me. A brain of pattern thinking, music and mathematics.

Some of these often have problems reading.

Dyslexic children will also see this type of problem.

You can see these different kinds of hearts.

And there is a linguistic mind, they know every fact about everything.

Another issue is sensory issues.

I was really worried about having to wear this gadget on my face.

I came 30 minutes early and was able to put it on and get used to it a little. I had to bend it so it wouldn't hit my chin.

But sensation matters.

Some children are concerned about fluorescent lights. Some people have problems with sound sensitivity.

You know, it changes.

Well, visual thinking has given us a lot of insight into the animal mind.

Because think about it. Animals are people who think based on their senses, not their language. Think in pictures, think in sounds, think in smells.

Think about how much information you have about local fire hydrants.

He knows who was there -- (laughter) when they were there.

There is a lot of information about fire hydrants.

All the information is very detailed.

And seeing details like this gave me a lot of insight into the animals.

Now, animal minds, and my mind too, categorize sensory-based information.

A man on a horse and a man on the ground are considered quite different things.

Some horses may have been mistreated by their jockeys.

Veterinarians and horseshoes are perfectly fine, but you can't ride a veterinarian.

You have another horse and it will probably get hit by a horseshoe and it would be terrible to do anything on the ground with a veterinarian, but a person can ride him.

It's the same with cows.

A man on horseback and a man on foot are two different things.

As you can see, it's a different picture.

Look, I want you to think about how specific this is.

Now, the ability to sort this information into categories, and I find that many people struggle with this.

When I'm troubleshooting equipment and problems in the factory, they can't seem to figure out: "Isn't there a problem with human resource training?"

Or is there a problem with the equipment? ”

In other words, separate equipment problems from people problems.

Many find it difficult to do.

Now, let's say it turns out to be an equipment problem.

Is it a minor issue that can be easily fixed?

Or is the whole system design wrong?

People have a hard time understanding it.

Think about solutions to problems that make airlines safer.

Yes, I am a million mile flier.

I fly a lot, what would I see first hand if I were in the FAA?

That would be the tail of the plane.

There have been 5 fatal accidents in the last 20 years where the tail has come loose or the steering components inside the tail have somehow broken.

A pure and simple tail.

And what happens when the pilot walks around the plane?

They can't see what's inside their tail.

Thinking about it now, pulling out all the concrete information.

it is specific.

Take out all the small pieces and put the pieces together like a puzzle.

Well, here's a horse who's deadly afraid of a black cowboy hat.

He was being abused by someone wearing a black cowboy hat.

A white cowboy hat, that was perfectly fine.

Now, the problem is, the world needs all different kinds of minds to work together.

We have to work on developing these different kinds of minds.

One of the things that really annoys me when I travel or attend autism conferences is that I see a lot of smart, geeky, geeky kids, but they're not very gregarious and none of them are working on raising interest in things like science.

And this reminds me all of my science teacher.

My science teacher is really beautifully represented in the movie.

In high school, I was a self-paced student.

I had no interest in studying until I took Mr. Carlock's science class.

In the movie he was Dr. Carlock.

And he challenged me to understand the optical illusion room.

This means that children should be shown something interesting.

You know, one of the things I think TED should do is let every school know about all the great lectures that TED gives. There are all kinds of great content on the internet to keep kids interested.

Because I see a lot of nerdy, nerdy kids and teachers in the Midwest and elsewhere who don't know what to do with these kids when they leave the tech field.

And they are not on the right track.

The point is that the mind can be made more thinking and cognitive, or it can be wired to be more social.

And what some research on autism is now showing is that there can be extra wiring in the truly brilliant minds and we can lose some social circuits here.

And it can reach a state so severe that some people become speechless.

In the normal human mind, language masks the visual thoughts we share with animals.

This is the work of Dr. Bruce Miller.

He studied Alzheimer's patients with frontal lobe dementia.

And dementia has eroded the language part of the brain.

And this artwork came from someone who had a stereo installed in his car.

Van Gogh knows nothing about physics, but I find it very interesting that some research was done to show that the swirl pattern in this painting follows a statistical model of turbulence. An interesting idea arises that some of this mathematical pattern may be in our heads.

And the Wolfram stuff -- I was taking notes and writing down all the search terms I could use. Because I think it will be covered in lectures on autism.

I have to show these kids something interesting.

Auto shop classes, drafting classes, and art classes have also been discontinued.

So art was my best subject in school.

We have to think about different kinds of thinking, and we absolutely have to work with this kind of thinking. Because we will definitely need this kind of talent in the future.

And let's talk about work.

Well, I didn't want to study at my own pace, so my science teacher let me study.

But do you know? I had work experience.

I've seen too many smart kids who haven't learned the basics, like how to be on time. I was taught that when I was eight years old.

How to make table manners for Grandma's Sunday party.

I was taught that at a very, very early age.

And when I was 13, I got a job sewing clothes in a dressmaker's shop.

I had an internship in college and was building something, but I also had to learn how to do assignments.

When I was little, I just wanted to draw horses.

My mother said, "Okay, let's take some other pictures."

They have to learn how to do something else.

Let's say your child is obsessed with Lego.

A characteristic of the autistic mind is that it is prone to attachment.

If your child likes race cars, use race cars for math.

Let's calculate how long it takes the race car to travel a certain distance.

In other words, using that obsession to motivate the child is one of the things we have to do.

It really sucks that teachers don't know what to do with smart kids, especially away from this part of the country.

It just drives me crazy.

What can visual thinkers do when they grow up?

They can do graphic design, all sorts of things with computers, photography, industrial design.

Pattern thinkers are mathematicians, software engineers, computer programmers, and people who go into all kinds of jobs.

And then there is the word mind. Not only do they make great journalists, they also make really, really great stage actors.

With autism, I had to learn social skills like acting.

You just... have to learn it.

And we need to work with these students.

And that's what makes a leader.

As you know, my science teacher was not a certified teacher.

He was a NASA space scientist.

Some states now allow students with a biology or chemistry degree to enroll in schools and teach biology or chemistry.

we need to.

Because what I observe is that for many kids the good teachers are at community colleges.

But we need to get some of these good teachers into our high schools.

Another thing that can be very, very, very successful is that there are a lot of people who have retired from working in the software industry and they can teach your kids.

And it doesn't matter if what they teach is old. Because what you are doing is lighting a spark.

You are causing the child's excitement.

And if you keep him interested, you can learn everything new.

Mentors are absolutely essential.

I can't stress enough what my science teacher did for me.

And we have to mentor them and employ them.

And if you bring people with mental illnesses like autism or Asperger's into internships at your company, you have to give them specific tasks.

Don't just say "design new software".

I have to be more specific. "We're designing software for phones, and the software has to do certain things, and it's limited in the amount of memory it can use."

I need that kind of specificity.

Well, that's the end of my story.

And I just want to thank everyone who came.

I'm so glad I came here.

(Applause) (End of applause) Oh, any questions? OK.

(Applause) Chris Anderson: Thank you very much.

You once wrote, I like this quote. “If autism had been magically eradicated from the face of the earth, humans would still be socializing in front of a wood fire at the entrance of a cave.”

(laughter) Temple Grandin: I mean, who do you think made the first stone spear?

It's a person with Asperger's, and if we could get rid of all the autism genes, there would be no Silicon Valley and the energy crisis wouldn't be solved.

(Applause) CA: I'd like to ask you a few more questions.

But if anyone here has a child with autism, or knows a child with autism and feels alienated from them, what advice would you give them?

TG: Well, first of all you have to look at age.

When you have a 2-, 3-, or 4-year-old who can't speak or socialize, you can't stress too much. Don't wait.

The problem is that there are different degrees of autism.

About half of people on the spectrum will never learn to speak and will never work in Silicon Valley.

It wouldn't be a rational act for them.

But there are smart, nerdy kids with a bit of autism, so you have to motivate them to be funny.

I was able to gain social interaction through common interests. I rode horses with other children, built model rockets with other children, and did an electronic lab with other children.

And in the 60s, mirrors were glued to the rubber membranes of the speakers to create a light show.

(Laughter) CA: Is it unrealistic for them to wish or think that the child loves them the way some or most people want?

TG: Well, let me tell you, he's loyal, and if his house was on fire, he'd help you out.

CA: Wow. So if you ask them what they are most passionate about, most people will say something like "children" or "lovers".

What are you most passionate about?

TG: I'm passionate about making the world a better place for what I do.

It makes me very happy when a mother with an autistic child tells me, "Thanks to your books and lectures, my child was able to go to college."

You know, I worked in a slaughterhouse in the 80's. they were really bad.

I developed a very simple scoring system for slaughterhouses. There we simply measure the results. So how many cows have fallen?

How many cows are raising their heads?

Directly observe some simple things.

It worked really well.

I get satisfaction from seeing things that make a big difference in the real world.

We need more and less of the abstract.

CA: Absolutely.

(Applause.) CA: What really struck me about what you said on the phone was that one of your passions was server farms.

Please tell me about it.

TG: Well, I was really excited to read that because it contains knowledge.

it's a library.

And for me, knowledge is invaluable.

So maybe ten years or more from now, our library was flooded.

This was before the Internet really took off.

And I was really upset that all the books were destroyed. Because knowledge has been destroyed.

And server farms, or data centers, are great knowledge libraries.

CA: Temple, can I just say, I'm so glad you're here at TED.

TG: Well, thank you very much. thank you.

If you're a blind kid in India, it's very likely that you'll have to contend with at least two big pieces of bad news.

The first bad news is that the chances of getting treatment are very low or not at all. The reason for this is that most blindness reduction programs in the country are aimed at adults and very few hospitals are equipped to actually treat children.

In fact, if you are to be treated, it is quite possible that you will be treated by an unqualified person, as this case in Rajasthan shows.

This is a 3-year-old orphan girl with cataracts.

So the custodians took her to the village shaman and instead of suggesting that the custodian take her to the hospital, the man decided to burn her abdomen with a red-hot iron rod to drive out the evil spirits.

The second bad news will be brought to you by a neuroscientist. Neuroscientists would say that if you're over the age of 4 or 5, your brain is very, very unlikely to learn how to see, even if you correct your eyes: again, little or nothing.

So when I heard these two things, for both personal and scientific reasons, I was very troubled.

So let me start with personal reasons.

It may sound corny, but it's sincere.

That's my son, Darius.

As a new father, I have a qualitatively different sense of how sensitive babies are, what our obligations are to them, and how much love we can feel for them.

I'd move heaven and earth to get Darius' treatment, but it's intuitively wrong to say that there might be other Dariuses who aren't getting treatment.

That's my personal reason.

The scientific reason is that I don't like this neuroscientific notion of the critical period, the idea that the brain loses its ability to learn beyond the age of 4-5. Because I think the idea is not well tested.

The birth of this idea comes from the work of two researchers at Harvard University, David Hubel and Torsten Wiesel. They were awarded the Nobel Prize in 1981 for their work on visual physiology. This is stunningly beautiful research, but I think some of their work is prematurely extrapolated into the human realm.

So they did research on kittens with different kinds of deprivation regiments, and work dating back to the '60s is now being applied to human children.

So I felt I needed to do two things.

The first is to provide care to children who currently have no access to treatment.

That is the humanitarian mission.

And the mission of science will be to test the limits of visual plasticity.

And as you can see, these two missions are perfectly aligned. One is added to the other. In fact, one is impossible without the other.

So I started Project Prakash a few years ago to carry out these two missions.

As many of you know, Prakash is the Sanskrit word for light, and the idea is that by bringing light into children's lives, they also have the chance to shed light on some of neuroscience's deepest mysteries.

And the logo, although it looks very Irish, is actually derived from the Indian symbol Diya, the earthen lamp.

There are three elements to the overall Prakash effort. It is a support activity to identify children who need care. medicine; and also in subsequent research.

And I would like to present a short video clip that explains the first two components of this work.

This is an outreach station held at a school for the blind.

(Text: Most of the children are severely and permanently blind...) Pawan Sinha: So this is a school for the blind, so many children are permanently blind.

This is a case of microphthalmia, an eye deformity, a permanent condition. It cannot be treated.

It is the culmination of Micropthalmos, called Enophtalmos.

Occasionally, however, we encounter children who exhibit some residual vision. This is a very good indication that the condition may indeed be treatable.

So, after examination, we take the children to the hospital.

That is the hospital we are working with in Delhi, Shroff Charity Eye Hospital.

We have a very well-equipped pediatric eye center, made possible by a donation from the Ronald McDonald Charity.

So, eating a hamburger actually works.

(Text: Such tests can improve the eye health of many children....

...help find children who can participate in Project Prakash. ) PS: So if you zoom in on this kid's eyes, you'll see the cause of his blindness.

The white area in the center of the pupil is a congenital cataract, which is an opacity of the lens.

In our eyes, the lens is transparent, but in this child, the lens is opaque, so we cannot see the world.

So the child is treated. You can see eye shots.

This is an eye with an opaque lens. The opaque lens was removed and an acrylic lens was inserted.

And this is the same child 3 weeks after surgery, right eye open.

(Applause.) Thank you.

So even from that small clip you get the sense that recovery is possible. We are now treating over 200 children and the story is repeating.

After treatment, the child gains remarkable function.

In fact, the story applies to anyone who regains sight after losing it for several years.

We published a paper a few years ago about a woman named SRD, seen on the right. She regained her sight late in life and her vision at this age was astonishing.

I must add a tragic addition to this -- she died in a bus accident two years ago.

So her story is just a truly inspiring story, an unknown but inspiring story.

So, as you can imagine, it caused quite a stir in the scientific community and the general press when we started discovering these results.

Here's a Nature article and another Time article highlighting the study:

Therefore, we were fairly confident that recovery was possible even with long-term visual deprivation.

The obvious question to ask next is what is the recovery process?

So the way we study it, let's say we find a child with photosensitivity.

Treatment is provided for children, and I would like to emphasize that the treatment is completely unconditional. No return.

We treat more children than we actually treat.

All children who need treatment receive treatment.

After treatment, we give children a series of brief visual tests approximately every week to see how their visual abilities are improving.

And we try to keep this going for as long as possible.

This arc of development gives us unprecedented and invaluable information about how the scaffolding of Vision is built.

What are the possible causal relationships between early-developed skills and later-developed skills?

We have used this general approach to study various visual abilities, but we would like to focus on one in particular. It is image analysis to objects.

In other words, the kind of image shown on the left, whether real or synthetic, consists of small areas in the middle column, areas of different color and different brightness.

The brain has the complex task of organizing and integrating subsets of these areas into something more meaningful, something that can be viewed as an object, as seen to the right.

And no one knows how this integration will happen. That's the question we asked at Project Prakash.

Now, here's what happens as soon as vision begins.

This is a man who had his sight restored only a few weeks ago, and we see MIT graduate student Ethan Myers doing an experiment with him.

His visual and motor coordination is very poor, but he has a rough sense of what areas he's trying to track.

When you show him images of the real world, or show others like him images of the real world, the world is too fragmented for them, so they can't recognize most objects. It consists of a collage, a patchwork of areas of different colors and brightness.

That is what is indicated by the green frame.

These are the areas they point to when you ask them to "point to where the object is, even if they can't name it".

In short, the world is a complex patchwork of regions.

Even the shadow on the ball becomes its own object.

Interestingly, if you leave it alone for a few months, something like this happens.

Doctor: How many are these?

Patient: That's two.

Doctor: What is its shape?

Patient: Its shape is...

This is a circle and this is a square.

PS: A very dramatic change has happened.

And the question is, what underlies this change?

This is a deep question, but what's even more amazing is that the answer is so simple.

The answer is in motion, which I want to show you in the next clip.

Doctor: What shapes do you see here?

Patient: I don't know.

Doctor: Now?

Patient: It's a triangle.

Doctor: How many of these are there?

Well, how many of these are there?

Patients: Two.

Doctor: What are these?

Patient: A square and a circle.

PS: I see this pattern many times.

One of the things the visual system needs to start analyzing the world is dynamic information.

Therefore, the inference we have drawn from this and several such experiments is that dynamic information processing, or motion processing, serves as the basis for building the rest of the complexity of visual processing. It leads to visual integration and ultimately recognition.

This simple idea has far-reaching implications.

Here are just two. One from the engineering field and one from the clinic.

So from an engineering perspective, you can ask: We know that motion is very important to the human visual system, but can we use this as a recipe for building machine-based visual systems that can learn by themselves without the need for human programmers to program them?

That's what we're trying to do.

I am at MIT. At MIT, you have to apply the basic knowledge you get.

So we're creating Dylan, a computational system with the ambitious goal of taking the same kind of visual input that a human child receives and autonomously discovering, "What are the objects in this visual input?"

So don't worry about Dylan's inner life.

Here we only describe how to test Dylan.

The way to test Dylan, as I said earlier, is to give it the same kind of input that a baby or a Project Prakash kid would get.

But for a long time, we never really understood, "Can we get this kind of video input?"

So I wondered if I could have Darius act as a baby camera carrier to get input to Dylan.

that's what we did.

(laughter) I had to have a long conversation with my wife.

(laughter) Actually, Pam, if you're watching this, forgive me.

So we changed the optics of the camera to mimic a baby's eyesight.

As some of you may know, babies are born legally blind.

Their acuity -- our acuity is 20/20. Babies have around 20/800 vision, so they see the world in a very blurry way.

The baby camera video looks like this:

(Laughter) (Applause) Thankfully, there's no audio for this.

What is surprising is that working with such highly degraded input, babies can discover the meaning of such input very quickly.

But after a couple of days, the baby begins to pay attention to the mother's or father's face.

How does that happen? We want Dylan to be able to do that. And with this movement mantra, Dylan can actually do it.

So with this kind of video input, Dylan can start extracting patterns, including faces, with just 6-7 minutes worth of video.

So this is an important demonstration of the power of movement.

The clinical implications come from the autism realm.

Visual integration has been associated with autism by some researchers.

When we saw it, we asked: Could the impairment of visual integration be a manifestation of something that underlies the dynamic information processing deficit in autism?

This is because, if the hypothesis is true, it will have a profound impact on our understanding of the causes of various aspects of the autism phenotype.

What you'll see is a video clip of two children (one neurotypical and one autistic) playing with a pong.

So we keep track of where our kids are looking while they pong.

The red part is the trajectory of eye movement.

This is a neurotypical child, and we see that the child can cue dynamic information to predict where the ball will go.

Even before the ball gets there, the child has already seen it.

Compare this to an autistic child playing the same game.

Instead of predicting, the child will always follow where the ball has been.

Dynamic information utilization appears to be significantly impaired in autism.

We are therefore working on this line of work and hope to report more results in the near future.

Going forward, this is the magnitude of the problem when we consider that this disc represents all the children we have ever treated.

The red dots are the children we don't treat.

Therefore, there are many more children who need treatment. To expand the scope of the project, we plan to launch a dedicated pediatric hospital, a school for the children we treat, and a Prakash Children's Center with state-of-the-art research facilities.

The Prakash Center integrates medicine, education and research in such a way that the whole is truly greater than the sum of its parts.

In summary, in the five years of his existence, Prakash has impacted multiple fields, from basic neuroscience plasticity and brain learning, to clinically relevant hypotheses such as autism, to the development of autonomous machine vision systems, to undergraduate and graduate education, and most importantly to alleviating childhood blindness.

And for the students and me, this was just a phenomenal experience. I was able to do some interesting research and at the same time help a lot of the kids I worked with.

thank you very much.

(applause)

I think I was in second grade when I was caught painting a nude by Michelangelo.

I was immediately sent to the principal. Then the principal, a kind nun, looked with disgust at my book, turned the pages, and saw all the nudity. You know, I used to watch my mom paint nudes, so I was following her. Then the nun slapped me in the face and said, "Dear Jesus, this child has already started."

I had no idea what she was saying, but it was persuasive enough that I never drew again until 9th ​​grade.

A really boring lecture led me to draw a caricature of my school teacher.

And you know, I was very popular.

i don't play sports I'm not really good at sports.

No fancy gadgets at home.

I'm not at the top of my class.

So for me, drawing manga gave me a sense of identity.

I became popular, but I was afraid of being caught again.

So what I did was hastily put together a collage of all the teachers I had drawn, praised the principal of the school, put him on top of it, and gave it to him.

He laughed at the other teachers and posted it on the bulletin board.

(Laughter) This is part of that.

And I became a school hero.

All my seniors knew me. It felt really special.

I have to say a few words about my family.

that's my mother i love her dearly

She is the one who taught me how to draw and, more importantly, how to love.

She looks a little hippie.

She said, "Don't say that," but I still say it.

The rest of my family are bored academics, busy collecting Ivy League decals for classic Ambassador cars.

My father is a little strange.

My father believed in a holistic approach to living and every time he taught us he would say, ``I hate these books because they have been hijacked by the industrial revolution.''

Back when he still had that worldview, at 16, I hired my brother Karthik, the best lawyer in town, sat him down and said, "Dad, from today on I have decided to discipline myself. I will be curious and learn something new every day. I will work very hard. And I will not depend on you emotionally or financially."

And he was very impressed. He was in tears. ready to hug me

And I said, "Put that idea on hold."

I said, "Then can I quit school?"

But long story short, I quit school to pursue a career as a cartoonist.

Did you draw about 30,000 portraits?

I do birthday parties, weddings, divorces and anything else for those who want to use my services.

But most importantly, I taught my kids cartoons while traveling and learned how to be spontaneous instead.

And it's crazy and crazy and fun.

When I started teaching them, I said let me start this professionally.

When I was 18, I started my own school.

But starting school for an 18-year-old is no easy task unless you have a big sponsor or a big supporter.

So I was flipping through the pages of the Times of India and saw that the Prime Minister of India was visiting my hometown of Bangalore.

And, you know, like all the cartoonists here know Bush, if I had to meet Bush it would be super fun, because his face was a delight to the cartoonists.

I had to meet the Prime Minister.

I went to where his helicopter was about to land.

You can see the layers of security.

I caricatured how to get through the three layers just to impress the guards, but I got stuck. I got stuck on the third one.

And what happened was that I was lucky enough to meet a nuclear scientist at a party where I drew cartoons.

I ran up to him and said, "Hi, sir. How are you?"

He said, "Raghava, what are you doing here?"

I said, "I'm here to see the Prime Minister."

He said, "Oh, so am I."

I hopped in his car, went through the remaining security layers and off we went.

(Applause.) Thank you.

I sat him down, caricatured him, and have caricatured hundreds of celebrities since.

This is what I remember fondly.

I think Salman Rushdie was angry because I altered the map of New York.

(Laughter) Anyway, the next slide I'm going to show you -- (Laughter) Should I turn it off?

The next slide I'm going to show you is a little more serious.

Since this cartoon was published shortly after 9/11, I was hesitant to include it in my presentation.

It was a very naive observation for me, but it ended up being a disaster.

I came home that night to find hundreds of harassing emails and hundreds of people telling me they could have lived a day without seeing this.

I was also asked to withdraw from the American cartoonist association, which had been a lifeline for me.

That's when I realized that comics really have power and art comes with responsibility.

Anyway, what I did was decide I needed to take a break.

I quit my newspaper job, skipped school, packed up my pencils, brushes, and ink and decided to go on a trip.

I remember when I traveled, I met a wonderful old man who later became an artist, whom I met when I was doing caricatures in Italy.

He invited me to his studio. He said, "Come and play with me."

When I went I saw the scariest thing ever.

I saw this statue of myself dead and naked hanging from the ceiling.

I said, "Oh my God. What is that?"

So when I asked him, he said, "Oh, what? I die at night.

In the morning I am reborn. ”

I thought he was cooing, but something really hit me.

I liked it I thought there was something really beautiful there.

So I said, "I am dead and must be reborn."

So I wanted to be a painter like him, but I don't know how to paint.

So I went to an art supply store.

There are hundreds of types of brushes.

Even if you know how to draw, you will be confused.

So I decided to learn to paint on my own.

Here's a quick clip of how I painted and a little introduction about my city Bangalore.

(music) They had to be life size.

Everything had to be bigger. The next picture was even bigger.

And even bigger.

And in my case, I had to dance while I was painting.

I was so excited.

However, I also started drawing dancers.

For example, we have a flamenco dancer here, but there is one problem.

I didn't know the dance form, so I started following them, made money, sold my paintings, and rushed to France and Spain to work with them.

Pepe Linares, a famous flamenco singer.

However, there was one problem. My painting never danced.

No matter how much energy I put into making them, they never danced.

So I made up my mind. I had this crazy epiphany at 2am.

I invited my friends to draw pictures on my body and danced in front of them.

Then suddenly my painting came to life.

And I was lucky enough to actually perform this with Velocity Circus in California.

And I was sitting in the audience just like everyone else.

And I found my work to come to life.

Normally you would work in isolation and show in a gallery, but here the work was alive and other artists were collaborating with me.

Working together was great.

I said I would work with everyone I met.

I started fashion.

This is the fashion show we held in London.

Of course, the best collaboration is with children.

They are ruthless and honest, but full of energy and fun.

This is a library I designed for the Robin Hood Foundation.

And I must say I spent time working with these kids in the Bronx.

And instead of me working with them, they taught me how to be cool.

I don't think they succeeded, but they told me.

They said, "Stop saying sorry, say sorry."

(Laughter) Then I said, "This is all good, but I want to paint like a real painter."

Education in America is very expensive.

I was in India, walking down the street and saw a sign painter.

And they make huge paintings, and they look really good.

And wondered how they did it from so close.

So one day I had the chance to meet one of them, and I asked him, "How do you draw like that? Who taught you?"

And he said, "Oh, it's so easy. We can teach you, but we're leaving town because sign painters are a dying collective of artists because digital printing has completely replaced and taken over them."

I started a company saying I would support them in exchange for an education in painting.

Since then, I have continued to paint here and there.

This is a painting of my wife in my apartment.

This is another picture.

And in fact I started painting everything and sending it all over town.

Since mentioning his wife, the most important collaboration is Netra with her.

Netra and I met when she was 18 years old.

I was 19 and a half at the time, I think, and it was love at first sight.

i used to live in india She lived in America.

She came to visit me every two months and then I said I was a man, I was a man, and I had to give it back.

I must travel the seven seas and come to meet you.

I did it twice and went bankrupt.

So I said, "Nets, what should I do?"

She said, "Would you like to send me your drawing?"

My father knows many rich people.

Try to trick them into buying it, and..."

However, after sending her the work, it turns out that her father's friends are geeks, just like most of you.

just kidding.

(laughs) No, they were really big geeks and didn't know much about art.

So Netora ended up holding 30 of my paintings.

So what we did was rent a little van and drive it all over the East Coast trying to sell it.

She reached out to anyone who would buy my work.

She made enough money, sold all her collections, made enough money to run me as a lawyer, a firm, and everything else for four years, and became my manager.

That's us in New York.

One thing to note, we are equal here.

Something happened along that line.

(Laughter) But this has been a huge success for me, thanks to Netra managing my career.

I was really happy. I considered myself a bit of a rock star.

I loved being the center of attention.

This was the only press we received, and we said, "It's time to celebrate."

And I said the best way to celebrate is to marry a Netra.

I said, "Let's get married."

And I said, 'It's not just marriage. Let's invite all the people who have helped us, who have bought our work.'

Believe it or not, we created a list of 7,000 people who made a difference. It's a ridiculous list, but I was determined to bring them to India. So many of them were in India.

150 artists helped me with my wedding.

Fashion designers, installation artists, models, makeup artists, jewelry designers, all sorts of people worked together to turn my wedding into an art installation.

And I did a special installation in honor of my parents-in-law.

I had a vegetable sculptor do it.

But all this excitement ended up writing about us in the press.

We were in the newspapers and are still in the news three years later, but unfortunately soon after, something tragic happened.

My mother became seriously ill.

I love my mother, but suddenly I was told that she was going to die.

And they said they had to say goodbye to her and do their thing.

And I was devastated.

I had booked another year's worth of shows.

I was high

And I couldn't. I couldn't

My life has never been vibrant.

I could never have lived a life-size human being like this.

I began exploring the dark abscesses of the human heart.

Of course my job got ugly, but something else happened.

I lost my audience.

The Bollywood stars I used to party with and buy my work from disappeared.

Collectors, friends, press, everyone said, "I'm happy, but thank you."

"No, thank you" was more like it.

But I was painting my work intuitively, and I wanted people to feel my work actually intuitive.

If they want beauty, this is the beauty I am willing to give you, I said. It's politicized.

Of course, no one liked it.

My work has also become autobiographical.

At this point, something else happened.

A very dear friend of mine came out of the closet. It was illegal to be gay in India at that time. I'm sick of seeing people's reactions to being gay.

i was very upset.

I remember when my mother dressed me in girl clothes because she wanted a girl, even though we only had boys.

(Laughs) Anyway, I don't know what my friends will say after this story.

that's a secret.

So after this my work became a little more violent.

I talked about this masculinity that doesn't have to be played.

And talked about the weakness of male sexuality.

This time, not only was my collector gone, but political activists decided to banish me, threaten me, and ban me from exhibiting.

It got messy and made me a bit of a chicken.

It cannot deal with any threat. This was a big threat.

So I decided to finish it and go home.

I said let's try something different this time.

You must be born again.

And, as most of you who have children know, I thought the best way to start a new life was to have children.

I decided to have a child and quickly found out what could go wrong before that.

How can a family become dysfunctional?

And Rudra was born.

That's my little son.

And after he was born, two magical things happened.

My mother miraculously recovered after major surgery and this man was elected president of this country.

You know, I was sitting at home watching.

With tears in my eyes, I said that was the place I wanted to go.

So Netra and I decided to end our lives, close everything we had, and move to New York.

And this was exactly eight months ago.

Back in New York, my job changed.

Everything about my job got weirder.

This work is called "What the Sex Was I Thinking?"

We are talking about spiritual incest.

You know, I might look like a very sweet, clean, and sweet boy.

But I'm not. I can think of anything

But I assure you that I am acting very politely.

(Laughter) These are just different cartoons.

And before that, I want to tell you a little story.

I was talking to my mom and dad this morning and my dad said, "I know you have a lot to say, but I have to talk to my kids about work."

So I said, okay.

I am involved with children all over the world. That's a whole other story, but I'd like to leave you with one story that really, really inspired me.

I met Belinda when she was 16 years old.

I was seventeen.

I was in Australia and Belinda had cancer and was given a life expectancy.

In fact they told me 3 weeks.

I walked into her room and there was a shy girl, she was bald and was trying to hide her baldness.

I took out my pen and started drawing on her head and drew a crown for her.

Then we started talking and had a lovely time. I told her how I came to Australia, how I backpacked and cheated, how I got the tickets and everything else.

And I drew it for her.

and i left.

Belinda died and within days of her death the government published a book for her and used my cartoon on the cover.

And she wrote a little note and said, "Hi Laguz, thank you for traveling around the world on your magic carpet."

For me, my art is like riding a magic carpet.

We hope that you will get on this magic carpet, touch the children, and be honest with them.

Thank you very much.

(applause)

Everyone talks about happiness these days.

When I asked them to count the number of books with the word "happiness" in their title published in the last five years, I stopped after about 40, but there were many more.

There is a growing interest in well-being among researchers.

Happiness coaching a lot.

Everyone wants to make people happy.

But despite this flood of work, there are some cognitive traps that make it nearly impossible to think straight about happiness.

And my talk today will be mostly about these cognitive traps.

This applies to ordinary people who think about their own well-being, and it applies to academics who think about their well-being. Because it turns out that we are just as messed up as other people.

The first of these traps is the reluctance to admit complexity.

It turns out that the word “happiness” is no longer a useful word because it has been applied to so many different things.

I think there is one particular meaning that we can limit it to, but by and large this is something we will have to give up and adopt a more complicated view of what happiness is.

The second trap is the confusion of experience and memory. Basically, it's somewhere between being happy with your life and being happy with your life or being content with your life.

And these are two very different concepts, both wrapped up in the concept of happiness.

And the third is the delusion of concentration, the unfortunate fact that we cannot think of any situation that affects our well-being without distorting its significance.

So this is a real cognitive trap.

There is no way to get it right.

Now, I would like to start with the example of someone who had a question and answer session after one of my lecture stories was reported. And it was a story. He said he listens to symphonies. And it's all great music, with a horrible screeching sound at the end of the recording.

And he added, really very emotionally, that it ruined the whole experience.

But it wasn't.

What it ruined was the memory of the experience.

he had that experience.

He listened to great music for 20 minutes.

The memories remained with him, and they were of no value. Memories were ruined and all he had left was them.

What this tells us is that we may think of ourselves and others in terms of two selves.

There is an experiential self that lives in the present, knows the present, and can relive the past, but basically there is only the present.

It is you experiencing yourself that the doctor approaches - you know, when the doctor asks, "Does it hurt to touch here?"

And then there is the remembering self, and the remembering self is the one that keeps score and keeps the story of our life, the one that comes to mind when the doctor asks, "How are you feeling these days?"

Or "How was your trip to Albania?" or something like that.

These are two very different beings, the experiencing self and the remembering self, and getting confused between the two is part of the confusion about the concept of happiness.

Now, the remembering self is the narrator.

And it actually starts with the basic reactions of our memory. It starts right away.

We don't just tell stories when we try to tell stories.

Our memories tell us stories. So what we get from experience is a story.

Let's start with an example.

This is old research.

These are real patients undergoing painful procedures.

I won't go into details. It's less painful these days, but it was painful in the 1990s when this study was done.

They were asked to report pain every 60 seconds.

I have two patients here. These are their records.

And you are asked, "Which of them suffered more?"

And it's a very simple question.

Clearly, patient B was in more pain. His colonoscopies were longer, with patient A and patient B pain lasting every minute.

But here another question arises. "How much did you think these patients had suffered?"

And here is the surprise.

Surprisingly, patient A remembered the colonoscopy much worse than patient B.

Because the colonoscopy story is different and a very important part of the story is how it ends.

And neither of these stories are very moving or great. But one of them is so peculiar... (laughter), but one of them is clearly worse than the others.

Even worse is when the pain peaks at the very end. That's bad news.

How do we know that?

Because we asked these people after the colonoscopy and even long after, "How bad was it overall?"

And in my memory, A was much worse than B.

Now, this is a direct conflict between the experiencing self and the remembering self.

From my experience point of view, B was clearly worse.

Now, what can we do for Patient A? You can actually extend Patient A's colonoscopy by simply leaving the tube in without too much agitation.

It causes the patient to suffer, but only slightly less than before.

And if you do that for a few minutes, patient A's experience of him/herself will be much worse, and patient A's memory of him/herself will be much better. Because I can give Patient A a better story about her experience.

What defines a story?

And that's true of the stories that memory tells us, and it's true of the stories that we make up.

What defines a story is the changes, the key moments, and the ending.

The ending is very important and in this case the ending dominates.

Now, the experiencing self is continuously living its life.

Moments of experience are born one after another.

And you can also ask: "What happens in these moments?"

And the answer is really simple. they are lost forever.

So, I calculated that most moments in our lives have a psychological present length of about 3 seconds. That means, as you know, there are about 600 million of them in a lifetime. About 600,000 per month, most of which leave no trace.

Most of them are completely ignored by my remembering self.

Yet somehow you get the sense that they should matter and that what happens in these moments of experience is our life.

It is a finite resource that we consume while on this planet.

And while how we use it seems to matter, it's not the story we keep for us in memory.

So we have a remembering self and an experiencing self, which are actually quite different.

The biggest difference between the two is how they handle time.

From my experience perspective, if you have a vacation and the second week is as good as the first, then two weeks vacation is double the one week vacation.

It doesn't quite work for me as I remember it.

For myself who remembers, a two week vacation is slightly better than a one week vacation because it doesn't add new memories.

The story hasn't changed.

Thus, time is actually the key variable that distinguishes the remembering self from the experiencing self. Time has little effect on the story.

Now, the remembering self does not just remember and tell stories.

In fact, it is the doctor who makes the decision. Because, for example, if a patient has had colonoscopies done by two different surgeons and is deciding which one to choose, the surgeon who has a better memory will choose that surgeon.

The experiencing self has no say in this choice.

In fact, we do not choose among our experiences, but among our memories of our experiences.

And even when we think about the future, we usually don't think of our future as an experience.

We think of our future as an anticipated memory.

And basically, this can be seen as the tyranny of the remembering self, which can be thought of as dragging the experiencing self through experiences that the experiencing self does not need.

I feel this is the case very often when we go on vacation. I mean, we take vacations for our remembered selves, to a large extent.

And I find this a bit difficult to justify.

So how much memory do we consume?

This is one of the explanations given for the remembered self's superiority.

When I think about it, it reminds me of my vacation in Antarctica a few years ago. It was clearly the best vacation I have ever had. I think of it relatively often compared to how often I think of other vacations.

And I've probably consumed the memory of a three-week trip of maybe 25 minutes or so over the past four years.

Well, opening a folder with 600 photos would have taken another hour.

Well, that's three weeks, an hour and a half at most.

There seems to be a discrepancy.

Now, I might be a little extreme in that I don't have much of a desire to consume memory, but even if I do do more of this, there's a genuine question: Why do we put so much weight on memory compared to experience?

So let's consider a thought experiment.

Imagine that on your next vacation, you know that at the end of the vacation all your photos will be destroyed and you will be administered amnesiac drugs so that you don't remember anything.

Now, would you choose the same vacation? (Laughter) And if you were to choose a different vacation, there would be a conflict between the two of you, and you would have to think about how to judge that conflict, and it's not really obvious at all. Because if you think about it in terms of time, you'll get one answer, but if you think about it in terms of memories, you might get another answer.

Why we choose vacation is a question that leaves us with a choice.

Now, the two selves bring up two concepts of happiness.

There are actually two concepts of happiness that we can apply, one that applies to ourselves.

So you can ask: How happy are you experiencing yourself?

And you would ask: How happy are you in the moment of your life you are experiencing?

And all of them, instant happiness is a rather complicated process.

What are measurable emotions?

And by the way, we now have a much better understanding of the self-happiness we are experiencing over time.

If you want your own happiness that you remember, that's a whole other thing.

This is not about how happy a person lives.

It is how satisfied or happy a person is when he thinks about his life.

It's a completely different concept.

Anyone who does not distinguish between these concepts will ruin the study of happiness, and I belong to the group of happiness students who have been ruining the study of happiness in exactly this way for a long time.

The difference between experienced self-happiness and remembered self-satisfaction has been recognized in recent years, and efforts are now being made to measure the two separately.

The Gallup organization conducts global polls that ask more than half a million people what they think about their lives and about their experiences, and others are doing the same.

So in recent years we have begun to learn about the happiness of two people.

And the main lesson we learned is that they are actually different.

You can tell how happy someone is with their life, but that alone doesn't tell you much about how happy they are, and vice versa.

Correlation is around 0.5 to give a sense of correlation.

What that means is, if you meet someone and they say, "Oh, his father is six feet tall," how much do you know about his height?

We know something about his height, but there are a lot of uncertainties.

I have so much uncertainty.

If someone said they ranked their life an 8 on a scale of 10, they would have a lot of anxiety about how satisfied they were with what they were experiencing.

Therefore the correlation is low.

We know something about what controls our happiness satisfaction.

We know money is very important and goals are very important.

We know that happiness is primarily about being content with and spending time with people you love.

There are other hobbies, but this one dominates.

So if you want to maximize the happiness of two people, you end up doing something completely different.

The point I made here is that happiness should not be taken as a substitute for happiness.

It's a completely different concept.

Now, another reason why we can't think straight about happiness is that we don't pay the same attention when we think about life, and when we actually live.

So asking a simple question about how happy people in California are doesn't give the right answer.

When you ask that question, you might think that if you live in Ohio, people must be happier in California.

(Laughter) And when you think about living in California, you think about the contrast between California and other places. That contrast is in the climate, for example.

Well, I've found that the climate is less important to the experiencing self, and less important to the introspective self that determines how happy people are.

But now that the introverted self is in control, some may end up moving to California.

And it's kind of interesting to follow what happens to people who move to California in hopes of being happier.

Well, it's not that their selves experiencing are happy.

we know that

But something happens. They will think they are happy. Because when I think about it, it reminds me of how bad the weather was in Ohio and makes me feel like we made the right decision.

It is very difficult to think straight about happiness, but I hope you understand how difficult it can be.

thank you.

(Applause) Chris Anderson: Thank you. I have a question.

Thank you very much.

Well, a few weeks ago when we spoke on the phone, you mentioned some very interesting results from the Gallup survey.

We still have some time left, so could you share about that?

Daniel Kahneman: Absolutely.

I think the most interesting finding from Gallup's research is a number we didn't expect at all.

We have found it in terms of experiencing self-happiness.

I tried to see how my feelings changed depending on my income.

And since Americans make less than $60,000 a year, which is a very large sample of 600,000 Americans, it turned out to be a large representative sample. You earn less than $600,000 a year...

California: 60,000.

DK: 60,000。

(Laughter) At $60,000 a year, people are unhappy, and the poorer they are, the more unhappy they become.

Beyond that you get a perfectly flat line.

I mean, I've rarely seen a line this flat.

Clearly, what is happening now is that money cannot buy experiential happiness, but lack of money certainly buys unhappiness, and we can measure that misery very clearly.

As for the other self, the remembering self, we get a different story.

The more money you make, the more satisfaction you get.

That doesn't apply to emotions.

CA: But Danny, the whole American effort is about life, liberty, the pursuit of happiness.

If people take the findings seriously, it seems to upset everything we believe in, such as the tax system.

Is it possible that politicians, and the country as a whole, would take such findings seriously and base public policy on them?

DK: I think there is recognition of the role of happiness surveys in public policy.

Recognition will be delayed in the United States, no doubt about it, but it is happening in Britain, and it is happening in other countries.

People are realizing that when they think about public policy, they need to think about well-being.

It will take some time, and people will debate whether they want to study happiness experiences or life appraisals. So we have to have that discussion pretty quickly.

How you increase your well-being depends a lot on how you think and whether you think about yourself in memory or in experience.

I think this is going to have an impact on policy in the next few years.

In the United States, efforts are being made to measure the experiential well-being of the population.

I think this will be part of national statistics within the next 10-20 years.

CA: Well, it seems to me that this is, or at least should be, the most interesting policy debate to follow over the next few years.

Thank you so much for inventing behavioral economics.

We talk - mine - a new lecture just for TED - and I'm going to show you some illusions we've created for TED and try to relate this to happiness. What I was thinking about happiness, what brings happiness, which I see as joy in a particular field, I think there is something very fundamental about it. and i was thinking about this. And that in both the illusions and movies, jokes and magic shows we go to see, there is something that defies our expectations in some kind of fun way. Go see a movie. And it has unexpected twists and turns that you didn't expect to get a fun experience. See such illusions in my book and it's not what you would expect. And there is something to be happy about. And it's the same for jokes and all sorts of other things. So what I'm going to do in my lecture is go a little further and see if I can satisfy your expectations. I mean, being disappointed is sometimes not fun, but I'm going to do it in a fun way, in a very primitive way, and try to make the audience here happy.

So here are some ways to subvert your expectations. First of all, I would like to show you a special illusion here. When the popup appears on your screen, first notice that the two holes are at right angles to each other. These are all perceptual tricks. These are the actual objects that I will show you. Now I will explain how it is done. I looped the film here for a very interesting experience. I want you to see how this illusion is constructed, and it spins so you know it's inside out. Now see how quickly your perception snaps as the rotation returns. okay now

Watch it spin again. And this is a very bright audience, okay? Even if you know it's 100% true, see if you can prevent it from happening. It cannot be undone. What does it tell you about yourself? I will do it again. no mistake. See if you can prevent that from happening. No, it's difficult.

And we can fall short of your expectations in many ways with expressions, shapes, colors, etc., but it's very primal. And it's an interesting question to think about why these things make us happy. why are they happy? So this is what Lionel did some time ago. I love little things like this.

Again, this is not an optical trick. Here's what you see. In other words, it's not a camera cut. It's a trick of perception.

OK. It may disappoint the customer's expectations regarding the shape.

We can fall short of your expectations when it comes to representation, or what the image represents. what do you see here?

How many people are watching dolphins here? Raise your hand if you see dolphins. OK, those who raise their hands, then the rest of the audience please talk to them, okay? In fact, this is the best example of empirical priming as far as I can tell.

If you're a kid under the age of 10 who hasn't been ruined yet, you'll see dolphins when you look at this image. Now, some of the adults here are saying, "What's a dolphin? What's a dolphin?"

But actually, if you flip the ground in the figure, the dark area here, I forgot to ask for the pointer, you'll see a whole bunch of little dolphins when you flip it. By the way, if you're a Caltech student, they also tend to just watch dolphins. It's based on experience.

Well, this is also a design story after all, so you can use something like this. This is done by Saatchi and Saatchi, and in Australia this ad actually sidestepped the issue. Looking at this beer ad, you can see that all of these people are in some kind of provocative position. But they let it pass and they actually won a Clio award, so it's interesting how they can do something like this.

Keep things like that in mind, uh. This is a joke I made when the Florida poll was on. Count Gore points. Count the points on the bush. Count again...

You can also betray your expectations of the experience. This is an outdoor fountain I made with some friends, but you can stop the water drop by drop and actually make all the drops float. This is what we are building for amusement parks and things like that.

Now let's take a still image. can you see this?

Can you see the middle section moving down and the outer section moving up? Completely static.

A still image. How many people have seen this illusion? Completely static.

right. Now, the interesting thing is when you look at the image you see color, depth and texture. And you can watch and analyze this whole scene. You can see that the woman is closer than the wall etc. But actually the whole thing is flat. It is painted. It's a deceptive picture.

And it was such a good trompe l'oeil that I was annoyed when people tried to talk to her and she didn't respond.

Well, you can make a design mistake. Like this building in New York. When viewed from this side, the balcony appears to lean upward, and when turned to the other side, the balcony appears to descend. Therefore, there are cases where mistakes are made in designs that incorporate illusions.

Alternatively, take this special raw photo. Interestingly, I get a lot of emails from people asking, "Are there any perceptual differences between men and women?"

And I really say no. I mean, women can navigate the world just like men, so why not? But this is the illusion that women are always better than men. I mean, it's about which head to match, because women rely on fashion tips. You can match it with a hat.

Now let's get to the part -- I want to show you the design in an illusion. I believe the first example of the deliberate use of illusion was this anamorphic eye image by Da Vinci. It looked like this from a slight angle. This little technique was popularized in the 16th and 17th centuries to hide hidden meanings. This way the image can be flipped and viewed from a smaller perspective.

But these are the early incorporations of the illusion that brought to something like the high point of Hans Holbein's "Ambassadors." And Hans Holbein was working for Henry VIII. It hangs on the wall that leads down the stairs, where you can see this hidden skull.

Now, let's take a look at some of the designers who use illusions to give an element of surprise. One of my favorites is Scott Kim. I worked with Scott to create some illusions for TED. I hope you enjoy it. Here's something about TED and happiness.

okay now Arthur [Gunson] hasn't spoken yet, but it's going to be a fun talk and he's got some really great machines of his out in the open. So we at Scott have created a wonderful tribute to Arthur Gunson.

Well, we have analog and digital. I thought it was appropriate here.

The figure then falls to the ground.

And for musicians too.

And, of course, happiness, so we want to bring joy to the world.

Now, another great designer, he is very well known in Japan, Shigeo Fukuda. And he made some great stuff. This is just amazing. It's a pile of junk that, at certain angles, looks like a perfect piano in the mirror.

A pianist turns into a violinist.

This is really wild. Forks, knives, spoons and various cutlery welded together. A shadow of a motorcycle appears. You can learn something by doing something similar to me. It means that there are people in the world who have a lot of time on their hands.

Ken Knowlton makes amazing composite images, such as creating Jacques Cousteau out of seashells. The shells are not modified, just rearrange the shells. He played Einstein with dice, after all, because Einstein said, "God does not roll dice against the universe." Bert Herzog walks out of an unretouched keyboard. Will Shortts, Crossword Puzzles. John Cederquist created this wonderful trompe l'oeil cabinet.

Well, I'm kind of running (from the back), so skip ahead. I would like to show you a new type of illusion that I have created very soon. I tried to do something with a Pixar-type illusion. I see children about the same size running down the hallway. I have two table tops of the same size.

They are looking in two directions at the same time. The big part fits the small part. And that's what you should be thinking about, okay? Here you can see that the larger part fits inside the smaller part. does everyone see that? It is impossible. You can see that the two children are looking out in two different directions at the same time. Now, can you believe these two table tops are the same size and shape?

So if you measure it, it does. And like I said, these two figures are the same size and shape.

And what's interesting is how powerful the illusion becomes by doing this with such a rendering method. Either way, I hope this brings you a little joy and happiness. If you want to see more cool effects, see you outside. I would appreciate it if you could show me a lot.

So all I'm going to do is present the latest episode of Cricket, India's and possibly the world's longest-running soap opera.

And may it last forever. Because it gives people like me a living.

It has everything you want in a regular melodrama. Love, joy, happiness, sorrow, tears, laughter, lots of deceit and intrigue.

And like all good soaps, that span jumps by 20 years when audience interest shifts.

And that's exactly what cricket did.

It's been 20 years since we entered the 20 over game.

That's what I'm going to talk about, how small changes can lead to big revolutions.

However, this was not always the case.

Cricket has not always been a speed-oriented game across generations.

There was a time when you played cricket, played timeless test matches, and played until the match was over.

There was this match in March 1939, which started on March 3rd and ended on March 14th.

And it only ended because the British cricketers had to make a two-hour train journey from Durban to Cape Town to board the ship that left on the 17th, because the next ship hadn't come for a long time.

So, the game ended in the middle.

Then one of the English batsmen said:

With 30 more minutes we would have won. ”

(Laughter) 12 days later another 30 minutes.

There were two Sundays in between. But of course we don't play on Sundays because Sunday is church day. And then one day it rained, so they all sat down and became friends with each other.

But there's a reason why Indians fell in love with cricket. That's because our pace of life was almost the same.

(laughs) It was the same with Mahabharata.

They fought during the day, but when the sun fell, they all went home.

And then you strategized, came the next day, fought, and went home again.

The only difference between Mahabharata and our cricket was that in cricket everyone lives to come back and fight the next day.

The princes patronized the game not because they liked it, but because it was a way to impress the British rulers.

But there is another reason why India fell in love with cricket. All you need is a wooden board and a rubber ball, and it can be played anywhere and by any number of people.

please look. You can play in the rubbish dump with stones there, or you can play in the small alley. I couldn't hit the square anywhere because the bat hit the wall. Don't forget air conditioners and cable wires.

(Laughter) We can also perform on the banks of the Ganges. It is as clean as the Ganges has been clean for a long time.

Alternatively, you can play many games on one small piece of land, even if you don't know which game you're actually in.

(Laughter) As you can see, you can play anywhere.

But the game slowly progressed and finally progressed.

We don't always have 5 days. So we went ahead and started playing 50 overs cricket.

Then a big accident happened.

In Indian sport, instead of making things happen, accidents happen and sometimes you are in the right place at the right time.

And we won the 1983 World Cup.

And suddenly we were hooked on a 50-over game and played it virtually every day.

There were more 50-over crickets than anywhere else.

But there was another important date.

1983 was the year they won the World Cup.

In 1991-92, we found finance ministers and prime ministers who wanted the world to see India instead of the great intrigue and mystery of this closed country.

So we allowed multinational companies to enter India.

We have cut tariffs and cut import taxes. And we had multinationals enter multinationals and have them participate with multinational budgets. Focusing on per capita income, they were very excited about India's potential and were looking for a way to reach all Indians.

And there are only two vehicles in India. One is real and the other is scripted.

What was written in the script was what you see in the movies, what was actually cricket.

And one of my friends sitting here in front of me, Ravi Dhaliwal of Pepsi, decided to take it all over the world.

It was a big revolution because Pepsi started embracing cricket all over.

And cricket started to get big. Cricket began to bring wealth.

TV started picking up cricket. For a long time, television has said, 'I won't cover cricket unless I'm paid to cover it'.

Then they said, 'Okay, the next right sells for $55 million.

The following rights are sold for $612 million. ”

So it's a little curved, that.

Then another big accident happened in our cricket.

England invented 20-over cricket and said "the world must play 20-over cricket".

Just like England invented cricket and made other countries play cricket.

Thank God.

(laughter) So India had to compete in the T20 World Cup.

India did not want to compete in the T20 World Cup.

However, we were forced to play by a large margin of 8-1.

And then something very dramatic happened.

We made it to the finals, and this moment will last forever, see you all.

(Crowd cheers) Pakistani batsman trying to drive off a fielder.

Announcer: Zhushan accepts it! India wins!

A match worthy of the finals of Twenty20.

World Champion India.

(Cheers) India, T20 champions.

But our match was great, M.S. Dhoni scored it in the air, but Misbah ul Haq was a great player.

Massive success: TT World Champions India.

Harsha Bogle: India suddenly discovered the power of 20-over cricket.

The accident there, of course, was that the batter thought the bowler was bowling fast.

(Laughter) If he had bowled faster, the ball would have gone where it should have gone, but it didn't. And suddenly we realized that this game could be good.

And it also led to a kind of pride in the fact that India could be number one in the world.

At a time when investment started pouring in, India started to feel a little more confident about itself.

And there was a sense of great pride in what we were able to do.

And thankfully for all of us, the British are so good at inventing things, and they're benevolent people, that they've made it possible for the world to invent it.

(Laughter) So Britain invented the T20 cricket and allowed India to hijack it.

Instead of re-engineering as in the medical field, we adopted it as is.

(Laughter) So we launched our own T20 league.

Six weeks, city to city.

It was new to us. The only time we have ever helped our country is in areas where India is very proud of it and represents it on the field.

One is war with the Indian army, which we don't want to happen.

Another was Indian cricket.

Well, I'm going to support the city league in a hurry.

But the people who attended these city leagues were those who took their cues from the West.

America is the home of the league. And they said, 'Yes, let's build a glitzy league here in India.'

But was India ready for it?

Because cricket has always been organized in India for a long time.

It was never advertised and never sold. It was organized.

And see what they did with our beautiful, wonderful and simple family game.

Suddenly something like that happened.

(music) Opening ceremony in tune with each other.

This was an Indian who was buying a Corvette. India was buying the Jaguar.

India added twice as many mobile phones as New Zealand's population each month.

It was a different India.

But it was also a slightly more orthodox India that was very happy to be modern but didn't want to tell people about it.

So when the cheerleaders arrived, they were taken aback.

Everyone was secretly observing them, but everyone claimed otherwise.

(music) (laughter) Indian cricket's new owner was no prince of old.

They weren't bureaucrats who were forced into sports because they didn't actually like them. They were people who ran serious companies.

So they started to hype up cricket, and they started to hype up clubs.

And they started the promotion against the backdrop of a huge amount of money.

So by the time the ball was thrown, the IPL had $2.3 billion, $1.6 billion in TV revenue over the decade, and another $70 million from all the franchises that were funding it. And they had to appeal to their cities, which had to be the same as in the West, right? Because we are building a league.

But what they did very well was localize it very well.

So let me give you an example of how they did it - not a Manchester United style promotion, but a very Mumbai style promotion. please look.

(music) Of course, a lot of people said, 'Maybe they can dance better than they can play'.

(Laughter) But that's okay. It has also changed our view of cricket.

If you want a young cricketer, you used to pick him up from your own little neighborhood, your own city bylane, and be very proud of the system that produced those cricketers.

Now all of a sudden, if you're bowling a shot, let's say Mumbai bowling a shot, they don't have to go to Kalbadevi or Shivaji Park or any sourcing place, they can go to Trinidad.

This was the new India. This was a new world where you could source the best product from anywhere as long as you got it at the best price.

And suddenly, the Indian sports world woke up to the reality that they can source the best products at the best prices anywhere in the world.

So the Mumbai Indians flew in Dwayne Bravo overnight from Trinidad and Tobago. And when he had to return as representative of the West Indies, they asked him, "When must I arrive?"

He said, "I have to go home on time, so I have to go home today."

We said, "No, no, no. It's not a question of when we have to leave, it's a question of when we have to get there."

So he said, "I have to arrive by date X."

Then they said, "Okay, I've played X days, so I've subtracted 1."

So he played in Hyderabad and immediately after the game he went from the stadium to Hyderabad airport and got on a private jet, refueling first in Portugal and second time in Brazil. He was eventually in the West Indies.

(Laughter) I don't think India has ever thought about it on such a scale.

India would never have said, ``I just want a player to play one game.

And I just thought to myself, "Wow, have we arrived somewhere in the world?"

we have arrived somewhere We think big. ”

But this was also the beginning of bringing together two of the most important things in Indian cricket: cricket and cinema in Indian entertainment.

There is cricket and movies.

And they got together because the people in the movie started owning clubs.

And people started going to cricket to see Preity Zinta.

They started playing cricket to watch Shah Rukh Khan.

And then something very interesting happened.

We started singing and dancing with Indian cricket.

And it became more and more like an Indian movie.

And of course, if you were on Preity Zinta's team, you'll get a hug from Preity Zinta if you do well, as you can see in the clip below.

That was the ultimate reason it worked. Look -- everyone is watching Preity Zinta.

(music) And of course Shah Rukh was playing the audience in Kolkata.

We have all seen games in Kolkata but never seen anything like this. Shah Rukh thrilled the audience with Bengali songs for Kolkata - not for India, but for Kolkata.

But look at this.

(music) An Indian movie star who hugs a Pakistani cricketer because he won in Kolkata.

Can you imagine?

Do you know what the Pakistani cricketer said?

(Applause) "I wish I had played for Pretty Jinta's team."

(Laughter) But I thought I would take advantage of this opportunity. There are some people here from Pakistan.

I'm so glad you're here because I think we can prove that we can be friends together, right?

We can play cricket together and we can be friends.

Thank you very much for coming from Pakistan.

(Applause) Some criticized, "Are players being bought and sold?"

Grain?

are they cows? ”

because of this auction.

How do you price players?

And at the auction that followed, people literally yelled, "Burn! Millions of dollars for every player!"

there it is.

(music) Auctioneer: Going for $1,500,000. Chennai.

Shane Warne sold for $450,000.

HB: Suddenly we have a game where players can earn 50 rupees per day. So, 250 rupees in a test match, but only 200 rupees if you finish it in less than 4 days.

The standard contract for the best Indian player who has played all the test matches, i.e. national team players, elite players is $220,000 a year.

Now they were receiving 500,000 for six days of labor.

Then Andrew Flintoff came over from England, got $1.5 million and came back and said, 'For four weeks I've made more than Frank Lampard and Steven Gerrard and I've made more than footballers, wow.

And where was he getting his money from? From a small club in India.

Could you imagine that day coming?

$1.5 million for six weeks of work.

That's not bad, right?

So $2.3 billion by the time the first ball was thrown.

But what India was doing was benchmarking itself against the best companies in the world, and India became a giant brand.

Lalit Modi graced the cover of Business Today.

The IPL has become India's biggest brand, but due to elections it had to move to South Africa and the tournament had to start in three weeks.

The entire tournament will be moved to South Africa after 3 weeks.

But we made it through. you know why?

Because no country works as slowly as we do until 3 weeks before the event, and no country works as quickly as we do in the last 3 weeks.

(Applause.) Our population, long thought to be a problem, suddenly became our greatest asset because more people were watching, we had a huge consumer base, and everyone was coming to watch cricket.

Also, we used to have cricket as the only sport in India, which is a shame because in India all other sports have driven the growth of cricket which is a bit of a modern day tragedy.

Now, in the final moments before departure, this has some side effects.

For a long time India was a land of poverty, dust, beggars, snake charmers, filth and Delhi. People had heard stories of Delhi Belly even before they came.

And suddenly, India became a land of opportunity.

Cricketers around the world said, "As you know, we love India. We love to play in India."

It felt so good, didn't it?

We said, "The dollar is actually very strong."

Can you imagine, the dollar is in front of you and there is no more Delhi belly there?

No filth, no beggars, no snake charmers, no one. This shows how the capitalist world is ruled.

Yes, and finally, a British game that India usurped a little bit, T20 will be the next missionary in the world.

If you want your game to spread worldwide, it has to be the shortest form of the game.

You can't take a timeless test in China and keep taking it for 14 days with no final result. It is also not possible to take the exam anywhere in the world.

That's what T20 does.

I hope it makes everyone richer and hopefully the game gets bigger and the cricket commentators have more time to do their jobs.

thank you very much. thank you.

(applause)

If I can leave you with one big idea today, it's that the total data we consume is greater than the sum of its parts. Instead of thinking about information overload, I want you to think about how you can use information to surface patterns and see trends that might otherwise be invisible.

What you're looking at here is a typical mortality graph organized by age.

The tool we're using here is a bit of an experiment.

It's called Pivot, and Pivot allows you to filter for specific causes of death, such as accidents.

And I soon found another pattern emerging.

This is because people are the most active here in the central area and the weakest here.

Taking a step back again and reorganizing the data by cause of death, we see that cardiovascular disease and cancer are commonly suspected, but not for everyone.

If you go even further and filter by age, say under 40, you'll find that accidents are actually the number one cause people have to worry about.

Looking more closely, this is especially true for men.

So you get the idea that presenting information or presenting data in this way is a lot like swimming through an infographic of living information.

If you can do this for your raw data, why not do it for your content as well?

Here are every Sports Illustrated cover ever made.

Everything is here. It's all on the web.

When you're done with my story, go back to your room and try this out.

Pivot allows you to dig into 10 years.

You can drill down on specific years.

A specific problem can be tackled immediately.

So I'm looking at this Look at the athletes featured in this issue.

I'm a fan of Lance Armstrong, so go ahead and click there and it will reveal all the issues Lance Armstrong has been involved with.

(Applause.) Now, if you want to take a peek at all of this, you might be thinking, "Why don't we look at cycling as a whole?"

So I can step back and expand on that.

And now we meet Greg Lemon.

And you get the idea that when you navigate information in this way—narrow and wide, back and forth—you're not searching or browsing.

I'm actually doing something a little different.

We think it's somewhere in between and will change how we use information.

So I'd like to speculate on this idea a little wildly.

What we've done here is take all the Wikipedia pages and put them into a small summary.

An overview therefore consists only of a brief overview and icons indicating the topic area of ​​the content.

Only the top 500 most popular pages on Wikipedia are shown here.

But even with this limited perspective, there is much that can be done.

Quickly find the most popular topical domains on Wikipedia.

I will choose my administration.

Having chosen government, I found that the Wikipedia category that most often corresponds to this is Time Magazine's "Person of the Year".

This is very important because it's an insight not contained in one Wikipedia page.

That insight is only possible when you step back and observe them all.

You can take a look at one of these specific recaps and delve into Time magazine's "Person of the Year" concept to cover them all.

If you look at these people, you can see that the majority are government officials. Some come from the natural sciences. Some come from business, like my boss, but some come from music.

And interestingly, Bono is also a TED Award winner.

So let's go, jump, and see all the TED Award winners.

So for the first time, we're navigating the web at a higher level of abstraction, rather than from page to page, as if it were actually the web.

So I want to introduce you to another thing that might surprise you a little.

I'm just referring to the New York Times website here.

Now, Pivot, this application -- I wouldn't call it a browser. It's not really a browser, but you can use it to view web pages. And we're bringing that zoomable technology to every web page like this.

So you can step back and quickly return to a specific section.

Why this is important is that you can see your entire browsing history in exactly the same way just by viewing a web page this way.

So you can drill down on what you've done over a specific period of time.

In fact, this is the state of all the demos I just described.

And you can replay some of what you saw earlier today.

And if you want to step back and see it all, perhaps your search history allows you to slice and dice your own history. Here, I was doing a relationship search looking for Bing, here looking for Live Labs Pivot.

And from these you just drill down to the web page and launch it again.

It reuses one metaphor multiple times, each time the whole being greater than the sum of its parts of the data.

So now in this world we think of data as a kind of curse.

Talk about the curse of information overload.

Talk about drowning in data.

What if we got used to the habit of actually flipping this around and turning the web upside down so that instead of moving from one thing to the next, we could move from many things to many things, we could see patterns that were hidden?

If we can do that, we may be able to actually extract information instead of getting stuck in the data.

And instead of just working with information, you can draw on knowledge.

And if knowledge is found, wisdom may also be found.

Thank you very much.

(applause)

I grew up reading science fiction all the time.

In high school, I used to ride the bus an hour each way to school every day.

And I was always into books, sci-fi books that took my mind to another world and fulfilled this insatiable curiosity that I had in the form of stories.

And, as you know, that curiosity was expressed in the fact that whenever I wasn't at school, I was out in the woods, hiking, taking "samples" (frogs, snakes, worms, pond water) and taking them home to look under a microscope.

You know, I was a real science nerd.

But it was all about making sense of the world and trying to understand the limits of what was possible.

And my love of sci-fi really seemed to be reflected in the world around me. Because what was going on, this was the late 60's and we were going to the moon and exploring the deep ocean.

Jacques Cousteau came into our living room with an amazing show that showed us animals, places and wonderful worlds we could never have imagined.

I mean, it just seemed to resonate with parts of sci-fi as a whole.

And I was an artist.

I was able to draw. I was able to draw.

And since the media world was devoid of video games and saturated with CG movies and images, I knew I had to create these images in my head.

You know, all of us, as children, read books and through the descriptions of the authors had to get into our minds something on the screen of a movie.

So my reaction to this was to draw and paint alien creatures, alien worlds, robots, spaceships and all that stuff.

I was arrested multiple times for scribbling on the back of textbooks in math class.

So creativity had to find its outlet somehow.

And then something interesting happened. I saw the Jacques Cousteau show and was very excited by the fact that there is another world on earth.

Maybe one day we won't really get on a spaceship and go to another world—that seemed pretty unlikely.

But it was a world I could really go to, here on Earth, a world as rich and exotic as I had imagined reading these books.

So when I was 15, I decided to become a scuba diver.

The only problem was that I lived in a small Canadian village 600 miles from the nearest ocean.

But I was not daunted by that.

I pestered my dad and eventually found a scuba class in Buffalo, New York, across the border from where we live.

And I actually got certified at the YMCA pool in Buffalo, NY in the dead of winter.

And for two more years, until I moved to California, I couldn't see the ocean, the real ocean.

Over the next 40 years, I have spent about 3,000 hours underwater, 500 of those hours in submersibles.

And I learned that the deep sea environment, and even the shallow sea, is incredibly rich in life beyond our imagination.

Nature's imagination is infinite compared to our meager imagination.

I am still in absolute awe of what I see when doing these dives.

And my love for the ocean continues and is as strong as ever.

But when I grew up and chose my career, it was filmmaking.

And that seemed to be the best way to reconcile the urge to tell a story with the urge to create an image.

When I was a kid, I was always drawing cartoons and things like that.

So filmmaking is a way of combining photography and story, and it made sense.

And, of course, I chose to talk about science fiction, Terminator, Alien, and Abyss.

And with "The Abyss," he combined his love of the water and diving with filmmaking.

It's about merging two passions.

An interesting thing happened in "The Abyss". It's that they actually employed computer-generated animation, CG, to solve the film's specific narrative problem of creating these sorts of liquid water creatures.

And with this, CG animation was born, the first soft-surface character in the history of cinema.

And even though the movie made no money at all, and I would say it was almost break even, I witnessed something amazing. That said, audiences, audiences around the world, were mesmerized by this apparent magic.

As you know, it's Arthur Clarke's law that any sufficiently advanced technology is indistinguishable from magic.

They saw something magical.

That got me so excited.

And I was like, 'Wow, this should be in cinema art.

So with my next movie, Terminator 2, I took it one step further.

We worked with ILM to create the liquid metal man in the film. Success depended on whether the effect worked.

And it happened, we created magic again, and the audience did the same. However, it made a little more money.

So I realized that when I draw the line between the two points of experience, "This is going to be a whole new world," this is going to be a whole new world of creativity for film artists.

So I started a company with Stan Winston, my best friend Stan Winston who was the best makeup and creature designer at the time. The company was called Digital Domain.

The company's concept was to leapfrog analog processes such as optical printers and move to digital production.

And we really did that and it gave us a competitive advantage for a while.

However, in the mid-'90s, we found ourselves falling behind in the area of ​​creature and character design that we were actually trying to start the company.

So I wrote this piece called "Avatar". It aims to completely push the boundaries of visual effects, CG effects, using CG-generated characters that express realistic human emotions, the main characters are all CG, and the world is also CG.

Then the envelope was pushed back and people at my company told me they couldn't do this for a while.

So I shelved it and made another movie about a big sinking ship.

(Laughter.) You know, I went into the studio and pitched, 'Romeo and Juliet on board, this epic romance, it's going to be a passionate movie.'

What I secretly wanted to do was jump into the real wreck of the Titanic.

That's why I made the movie.

(Applause.) That's the truth. Well, the studio didn't know that.

But I persuaded them. I said, 'I'm going to jump into a wreck.

I will use it in the opening of the movie.

It really matters. It would be a great marketing hook. ”

And I persuaded them to finance the expedition.

(laughs) It's crazy. But this goes back to the theme of imagination creating reality.

Because we actually created the reality that six months later we were in a Russian submarine 2.5 miles downstream in the North Atlantic, looking through the viewport at the real Titanic.

It's neither cinematic nor HD -- it's true.

(Applause) Well, it blew my mind.

It required a lot of preparation, building cameras, lights and all sorts of things.

But I was struck by how this dive, these deep dives, resembled a space mission.

As you know, this was highly technical and required a lot of planning.

You board this capsule and descend into this dark and hostile environment. There, if you can't get back on your own, there is no hope of rescue.

And I thought, "Wow, I feel like I'm living in a sci-fi movie."

This is really great. ”

So I really got bitten by the deep-sea exploration bug.

Of course, curiosity, the scientific element, that's all. It was adventure, curiosity and imagination.

And it was an experience that Hollywood doesn't give me.

Because I could imagine a creature and create a visual effect for it. But I couldn't imagine what I was seeing out the window.

On several subsequent expeditions, I saw creatures in hydrothermal vents, sometimes things I'd never seen before, sometimes no one had ever seen, things that science hadn't explained at the time I actually saw and imaged them.

So I got totally hooked on this one and had to do more.

So I actually made some kind of interesting decisions.

After the success of Titanic, I said, "Okay, I'm going to quit my day job as a Hollywood filmmaker and become a full-time explorer for a while."

So we started planning these expeditions.

And we ended up going to Bismarck to explore in a robotic vehicle.

We returned to the Titanic wreck.

We created a little bot with fiber optics involved.

And the idea was to get on board that ship and conduct an internal investigation, which had never been done before.

No one had ever seen the inside of a sunken ship. They didn't have the means to do it, so we developed the technology to do it.

So, here I am on the deck of the Titanic, sitting in a submersible, looking at a board very similar to this one, and I know the band played there.

And I'm flying a small robotic vehicle through the corridors of the ship.

When I say "I'm driving" my mind is in the car.

I felt like I was physically present inside the Titanic wreck.

And it was the most unreal kind of déjà vu experience I've ever had. Because I spent months walking around the set while making the movie, so I knew what was there before I even turned a corner before the car lights really revealed it.

And this set was an exact reproduction of the ship's blueprints.

So this was a really great experience.

And I really realized that you can actually have a telepresence experience, a robotic avatar, and then your consciousness is injected into the vehicle, this alternate form of being.

It was really, really deep.

And it might give us a little glimpse of what's going on decades after we start having cyborg bodies for exploration and other means, in the various post-human futures I can imagine as a sci-fi fan.

So, having done these expeditions, we really started to understand what was out there, such as the deep-sea vents where we had these amazing and amazing animals -- they're basically aliens here on Earth.

They live in a chemosynthetic environment.

They won't survive solar-based systems like we do.

And you're looking at animals living next to a 500 degree Celsius water column.

You think they shouldn't exist.

At the same time, I also became very interested in space science. This is also the influence of SF when I was a child.

And then I ended up getting involved in the space community, getting really involved with NASA, being on NASA's advisory board, planning a real space mission, going to Russia, going through pre-astronaut biomedical protocols, etc., and actually going and flying to the International Space Station with a 3D camera system.

And this was charming.

But what I ended up doing was taking space scientists to the deep sea.

And then they took them down so they could be accessed by astrobiologists, planetary scientists, and people interested in these extreme environments, and they lowered them into vents to look at, take samples and test instruments, and things like that.

So here we were making documentary films, but we were really doing science, we were really doing space science.

Ever since I was a kid, I've completely closed the loop between being a sci-fi fan and actually doing this work.

I learned a lot during this journey of discovery.

I learned a lot about science. But I also learned a lot about leadership.

Now you're thinking that a director should be a leader, a leader, a captain of a ship, or something like that.

I didn't really learn about leadership until I did these road trips.

Because, at some point, I had to say, "What am I doing here?"

why am i doing this What can we get out of it? ”

We're not making money off this shit show.

Almost no break-even point. No fame there.

People seem to think I'm somewhere between Titanic and Avatar, sitting on the beach and polishing my nails.

We made all these films and made documentaries for a very limited audience.

No fame, no glory, no money. what are you doing

You are doing it because of the work itself, because of the challenge. And the ocean is the most difficult environment on earth. Because of the thrill of discovery, and because of the strange bond that forms when small groups form close-knit teams.

Because we did these operations in groups of 10, 12, working at sea for years at a time, sometimes two or three months at a time.

And in that bond, you realize that the most important thing is the respect you have for them and they have for you, and that you have done work that cannot be explained to others.

You can't explain it to people when you come back to the shore and say, 'I had to do this, I had to do this, I had to do the fiber optics, I had to do the attenuation, this and that, and all that technology and the difficulty of working at sea, the human performance aspect. It's probably something the police or people have who went through something together during a battle and know it can never be explained.

Creates a bond, creates a bond of respect.

So when I came back to make my next movie, Avatar, I tried to apply the same leadership principles. It's about respecting the team and earning their respect in return.

And it really changed the dynamics.

So, here I am again with a small team, creating 'Avatar' in uncharted territory, devising new technologies that didn't exist before.

Very exciting.

Very challenging.

And we became a family over the course of four and a half years.

And it completely changed the way I make movies.

That's why people are commenting, "Well, you brought back marine life and put it on the planet Pandora."

For me, it was rather the fundamental way of doing business, the process itself, that changed as a result.

So what can you sum up from all this?

Do you know, what lessons can be learned?

Well, I think the most important thing is curiosity.

It's the most powerful thing you own.

Imagination is the power to actually materialize reality.

And respect from the team is more important than any accolades in the world.

I have young filmmakers come to me and say, 'Give me advice on how to do this.

And I say, 'Don't limit yourself.

Others will do it for you, don't do it to yourself, don't bet on yourself and take risks. ”

One of NASA's favorite sayings is "Failure is not an option."

But in art and exploration, failure must be accepted as an option. Because it's a leap of faith.

And no major undertaking requiring innovation has been without risk.

We must be willing to take such risks.

So the thought I want to leave you with is that whatever you are doing, failure is an option, but fear is not. thank you.

(applause)

(music) (applause) I'm John M. Chu. And I'm neither a dancer nor a choreographer. Actually a filmmaker and a storyteller.

Two years ago I directed a movie called "Step Up 2: The Streets".

who? who? yes!

During the screening of the film, I met a lot of hip-hop dancers, some of the best and most amazing dancers in the world, and they brought me into a kind of underground street culture, which surprised me.

So this is literally a human with superhuman strength and abilities.

they could fly. They could bend their elbows back.

They managed to turn their heads 80 times in a row.

I had never seen anything like it.

When I was a kid, my heroes were people like Fred Astaire, Gene Kelly, and Michael Jackson.

I grew up in a musical family.

(Laughter.) And they were kind of the ultimate heroes.

Thanks to the shy, petite, skinny Asian kids who grew up with low self-esteem in Silicon Valley, they made me believe in bigger things.

They made me think, 'I'm going to do a moonwalk at that bar mitzvah for that girl tonight.'

(Applause.) And those dance heroes seem to have disappeared, relegated to the background of pop stars and music videos.

But looking at what I've seen, the truth is they haven't gone away at all.

They are here and getting better every day.

I also improved my dance.

Dance is crazy now.

Dance has no better friend than technology.

Online video and social networking...

Dancers have created a global lab for dance online. There, Japanese kids take moves from a YouTube video made in Detroit and build it within days to release a new video. Meanwhile, California teenagers are taking Japanese videos and remixing them with Philadelphia flair to create a whole new dance style in their own right.

And this is happening every day.

And from these bedrooms, living rooms and garages, with cheap webcams, lies tomorrow's world's greatest dancers.

Our Fred Astaire, our Gene Kelly, and Michael Jackson are right around the corner, but we may not have that opportunity.

So we created LXD, Legion of Special Dancers, a League of Justice for dancers who believe dance can change the world.

It's a comic book series that comes to life, but unlike Spider-Man and Iron Man, they can actually do it.

And today I will introduce some of them. So let me introduce you to some of our heroes now.

Mad Chad, Lil C, Kid David, and J. Smooth participated.

Get excited, have fun, scream, scream.

Hi everyone, this is LXD.

(Applause) (Video): Mad Chad: When people see me for the first time, I actually get a lot of different reactions.

Sometimes I think that children might enjoy it, but sometimes I am a little surprised.

And I don't know, I get a little excited about that.

(Music) (Applause) J Smooth: When I'm concentrating, I'm dancing and styling freely, but I'm actually visually making the lines of a painting and making them move.

I'm thinking of something like Transformers. It's like a panel opening and folding and folding and closing the panel.

And another one opens and closes it.

(music) (applause) Kid David: To be honest, I often don't know what's going on when I'm dancing.

Because at that point it really felt like it was my body and the music.

It's not a conscious decision, "I'm going to do this next, I'm going to do this next."

It's like another level where you can't choose anymore, just your body responds to certain notes in the music.

I got my name because I was young.

I was young when I started. I was younger than many of the people I used to dance with.

So, since I was a kid, they called me Kid David.

(music) (applause) L'il C: I tell them to make a ball and you just use that ball of energy.

And instead of throwing it out, people will think it's a clamp move, it's a clamp move.

It's not a clamping move. You try to throw it away, you throw it away, and you keep it.

Then let go, grab the tail as soon as you see it, and put it back.

And you are just taking this energy and manipulating it.

As you know, it creates power and tame it.

(music) (applause) (music) (applause)

I have a vision for each of you. And the vision I have for you guys is that when you wake up in the morning your blood boils with the thought of who you are and do what you do. Being able to literally get on your knees and thank you for the incredible luck you have given me as I go through the day. As you spend your day, you will shine and come back to life several times.

And I would humbly say that if your life is not, you are wasting your life.

Life is too short to waste.

So what I propose to do in the next 17 minutes is to give you a powerful set of tools to get you started, even though you've already used up your minute.

is that of interest to you?

Audience: Yes.

Srikumar Rao: Okay.

This is a conference about happiness, but can I just say that in some way, fashion, in some way, you give your whole life to being happy, even if it's not a conference about happiness?

Whether it's work, family, children, relationships, or whatever else you do, it's a quest for happiness.

correct?

I want you to think about the following: what do you have to have in order to be happy?

I will spend some time explaining this.

What do you have to have to be happy?

someone quick?

When you do this experiment, lots of things come to the fore: great wealth, trophy spouses, good health, lots of travel, time.

Now that you think about it, you probably have a list of things you need to have in order to be happy.

I want you to think about this: everything you can get, and again, everything you can get you can't get.

is that correct?

Therefore, great wealth can make you happy. Huge wealth could disappear tomorrow.

Many people in the financial industry are already aware of this.

Therefore, everything you got to make you happy can be gone.

where does it leave you?

Not a very nice place, is it?

I have another suggestion I would like to make to you.

What I want to suggest to you is that you don't have to have, do, or do anything to be happy.

Again, you don't have to get or do anything to be happy.

In fact, happiness is your innate quality.

it's built into you. It's part of your DNA.

I can't help but be happy.

Now, you guys are very polite, but not so polite in other forums where I speak, such as top business schools.

And always someone will articulate what many of you are thinking:

Why do I feel like my life is the worst? ”

(Laughter) And the answer is actually very simple.

You have spent your life learning to be unhappy.

Again, you have learned to be unhappy all your life.

And the way we learn to be unhappy is by accepting certain mental models.

A mental model is our conception of how the world works.

We all have mental models, and dozens of them.

We have mental models of how to find a job, how to get ahead at work, how to choose a restaurant to eat at, how to enjoy a movie...there are dozens of them.

The problem is not that we have mental models.

The problem is that we don't know that we have a mental model.

We believe this is how the world works.

And the more you invest in your mental model, the more it looks like this is how the world really works.

But it's not. It's just a mental model, and the mental model we strongly believe in is that you need to get something in order to do something.

For example, to be happy, you must have a lot of money so that you can travel to exotic places.

For us to be happy, we have to build our relationships so that we can have great sex.

These are all variations of the if-then model.

And the if-then model is, "If this happens, we'll be happy."

If I get a better job, if I get more money, if my boss has a heart attack, if I'm married, if my wife leaves me -- (laughter) if I have kids, if they grow up and go to college...

It doesn't matter what it is.

The whole concept is that if this happened I would be happy.

And at this point, the only difference between this audience is what is the specific "if" you are focusing on.

And the only thing that makes you different now than you were 10 years ago is what specific “what ifs” you were focusing on.

Think about your life 10 years ago.

Spend some time doing it.

Ten years ago, if you remember clearly, you had what you wanted.

is that correct?

It's quite possible that much of what you wanted 10 years ago is now in your possession.

is that correct?

where did it leave you?

Exactly the same place, right?

What we don't realize is that the model itself is flawed.

The if-then model -- "If this happens, I'll be happy" -- the model itself is flawed.

But instead of recognizing that the model itself is flawed, we spend a ton of time changing the "if".

"Oh, I thought being CEO would help me, but now I realize I don't want to be CEO.

I want to be a billionaire CEO and I will be happy. ”

It has its own variations on that.

But it's the model itself that's flawed, not what you put on the "if" side of the equation.

I can prove it to you.

Does anyone remember when you were confronted with a spectacle of beauty so spectacular that you were taken outside yourself to a very quiet place?

It could be a rainbow, a mountain range, a valley, or an ocean.

If you remember it, please raise your hand if possible.

Can almost everyone do that?

Have you ever wondered why that happened?

It happened because somehow, in that moment, you accepted the universe as it is.

I didn't say, "That's a beautiful rainbow, but it's a little off to the left. If I could move it 200 yards to the right, it would be even prettier."

(Laughter.) You didn't say, "It's a beautiful valley, but the trees in the foreground have too much bending."

So give me a chainsaw and 20 minutes and I'll be better off. ”

Well, the off-center rainbow was just right.

Trees with crooked branches were fine.

And the moment you accepted the universe for what it is, your habitually wanting self vanished and your innate nature of happiness surfaced and you felt it.

And I think you felt it too, because after all these years I can still remember it.

The problem is that your life right now with all the problems you have, or more precisely all the problems you think you have, is just as perfect.

But you don't accept it.

In fact, you spend all your time trying your best to change it.

you are not accepting it

And when you can't accept that, you're accepting the "if-then model" of "if that happens, I'll be happy."

And it is the model itself that is flawed.

So let me tell you how to get out of that situation, or at least how you can start taking steps to get out of it.

I would like to share that action with you.

We all live wanting to achieve something, right?

You know, we're here and we want to get something.

Alex wants the conference to be a success.

Many of you want to have a great program in place to help your company become a big success.

I want progress, I want more money, is that all right?

Each of them is a result. you want something to happen

Now I want you to think about this: Your actions are within your control to a great extent, but not entirely.

The results are completely out of your control.

OK？

Action is within your control.

The results are completely out of your control.

Has anyone noticed that when you set a goal and start working towards it, sometimes you don't achieve it, and sometimes you get exactly the opposite of what you wanted?

Has this happened to any of you?

As a friend of mine said, "Hey, I haven't paid much attention to my wife. This has to change."

So the next time we went on a business trip, he bought her a very expensive dress.

And this was his way of showing that I care about you and that great things will happen.

And when he presented the gift to his wife, her immediate reaction was, "You've been married for 20 years and you still don't know my size?"

(Laughter) "And don't you know I've never dressed like this before?"

And the next thing you know, he had a full-blown marital quarrel.

Has this happened to any of you?

You took action for a specific result, but the result you got was the exact opposite of what you wanted?

always happens.

We live in a world where the results are what we think and what we invest in.

We define our life as: I am here, this is where I want to go, these are the steps I must take to get from where I am to where I want to go, and if I succeed, life will be wonderful.

If I don't, I'm a failure, life sucks, life sucks.

truth? error?

that's how we live.

We invest in results, and as I pointed out earlier, the results are often different from what we want, and sometimes the exact opposite of what we want.

Invest in results and you're guaranteed to end up with more frustration, anxiety, and all the other worst things in life.

There are alternatives.

Alternatively, instead of investing in the outcome, invest in the process.

The best way to describe it is in the words of John Wooden.

I don't know how many people know about John Wooden.

He is very well known in the US and certainly famous among basketball fans.

He is the only person to be inducted into the Basketball Hall of Fame as both a player and a coach.

And the words he told incoming teams—he led UCLA to an unprecedented number of wins and the NCAA finals—and what he always said to new teams was never talk about winning.

He always said, "When you're done and you look in the mirror, have you done the best you can?"

And if you did the best you could, your score doesn't matter.

But if you do the best you can, I think you'll find a score you like. ”

It's an investment in the process.

What we are doing is quite the opposite.

We invest in results.

This is what I want -- oh, I want it so much, because it would make me happy to have it.

And you go all out and try to do whatever you can, but always focus on "this is the result."

Well, it's okay to focus on results.

It gives you direction.

Investing in results means that achieving a particular result depends on your well-being.

And it's a sure fail recipe.

What you can do is another.

You can invest in that process.

So this is where I am, this is where I want to be, and once I decide that's fine, I focus on the results only to the extent that it gives me direction, and then I fully invest myself in the process.

You say, "This is the step you want to take," and you put your all into it.

And if it succeeds, great.

Even if it doesn't work, that's great. Because now you have a new starting point and from that new starting point you choose a different outcome and keep going.

Then you will find that every day is fun.

Let's take an example.

And if you have children, raise your hand if you have children.

Have you ever seen a small child learn how to walk?

What happens is, this usually happens between 11 and 13 months, the child gets up, sees everyone walking, wants to walk, gets up, falls and starts crying. Mama then runs up to comfort her and kisses her to make the situation better.

She tries again and falls, but Mama runs up again.

After a while, the mother feels tired and stops running, the child stops crying, then stands up, takes a step, does not fall and takes another step, and a beautiful smile appears on her face.

And soon, usually within 24 hours, she's roaming all over the place, disrupting the arrangement of the living room.

And you know you've entered a new phase of parenting.

right?

Now imagine what would happen if every time a child fell, he said, "Oh my God, I failed again."

I'm never going to learn how to walk. ”

And you have to get counseling for her so she can deal with her feelings of inadequacy, of not achieving and failing.

If she had to see a counselor every three times, how long do you think it would take her to walk?

It is interesting.

But that's exactly what we do.

What the child is doing is focusing on the process.

She invests in process, not results.

What we are doing is quite the opposite.

As we grow older, we lose the ability to invest in processes and become more invested in outcomes.

By definition, the outcome is out of our control, and if we spend all of our emotional energy there, we will be just as drained.

But on the other hand, if you say, "Here's the result, I'm going to invest in that process and give everything I can," every day is fun and you're on track to achieve the vision I outlined.

A question I get all the time is that people say, "Professor Rao, but there is nothing that makes me passionate."

So I say, "Okay, what are you going to do?"

And they always come up with lists like this:

My job is this, my salary is this, my boss is this, my colleagues are this, my clients are this, my travel expenses are this, the size of my office is this, the depth of the carpet is this, how many windows are there, and so on.

And what I am telling them is what I want to share with you. Because all such things – first of all, they do not exist.

But secondly, even if it did, it wouldn't take half a year for you to be the same sad, miserable self you are now. Because passion exists within you.

It doesn't exist at work.

And you cannot find it outside unless you find a way to ignite it within yourself where you are.

But if you find a way to light it where you are, then you will find that the outside world rearranges itself to accommodate the new man you are becoming.

As you do so, you will notice that miracles happen regularly.

Someone you are happy to meet will appear.

A new person comes into your life.

It's so easy because all you do in life is travel.

You are here for this conference. you set out on a journey

You hang around the water cooler and talk about how bad your workplace is. you set out on a journey

Watch "Desperate Housewives" and you will go on a journey.

A woman in her 40s goes on a journey to have an affair with a gardener in her 19s while her husband plays with models.

All you do is travel.

There's nothing wrong with that, but ask yourself, "Is this the trip I want to take?"

Will this take me where I want to spend my time? ”

And once you start doing it, you will find that your life will change.

The kind of people you meet, the things you talk about, the movies you go to, the books you read all change.

And it all starts with focusing on the process.

Invest in the process, not the result.

thank you.

Last year here at TED, I asked you to give me your data and put your data on the web on the basis that if people put government data, scientific data, community data, or anything else on the web, that data would be used by other people to do amazing things they never imagined possible.

So I'm back today to show you a few things. In fact, to show that the open data movement is currently underway around the world.

Screaming "Raw data now!"

The pieces I had people make in auditoriums were heard all over the world.

Now let's stream the video.

The classic story, and one that many people first picked up, was in March — actually March 10, shortly after TED — when British government official Paul Clarke blogged, "Oh, I just got the raw data. This is about a bicycle accident."

Times Online spent two days creating maps, maps that can be mashed up (we call these things mashups). With a mashed-up user interface, you can go in and take a look and see if your bike route to work has been affected.

Again, this is traffic survey data released by the UK government. Published using the Linked Data standard, users can create maps with just a click.

Does this data affect anything? Well, let's go back to 2008.

Look at Zanesville, Ohio.

Here is a map made by a lawyer. He put waterweeds on it to show which houses were there and which were connected to the water.

He then obtained information from other data sources that indicated which houses were inhabited by white people.

Well, he felt that there was too much correlation between which houses had white people and which had running water, but the judge was not impressed either.

The judge was unimpressed with the $10.9 million sum.

It's the power to take one piece of data with another, combine them, and display the results.

Now let's look at the UK data.

This is UK government data and a wholly independent site, Where Does My Money Go.

This allows anyone to go there and dig a hole.

You can drill down by specific spending type, or explore and compare all the different regions.

So, according to UK government data, it's happening in the UK as well.

Yes, you can definitely do it here.

You can find out about recovery spending in California here.

Let's take an arbitrary example. You can go to Long Beach, California and see how much recovery money is being spent on different things like energy.

In fact, this is a graph of the number of data sets in the data.gov and data.gov.uk repositories.

And it's nice to see a great competition between the blue UK and the red US.

How can I use something like this?

For example, if you have a large amount of location data available from a zip code (something like zip code plus 4) for a particular cluster of homes, you can create and print a paper with very specific information about bus stops and especially nearby things.

On a larger scale, this is a mashup of data released on the Afghan election.

You can set your own criteria for what you want to look for.

Red circles are polling places selected by criteria.

You can then select other items on the map to see other factors such as threat level.

So it was government data.

We also talked about community generated data. I actually edited some.

This is a Wiki map, this is an Open Street Map.

"Terrace Theater" It wasn't on the map until last year's TED, so I actually put it on the map.

I wasn't the only one editing OpenStreetMap.

Each flash in this visualization put together by ITO World shows edits made to the Open Street Map in 2009.

Let's turn the world around in the same year.

All flashes are edits. Someone somewhere saw Open Street Map and realized it could be better.

You can see that Europe is buzzing with updates.

Depending on the location, it may not be as good as it should be.

Here we focus on Haiti.

A map of Port-au-Prince at the end of 2009 was as good as it could be, not as good as a map of California.

Luckily, shortly after the earthquake, the commercial company GeoEye released the satellite imagery under license for use by the open source community.

Here's a timelapse of people I'm editing in January...that's an earthquake.

Immediately after the earthquake, people all over the world, cartographers who wanted and could help, looked at the images and made maps, and rapidly built maps.

The focus is now on Port-au-Prince.

Light blue is the refugee camp these volunteers discovered from [satellite imagery].

Now you have a real-time map showing the location of refugee camps at your fingertips. This has become the perfect map to use if you are doing relief work in Port-au-Prince.

Witness the fact that it's in this Garmin device used by the Haitian rescue team.

There is a map showing the hospital on the left. Actually, it's a hospital ship.

This is a real-time map showing blocked roads, damaged buildings and refugee camps. It shows what is needed [for rescue and relief operations].

So, if you've ever gotten into it in the slightest, I just wanted to say: whatever you were doing, whether or not you were just yelling "Raw data now!"

Or, if you're putting government or scientific data online, I'd like to take this opportunity to say, "Thank you, we're just getting started!"

(applause)

Multitasking can be difficult because you only have 3 minutes, you have to speak fast, and you consume extra mental cycles.

So, 27 years ago, I was ticketed and made to think.

I had some time to think.

And energy efficiency isn't just about vehicles, it's also about roads.

Road design makes a difference, especially with intersections of two types: signalized and non-signaled, or stop signs.

50% of crashes occur at intersections.

A roundabout is much better.

A study of 24 intersections found a 40% reduction in collisions compared to changing traffic lights to roundabouts.

Injuries were down 76% and fatalities were down 90%.

But it's just safe.

What about time and gas?

That means less braking, less acceleration, less gas and pollution, less time wasted, as traffic keeps flowing, which is one of the reasons Europe is more efficient than the US.

In short, unsignalized intersections, or stop signs, are saving many lives, but their numbers are increasing excessively.

Small roundabouts are starting to appear.

This is the one in my neighborhood. And they are much better than traffic lights, much better than four-way stop signs.

It will cost you to install it, but it will cost you more if you don't install it. So let's look at it.

However, they are not applicable in all situations.

For example, consider a three-way intersection.

So it's logical that there is one on the minor road into the majors.

But the other two are a little questionable.

So here is one. I learned one more thing.

Few cars appear on that third street.

So the question is, what will that cost?

The intersection I've seen has about 3,000 cars per day in each direction, and it takes 2 ounces of gas to accelerate.

That's 5 cents per car, multiplied by 3,000 cars per day, or $51,000 per year.

It's just the cost of petrol. There is also pollution, car wear and time issues.

What is that time worth?

10 seconds per 3,000 units equals 8.3 hours per day. average wage in america

$20 per hour. That's 60,000 a year.

Add gas to this and the directional signs alone add up to $112,000 a year.

Discounting this to 5% today, the cost of a stop sign would be over $2 million in each direction.

Now, given the value of that adjoining land, you could actually buy it, cut down the shrubbery for better visibility, and then sell it again.

And you will still come out ahead.

So you're probably wondering, "Why is it there?"

Or rather, why are there stop signs in each direction?

Because it saves lives. So is there a better way to achieve that goal?

The answer is to allow cars to safely enter from that side road.

Because there can be a lot of people living there and if they wait forever, a long queue can form as the cars don't slow down on the main road.

Can it be done with existing signs?

Therefore, stop signs and priority signs have a long history.

Stop signs were invented in 1915 and slow signs were invented in 1950. But that's all we got.

So why not use a stop sign?

Now, yield means ``you must yield the right of way''.

So if there are 5 cars waiting, you have to wait until they are all done before leaving. It lacks the notion of alternating and alternating, always taking the minor path and ending up with the major path taking precedence.

This makes it difficult to create new meanings for existing symbols.

You can't suddenly say to everyone, "Okay, remember what you were doing at the turn sign last time? Let's do something different this time."

It doesn't work.

So what the world needs now is a new type of sign.

(Applause) For those of you who haven't seen the public service announcement, there's a little explanation below.

And integrate stop signs and priority signs.

It's shaped like a T, like when you take turns.

And uncertainty brings prudence.

When people encounter unfamiliar situations, they don't know how to deal with it and they slow down.

Well, you are now a "Road Scholar"...

(Laughter) We don't have to wait for that sign to be adopted. These things won't change anytime soon.

But you are a member of the community, and you can use your community influence to create smarter traffic flows.

And you can have a greater impact on the environment just by getting your neighbors to change these things than you can by changing your car. thank you very much.

(applause)

Let me take you to Bangladesh.

Before we talk about it, we should ask ourselves. Why does poverty exist?

So there is a lot of knowledge and scientific progress.

We all live on the same planet, but there is still much poverty in the world.

So I would like to throw the perspective that I have so that this project and others can be evaluated to see if they are contributing to poverty or if they are contributing to poverty or trying to alleviate poverty.

For the past 60 years, rich countries have sent aid to poor countries.

And by and large this failed.

And although this book was written by a man who worked for the World Bank for 20 years, he finds the country's economic growth to be elusive.

By and large it didn't work.

So the question is, why is that?

In my mind, there is something to be learned from European history.

So here, too, yesterday, as I was walking across the street, I saw the execution of three bishops 500 years ago, just across the street from here.

So what I'm trying to say is that there were many struggles in Europe, where people were empowered by technology.

They then demanded that the authorities dismount from their high horses.

And in the end, better negotiations took place between the authorities and the people, and democracy, capitalism, and everything else flourished.

This is how we see the real process of the authorities falling and the people rising back up in this 500-page book.

But if you look at it with that perspective, you can see what happened in the last 60 years.

Aid actually did the opposite.

It empowered the authorities and, as a result, alienated the public.

The authorities had no reason to grow the economy in order to tax the people and make more money to run their businesses.

Because it was ordered from overseas.

And indeed, if you look at oil-rich countries, Nigeria, Saudi Arabia, all sorts of countries whose citizens are not yet empowered, the same is true.

Because aid and oil and mineral money work the same way.

It empowers the authorities without activating citizens, their hands, feet, brains, etc.

If you agree, I think the best way to improve these countries is to recognize that economic development is by the people, by the people, and for the people.

That's the real network effect.

As citizens network, become more organized and productive, and their voices heard, the situation will improve.

In contrast, the most important institution in the world, the World Bank, turns out to be an organization of governments, by governments, for governments.

Look at the contrast.

That's the perspective I have, and then I can start my story.

Of course, how to empower the people?

All kinds of technologies can exist. And one is a mobile phone.

The Economist recently acknowledged this, but I stumbled upon this idea 12 years ago and have been working towards it.

So 12 years ago, I was trying to become an investment banker in New York.

We had quite a few colleagues connected by a computer network.

It also increased productivity by eliminating the need to change floppy disks. We could update each other more often.

However, it broke down at some point.

Then I remembered one day in 1971.

A war was going on in my country.

And my family moved from the city where we lived until then to a safer, more remote countryside.

Then one day my mother asked me to buy some medicine for my younger siblings.

And I walked about ten miles all morning to the medicine man there.

And he wasn't there, so I walked back all afternoon.

So, another unproductive day.

So I put these two experiences side by side while sitting in a New York skyscraper and came to the conclusion that connectivity is, at its core, productivity, whether in a modern office or an undeveloped village.

So, of course, I mean the phone is a weapon against poverty.

If so, the question is, how many phones were there at the time?

And it turns out that Bangladesh had 1 phone for every 500 people.

And those phones were all in a few urban locations.

There were no telephones in the vast countryside of 100 million people.

So imagine how many man-months or man-years have been wasted in the same way I have wasted a day.

Simply multiply by 100 million and you see that one day lost in the month, for example, is an enormous amount of wasted resources.

And at the end of the day, poor countries, like rich countries, one thing we equalize is that the days are the same length, 24 hours.

So it would be a big waste if we were to lose a precious resource that is somewhat on par with wealthy countries.

So I started looking for evidence that connectivity could really improve productivity.

I couldn't find much, but I did find this graph produced by the ITU, the International Telecommunications Union based in Geneva.

They show interesting things.

As you can see, the horizontal axis is where we put the countries.

So the US or UK would be out here.

So the impact of one new phone on the vertical axis is very small.

But if you go back to a poorer country with a GNP per capita of say $500 or $300, the impact is much higher at $6,000. or $5,000.

The question was how much it would cost to install a new phone in Bangladesh.

After all, it's $2,000.

So if you spend $2,000 and assume the phone lasts 10 years, and you spend $5,000 each year, that's $50,000.

So this was clearly a necessary gadget.

And of course, it would be even more dramatic if phone installation costs were dropping because of the digital revolution.

And by that time I knew a little bit of economics. Adam Smith is said to have taught us that specialization leads to productivity.

But how do you specialize?

Let's say I'm a fisherman and a farmer.

And Chris is a fisherman, a farmer. Both are generalists.

So the point is, the only way we can depend on each other is if we can connect with each other.

And if we are neighbors, we can walk to his house.

However, that would limit the economic zone to a very narrow range.

But to expand it, you need a river, you need a highway, you need a telephone line.

But in any case, it is connectivity that leads to reliability.

And that leads to specialization.

That leads to increased productivity.

So the problem was that I started to consider this issue, going back and forth between Bangladesh and New York.

There were many reasons people told me about why the phone was missing.

And one of them is the lack of purchasing power.

Poor people don't have the power to buy things.

But the point is, if it's a production tool, why should you worry about it?

So in America people buy cars with very little down payment.

They get a car and go to work.

They are paid by their work. Your salary will allow you to pay for your car for the long term.

The car pays for itself.

So if your phone is your production tool, you don't have to worry about purchasing power at all.

And of course, even if that's true, what about initial purchasing power?

So the question is, why can't I have some kind of shared access?

In the United States, everyone needs banking services, but few people are trying to buy banks.

In other words, banks tend to serve entire communities.

So you can do it on your phone too.

People also said that we have many important primary needs that need to be met, such as food, clothing, and housing.

But again, it's very paternalistic.

We should increase our income and let people decide what they spend their money on.

But the real problem is the lack of other infrastructure.

You need some kind of infrastructure to bring in the new.

For example, the Internet was booming in America.

Because there were people with computers.

They had modems.

We had phone lines, so it was very easy to incorporate new ideas like the Internet.

But that is what poor countries lack.

For example, there were few ways to do a credit check or banks to collect bills.

But that's why I turned my attention to Grameen Bank. Grameen Bank was a bank for the poor, with 1,100 branches, 12,000 employees and 2.3 million borrowers.

And they had these branches.

I thought I could build a network by installing cell phone base stations.

Anyway, to save time, I went to them first and said, "Maybe I can connect all your branches and be more efficient."

But after all, phones have evolved in countries without phones, so they are decentralized. Of course, there could be other valid reasons, but this was one of them.

So they weren't that interested in hooking up all the branches and rocking the ship.

So I started concentrating. what are they actually doing?

What happens is that someone borrows money from the bank.

She usually buys cows. Cow gives milk.

She then sells the milk to the villagers to pay off the loan.

And this is business for her, but milk for others.

And suddenly I realized that mobile phones can be cows.

Because somehow she can borrow $200 from the bank, get a phone, and let everyone have a phone.

And it's her business.

So I wrote to the bank and they thought about it for a while and they said, 'That's a little crazy, but logical.

If you think you can do it, come and make it happen. ”

So I quit my job. I returned to Bangladesh.

I founded a company called Gonofone in America. Gonofone means "people's phone" in Bengali.

And American angel investors put money into it.

I have flown around the world.

After a million or so, I mean, rejected by many places. Because I wasn't just trying to go to poor countries, I was trying to go to poor people in poor countries.

After driving about a million miles and experiencing a fair amount of hair loss, I eventually founded a consortium. It involved the Norwegian telephone companies and provided know-how, and Grameen Bank provided the infrastructure to roll out the service.

In a nutshell, here's the coverage of the country:

You can see it's pretty well covered.

There are vacancies in Bangladesh as well.

But we are investing about $300 million more this year to expand its reach.

Now, about the cow model we talked about earlier.

There are approximately 115,000 people in the neighborhood who have telephone service as a retail business.

And it serves 52,000 villages, equivalent to about 80 million people.

And those phones generate about $100 million for the company.

And that's a profit of $2 per day per entrepreneur, or about $700 a year.

And of course it is very beneficial in many ways.

Increased income and improved welfare benefits.

As a result, the company is now the largest telephone company, with 3.5 million subscribers, of which 115,000 phones generate about one-third of the traffic in the network.

And after-tax (very serious tax) net income for 2004 was $120 million.

And the company donated about $190 million to the national treasury.

Again, here are some of the lessons learned.

"Governments need to provide economically viable services."

In fact, this is an example of what a private company can provide.

“The government needs to give subsidies to private companies.”

This is what some people think.

And in fact, private companies help the government with their taxes.

“The poor are the recipients.”

Poor people are a resource.

"Services are too expensive for the poor."

Their involvement reduces costs.

"Poor people are uneducated and can't do much."

They are very eager learners and very capable survivors.

I was very surprised.

Most of them learn how to operate the phone within a day.

"Poor countries need help."

If 5 percent of the ideal number of companies -- which this one company lifted -- is true, then this one company is pulling far more GNP than the country receives.

And, as I was about to show, aid does damage because, as far as I am concerned, it strips the people of their government.

This is a new project with the famous American inventor Dean Kamen.

He has built several generators and we are currently conducting experiments in two villages in Bangladesh. There, biogas is produced from cow manure and a generator is running.

And each of these generators sells electricity to 20 homes.

It's just an experiment.

I don't know how long it will last, but it does.

So I've known a lot of fish in my life.

I only loved two.

The first seemed to be a rather passionate affair.

It was a beautiful piece of fish, flavorful, textured, meaty and a bestseller on the menu.

What a fish!

(Laughter) Even better, it was farm-grown to the highest standards of sustainability.

Therefore, you can sell with confidence.

I have been in a relationship with this beauty for several months.

One day, the head of the company called me and invited me to speak at an event about farm sustainability.

"Of course," I said.

There was a company trying to solve the unimaginable problem for us chefs: how to keep fish on the menu.

For the past 50 years, we have fished the ocean like clearcutting forests.

It's hard to overstate its destruction.

90% of the big fish we love, including tuna, halibut, salmon and swordfish, have gone down.

Almost nothing left.

So, for better or worse, aquaculture, fish farming, will be part of our future.

There are many arguments against this. Farms are polluting the environment and most farms are polluting but inefficient. For tuna there is a big drawback.

The feed conversion ratio is 15 to 1.

In other words, it takes 15 pounds of wild-caught fish to get 1 pound of farmed tuna.

Not very sustainable.

It doesn't taste very good either.

So finally there are companies trying to do it right.

I wanted to support them.

The day before the event, I called the company's public relations director.

Let's call him Don.

"Don," I said. "To be factually accurate, you are famous for farming in remote seas. You are not polluting."

"Exactly," he said. “We are so far away that the excrement from the fish is dispersed rather than concentrated.”

And he added, "We are basically our own world.

What is the feed conversion rate? 2.5 to 1," he said.

"Best in the industry."

2.5 to 1, wow.

"2.5 Huh? What are you eating?"

"It's a sustainable protein," he said.

"Great," I said. I hung up.

And that night, as I lay in bed, I thought: what exactly is sustainable protein?

(laughs) So the next day, just before the event, I called Don.

I said, "Don, what's an example of a sustainable protein?"

he said he didn't know. he asked around.

Well, I spoke with some people in the company on the phone. No one could give me a definite answer until finally I called the chief biologist.

Let's call him Don too.

(Laughter) "Don," I said, "What are examples of sustainable proteins?"

Well, he mentioned some algae and some fishmeal, and then chicken pellets.

I said, "Chicken pellets?"

He said, "Yes, feathers, hides, bone meal, and offcuts that have been dried and processed into fodder."

I said, "What percentage of the feed is chicken?"

If you think about it, it's 2 percent.

"Well, it's about 30 percent," he said.

I said, "Don, what's sustainable about feeding chicken to fish?"

(Laughter) After a long silence on the phone, he said, "There is too much chicken in the world."

(Laughs) I fell in love with this fish.

(Laughter) No, not because I'm a self-righteous, two-shoe-eating glutton.

Actually it is.

(Laughter) No, actually, I don't like this fish anymore. Because, I swear to God, the fish tasted like chicken after that conversation.

(Laughter) This second fish is a different kind of love story.

He is the romantic type and the more he knows a fish, the more he likes it.

The first time I ate there was in a restaurant in the south of Spain.

Journalist friends have been talking about this fish for a long time.

She set us up.

(Laughs) What came out on the table was a sparkling white color.

The chef overcooked it.

Like twice or more.

Surprisingly, it was still delicious.

Who can make overcooked fish delicious?

I can't do it, but this person can.

Let's call him Miguel. Actually his name is Miguel.

(Laughter) No, he didn't cook the fish, and he's not a chef, at least as far as you and I understand.

He is a biologist from Veta La Palma.

A fish farm in the southwest of Spain.

It is located at the tip of the Guadalquivir River.

Until the 1980s, the farm was in Argentinian hands.

They raised beef cattle in what was essentially wetlands.

They did it by draining the land.

They built this intricate series of canals to push water from the land into the river.

Well, it didn't work out financially.

And ecologically, it was a disaster.

The bird population is so high for this location that 90% of the birds died.

So in 1982, an environmentally conscious Spanish company purchased the land.

what did they do?

They reversed the flow of water.

They literally flipped a switch.

Instead of pushing water out, they used channels to pull it back.

They flooded the canal.

They established a 27,000-acre bass, mullet, shrimp and eel farm, and in the process, Miguel and the company completely reversed ecosystem destruction.

The farm sounds amazing.

I mean, I've never seen anything like this before.

Staring at the horizon a million miles away, all you see are flooded canals and this thick, fertile moor.

Until recently I was there with Miguel.

He's a great guy, kind of like three parts Charles Darwin and Crocodile Dundee.

(laughs) Okay? So we raced through the marshes, I was breathless and sweaty, knee-deep in mud, and Miguel calmly delivered his biology lecture.

Here he is referring to the rare black shoulder kite.

Now he refers to the mineral needs of phytoplankton.

And here he saw a grouping pattern that reminded him of the giraffes of Tanzania.

It turns out that Miguel spent most of his career in Africa's Mikumi National Park.

I asked him how he became a fish expert.

He said, "Fish? I didn't know anything about fish.

I am a relationship expert. ”

Then he walked away and started talking more about rare birds and algae and strange aquatic plants.

Don't get me wrong, it was really fascinating, I mean, it was like the bio-community was disconnected.

It's great, but I fell in love.

And my head was brooding over the delicious overcooked fish I had the night before.

So I interrupted him. "Miguel, why is your fish so delicious?" I said.

He pointed to algae.

“Algae, phytoplankton, I know the relationship.

But what are your fish eating?

What is the feed conversion rate? ”

Well, he went on to say that this is a very rich system and the fish are eating what they eat in the wild.

Plant biomass, phytoplankton, and zooplankton, which feed the fish.

The system is very sane and fully self-updating.

No bait.

Ever heard of farms that don't feed animals?

Later that day I was driving around this property with Miguel and asked him. "How do you measure success in a place that looks so natural, unlike any farm you've ever been to?"

At that moment, it was as if the director had requested a set change.

And as I turned the corner, I saw the most amazing sight. It was literally a pink carpet with thousands of pink flamingos as far as the eye could see.

"It's a success," he said.

"Look at their bellies, they're pink.

they are having a feast ”

Feast? I was completely confused.

"Miguel, aren't they eating your fish?" I said.

(Laughter) “Yes,” he said.

(Laughter) "We lose 20 percent of our fish and fish eggs to birds.

Last year, the site was home to 600,000 birds of more than 250 species.

Today it is one of the largest and most important private bird sanctuaries in all of Europe. ”

I said, "Miguel, isn't an increase in bird populations the least desirable thing for a farm?"

(laughter) He shook his head, no.

“We farm extensively, not intensively,” he said.

This is an ecological network.

Flamingos eat shrimp.

Shrimp eat phytoplankton.

In other words, the pinker the belly, the better the system. ”

Now let's review. Farms that don't feed animals and farms that measure success based on the health of predators.

It is both a fish farm and a bird sanctuary.

Oh, by the way, those flamingos shouldn't be there in the first place.

They spawn in towns 240 miles away where soil conditions are suitable for nesting.

They fly 150 miles to the farm every morning.

And every night they fly 150 miles home.

(Laughter) They do it because they can follow the white dashed line of the A92 motorway.

(laughs) I'm not kidding.

I was imagining "Penguin March" and I saw Miguel.

I said, "Miguel, are they going to fly 150 miles to the farm and then fly 150 miles back at night?"

Are you doing that for your children? ”

He looked at me as if I had just quoted a Whitney Houston song.

(Laughter) He said, "No, they're doing it because the food is better."

(laughter) I didn't mention the fish skin which I love, it was delicious, but I don't like fish skin. I don't like tataki, I don't like crispy.

That harsh, tar-like taste.

I rarely cook with it.

But when I tasted it at that restaurant in southern Spain, it didn't taste like fish skin at all.

It had a sweet and refreshing taste, like biting into the sea.

When I mentioned this to Miguel, he nodded.

“The skin acts like a sponge,” he said.

It is the last line of defense before anything enters the body.

It evolved to absorb impurities. ”

"But there are no impurities in our water," he added.

OK. Farms that don't feed fish, farms that measure their success by predator success.

And when he says "a farm without impurities," I realize he's being very understatement. Because the water that runs through the farm comes from the Guadalquivir River.

It's a river that carries chemical pollutants, pesticide runoff, and everything that modern rivers tend to carry.

And when the water leaves through the system, it's cleaner than it was when it came in.

This system is very sound and purifies the water.

In other words, we need farms that are literally water purification plants, not farms that simply don't feed the animals, and farms whose success is measured by the health of predators. Not just for the fish, but for you and me as well.

Because when the water leaves, it flows into the Atlantic Ocean.

I know it's a drop in the ocean, but I accept it. And so should you. Because this love story is both romantic and didactic.

It could be said that it is the recipe for the future of delicious food, whether we are talking about bass or beef cattle.

What we need now is a radically new concept of agriculture where food actually tastes good.

(Laughter) (Applause) But for a lot of people, that's a little too radical.

We are not realists, we are also foodies. we are lovers

We love farmers markets, we love small family farms, we talk about local food, we eat organic.

And when you suggested that these were the future of good food, someone somewhere stood up and said, "Hey, I love pink flamingos, but how are you going to feed the world?"

How are you going to feed the world?

Can I be honest?

I don't like that question.

No, not because we already produce more calories than we feed the world.

A billion people will go hungry today.

At 1 billion, this is an all-time high, but it is not because of tonnage, but because of gross inequalities in distribution.

Well, I don't like this question. Because this question has defined the logic of the food system for the past 50 years.

Grains to herbivores, pesticides to monocultures, chemicals to soil, poultry to fish, and agribusiness has always asked simply, "How bad would it be if we could feed more people cheaper?"

That was the motivation and the justification. That was the business plan of American agriculture.

we should call it whatever. A business in liquidation, a business that is rapidly eroding the very environmental capital that makes production possible.

It's not business, it's not agriculture.

Our breadbasket is threatened today not by dwindling supplies, but by dwindling resources.

Not because of the invention of the latest combine or tractor, but because of fertile land. Fresh water, not a pump. By the woods, not by a chainsaw. Not by fishing boats or nets, but by the fish of the sea.

Want to feed the world?

Let's start by asking ourselves: How do you feed yourself?

More to the point, how can we create a situation where all communities are self-sufficient?

(Applause) For that, we don't have to look at future agribusiness models.

It's really old and I'm tired.

A lot of capital, chemicals, and machines are used, but nothing really edible is produced.

Instead, let us turn to the ecological model.

It relies on two billion years of field experience.

Look out for Miguel, farmers like Miguel.

A farm that is not a world in itself. A farm that regenerates instead of depletes. A farm that does agriculture extensively rather than intensively. Farmers are relationship experts, not just producers.

Because they are also taste experts.

To be honest, they are better chefs than I am.

Well, I'm fine with that, because if that's the future of good food, it's going to be good.

thank you.

(applause)

OK. We have heard many people at this conference talk about the power of the human mind.

And what I want to do today is to give a vivid example of how that power is unleashed when someone is in a survival situation, how the will to survive can draw that power out in people.

This is what happened on Mount Everest. It was the worst disaster ever on Everest.

And when it happened, I was the only doctor on the mountain.

So let me explain it to you and see what it's like when someone truly summons the will to survive.

Yes, this is Everest.

It is 29,035 feet tall.

I went there 6 times. Four times we worked with National Geographic to measure plate structure. Twice I went with NASA to research remote sensing devices.

It was during the fourth trip to Everest that the comet passed over Mt. Hyakutake.

And the Sherpas told us at the time that it was a very bad omen and we should have listened to them.

Everest is an extreme environment.

The amount of oxygen at the summit is only one-third that at sea level.

Temperatures can drop to -40°C near the summit.

Winds can blow 20 to 40 miles per hour.

In fact, this is a lower wind-chill factor than a summer day on Mars.

I remember one time when I was near the top of a mountain and reached into my down jacket to get a drink from the water bottle inside it, I found the water already solidified.

If you look at this, you can see how severe the situation is near the top of the mountain.

Yes, this is the route to climb Everest.

Start at base camp at an altitude of 17,500 feet.

Camp 1, 2,000 feet high.

Camp 2, 2,000 feet further upstream, the so-called Western Cwm.

Camp Three sits at the foot of Lhotse, the fourth highest mountain in the world, but looks dwarfed by Mount Everest.

And Camp 4 is the highest camp. It's 3,000 feet short of the top.

It's like base camp.

It sits on top of a glacier at an altitude of 17,500 feet.

This is the highest point where the yak can be brought in before the yak is unloaded.

And here's what they dropped off for me. I had medical supplies for 4 yaks and threw them in the tent. And here I am trying to sort things out.

This was our expedition.

This was a National Geographic expedition, but it was hosted by the Explorers Club.

Three other expeditions took part in the mountain: the USA team, the New Zealand team, and the IMAX team.

And actually after two months of preparation, we built camp all the way up the mountain.

This is the view looking up at the icefall on the first 600 feet of the climb from base camp.

And here is a picture of the inside of the icefall. Although it is a waterfall, it is frozen, but it moves very slowly and actually changes every day.

Being in it, you are like a mouse in a maze. You can't even see it from above.

This is near the top of the icefall.

I want to climb at night when the ice is frozen.

That way they are less likely to fall on you.

Climbers who reached the top of the icefall at sunrise.

This is me crossing the crevasse.

Cross an aluminum ladder with a safety rope attached.

It's another crevasse.

Some of them are more than 10 storeys deep, and one of my fellow climbers actually climbed them at night because if they could see the bottom of what they were climbing, they would never climb.

have understood. This is Camp One.

It is the first flat area reached after climbing to the top of the icefall.

And from there, climb up to Camp 2, which looks like the foreground.

These are the climbers up the Lhotse plane, the mountain towards Camp 3.

Here we are on a fixed rope.

If you fell here, you'd be 5,000 feet high if you weren't on a rope.

This is the view from the 3rd campsite.

You can see that Lhotse's face is turned sideways. It's an angle of about 45 degrees. I left the camp halfway because it takes two days to climb.

If you notice, the summit of Everest is pitch black.

No ice on it.

That's because Mount Everest is so high, in a jet stream, and the wind is constantly brushing your face, so it doesn't get snowy.

What looks like clouds behind the summit ridge is actually snow blown off the summit.

This is on its way from Camp 3 to Camp 4, piercing through the clouds.

And this is Camp 4.

Once you've arrived at Camp 4, you probably have 24 hours to decide whether or not you want to reach the summit.

We are all breathing oxygen, and our oxygen supply is limited, so we have to either go up or down, and we need to make that decision quickly.

This is a photo of Rob Hall.

He was the leader of the New Zealand team.

We'll talk later about the radio he used to call his wife.

These are some climbers waiting to go to the top.

They are in Camp 4, but you can see the wind blowing from the top.

The weather is not very good for climbing, so the climbers are waiting and praying for the wind to ease.

And indeed, at night, the wind calms down.

It became very calm and there was no wind at all.

This looks like a good opportunity to aim for the top.

Here we introduce the climbers who set out to reach the summit called Triangular Face.

This is the first part of the climb.

It takes place in the dark. Because it's actually a gentler slope than the one that comes next, and if you do it in the dark you'll get daylight hours.

That's how it happened.

Climbers rode the southeast ridge.

A view of the southeast ridge.

The top will be in front of you.

From here it's about 1,500 feet up at a 30-degree angle to the summit.

But what happened that year was that the wind suddenly picked up unexpectedly.

A storm raged that no one expected.

Here you can see fierce winds blowing snow far above the summit.

And on the ridge at its summit were climbers.

Here's a picture of me in the area a year ago and you can see I'm wearing an oxygen mask and a rebreather.

This is where I connect my oxygen hose.

As you can see in this climber, the backpack has two oxygen tanks. It's a small titanium tank and very light. Other than that, it doesn't stack much.

That's all. There is quite a lot of exposure on the summit ridge.

OK, this is the view from the summit ridge itself.

This is a 1,500 foot high bridge on the way to the top.

All the climbers here climb without ropes because the drop on both sides is so steep that if someone was tying them with a rope, they would pull them off together.

So each person climbs individually.

And it is by no means a straight road, very difficult to climb, and there is always danger of falling on either side.

Fall left and you'll fall 8,000 feet into Nepal. If it fell right, it would drop 12,000 feet into Tibet.

Therefore, you will live longer if you fall in Tibet.

(Laughter.) But either way, you will fail for the rest of your life.

OK. Those climbers were climbing along the summit ridge near the summit and I was here at Camp 3.

My expedition was lost at Camp 3, but they were there in the storm.

The storm was so violent that we had to lie on the floor of our tent dressed and geared up to keep it from being blown off the mountain.

It was the worst wind I have ever seen.

And climbers climbing the ridge were completely exposed to the elements at a height of 600 meters, much higher than that.

We were in radio contact with some of them.

A view from the summit ridge.

Rob Hall was here with Doug Hansen at this point in the storm, according to what we heard on the radio.

And I heard that Rob was fine, but Doug was too weak to go down.

He was exhausted, so Rob stayed by his side.

Bad news also came in that another climber, Beck Weathers, died after collapsing in the snow during the storm.

There were 18 other climbers, but their condition was unknown.

they lost their way. The mountain was in complete chaos. All the stories were confusing and mostly contradictory.

We had no idea what was going on during that storm.

We were just crouching in our tents at Camp 3.

Our two strongest climbers, Todd Burleson and Pete Athans, were determined to climb to help as many people as they could, even though the storm was raging.

They tried to radio a message to Rob Hall, a fine climber who got stuck with a weaker climber near the summit.

I expected them to say to Rob, "Wait a minute. I'm about to go."

But really, what they said was, 'Leave Doug and get off on your own.

No chance to save him, try to save yourself at this time. ”

Rob got the message, and his answer was, "We're both listening."

Todd and Pete climbed the summit ridge here and it was a sight of complete chaos.

But they did everything they could to keep people stable.

I radioed them from Camp 3 with advice and sent out climbers who were able to descend on their own.

Those unable to do so decided to withdraw at Camp 4.

In other words, climbers were coming down along this route.

This was taken from Camp 3 where I was.

And they all came to me so that I could look at them and think what I could do for them. It's not really a big deal. Because Camp 3 has a small cut in the ice in the middle of the 45 degree angle.

I can barely stand outside the tent.

It's really cold. Altitude is 24,000 feet.

The only supplies I had at that altitude were two plastic bags pre-filled with painkillers and steroid syringes.

So when the climbers passed me, I sort of assessed if they were in a condition to go further down.

For those who were not so clear or adjusted so well, I gave them a period of clarity and adjustment and then injected them with steroids to allow them to go further down the mountain.

I once got an injection through my clothes because it was so awkward working there.

It was too difficult to get there any other way.

While I was taking care of them, more news about Rob Hall came in.

There was no way to climb high enough to rescue him.

He called and said he was alone now.

Apparently Doug died at the top of the mountain.

But Rob was now weak and unable to descend on his own, and the heavy winds and its altitude made him impossible to rescue, and he knew it.

At that point he asked his wife to be summoned.

He carried a radio with him.

His wife, seven months pregnant with their first child, had returned to New Zealand, and Rob asked him to patch her up. It was over and Rob and his wife had a final conversation.

They chose a baby name.

Rob has since released the contract. That was the last time we heard of him.

I had to treat many critically ill patients at an altitude of 24,000 feet, which was not possible.

So what we did was lower the victim to an altitude of 21,000 feet, which was easier for me to treat.

This was my medical kit.

A tackle box filled with medical supplies.

This is what I climbed the mountain.

There were more supplies down there, so I asked them to bring them to the lower camp.

And this was the scene at the lower camp.

One by one the survivors came.

Some had hypothermia, some had frostbite, and some had both.

All we did was try to revive them by warming and oxygenating them as best we could, but that was difficult at 21,000 feet, where the tents were freezing.

This is severe frostbite on the legs, severe frostbite on the nose.

This climber was snow-blind.

We had an amazing experience while looking after this climber.

Out of nowhere, Beck Weathers, who had been told dead, staggered into the tent like a mummy.

I expected him to say something incoherent, but in fact he came into the tent and said to me, "Hi Ken. Where should I sit?"

And he said "Do you accept my health insurance?"

(Laughter) He really said that.

(Laughter) So he was completely conscious, but he had very severe frostbite.

You can see his hands are completely white. His face and nose are burned.

It turns white at first, turns black when necrosis is complete, and then sloughs off.

It is exactly the final stage like a scar.

So while I was taking care of Beck, he talked about what was going on there.

It is said that he got lost in the storm, collapsed in the snow, and just lay there motionless.

I heard some climbers come up and look at him and say, "He's dead."

But Beck wasn't dead. Hearing that, he couldn't move at all.

He was in a sort of catatonic state, able to perceive his surroundings but not even blink to indicate he was alive.

There climbers passed by him and Beck lay in the snow for a day, night, and day.

And he said to himself, "I don't want to die.

I have a family to return to. ”

And the thoughts of his family, his children, and his wife created enough energy and enough motivation within him that he actually got back on his feet.

After lying in the snow for a long time, he got up and found his way back to camp.

Beck told me the story very quietly, but I was really surprised to hear it.

I couldn't imagine someone lying in the snow for so long and then standing up.

He recovered from apparently irreversible hypothermia.

And I can only guess how he did it.

But what if Beck was connected to a SPECT scan that could actually measure brain function?

Very simply, the three parts of the brain. The frontal lobe that focuses attention and concentration. There is the temporal lobe, where images are formed and memories are stored. And the back of the brain contains the cerebellum, which controls movement. The brainstem is responsible for basic maintenance functions such as heartbeat and breathing.

So let's take a brain cut here and imagine Beck hooked up to a SPECT scan.

It measures dynamic blood flow and therefore energy flow in the brain.

Here is the prefrontal cortex, which glows red.

This is a fairly evenly distributed scan.

There is a central region here where the temporal lobe is thought to be, and a posterior region with maintenance functions.

This is a nearly normal scan, showing an even distribution of energy.

Now, going into this, you can see that the frontal lobe is even brighter.

This may be what Beck experiences when he perceives himself in danger.

He is totally focused on getting out of trouble.

These parts of the brain quiet down.

He doesn't think about his family or anyone else at the moment, and works pretty hard.

He's trying to build muscle to get out of this situation.

All right, but he's outnumbered here.

he's running out of energy.

Too cold; he can't keep his metabolic fire going, and you know, no more red here. his brain is quiet.

He fell down in the snow here. Everything is quiet, almost no red spots anywhere.

Beck's power is down.

he is dying

Moving on to the next scan, we can see that in Beck's case, the middle part of his brain is starting to glow again.

He's starting to think about his family.

He's starting to have an image that motivates him to stand up.

He develops the energies of this field through his thoughts.

And this is how he puts thoughts into action.

This part of the brain is called the anterior cingulate gyrus.

This is the area where many neuroscientists believe the seat of will resides.

This is where people make decisions and where willpower is cultivated.

And as you can see, there is a stream of energy flowing from the central part of his brain, where family images are drawn, to this area, which drives his will.

have understood. This is getting stronger and stronger to the point where it is actually a motivating factor.

He intends, day after day, night after day, to develop enough energy in the area to actually motivate him to get up.

As you can see here, he's starting to put more energy into his frontal lobe.

He's starting to focus, now he can.

He ponders what he must do to save himself.

So this energy is being transmitted to the front of his brain, where it's getting quieter, but he's using this energy to think about what he has to do to propel himself forward.

And that energy spreads throughout his thought realm.

He's not thinking about his family now, he's picking himself up.

This is the buttocks area where the muscles work and you will be able to move at your own pace.

His heart and lungs will pick up speed.

So, this is what we can speculate that might have happened had we been able to perform a SPECT scan of Beck during this epic period of survival.

So, here I am at 21,000 feet taking care of Beck, and I felt like what I was doing was utterly insignificant compared to what he was doing for me.

It just shows what the power of the mind can do.

He was in critical condition and there were other patients in critical condition. Luckily, we were able to have a helicopter arrive to rescue them.

A helicopter arrived at an altitude of 21,000 feet, conducting the greatest helicopter rescue ever.

It landed on the ice and was able to take Beck and the other survivors away one by one and take them to a Kathmandu infirmary before we returned to base camp.

This is the scene at Base Camp, one of the camps where some of the climbers went missing.

And a few days later, a memorial service was held there.

These are Serphas Lighting Juniper branches.

They believe that juniper smoke is sacred.

Climbers then stood on high rocks and talked about climbers who got lost near the top, and actually turned to the mountain to talk to them directly.

Five climbers were lost here.

They were Scott Fisher, Rob Hall, Andy Harris, Doug Hansen and Yasuko Namba.

And that day, another climber was supposed to die, but he didn't, and it was Beck Weathers.

He was able to survive because he was able to generate incredible willpower and use all of his mental strength to save himself.

These are Tibetan prayer flags.

These Sherpas believed that if they wrote a prayer on the flag, the message would be delivered to God, and Beck's message was answered that year.

thank you.

(applause)

I have been interested in the placebo effect for some time. This may seem strange of interest to magicians unless you think in terms like mine. In other words, "a fake is believed enough by someone that it becomes real."

In other words, sugar pills have a measurable effect in some studies, the placebo effect. Simply because the person thinks what is happening to them is a drug or something. For example, when it comes to pain management, if you believe enough, there is a measurable effect in your body called the placebo effect.

A fake becomes real when someone recognizes it.

To help us understand each other, I'd like to show you a rudimentary, very simple trick.

And I'll explain how it works. This is a trick that has been in every children's magic book since at least the 1950s.

I learned it from Cub Scout Magic in the 1970s.

I'll do it and then I'll explain.

And I'll explain why I explained it.

So what happens?

You can inspect the knife. check my hand

Just stick the knife into your fist.

I want my sleeves back.

And I'm going to squeeze my wrist here so that nothing gets in the top or bottom of the sleeve.

That way, as long as I'm squeezing there, nothing goes up or down my sleeve, so I know I can't move anything at any time.

And this purpose is very simple.

I'm going to open my hand, and hopefully, if all goes well, my pure animalistic magnetism will grip the knife.

In fact, it's held in place so tightly that the knife won't come off when shaken.

There is nothing above and below, there is no trickery. And everything can be examined.

free!

(Applause.) This is a trick I often teach young kids who are interested in Magic. Methodologically it's a very simple trick, but learning this can teach you a lot about deception.

Probably many people at this venue know this trick.

What happens is this.

I have a knife in my hand

They say grab your wrists and keep nothing under your sleeves, but that's a lie.

I'm holding onto my wrist because it's actually the secret of illusion.

The moment my hand moves away from facing you, this finger is about to move from where my index finger is now to where it points.

nice one.

There are people out there who never had a childhood.

(Laughs) So, from here on out it will be like this.

And the fingers change as you move around.

And we can also talk about why this is a deception and why you don't realize you only have three fingers here. Because the mind and the way it processes information cannot count 1, 2, 3. it groups them.

But this is not what it really means. right? Then spread your hands.

Clearly not by animal magnetism, but by the prank that my index finger is there.

And if you close your fingers, you'll feel like this movement covers the back movement of your fingers as you move back in the same way.

Take this hand you hand out the knife

There are tricks you can do for your friends and neighbors. thank you.

Now (laughs) what does that have to do with the placebo effect?

I read a study about a year ago that really shocked me.

I am neither a doctor nor a researcher so this was surprising to me.

When the placebo was administered in the form of a white pill shaped like aspirin, it was just a round white pill, but it was found to have a definite and measurable effect.

But changing the form in which the placebo is given, such as making small pills that are blue and stamping them with letters, actually visibly enhances the effect.

Neither of these are pharmaceuticals, but sugar pills.

But white pills are not as good as blue pills.

what? (Laughter) It really surprised me.

But it turns out that it doesn't end there.

If you have a capsule, it works better than any form of tablet.

Colored capsules that are yellow on one end and red on the other are better than white capsules.

Dosage has something to do with this.

One tablet twice daily is not as effective as three tablets. I don't remember the stats now. sorry.

But the point is...

(Laughter) ...these dosages have something to do with it.

And the shape also has something to do with it.

If you want the ultimate placebo, you need to stick a needle.

right? Syringe with Inactive Substance - A few CCs of inert substance are put in and this is injected into the patient...

This is a very powerful image in their minds, much stronger than the white pill.

This is really this graph. I will show you again when I have the slides.

The point is that white pills are not as good as blue pills and capsules are not as good as needles.

And none of them have real medicinal properties, only your beliefs make it real and more powerful in your body.

I wanted to see if I could apply the idea to a magic trick.

And then pick up the obvious fake tricks to make it look like it's real.

And the research shows that when you want reality, you prick a needle.

7 inch hat pin. It's very sharp, so I'm going to sanitize it just a little bit.

This is my physical body. This is not Damian's specially raised meat.

That's my skin. This is not Hollywood special effects.

A hole is made in the skin and the needle is passed through the other side.

If you feel nauseous -- (Laughter) if you faint easily -- I was doing this to some friends and people I didn't know in a hotel room last night, and one woman nearly passed out.

So if you feel sick, I suggest you try looking away for the next 30 minutes. As a matter of fact, I do the first bad part.

You can see, and you can look away if you want.

So what happens is I just poke a little hole in the beginning of the meat on the under arm.

I'm sorry, hey. am i surprising you?

OK, so I'm just going to get the skin through a little bit and then come out on the other side like this.

Now, basically we are in the same position as with the knife trick.

(laughs) Yes.

But now you can't count my fingers, can you?

Now let me show you them. That is, 1, 2, 3, 4, 5.

Yes, That's right...

I know what people think when they see this.

They say, "Well, he's certainly not stupid enough to pierce his skin to entertain us for a few minutes.

Let's take a peek.

how is it outside? pretty good.

(Laughter) Yes, I know. (Laughter.) And the people in the back say, "Okay, I didn't really see that."

People in satellite rooms are moving out now.

Let's take a closer look at this.

It's just my skin. That's not Hollywood special effects.

That's my physical body and I can twist it.

sorry. If you feel sick, look away and do not look at the object.

People in the back watching this, and years later on video, will say, 'Oh, it looks pretty with some kind of effect, but if it was real, he'd be -- you know, there's a hole there too, and if it was real, he'd be bleeding.

Now let me check the blood for you.

(laughs) Yes, there are.

(Applause.) (Laughter.) Normally, I would pull the needle out now.

Wipe off the dirt on your arm to show it is unblemished.

But in this context, given the idea of ​​taking something fake and turning it into the real thing, I think I'm going to leave it there and walk off stage.

(Laughter) I'll be seeing you a few times over the next few days.

Please look forward to. thank you very much.

(laughter) (applause)

Today I want to talk about my research on suspended animation.

Now, when I talk about suspended animation, people usually show me the Vulcan and laugh.

But now I'm not talking about preying on people and flying to Mars or Pandora. It can be a lot of fun.

I'm talking about the concept of using suspended animation to help traumatized people.

So what does "suspended animation" mean?

This is the process by which an animal loses life, appears dead, and can then wake up again without being harmed.

Well, here's what the big idea looks like. When we look to nature, we find that just as we tend to see suspended animation, we tend to see immortality as well.

So what I am going to talk about is how to communicate that to someone who is traumatized. Find a way to unlock a little of the person's life force and make him a little more invulnerable when he has a heart attack.

Plant seeds and bacterial spores are examples of one or two organisms that happen to be completely immortal.

These creatures are some of the most immortal life forms on Earth and tend to spend most of their time in suspended animation.

Scientists now believe that bacterial spores live as individual cells, but have existed in suspended animation for as long as 250 million years.

I want to make it familiar to suggest that this is, in a way, a story about tiny, tiny creatures.

The human immortal germline, the egg that resides in the ovary, actually sits there in suspended animation for up to 50 years of each woman's life.

Then there's my favorite example of Suspended Death.

It's Sea Monkeys.

Those of you with children know this.

You can buy these things at any pet store or toy store.

Just open the bag and drop it into the plastic tank, and in about a week the little shrimp will be swimming around.

Well, I wasn't really into swimming.

I was curious about what was going on in that bag, the bag of shrimp on the toy store shelf indefinitely in suspended animation.

So these ideas about suspended animation aren't just about cells and weird little creatures.

Occasionally, humans become temporarily lifeless, but I am most interested in the stories of people who are temporarily lifeless and have something to do with the cold.

Ten years ago, a skier was trapped in an ice waterfall in Norway, where she remained for two hours before being rescued.

She was extremely cold and had no heartbeat. She was dead and frozen for all appearances.

Seven hours later, still without a heartbeat, they brought her back to life and she became the chief radiologist at the hospital where she was treated.

Years later I'm very excited about these things, but about two years later I had a 13 month old girl from Canada.

Her father was out during the winter. He was working the night shift, so she followed him outside in only diapers.

And hours later they found her frozen and lifeless and brought her back to life.

Last year, a 65-year-old woman in Duluth, Minnesota, was found dead and frozen in her front yard on a winter morning, and they brought her back to life.

The next day, she was doing so well that they wanted to run a test on her.

She got upset and just went home.

(Laughter.) So this is a miracle, right?

These are truly miraculous events.

In fact, doctors have a saying, "You're not dead until you're warm enough to die."

That's true. That's true.

A study published in the New England Journal of Medicine showed that people who suffered three hours of cardiac arrest could survive without neurological problems with proper warming.

It's over 50 percent.

So what I've been trying to do is study suspended animation and figure out a way to possibly recreate what happened to the skier.

Well, I have to say something very strange. That is, exposure to hypoxia does not necessarily result in death.

So there's about 20% oxygen in this room, and if we drop the oxygen level, we're all dead.

And in fact, even the animals we worked with in the lab, these little garden worms and nematodes, died when we exposed them to hypoxia.

And here I have to surprise you.

It turns out that when the oxygen level was lowered another 100 times, to 10 ppm, they were not dead, they were in suspended animation and could be brought back to life without harm.

And this exact oxygen concentration that caused suspended animation, 10ppm, is preserved.

We see it in a variety of organisms.

One of the creatures we see it in is fish.

And just like a light switch, you can turn heartbeats on and off by going into and out of suspended animation.

So it was pretty shocking to me that we were able to do this.

So when I was trying to recreate this skier's work, I noticed that he was not consuming oxygen, of course, and wondered if he was in a state similar to suspended animation.

But of course she was very cold.

So we wondered what would happen if we exposed the suspended animals to the cold.

So what we discovered was that when you and I chilled live animals like you and me, they were bugs in the garden, and now they're dead.

However, if you put them in suspended animation and move them to a cold place, they are all alive.

And there is something very important there. If you want to survive the cold, you should be suspended. right?

That's really good.

So we thought about it, the relationship between these things, whether it happened to skiers.

So we thought: Could it be that there are some agents within us that we create ourselves that can regulate our own metabolic flexibility in ways that allow us to survive extreme cold or die?

I thought it might be interesting to try to find something like that.

Look?

I'll touch on it briefly here, but if you read any physiology textbook, you'll find this to be a kind of heretical proposition.

From the time we're spanked to the time we take our last breath, from birth to death, we can't lower our metabolic rate below what is called our normal or basal metabolic rate.

But I knew there were examples of organisms that slowed their metabolic rate even in mammals, such as ground squirrels and bears. They lower their metabolic rate in the winter when they hibernate.

So I wondered. Couldn't we find some agent or trigger in us that could cause such a state?

So we went looking for something like that.

And this period was also the time when we made a big mistake.

Here comes Ken Robinson. He spoke of the glories of failure.

Well, there were many.

I have tried many different chemicals and agents and have repeatedly failed.

So one time at home I was watching TV on the couch while my wife put the kids to bed.

It was a TV show about caves in New Mexico. It was the NOVA show on PBS.

And this special cave is Lechugira, and this cave is incredibly poisonous to humans.

Researchers had to wear suits to enter there.

This poisonous gas, hydrogen sulfide is full.

Well, hydrogen sulfide is mysteriously present in our bodies.

We will make it ourselves.

Our brain is the most focused.

However, it was used as a chemical weapon in World War I.

It's extremely toxic.

In fact, chemical accidents are known to be caused by hydrogen sulfide. Inhaling too much hydrogen sulfide will cause it to fall to the ground and appear dead, but if it is carried into the air of a room, it can be harmlessly revived if treated quickly.

So I thought, "Wow, I have to get this."

(Laughter) Now, in post-9/11 America, when you walk into a lab, you're like, 'Hello.

I have an idea to hang a person, so I would like to purchase a compressed gas cylinder enriched with a lethal gas.

I'm really fine. ”

It's been a bit of a rough day, but I said, "There are certainly some grounds for thinking about why you might want to do this."

As I said earlier, this substance exists within us, and indeed there is something strange about it. It binds to the very place in the cell where oxygen binds, and where it burns oxygen, and where it does this burning in order to live.

So we wondered if we could give people hydrogen sulfide, like a musical chair game, and occupy the place where oxygen binds, like a musical chair game.

And since it can't bind oxygen, it probably doesn't consume it anymore and may have a reduced demand for it.

I mean, who knows?

So -- (laughter) So there's the part about dopamine and the little things. What do you call it, delusional and you could have just been that.

So we wanted to know if we could use hydrogen sulfide in the cold and if we could replicate this skier in mammals.

Well, mammals are warm-blooded animals, but when it gets cold, their bodies shiver and shiver, right?

We actually try to keep our core body temperature at 37 degrees by burning more oxygen.

Interestingly, we found that applying hydrogen sulfide to mice when they were cold lowered their core temperature.

It has stopped moving.

It looked dead.

Oxygen consumption rate decreased by a factor of 10.

And here is the really important point.

I said hydrogen sulfide is in us.

It metabolizes rapidly and all you have to do after 6 hours in this deanimated state is simply put it in the air in the room and it will get warmer and wear out no worse.

Well, this one was cosmic.

TRUE. Because we found a way to kill mammals and it didn't harm them.

Well, I found a way to reduce the oxygen consumption to the lowest level, and it was fine.

Now, with this disarmed state, I couldn't go out dancing, but I wasn't dead and I wasn't harmed.

So we started thinking. Is this a substance that may have been present in the skier's body, and she may have had more of it than others, and could have reduced her oxygen demand before she got too cold and died, as the nematode experiment found?

So we wondered if this ability to control metabolic flexibility could be useful.

And one of the things that made us wonder, I think some of you are economists and know a lot about supply and demand.

And if the supply equals the demand all is well, but if the supply decreases, in this case oxygen decreases and the demand remains high, a person dies.

So what I just said is we've been able to reduce demand.

We should be able to bring the supply down to unprecedentedly low levels without killing the animals.

And with funding from DARPA, we were able to show just that.

Giving mice hydrogen sulfide can lower their oxygen requirements, allowing them to sit in oxygen levels as low as 5,000 feet above Mount Everest without a problem for hours.

Well this was really cool.

We also found that feeding hydrogen sulfide to animals could save them by exposing them to lethal blood loss.

So these proof-of-concept experiments led me to say, "We should start a company and take this to the wider playing field."

I started a company called Ikaria with the help of others.

And the first thing this company did was make a liquid formulation of hydrogen sulfide into an injectable form, inject it and send it to medical scientists around the world working on models of life-saving medicine. The results are incredibly good.

A model with a heart attack showed that animals given hydrogen sulfide had a 70 percent reduction in heart damage compared to animals receiving standard care that you and I here today would undergo if they had a heart attack.

The same is true for organ failure where function is lost due to poor perfusion of the kidneys or liver, acute respiratory distress syndrome, or damage sustained during heart bypass surgery.

Thought leaders in trauma medicine around the world claim this to be true. Therefore, exposure to hydrogen sulfide appears to mitigate damage caused by exposure to lethal hypoxia.

And it must be said that the concentration of hydrogen sulfide required to obtain this benefit is incredibly low.

So low, in fact, that doctors don't need to lower or darken people's metabolism too much to see the benefits I just mentioned. This is great if you are thinking of adopting this.

I don't want to prey on people just to save them. Really confusing.

(Laughter.) I mean, we're in a human trial.

Thank you. Phase 1 safety studies have been completed, are on track, and are now moving on to the next phase.

You need to reach Phase 2 and Phase 3. It will take years.

All this progressed very quickly, and an experiment with hibernating mice was done in 2005. The first human studies were conducted in 2008, and we should know in a few years if it works.

And all this happened really quickly, thanks to the tremendous help of many people.

First of all, I would like to mention my wife. This talk and my work would not have been possible without my wife. I'm really thankful to you.

It's also a great place to work in my lab and the other staff, the brilliant scientists who work at the Fred Hutchinson Cancer Research Center in Seattle, Washington.

And the wonderful scientists and businessmen of Ikaria.

One of the things they've done is take this hydrogen sulfide technology, a fast-burning venture capital start-up, and merge it with another company that sells another toxic gas that's even more toxic than hydrogen sulfide, and they're giving it to newborns who otherwise wouldn't be able to oxygenate their tissues properly and would die.

And this gas, which is supplied to over 1,000 critical care hospitals worldwide and is now approved and labeled, saves thousands of babies from certain death each year.

(Applause.) So it's really incredible that I can be a part of this.

And what I'm saying is that I think we're on our way to understanding metabolic flexibility in a fundamental way, and that in the not-too-distant future, paramedics might inject a seriously injured person with hydrogen sulfide or a related compound, which might make them a little less vital and a little more invulnerable.

It slows down your metabolism, like dimming a light switch in your home.

And it buys you time to get to the hospital for the treatment you need.

And after receiving that care, they'll wake up like rats, like skiers, like 65-year-old women.

miracle?

We hope not. Or maybe we just wish miracles were a little more likely.

thank you very much.

(applause)

If you think about telephony, over the past decade Intel has tested many of these things in about 600 senior households, 300 in Ireland and 300 in Portland, trying to understand how to measure and monitor behavior in a medically meaningful way.

And when you think about the phone, yes, it can be used in a great way to help people actually take the right medication at the right time.

We are testing this kind of simple sensor network technology at home to help seniors manage their medications with phones they are already familiar with.

And a lot of what they do is pick up the phone, whisper what our system needs to take, and pretend like they're having a conversation with a friend.

And they're not ashamed of the ugly medicine pot that sits at the kitchen table and says, "I'm old and I'm weak."

It's a secret technology that helps you do the simple task of taking the right pill at the right time.

Well, we also do some pretty cool things with these phones.

Because every moment of answering the phone is a cognitive test.

Think about it, okay? I plan to answer the phone in three parts.

"Hello? Hi"

have understood? It's the first time.

"Hello? Um, hi."

"Hello? Huh, who?

oh yeah ”

have understood? There was a big difference in how to answer the three calls.

And when we monitor phone usage by seniors for long periods of time, down to tenths of a microsecond, there are moments when we recognize if we know someone is a friend, and we immediately talk to them or do a lot of so-called trouble talk, like, "Wait, who is this? Oh." right?

Waiting for that moment of realization may be the best early indicator of dementia development than anything clinically manifests today.

These are called behavioral markers.

There are many others. When the phone rings, does that person answer the phone as quickly as before?

Is it a hearing problem or is it a physical problem?

Have their voices gotten a little softer? We do a lot of research on people with Alzheimer's disease, especially Parkinson's disease. The occasional quiet voice in Parkinson's patients may be the best early indicator of Parkinson's disease 5-10 years before clinical manifestation.

However, these subtle changes in your voice over time are difficult for you or your spouse to notice until they become extreme and your voice becomes very quiet.

The sensor sees those voices.

How much does it shake when you pick up the phone? What is it like and what is its trend over time?

Are you finding it more difficult to make calls than before?

Is it a matter of dexterity? Is this the beginning of arthritis?

are you using the phone? Are you socializing less than you used to?

And look at the pattern. And what does declining social health mean as an important sign of the future?

And wow, what a novel idea. Except in the US, you may be able to actually interact with nurses and doctors on the other end of the phone with this new technology.

Wow, what a wonderful day it would be to actually be able to do something like that.

So these are what I call behavioral markers.

And this is a whole area that we've been trying to work on over the last ten years at Intel.

How would you describe Simple Disruptive Technology and the first of the five phrases I will discuss in this talk?

Behavioral metrics are important.

How can we change behavior?

How can we measure behavioral changes in meaningful ways to help prevent disease, detect disease early, and track disease progression over time?

Now, why did Intel make me spend so much time and money over the last decade understanding the needs of older people and starting to think about these kinds of behavioral markers?

This is part of the fieldwork we did.

We have lived with 1,000 senior households in 20 countries over the last 10 years.

We study people in Rochester, NY.

We live with them in winter because what they do in winter, their access to medical care, and how much they socialize is very different from summer.

If they have a hip fracture, we accompany them and explore their entire discharge experience.

If there are any family members who are an important part of their care network, we will fly in to investigate them as well.

So we study the overall health experience of 1,000 older people in 20 countries over the last decade.

Why would Intel want to fund it?

That's for the second slogan I want to talk about.

Ten years ago, when I started convincing Intel to start thinking about disruptive technologies that would help us live independently, I called it "Y2K+10."

You know, back in 2000, we were so obsessed with watching computers age and whether they could survive 1999-2000 that we missed a moment that only demographers were paying attention to.

It was just around New Year.

And that switch was the first time on earth that there were more old people than young people.

For the first time in human history, and barring an alien landfall or another major pandemic, that's what demographers expect going forward.

And ten years ago it seemed like I had plenty of time to convince Intel to work on this. right?

Y2K+10 is approaching and baby boomers are starting to retire.

Folks, we seem to know the demographics here.

This is a map of the whole world.

It's like the lights are on, but no one understands this demographic 2000+10 problem. right?

I mean, I kind of understand it here, but I don't understand it here, and I haven't done anything about it.

The health care reform bill largely ignores the reality of the coming wave of aging populations and their impact on what we must do not only to change how we pay for health care, but also to deliver care in a radically different way.

And indeed it is upon us.

You've probably seen these headlines. This is Katherine Casey, the first Boomer to actually get Social Security.

That really happened this year. She retired early.

She was born in 1946, one second after midnight.

A retired schoolteacher, she stays with her Social Security administrator.

In fact, the first baby boomers didn't even wait until next year, 2011.

Early retirees are already starting to occur this year.

OK, here we are. This Y2K+10 problem is right in front of us.

This is 50 tsunamis scheduled on the calendar, but somehow we can't rally our governments and revolutionary forces to come out in front of the tsunamis and do something. We will not prepare for catastrophe, but wait until catastrophe.

So one of the reasons why it's so hard to prepare for this Y2K problem, I'd argue, is because we're experiencing what's called mainframe poisoning.

Andy Grove, about 6-7 years ago, he didn't know or remember this, but he used the phrase "mainframe healthcare" in a Fortune magazine article. I have extended and extended this.

He saw it written somewhere. He's like, "Eric, that's a really cool concept."

I said, "Actually, it's your idea. You said it in the Fortune article.

It just extended. ”

As you know, this is a mainframe.

This idea of ​​visiting and time-sharing large and expensive health care systems actually began in 1787.

It is the first general hospital in Vienna.

In fact, around 1850, Vienna's second general hospital was where the entire curriculum for teaching medical students began to be built.

And that's where we started developing an architecture that literally divides the body and divides care into departments and compartments.

And it's reflected in our architecture, how we teach our students, and this mainframe mindset continues today.

Well, I'm not anti-hospital.

Due to my own health problems, I have been on medication and have been to this and other hospitals many times.

But we adore high hospitals on hills. right?

And this is mainframe healthcare.

And just 30 years ago, no one could have imagined that we would have the power of a mainframe computer that occupies so much space in our wallets, on our belts, and today we carry it around in our phones. And suddenly computing appeared. It used to be a system led by professionals, but it was a personal system that we all owned as part of our daily lives. Moving from mainframes to personal computing is what we have to do for healthcare.

We need to move from this mainframe mindset of healthcare to a personal model of healthcare.

We are obsessed with this idea.

When Intel conducts investigations around the world, we say "Response Rapidly: Healthcare."

The first word is "doctor".

Next is "Hospital". And the third is "disease" or "disease". right?

In our imaginations, we are wired to think of healthcare and healthcare innovations as being built into it.

The whole healthcare reform debate we're grappling with right now, health IT when talking to policy makers, is equated to, "How do we get doctors to use electronic medical records on the mainframe?"

We don't think about how we move from mainframe to home.

And the problem with this is in the healthcare mindset. right?

This is a very reactive, crisis-driven system.

I have a 15 minute exam with the patient.

It's population based.

We might collect a ton of biological information in this artificial environment, fix it up again like Humpty Dumpty, send it home, and give them pamphlets and interactive websites, but I hope they do what they ask and don't come back to the mainframe.

And the problem is, we can't afford it today, folks.

We cannot currently afford to provide mainframe healthcare, including to the uninsured.

And now do we want a double-double for the coming age wave?

Business as usual in healthcare is collapsing and we have to do something different.

We have to focus on our home.

We must focus on a personal health care paradigm that moves care into the home. How can we be more proactive and focus on prevention?

How can I collect vital signs and other information 24/7?

How do you get a personal baseline of what works for you?

How can we collect not only biological data, but also behavioral, psychological, and relational data inside, outside, and around our homes?

And with all this amazing technology all around us to change our behavior, how can we drive compliance to create customized care plans?

That's what we need to do for our personal health model.

I would like to give some examples. This is Mimi, one of our researchers. She is in her 90s and had to leave home because her family worried about her falling.

Raise your hand if something serious happens to your family, or your loved ones, parents, etc. right?

Classic. Fractures of the proximal femur often lead to hospitalization for the elderly.

This is what happened to Mimi. Her family worried about her and moved her from her home to a nursing home.

She tripped over an oxygen tank.

A lot of people in this generation, even if they had an alert call system, would pay $30 a month and wouldn't push the button because they didn't want to bother anyone.

Boomer will push the button. trust me.

They will be pushing that button non-stop. right?

Mimi breaks her pelvis and lies all night until morning when someone finally comes and finds her and sends her to the hospital.

they put her back together. She never returned to assisted living. They put her in a nursing home ward.

The first night in the nursing home unit where she was in the same nursing home, moving her from one bed to another, kind of throwing her, breaking her pelvis and sending her back to the hospital she just came from. No one read her charts, she had Tylenol on which she was allergic, she had rashes, bedsores, basically heart problems, and died of a fall and complications and a mistake there.

Now, the scariest thing about this is that this is my wife's grandmother.

Well, I'm Eric Dishman. I speak English, work for Intel, get paid well, and know a lot about falls and fall injuries. This is my research area.

I can get in touch with Senators and CEOs.

You can't stop this.

What if you don't have the money, you don't speak English, you don't have the means to deal with these kinds of problems that will inevitably arise?

How can we actually prevent the majority of falls in the first place?

Here's a quick example of what we're doing to do just that.

I wear a little piece of technology called Shimmer.

A research platform.

It has an acceleration sensor. A 3-lead ECG can be connected.

There are all sorts of plug-and-play types of Lego that can capture tremors, gaits, strides, and more in the wild of the real world.

The problem is that, like Mimi, our understanding of a fall today is that three months after the fall, we receive a survey in the mail from our country asking, "What were you doing when you fell?"

It's kind of state of the art.

But with things like Shimmer, or something called Magic Carpet, sensors embedded in carpets, and camera-based systems borrowed from sports medicine, we are collecting and understanding real kinematic movement data for the first time in 600 elderly households. What subtle changes are occurring that indicate the mother is at risk of falling?

And in most cases, two interventions can be done: modifying the drug mix.

I'm a qualitative researcher, and when I look at these streams of data coming in from homes, I can see patterns changing within the homes, so I can look at the data and tell you the day a doctor prescribed a drug that no one else knew about. right?

The discovery of these behavioral markers and changes in behavior is game-changing, akin to microscopic discovery by collecting data streams that have never actually been done before.

Here is an example from the TRIL Clinic in Ireland. What you actually see is her looking at the data from the magic carpet in this photo.

So, we took a look at your amount of postural sway and prepared a small carpet where you can observe the changes in your postural sway over the months.

Some of this data looks like this:

This is actually a sensor firing.

These are two different subjects in our research.

Data for about one year.

Colors represent different rooms in the house.

The person on the left lives at home.

This person on the right actually lives in a nursing home.

I know this because I've seen how disrupted meal times are when they're not in a particular room here. right?

Now, this doesn't mean much to you.

But when you look at these cycles of data over time, looking at everything from movements in different rooms in your house to certain tremors picked up by shimmers to things related to your gait and stride length, these streams of data can give you information about behavioral patterns that were previously incomprehensible.

Visiting ORCATech.org has nothing to do with whales. Oregon Aging Technology Center. You can find out more about this.

The problem is that Intel is still one of the world's largest funders of independent living technology research.

We're not bragging about how much we fund. It's how few others are actually paying attention to aging and funding innovations around aging, chronic disease management, and independent living at home.

So my credo here, my fourth slogan, is, "Build 10,000 homes or we'll collapse."

We need to promote Framingham heart research on independent living techniques nationally, if not internationally. There, 10,000 senior households are connected with broadband, full medical characterization, and a platform to initiate experiments to turn a university-funded case study of 20 households into a large-scale clinical trial proving the value of these technologies.

In other words, 10,000 households will go bankrupt.

These are just a few of the households surveyed by Intel.

My fifth and final phrase. In the two years I've been trying, there have been moments where I've gotten pretty close to making this health care reform bill mean more than just a discussion of something-to-something, a mainframe model to a personal health model, or public choice and how to get funding.

It doesn't matter how you fund your medical care.

I'm going to try and think of something in the next 10 years.

Regardless of who pays, we would be better off initiating care radically differently, treating our homes, patients, families and caregivers as part of these coordinated care teams, and using the disruptive technologies that already exist to deliver care in a much radically different way.

The president needs to stand up at the end of the health care reform debate and say, "The goal as a nation is to move 50 percent of health care out of institutions, clinics, hospitals and nursing homes into the home within 10 years."

it is achievable. We should do it economically, morally and for quality of life.

But this medical reform has no goal.

Today is just a mess.

This is my last message to you.

How do we set our goals for the Moon to deal with the upcoming Year 2000+10 problem?

Innovation and technology won't be the silver bullet, but they will be part of the solution.

And we're going nowhere without launching the personal health movement that we all aim to transform.

So I hope that you will turn this conference into such a step forward.

Thank you very much.

(applause)

I'm Jane McGonigal. i am a game designer.

I have been creating online games for ten years. Our goal for the next decade is to make it as easy to save the world in real life as it is in online games.

I have a plan for that now. It requires convincing more people, including you, to spend more time playing bigger, better games.

Today, we spend 3 billion hours a week playing online games.

Some of you may be thinking, "I spend a lot of time playing games."

Considering how many pressing problems we have to solve in the real world, it may be taking too long. ”

But in fact, according to my research at the Future Institute, the opposite is actually true.

Three billion hours of gameplay a week isn't enough to solve the world's most pressing problems.

In fact, I believe that total will need to increase dramatically if we want to survive another century on Earth.

I've calculated that it would take a total of 21 billion hours of gameplay each week.

Perhaps this is a counter-intuitive idea, so again, please understand. I believe that if we want to solve problems like hunger, poverty, climate change, global conflict and obesity, we need to aim for at least 21 billion hours of online gaming per week by the end of the next decade.

(laughs) No, I'm serious. I.

Here's why.

This picture pretty much sums up why I think games are so essential to the future survival of mankind.

(Laughter) It's true.

He wanted to capture the emotion of the game, so he set up a camera in front of the gamer during the game.

This is the classic game feeling.

Now, if you're not a gamer, you might miss some of the nuances in this photo.

You will probably find yourself feeling a sense of urgency and a little bit of fear, but with intense concentration, deep, deep concentration, to tackle a very difficult problem.

If you are a gamer, you will notice some nuances here. Wrinkles around the eyes and mouth indicate optimism, and raised eyebrows indicate surprise.

This is a gamer on the cusp of what is called an "Epic Victory".

(Laughter) Oh, you've heard that.

got it. Some of us are gamers.

Winning epic is such a positive outcome that I never thought it was possible until I achieved it.

It's almost beyond your imagination and when you get there you'll be shocked to discover your true abilities.

This is a gamer on the cusp of an epic victory.

And this is the face we should see for millions of problem solvers around the world as we confront the obstacles of the next century, those who defy all adversity and are on the verge of epic victory.

Now, unfortunately, this is the face we see in our daily lives when trying to tackle an urgent problem.

This is what I call the "life is going wrong" face.

I'm actually making this.

This is me with a face that says, "Life sucks."

This is some graffiti in my old neighborhood in Berkeley, California. I got my PhD there on why humans are better at games than in real life.

And this is a problem many gamers have.

We feel that in reality we are not as good as in games.

It's part of being successful, but being successful doesn't mean it's good.

In the gaming world we are achieving much more.

But what I mean is a willingness to do something important, a willingness to cooperate and cooperate.

And when we are in the gaming world, many of us believe that we become the best versions of ourselves. That is, people who are most likely to help quickly, people who are most likely to stick with the problem until it takes time, and even if they fail to get up and try again.

And in real life, we often don't feel that way when faced with failures and obstacles.

We feel devastated, devastated, anxious, depressed, irritable, and sarcastic.

We don't have those feelings when we play games. Those feelings just don't exist in the game.

That's what I wanted to study when I was a graduate student.

Why do games stop feeling like you can't achieve everything?

How can we take that emotion from games and apply it to real-world work?

So I turned to games like World of Warcraft as the ideal environment for collaborative problem solving.

And I started to notice some things that make epic wins possible in the online world.

First of all, when you see these online games, especially World of Warcraft, there are a lot of different characters who will immediately put you on a mission to save the world.

But it's not just a mission, it's a mission that perfectly matches the current level of the game.

right? So it can be done.

They will never give you a task you can't accomplish.

But it's on the verge of your ability, so you'll have to try hard.

But there is no unemployment in World of Warcraft. No need to sit down and hold hands. There is always something specific and important to do.

There are many collaborators.

Wherever you go, hundreds of thousands of people are ready to work with you to accomplish your grand mission.

It is not so easy to obtain in real life. It is a feeling that there are many collaborators immediately.

And then we have this epic story, this inspiring story of why we are there and what we do, and we get all the positive feedback.

You've heard about leveling up, +1 health, and +1 intelligence.

You don't get that kind of continuous feedback in real life.

You won't get +1 speaking and +1 crazy ideas and +20 crazy ideas when you get off this stage.

You don't get that kind of feedback in real life.

Well, the problem with cooperative online environments like World of Warcraft is that it's always so satisfying to have epic victories on the horizon, so we decided to spend all our time in these game worlds.

Only better than reality.

So far, all World of Warcraft gamers have spent a total of 5.93 million years solving virtual problems in Azeroth.

Now, that's not necessarily a bad thing.

It may sound like a bad thing.

But to put it into context, 5.93 million years ago is when our first primate human ancestors stood up.

It was the first upright primate.

So when we talk about how much time we invest in playing games right now, the only way it even makes sense to think about it is to talk about time based on the magnitude of human evolution, which is extraordinary.

But it's also a good thing. Because we know that by spending all this time playing games, we are actually changing our capabilities as humans.

We are evolving into a more cooperative and caring race.

this is true. I believe this

So let's think about this very interesting statistic. This was recently announced by researchers at Carnegie Mellon University. The average young person today in a country with a strong gamer culture will spend 10,000 hours playing online games by the age of 21.

10,000 hours is a very interesting number for two reasons.

First, for children in the United States, 10,080 hours is the exact amount of time spent in school from 5th grade through high school, if perfect attendance.

(Laughter) So we're doing education in parallel, and young people are learning as much about what it takes to be a good gamer as they learn everything else in school.

If you've read Malcolm Gladwell's new book, Outliers, you've heard of his theory of success, the "10,000 hours" theory of success.

It's based on a great cognitive science study that says that if you can master 10,000 hours of intense learning about something by the time you're 21, you'll become a master in that field.

Whatever we do, we are as good as the greatest people in the world.

And what we're looking at right now is the whole youth who are seasoned gamers.

So the big question is, "What are gamers getting so good at?"

Because if you can figure it out, you have access to virtually unprecedented talent.

This is the number of people worldwide currently playing online games for at least one hour per day.

They are our virtuoso gamers, 500 million people who are exceptionally talented at something.

And in the next decade, there will be another billion more gamers who are exceptionally good at whatever they do.

If you don't know yet, it's coming soon.

The gaming industry is developing low-energy gaming consoles that run on wireless telephone networks instead of broadband internet, so that gamers around the world, especially in India, China and Brazil, can stay online.

They predict that there will be 1 billion more gamers in the next 10 years.

This will allow up to 1.5 billion gamers to participate.

So I started thinking about what these games make us masters of.

Here are the four I came up with:

OK, consider this extreme self-motivation.

Urgent optimism combines a desire to take immediate action to address obstacles with the belief that there is a reasonable hope of success.

Gamers always believe that epic wins are possible, that it's always worth trying, and that it's worth trying now.

Gamers don't just sit around.

Gamers are adept at weaving tight-knit social fabrics.

There's a lot of interesting research out there that shows you like people better after playing games with them, even if you win badly.

The reason is that playing games with someone requires a lot of trust.

We trust that they will spend time with us, play by the same rules, cherish the same goals, and stay in the game until the end.

So playing games together really builds bonds, trust and cooperation.

And as a result, we actually build stronger social relationships.

Blissful productivity. I love it.

There's a reason the average World of Warcraft gamer plays 22 hours a week. This is like half the job.

That's because we know that working hard is actually happier than relaxing or hanging out when you're playing a game.

We know that as humans, we are optimized for difficult and meaningful work.

And gamers work hard whenever they are given the right job.

Finally: grand meaning.

Gamers love to immerse themselves in awe-inspiring missions to human planetary-scale stories.

So here's just one trivia to help put it in perspective. So, you all know Wikipedia, the world's largest wiki.

The second largest wiki in the world, with approximately 80,000 articles, is the World of Warcraft Wiki.

5 million people use it every month.

They have compiled more information about World of Warcraft on the Internet than any other Wiki topic in the world.

They are building epic stories.

They are building an epic knowledge resource about World of Warcraft.

Now, if we add up these four superpowers, we can see one thing. It's that gamers are hopeful individuals with superpowers.

They are the people who believe they have the power to change the world.

And the only problem is that they believe they can change the virtual world, not the real one.

That's the problem I'm trying to solve.

There is an economist named Edward Castronova.

his work is great.

He examines why people invest so much time, energy and money in the online world.

And he said, "We are witnessing nothing less than a mass exodus into virtual worlds and online gaming environments."

And he's an economist, so it's reasonable.

And he says -- (laughter) unlike me, I'm a game designer. I'm fine.

But this makes perfect sense, he says, because gamers can accomplish more in the online world than in real life.

Games allow you to build stronger social relationships than you can in real life. Games give me better feedback than real life, and I find it rewarding.

So it makes perfect sense for gamers to spend more time in the virtual world than in the real world at this point, he says.

I agree that it's reasonable for now.

But it's never the best situation.

We have to start making the real world work more like a game.

I draw inspiration from events that happened 2,500 years ago.

These are ancient dice made from sheep joints.

Before there were great game controllers, there were sheep joints.

And these represent the first gaming devices designed by mankind, and those familiar with the writings of the ancient Greek historian Herodotus may know this history, the history of who invented games and why.

Herodotus states that games, especially dice games, were invented in the Kingdom of Lydia during times of famine.

Apparently, there was a starvation so severe that the King of Lydia decided that something must be done.

people were suffering. people were fighting.

It was an extreme situation and they needed an extreme solution.

So, according to Herodotus, they invented the dice game and set the policy for the entire kingdom. One day everyone would eat and the next day everyone would play a game.

And because games are so engaging and immerse us in such satisfying productivity bliss, they'll be addicted to dice games and ignore the fact that they have nothing to eat.

And the next day they played a game. And the next day they were to eat.

And, according to Herodotus, they spent eighteen years in this way, surviving famine by eating one day and playing games the next.

I think this is exactly how we use our games today.

We use games to escape the pain of the real world. I use games to escape from everything that's broken in my real environment, everything that's unsatisfying in real life, and I get what I need from games.

But it doesn't have to end there.

This is really exciting.

According to Herodotus, after eighteen years the hunger had not improved, so the king decided to play one final game of dice.

They divided the whole kingdom in half.

They played a single game of dice, and the winner of that game would go on an epic adventure.

They will leave Lydia and set out to find new places to live, leaving enough people to survive on the available resources, hopefully taking their civilization elsewhere where it can thrive.

Now, this sounds crazy, right?

Recently, however, DNA evidence has shown that the Etruscans, who were subsequently linked to the Roman Empire, actually shared the same DNA as the ancient Lydians.

So recently, scientists suggested that Herodotus' crazy story was actually true.

And geologists have found evidence of nearly two decades of global cooling that could explain the starvation.

So this crazy story could be true.

They actually saved their culture by playing games, escaped into games for 18 years, and after that they were so inspired and knew so much about how to work with games that they might actually have saved an entire civilization that way.

Ok, it can be done.

(Laughter) We've been playing Warcraft since 1994.

It was the first real-time strategy game in the World of Warcraft series.

That was 16 years ago.

They've been playing dice games for 18 years and we've been playing Warcraft for 16 years.

We say we are ready for our own epic game.

Now they've wiped out half their civilization in search of the New World, and that's where my 21 billion hours of gameplay come from per week.

Let's get half of us to agree to play the game for an hour a day until the real world problem is solved.

I think the question is, "How do we solve real-world problems in-game?"

Well, that's what I've devoted to my work at Future Lab for the past few years.

We hang this banner in our Palo Alto office, and it represents our view of how we should engage with the future.

We do not try to predict the future.

What we want to do is create the future.

We want to help people imagine best-case scenario outcomes and make them a reality.

We want to envision epic victories and give people the means to achieve those epic victories.

Here's a quick rundown of the three games I made. These games are meant to give people the means to win epic victories in their future.

We made this game in 2007.

This is an online game about surviving an oil shortage.

The oil shortage is fictional, but we believe it's real and publish enough online content to make you live your life as if you've run out of oil.

So when you sign up for the game and tell us where you live, you'll get real-time news videos and data feeds that show you exactly how much oil costs, what's not available, how food supplies are affected, how transportation is affected, if schools are closed, if riots are going on. And you have to think about how you live real life as if this were true.

And we ask that you blog about it, post videos, post photos, etc.

We piloted the game with 1,700 players in 2007 and have been tracking them for the past three years.

And I can say that this is a transformative experience.

No one wants to change the way they live just because it's good for the world or because we should.

But if you immerse them in an epic adventure and say, 'We've run out of oil.

This is a great story and adventure for you.

Challenge yourself how you survive,” but most players maintain the habits they learned in this game.

So we decided to aim higher than just peak oil in our next save-the-world game.

I played a game called Superstruct at the Institute for the Future.

And the premise was that the supercomputer had calculated that humans had only 23 years left to live on Earth.

Of course, this supercomputer was called the "Global Extinction Recognition System."

We invited people to join us online. Like a Jerry Bruckheimer movie.

You know the Jerry Bruckheimer movies. Astronauts, scientists and ex-convicts form a dream team. They all do something to save the world.

(Laughter) But in our game, instead of just adding five people to the dream team, we said, "Everyone is part of the dream team, and it's your job to invent the future of energy, the future of food, the future of health, the future of security, and the future of social safety nets."

We had 8,000 people play the game for 8 weeks.

They came up with 500 highly creative solutions. Check online by searching for "Superstruct" on Google.

So, finally the last game will be released on March 3rd.

After completing the game, you will be recognized as a Social Innovator Class of 2010 by the World Bank Institute.

We work with universities across sub-Saharan Africa and invite them to learn social innovation skills.

We have graphic novels to level up skills such as local insight, knowledge networking, sustainability, vision and resourcefulness.

I encourage all of you to share this game with young people anywhere in the world, especially in developing regions. They may benefit from banding together to start imagining their own social enterprise to save the world.

Well then, let me conclude with this.

i want to ask a question

What do you think will happen next?

We have a lot of great gamers, and we have games that are kind of pilots of what we can do, but no one has saved the real world yet.

We hope you agree that gamers are a resource for real-world work and that games are a powerful platform for change.

We all possess amazing superpowers: blissful productivity, the ability to weave cohesive social fabrics, a feeling of impending optimism, and a desire for grandiose meaning.

I sincerely hope that we can work together to play an important game to survive another century on this planet.

I hope you will join me in creating and playing games like this.

As I look to the next decade, I know two things for sure. It means that any future we can imagine is possible and we can play the games we love. So I say: "Let the world-changing game begin".

thank you.

(applause)

Kurt Andersen: Like many architects, David loves the limelight, but he's so reserved, or at least pretending to be, that he asked me to ask questions instead of talking.

In fact, I think that what we are going to talk about is actually a subject that is better talked about than addressed.

And I think there's a little news clip before that.

Dan Rather: Since the September 11 attacks on the World Trade Center, many have flocked to downtown New York to visit and pay their respects at the 16-acre equivalent of a cemetery.

As CBS's Jim Axelrod reports, they're now putting the finishing touches on new ways for people to visit and watch the scene.

Jim Axelrod: Forget the Empire State Building and the Statue of Liberty.

New York City has the most crowded new place, Ground Zero.

Tourist: I brought my stepdaughter here from Indianapolis.

This was her top choice of all the tourist destinations in New York City.

JA: There are thousands of people lining up for the Broadway lower right now.

Tourist: I've been wanting to come here ever since this happened.

EN: Even on the coldest winter days.

To honor and remember.

Tourist: It's a reality, it's us. It happened here.

this is ours.

JA: Actually, there are so many that it's a bit of a problem to see.

Tourists: I think people are very frustrated that they can't get up close and see what's going on.

JA: But that's about to change.

In record time, a team of architects and construction workers designed and built the observatory to ease frustration and bring people closer together.

Men: They will see incredible panoramas and have a more complete picture of the destruction of the place.

JA: If you think about it, Ground Zero is very different from other tourist destinations in America.

Unlike the Grand Canyon and the Washington Monument, people come here to see things that no longer exist.

David Rockwell: The first thing people see here is not as a construction site, but as this incredible moving burial ground.

JA: The walls are bare by design so that people can fill in their own monuments as they are already in the current surroundings.

Visitor: We were equally affected, from the bottom of our hearts.

JA: The ramp is made of a simple material, like the plywood you see on construction sites, and that's what really matters.

In the face of America's worst destruction, people are building again.

Jim Axelrod, CBS News, New York

KA: This is not an explicit subject that belongs in the erotic realm, but certainly David, you are known -- I know, I hate that phrase -- as an architect of entertainment.

Your work is very sensual, even hedonistic.

DR: I like that term.

KA: It's all about fun: casinos, hotels, restaurants.

How did the shock that all of us felt on September 11th, especially those of us who live in New York, translate into your desire to do this?

DR: Well, to tell you the truth, I originally felt that I had that role after the 9/11 attacks—first of all, as someone who lives in Tribeca whose neighborhood is devastated, and who works a mile away from it—I felt like I had a role in forcing the 100 employees that I work with at the company to continue to have the same level of enthusiasm about creating the places we've created.

In fact, we have completed a book called Pleasure about sensual pleasures in space.

But I have to say it has become impossible.

We were really numb.

And the Friday after September 11th, two days later, I realized that I literally couldn't motivate anyone to do anything.

We gave the office a few days off.

And in discussing this with other architects, I saw people in the press saying that the tower should be rebuilt as-is, which means it should be 50 stories tall.

And I thought it was amazing to speculate about a wound so fresh as if it were a competition.

And I had a series of discussions — first with Rick Scofidio and Liz Diller, who worked with us on this matter, and a few other people — and really felt like we had to find a relevance in doing something.

And that, as people who make places, the ultimate way to help was not to be arrogant or make up scenarios, but to help now.

So we tried to figure out how to create a kind of design SWAT team as a group.

And that was the mission we came up with.

KA: As a designer whose whole job is to satisfy desires, did you suddenly become aware of the need fulfillment?

DR: Well, what I've noticed is the overwhelming need to act now.

And I was asked to participate in some projects before that.

A school called PS 234 was evacuated to Ground Zero.

They moved to an abandoned school.

We mobilized 20 or 30 architects, designers and artists and spent four days working on the renovation – it was like growing a barn in the city – and everyone wanted to help.

It was just extraordinary.

Tom Otterness and Myra Kalman contributed and it was a cathartic experience for us.

KA: So it was effectively completed by October 8th or so?

DR: Right.

KA: Obviously you faced trying to do something as substantive as this project, which is only one of the four projects you designed around the property, but you must have faced the incredibly Byzantine and entrenched bureaucracy and power that exists in New York real estate and New York politics.

DR: Well, that's interesting.

Finished PS234 and had dinner with a small group.

Actually, I was asked to chair the AIA's reconstruction committee.

And I attended some conferences.

And then there was the most circuitous grand plan, involving long-term infrastructure and rebuilding entire cities.

And really, there were pressing wounds and needs that needed to be filled, and there was talk of inclusion and wanting it to be a comprehensive process.

And it was not an inclusive group.

So we said, what is -- KA: Wasn't it an inclusive group?

DR: It wasn't an all-inclusive group.

It was a wealthy corporate group, mostly white, but not representative of the city.

K: It's shocking.

DR: Well, it's surprising.

So Rick, Liz, Kevin and I came up with this idea.

The city actually called out to us.

We first approached the city around Pier 94.

Checked how the PS 234 works.

A family, a family victim, was trying to get to this incredibly inhuman jetty.

KA: On the Hudson River?

DR: Right. And the city actually - first through Tim Zagat, then through Christine Nicholas and then down to Giuliani - said, "We don't want to do anything about Pier 94 right now, but we want to have a family observatory at Ground Zero that provides a more dignified experience for families and a way to protect it from the weather."

So I went there with Rick, Liz and Kevin and I have to say it was the most moving experience of my life.

It was shocking to see a simple plywood platform with rails around it, with notes left by the victim's family.

And there was no middleman between us and the experience.

There were no filters.

And then, on September 11th, I remembered the roof of our building on 14th Street—with a good view of the World Trade Tower—and watched the first building collapse from the conference room on the eighth floor on the television we had set up.

And everyone was on the roof, so I ran up there.

And I was amazed at how much harder it was to believe in real life than what you see on TV.

There was something about the comfort of filters and how much information there was between us and the experience.

So it was a very powerful experience to see this in such a simple and regal way.

So we went back to town and said we weren't particularly interested in upgrading this as a VIP platform, but spent some time there.

At the same time, the city also had such needs.

They were looking for a solution to deal with 30,000 or 40,000 people a day with nowhere to go.

And there was no way to deal with traffic jams around the property.

So dealing with it is just a master plan for the time being.

There was a way to allow people to move around the site. there had to be a way.

KA: But then we've got to find a way -- to skip the insanely tedious process of getting permission and getting everyone involved -- just to fund this thing.

It seems pretty simple, but was this a $500,000 project?

DR: Well, we knew it wouldn't happen without private funding.

And frankly, we also knew that if that didn't happen by the end of the Giuliani administration, all the people we were dealing with at the DOT and the police stations, and all the people, were going to meet with the city in 20 or 30 people at a time, and that's what Emergency Management had put in place.

They really wanted this and felt the need to do so, which is why they took this amazing move.

KA: So this clock was ticking. Because Giuliani apparently left three months later.

DR: Right. So the first thing we had to do was find a way to get it. We had to work with the victims' families through the city to make sure they were informed that this was happening.

Because this was not surprising.

I also needed to be as inconspicuous as possible when I was in New York. The key was to work as quietly as possible without creating too many objections.

We came up with the idea to create a foundation mainly because when we found a contractor to build it, he wouldn't agree to do it even if we paid him.

I needed to lay the groundwork.

So we came up with a foundation, and what really happened was a big developer in New York -- KA: Who would stay anonymous?

DR: Right. His initials are JS and he is the owner of Rockefeller Center. I wanted to help someone, so I volunteered to help.

and we met him.

Prices from contractors ranged from $50,000 to $700,000.

And Atlantic Haight, the nation's largest scaffolding contractor, voluntarily offered to do the work for a fee.

The developer then said, "We will pay all the costs."

And we said, "That's amazing!"

I think this was the 21st, but I knew I had to build this by the 28th.

And construction had to start the next day.

We had a meeting with the contractor he had chosen that night. The contractor showed up with a drawing of a platform about half the size of the one we drew.

KA: Do you think it's like the scene in Spinal Tap getting a little Stonehenge?

(Laughter) DR: Actually, it was almost like a stepping stone for cleaning windows.

There was no sense of the fact that this was next to St. Paul, that this was actually a place that needed some kind of dignity, a place to reflect and remember.

And I have to say that we spent a lot of time putting this together, watching the crowds gathering in St Paul's just to our right and moving around the grounds.

Since I live there, I have spent a lot of time considering its needs.

And I think people were surprised by two things. I think they were surprised by the destruction, but I think they were distrustful of the heroism of the New Yorkers. It was very moving for me.

It's like a New Yorker's everyday heroic story.

So we were in this meeting and the contractor literally said, "Lock the door. This developer won't agree to move you out until you agree."

And we said, 'This is half the size and has none of the design features that everyone in town agreed on.

To do this we need to return to the origin. ”

And I persuaded him that he should agree to build as designed and leave the room.

The next day I received an email from the developer saying they were withdrawing all funds.

So we didn't know what to do, but decided to cast a very wide net.

We emailed as many people as we could (some of us in the audience here) and they were very helpful.

KA: Was there any thought of abandoning the ship at that point?

DR: No. In fact, I told the contractor to move on.

He had already ordered the ingredients based on my go-ahead.

Either way, I knew this was going to happen.

And we felt it had to happen.

KA: You were funded by yourself and donations and this foundation.

I think Richard first made that point about the history of chair designers imposing aesthetic solutions to this kind of universal, banal sitting problem, before they even existed.

Now it seems to me that it was the other way around.

This was an unprecedented and idiosyncratic design problem.

DR: Well, here's the problem. We knew this didn't mean thinking about the place and thinking about the need for a memorial.

It was important not to classify this as a memorial.

This was a place for people to look back and remember, a kind of quiet place.

That's why we've moved to design solutions that put as few filters as possible between the viewer and the experience, as we mentioned for the family platform.

It's all incredibly humble material.

Scaffolding and plywood.

And it's like an athletic march up by St. Paul's Cathedral and down the other side, allowing you to rise about 300 feet to a 360-degree view of 13 feet above the ground.

But this design was driven by the need to be fast, cheap, safe, polite and flexible.

Another feature is that it is designed to be mobile.

Because when I looked at the four platforms on the grounds (one of which was an upgraded version of my family's platform), I knew they needed to be mobile in order to accommodate changing conditions and changing definitions of what ground zero was.

KA: Your work, I've talked about this before, I think a lot of your work is shaped by your belief and focus on the transience of all things, the ephemerality of things, and a kind of presence like, "I'm going to die tomorrow so let's eat, drink and enjoy."

This is clearly not a timeless piece.

You know, it won't be here in a few years.

Did that require a new way of thinking about what you do as an architect?

How about thinking of this as just a temporary installation?

DR: No, I don't think so.

I think this is obviously, by its very nature, very different from what we've thought of doing so far.

What overlaps with our thinking about work in general is primarily the notion of collaboration as a way of getting things done.

And Kevin Kennon, Rick Scofidio, Liz Diller, and everyone in the city—Norman Lear, whom I spoke to four hours before the fundraising deadline—offered to provide bridge loans to get us through this crisis.

So I think the concept of collaboration underscores how important it is.

And regarding its ephemeral nature, our goal was not to create something that will be there longer than necessary.

I think what we were most interested in was facilitating the kind of dialogue that we felt wasn't happening enough in the city about what was really going on in the city.

Then, a day or two before the opening, Giuliani gave his farewell speech, where he pitched the idea of ​​turning the entire Ground Zero into a monument.

This was very controversial, but it resonated with a lot of people.

And whatever your position on how to use this sacred land, I think the dialogue that comes from actually meeting and seeing it in person is going to be much more powerful.

And that's what we were interested in.

So that's exactly what I've always been interested in.

KA: It seems to me, above all, great urban infrastructure.

It allows the conversation to get serious.

And now, six months after that fact, and just two months away from cleaning up the site, we're rapidly reaching a point where the debate about what should be there is getting serious.

Having been as hands-on in the field as this project, do you have any thoughts on what to do and what not to do?

DR: Well, I think one of the things you shouldn't do is ratings. I think that the discussion about the master plan is now a very closed discussion.

There was a recent exhibit on building ideas at the Protetch Gallery that showed a certain ingenuity with buildings.

KA: But there were some really scary ideas.

DR: It was also kind of an idea contest. I think the focus of an idea should be on the basic plan and use.

And I think there needs to be a broader dialogue, which is really starting to happen, but the dialogue is really open to what this site really wants to be.

And I truly believe that until the memorial issue is resolved, it will be very difficult to have a sensible argument.

There are some discussions right now that I think are very positive. It's about turning the West Side Highway into a depression to connect here and create an unbroken land.

KA: Well, I think that's interesting.

And then we come to another issue that was probably inappropriate to discuss six months ago, but probably shouldn't be discussed now. It's that not many people love the World Trade Center as a building and what it does to this city and that giant square.

Is this an opportunity to rebuild a more traditional urban grid, or a ray of hope?

DR: I think we have a real opportunity to discuss why we live in cities.

And why do we live in a place where such dissimilar people clash every day?

Whatever the number is, I don't think it has much to do with 5, 6, 7, 80,000 new office spaces.

Yes, I think we have a chance to rethink the way we think about cities.

And indeed, proposals for Building 7 are currently being considered.

KA: Which building is just north of the Towers?

DR: Yes, the tower fell there.

And the reason it's on hold is essentially due to community anger over not reopening the street to connect with the rest of the city.

I am thinking of public dialogue. I would like to see an international competition and call for application ideas.

KA: Is it the art, the housing, the amount of shopping?

DR: Right. And we are looking for something else.

This small foundation we founded is looking for other ways to help.

These include featuring a small piece adjacent to the site and inviting 10 architects who currently have no voice in New York to the artist's residence.

And find other ways to encourage arguments against arguments about multiple things, such as some kind of monolithic, single solution.

KA: Before we finish, do you have a digital video recording of your experience on this platform?

DR: John Kamen -- who's actually here -- put together a two-and-a-half minute article showing the platform in use.

So I thought this should be the end of it.

DR: Looking from the west side of Fulton Street.

One of the thorny issues we had with the Giuliani government was that I forgot how much he was against graffiti.

And essentially, our structures are designed to be written.

KA: You're right, this is not a memorial.

But were you conscious of the monument? Vietnam memorial?

Like that?

DR: We certainly did all the research we could and were aware of other monuments.

And so does the complexity and length of time it actually takes.

There are 350 people on the Oklahoma City committee, so we thought of this as a sort of temporary, spontaneous solution that expanded Union Square and other places in the city that were already temporary monuments.

The scaffolding built over the road is removable.

What is interesting is that the nature of the field has completely changed. So you can see that not only the ground zero building, but all the buildings around it were destroyed, leaving huge scars on the buildings around it.

You will see St Paul's Cathedral on your left.

KA: On behalf of the New Yorkers, I want to thank you for making this happen and doing it.

But the kind of virtually instantaneous nature of that erection, and its presence before a response of this magnitude could be believed to be achieved, is part of its extraordinary—beautiful, I don't know if that's the right word—presence.

DR: It was an honor.

And I am very happy to be able to show it here.

It's about fear, so I'm supposed to scare you, right?

And you should really be afraid, but not for the reasons you think you should.

You go there when you paste the first slide about this, but you should really fear what you're missing.

Because if you spend this week thinking about Iraq, Bush, and the stock market, you're missing out on one of the greatest adventures we've ever had.

And this is what this adventure is really about.

This is crystallized DNA.

All life on this planet, all insects, all bacteria, all plants, all animals, all humans, all politicians (laughter) are encoded in it.

And if you want to take out a single crystal of DNA, that's how it goes.

And we are just beginning to understand this.

And this is the most exciting adventure we have ever been on.

This is the greatest cartographic project we have ever worked on.

If you think that the map of America, the moon landing, etc. made a difference, it's actually the map of ourselves, the map of every plant, every insect, every bacterium that makes a difference.

And it's starting to tell us a lot about evolution.

(Laughter) As to what this is, and Richard Dawkins writes about it, it turns out that this is actually the river from the Garden of Eden.

So the 3.2 billion base pairs in each cell are actually a history of where you've been for the past billion years.

And we could start dating things and change medicine and archaeology.

If we take humankind as an example about 700 years ago, we can see that European whites diverged from African blacks in a very significant way.

European whites were also affected by the plague.

And while most people didn't survive the plague, those who did had mutations in the CCR5 receptor.

And because they were the ones who survived, the mutation was passed on to their children, thus creating great population pressure.

There were no population pressure mutations in CCR5 because Africa did not have these cities.

It can be traced back to 700 years ago.

That is one reason why AIDS is ravaging across Africa, but not as fast as across Europe.

And we're starting to discover these little things about malaria, sickle cell and cancer.

And in that we map ourselves, this is the greatest adventure we've ever had.

And this Friday, I would like you to draw a really delicious wine and toast to these two.

Because 50 years ago this Friday, Watson and Crick discovered the structure of DNA. It's a date almost as important as February 12th, when we first mapped it, but we'll get to it anyway.

I thought I'd talk about the new zoo.

You've all heard about DNA and DNA functions. But some of the things we're discovering are kind of nifty. Because it turns out to be the most abundant species on earth.

If you think you're successful, or cockroaches are successful, you'll find that there are 10 trillion Pluurococcus out there.

And we didn't know Pluurococcus existed there. That's one reason why this whole species mapping project is so important.

Because we are just beginning to learn where we came from and what we are.

And we're finding amoebas like this. Amoeba Dubia.

And the amoeba dubia is what you are made of except that each of you has about 3.2 billion letters, and when it comes to the genetic code within each cell, this little amoeba, as you know, sits in hundreds of millions, millions, billions of water, and it turned out to have a genetic code of 620 billion base pairs.

So this tiny Samomajig has a genome 200 times larger than yours.

And if you're thinking of an efficient information storage mechanism, it may not be a chip.

It may look a little like the amoeba.

And, again, we are learning from life and how life works.

This funny little thing was that people didn't think it was worth taking samples from nuclear reactors because they were dangerous and of course nothing lived there.

And finally someone picked up a microscope and looked at the water next to the core.

And sitting next to that water in the nucleus was this tiny Deinococcus radiodurans, backstroke, having its chromosomes blown and re-stitched six or seven times each day, living in about 200 times more lethal radiation.

And by now you should have a hint of how diverse, how important, how interesting this journey into life is, and how many different life forms exist, and how different life forms can live in very different places, perhaps even beyond Earth.

Because if we can live in such radiation, it raises a series of interesting questions.

THIS LITTLE THING AMAZIG: We didn't know this THING AMAZIG existed.

We should have known this existed as it is the only bacterium visible to the naked eye.

So this is 0.75 millimeters.

It lives in deep ocean trenches off the coast of Namibia.

And what we're observing in this namibiensis is the largest bacterium we've seen so far.

That is, about the size of a small period in a sentence.

Again, I didn't know anything like this existed 3 years ago.

We have just started our journey of life at our new zoo.

This is really strange. This is Ferroplasma.

Ferroplasma is interesting because it eats iron, lives inside the equivalent of battery acid, and excretes sulfuric acid.

So when you think about strange life forms and what it takes to live, you see that this is a very efficient life form, and they call it archaea. Archia means "ancient".

And the reason they're ancient is because this thing came out when this planet was covered in things like sulfuric acid in batteries, and it was eating iron when the Earth was part of its molten core.

So dogs and cats, whales and dolphins aren't the only things you should be aware of and interested in on this little trip.

What you fear is that you are not, that you are paying attention to the temporary.

I mean, George Bush, he's gone, okay? Life is not.

Whether humans survive or not, these objects will continue to live on this Earth or other planets.

And just beginning to understand the code of this DNA, it is the most exciting intellectual adventure we have ever taken.

And you can do weird things with it. Gaur baby.

Conservation groups come together to find ways to breed endangered animals.

They can't do that naturally, so what they do with this object is they use a spoon to take some cells out of the mouth of an adult gaur, write some code on it, take the cells out of it and insert them into a fertilized cow's egg to reprogram the cow's egg and write a different genetic code.

Then the cow gives birth to a gaur.

We are currently experimenting with bongos, pandas, eland and Sumatran tigers, and Australians - fortunately - play with these things.

Well, these last individuals died in September 1936.

This is a Tasmanian tiger. The last known individual died at the Hobart Zoo.

However, as we learned more about the genetic code and how species can be reprogrammed, it turned out that it might be possible to fill the genetic gaps in degraded DNA.

And if you learn how to fill in the genetic gaps, you can combine complete strings of DNA.

And if you insert this into a fertilized wolf egg, you might have an animal that hasn't walked the earth since 1936.

And then you can go even further back and start thinking about the dodo and start thinking about other species.

And other places, like Maryland, are trying to figure out what the progenitor is.

Each of us contains the entire genetic code of where we were for the last billion years, from which we evolved, so we can tear down that tree of life and put it back together. And to the extent that we learn to reprogram, perhaps we will produce something very close to the original primordial exudate.

And it all comes out of something like this.

These are companies that didn't exist five years ago.

A gigantic gene sequencing facility the size of a football field.

Some are public. Some are private.

It would cost about $5 billion to parse a human sequence for the first time.

From the second time, it will cost about 3 million yen.

We will have a $1,000 genome within the next five to eight years.

So each of you will have your entire genetic code on your CD.

And it will get really boring. It can be read like this.

(Laughter) The really great thing about this piece is that it's life.

Laurie talks a little bit about this.

Because if you happen to find this in your body, you're in big trouble, because it's the source code for Ebola.

It is one of the most deadly diseases known to mankind.

But plants and insects work alike, and so does this apple.

This apple is the same as this floppy disk.

Because this object encodes 1's and 0's, this object encodes A's, T's, C's, G's, sits there and absorbs energy on a tree, and one fine day it stores enough energy to say, it does, it thumps. right?

(Laughter) And when it runs, it pushes the .EXE and executes the first line of code. The first line of code reads the same as AATCAGGACCC. This means creating a route.

Next line of code: Create a stem.

The next line of code, TACGGGG: Creates these fragrant white flowers that bloom in spring.

By the measure of having the code and reading it, by the way, the first plant was read two years ago. The first human was read two years ago. The first insect was read two years ago.

We first read it in 1995 and it was a tiny bacterium called Haemophilus influenzae.

If you have the source code, as you all know, you can change the source code and reprogram the organisms so that this little thing becomes a vaccine or this little thing starts producing biomaterials. So DuPont is now growing a type of polyester that feels like corn silk.

This will change all rules. This is life, but we are reprogramming it.

This is what you look like. This is one of your chromosomes.

And what I can do now is that I can find out exactly what my chromosomes are, where the genetic code on that chromosome is, what those genes code for, and what animal I'm writing the code for, and I can link that to the literature.

And as a means to that end, today you can go home, connect to the internet, and access the world's largest public library, the library of your life.

And the same way this apple can be reprogrammed, if you go to Cliff Tabin's lab at Harvard Medical School, he's reprogramming chicken embryos to grow more wings, so it can do some pretty weird things.

Why would Cliff do that? He doesn't have a restaurant.

(Laughter.) The reason he's reprogramming the animal to have more wings is because when I was a kid, I used to play with a lizard, and when I picked it up, sometimes the tail would fall off, and it would grow back.

Not so with humans. If you cut off an arm, cut off a leg, it will not regenerate.

However, since each cell contains the entire genetic code, each cell can be reprogrammed to perform different bodily functions if stem cell and genomic research is not stopped.

And in our efforts to learn how chickens grow wings and what is the program for those cells to differentiate, one of the things we can do is stop the undifferentiated cells known as cancer, and one of the ways we can learn how to reprogram cells like stem cells in ways that represent bone, stomach, skin and pancreas.

And you and your children may be walking around with regenerated body parts in a reasonable amount of time in some parts of the world where research is never stopped.

how does this work? If you're 1 in 1,000 different from the person next to you, but your code is only 3 percent, or 1 in 1,000 multiplied by 3 percent, a very small difference in phrasing or punctuation can make a big difference. Consider a simple declarative statement.

(laughs) Right?

it's perfectly clear. So people read that sentence, see that sentence, read this.

have understood?

Now, the women look at the sentence and say, umm, that's wrong.

It should look like this.

(Laughter) That's how your genes work.

That's why you are a thousand times different than this person here.

right? But he's pretty handsome, but...

I will not go there.

You can do this without changing punctuation.

Would you like to see this?

And they see the world a little differently.

They see the same world and say...

(Laughter) This is how the same genetic code works. So you have 30,000 genes, your mouse has 30,000 genes, and your husband has 30,000 genes.

Mice and humans are the same. Wives know it, but anyway.

Very small changes to the genetic code can produce completely different results, even for the same string.

That's what your genes do every day.

Therefore, even if a person's genes do not change much, cancer may develop.

These tiny chips are about the size of a credit card.

They test any of you for 60,000 genetic diseases.

It raises issues of privacy and insurance and all sorts of other things, but it can also start tracking disease. This is because when people with leukemia are treated in this way, three diseases with completely similar clinical symptoms turn out to be completely different diseases.

Because in all leukemias there is a set of genes that are overexpressed.

In MLL this is the middle set of genes and in AML it is the lower set of genes.

And if any of these specific symptoms develop in your body, taking Gleevec will cure them.

Do not take Gleevec if it is not expressed in your body or if you do not have one of these types (specific types).

It will do you no good.

Receptin for breast cancer is similar.

Do you have HER-2 receptors? Don't take Receptin.

Changing the nature of medicine. Changing medical predictions.

change the way medicine works.

This was the biggest repository of knowledge when most of us were in college, but now we know this is not so important.

In terms of the amount of printed data in the Library of Congress, it contains less data than the best genomics companies provide on a combined basis each month.

Let me say it again. A single genomics company produces more data in a month than the US Library of Congress print collection on a combined basis.

This is what drives the US economy. It's Moore's Law.

We all know that computers halve in price and double in performance every 18 months, right?

However, juxtaposing this with the speed of genetic data being deposited in GenBank, Moore's Law does apply here. It's the blue line.

This is a logarithmic scale, which means hyperexponential growth.

This will require computers to grow faster than they have in the past. Because, so far, no application needs to run faster than Moore's Law. This is so.

And here is an interesting map.

This is a map completed at Harvard Business School.

One really interesting question is, if all this data is free, who is using it? This is the world's largest public library.

Well, it turns out that about 27 trillion bits are moving from US to US domestically. About $4.6 trillion is going to those European countries. About 5.5 go to Japan. There is very little communication between Japan and no one else can read or write about this.

It's free. nobody read. They focus on war. They focus on bush. They are not interested in life.

So the new world map looks like this.

That is the world of genome literacy. And that is the problem.

In fact, it is a world without genomic literacy.

You can break this down by state.

And we get to see states rise and fall according to their ability to speak the language of life, and we get to see New York fall off a cliff, New Jersey fall off a cliff, and new intellectual empires rise.

Since it is a specific county, you can also break it down by county.

If you want to be more specific, it's actually a specific zip code.

(Laughter) So you want to know where life is going?

In Southern California it happened in 92121. That's all.

That is the triangle between Sauk, Scripps and UCSD called Torrey Pines Road.

So you don't have to be a superpower to be successful. That means you don't need a lot of people to be successful. That means most of the country's wealth can be moved in a handpicked 3-4 747s.

Same in Massachusetts. It looks more spread out, but oh, by the way, the same color ones are continuous.

What is the net effect of this?

In agricultural societies, the richest versus the poorest, and the most productive versus the least productive, were five to one. why?

Because in farming, if you have ten children, grow up a little faster, and work a little harder, you can produce on average about five times more wealth than your neighbor.

In the knowledge society, that number is now 427 to 1.

Being able to read and write English, French and German as well as Microsoft, Linux and Apple is very important.

And soon it will be important whether you can read and write the code of conduct.

So if there's one thing you should be afraid of, it's keeping your eye on the ball.

Because it really matters who tells the life.

That is why nations rise and fall.

And, going back to the 1870s, we found that Australia was the most productive country per capita on Earth.

And New Zealand was far above. Then around 1950 the United States came to power, Switzerland around 1973, and then the United States came back on top, beating out chocolate and cuckoo clocks.

And we all know, of course, that today the most productive country on earth is Luxembourg, producing about a third more wealth per capita per year than the United States.

small landlocked country. No oil. No diamonds. No natural resources.

It's just smart people moving the bits. different rules.

This is the difference in productivity.

Here's how many people it takes to write one US patent:

That is about 3,000 Americans, 6,000 Koreans, 14,000 British, and 790,000 Argentinians. Want to know why Argentina collapsed?

It has nothing to do with inflation.

It has nothing to do with privatization.

A Harvard-educated Ivy League economist could be put in charge of Argentina. He doesn't understand how the rules have changed and is still tearing the country apart.

Oh yeah, it takes about 5.6 million Indians.

Well, see what happens to India.

India and China accounted for 40% of the global economy around the time of the industrial revolution, and now around 4.8%.

2 billion people. One-third of the world's population produces 5 percent of the wealth because it failed to accept this change and continued to treat its citizens like serfs rather than shareholders in a common project.

They didn't hold back educated people.

They didn't encourage business. They didn't IPO.

Silicon Valley was. That is why it is said that Silicon Valley has been supported by IC.

Not integrated circuits: Indians and Chinese.

(Laughter) Here's what's going on in the world.

If you go to the United Nations in 1950 when it was founded, you will find that there were 50 countries in the world.

It seems that there are about 192 people now.

One country after another divides, secedes, succeeds and fails, all very fragmented. And it doesn't stop there.

In the 1990s, these are sovereign states that did not exist before 1990.

This does not include merging, renaming, or flag changes.

We generate about 3.12 states per year.

People control their own conditions, sometimes for the better and sometimes for the worse.

And what's really interesting is that you and your children have the power to build a great empire and it doesn't take much to do so.

(music) And now that the music is over, I was going to talk about how this can be used to create a lot of wealth and how the code works.

Moderator: Two minutes.

(laughter) Juan Enriquez: No, I'll stop here and do it next year. Because I don't want to take any of Laurie's time.

But thank you very much.

So I was just asked to go shoot a movie called "Elizabeth."

And we all talked about this great British icon and said, 'She's a wonderful woman and she can do anything.

How shall we introduce her? ”

So we went around the table with studios, producers, screenwriters, and they came up to me and said, 'Shekhar, what do you think?

And I said, "I think she's dancing."

And it turns out that everyone looked at me and someone said "Bollywood."

Another said, "How much did you hire him for?"

And the third said, "Let's find another director."

I thought it would be better to change.

So we had a lot of discussions about how to introduce Elizabeth, and I said, 'Okay, maybe I'm too Bollywood.

Perhaps this great symbol, Elizabeth, is dancing?

what are you talking about? "

So I rethought everything and then we all came to an agreement.

And here was introduced this great British icon called "Elizabeth".

Lester: May I join you, miss?

Elizabeth: If you don't mind, sir.

(music) Shekhar Kapoor: I mean, she was dancing.

So how many people who watched this movie could not understand that there is a woman in love here, that she is so innocent, that she has so much joy in life, that she is so youthful?

And how many people couldn't figure it out?

That's the power of visual storytelling, that's the power of dance, that's the power of music, that's the power of the unknown.

When we go out to direct a movie, we do a lot of preparation and overthinking every day.

Knowledge weighs wisdom.

As you know, simple words get lost in the quicksands of experience.

So I stand up and say, "What are you going to do today?"

That's the only way to get rid of my mind, to get rid of the mind that says,

You're the director, and you've been doing that for years. ”

So I have to get there and completely panic.

It's a symbolic gesture. Break the script, go and find yourself panicked and scared.

I'm doing it now You can look at me I'm nervous, I don't know what to say, I don't know what I'm doing, I don't want to go there.

And when I go there, of course the AD says: I say, "Of course I will."

And studio executives would say, "Hey, look at Shekhar, he's so ready."

And in my heart I just listen to Nusrat Fateh Ali Khan because he is chaotic.

Out of the confusion I expect the moment of truth to come, so I get myself into confusion.

All preparations are preparations.

I don't even know if I'm being honest.

I don't even know if that's true.

All truth organically manifests itself in the moment. If you have five great moments of great organic stuff in storytelling, movies, and movies, audiences will get it.

So I'm looking for that moment and I stand there and say, 'I don't know what to say.

So, ultimately, everyone has their eye on you. 200 people who arrived at 7:00 in the morning arrived from 15:00 to 7:00. And you arrive at 7 o'clock and everyone is like, "Hey, what happens first? What happens?"

And you go into a panic of not knowing yourself and therefore you don't know.

So, you don't know, you're praying to the universe because you're praying to the universe for something - just like Einstein - saying a prayer - accessed the equations of the same source, I try to access the universe. I am looking for the same source because creativity comes from the exact same source that you meditate on outside yourself, somewhere outside the universe.

You are looking for something that will hit you.

I'm not going to do the first shot until it comes to mind.

So what do you do?

So Kate said, "Shekhar, what do you want me to do?"

And I say, 'Kate, what do you want to do?' (Laughter) 'You're a great actor.

(Laughter) What am I doing? I'm trying to buy time.

I'm trying to buy time.

So, the first thing about storytelling that I've learned, and that I've always followed, is "panic."

Panic is a great access to creativity. Because that's the only way to get rid of the mind.

throw away your heart

get out, get out

And let's go to space. For there is something out there that is truer than your heart, truer than your universe.

[Unintelligible], you said that yesterday. I repeat it because it is what I always seek to find shunyata, emptiness somewhere.

Out of emptiness comes a moment of creativity.

that's what i do.

When I was a kid, I was around 8 years old.

You remember what India was like. There was no contamination.

In Delhi we used to call it chat or kota.

Kota is now a bad word. That means their terrace - and we slept outside at night.

In school we were just taught about physics, and were told that if something existed, it could be measured.

If it's not measurable, it doesn't exist.

And at night, just like I did in Delhi when I was a kid, I used to lie down looking at the pristine sky, staring into space and thinking, 'How far does this universe go?

my father was a doctor.

And I thought, "Dad, how far does the universe go?"

And he said, "Son, it will last forever."

So I said, "School teaches that there is nothing that cannot be measured, so please measure forever."

It doesn't fall into my frame of reference. ”

So how long will eternity last?

What does eternity mean?

And I lay there at night crying because my imagination could not spark creativity.

So what did I do?

I was only seven years old at the time, and I made up the story.

what was my story

And I don't know why, but I remember that story.

There was a lumberjack with an ax trying to cut a piece of wood, but the whole galaxy is one atom of that ax.

And when that ax hits that piece of wood, then everything is destroyed and the big bang happens again.

But before that there was a lumberjack.

And when that story runs out, I imagine the woodcutter's world to be one of the atoms inside another woodcutter's axe.

So every time, over and over again, I was able to get over this problem because I was able to tell my story.

how did you do it tell a story.

So what is story?

The story is the story of us, all of us, the story we tell ourselves.

In this universe, and in this being, we live with the duality of whether we exist and who we are, but the stories we tell ourselves are the stories that define the possibilities of our existence.

We are the stories we tell ourselves.

So it's as broad as watching a story.

A story is a relationship between who you are, or potential you, and the infinite world, that's our myth.

We tell our stories, but there is no one without stories.

So Einstein told a story, followed the story, came up with a theory, came up with a theory, came up with an equation.

Alexander has a story his mother used to tell him and he went off to conquer the world.

We all have stories to chase.

We tell ourselves stories.

So I go further and say, "I tell stories, and therefore I exist."

I exist because I have a story, and we don't exist without a story.

We create stories to define who we are.

If we don't create stories, we'll probably go insane.

I don't know; I'm not sure, but that's what I've always done.

Now for the movie.

Movies tell stories.

I think a lot when I make movies. I'm thinking of making a Buddha movie. And think about it. If Buddha had all the ingredients for a director, if Buddha had music, if he had images, if he had a video camera, would Buddhism be better?

But it becomes a kind of burden for me.

I have to tell stories in a more elaborate way, but I have the potential.

It is called subtext.

When I first went to Hollywood, they said, I was talking about subtext, and an agent came up to me and said, "Can you please stop talking about subtext?"

And I said, 'Why?'

Talk about the plot, how great the film is shot, what the visuals will be like. ”

So when I watch movies, we look for: Look for stories at the plot level, then at the psychological level, then at the political level, then at the mythological level.

And look for the stories in each level.

Now, these stories don't have to match each other.

The great thing is that the stories often contradict each other.

So when I work with the great musician Rahman, I often tell him, 'Don't follow what's already written in the script.

Find one that isn't.

Find the truth for yourself, and when you find the truth for yourself, it contains the truth, it may contradict the plot, but don't worry. ”

The sequel to Elizabeth, The Golden Age.

Here's the story the writers told when I made the 'Elizabeth' sequel. A woman threatened by Philip II to go to war falls in love with Walter Raleigh.

She had given up her reasons for being queen because she fell in love with Walter Raleigh. And Walter Raleigh fell in love with a handmaiden, and she had to decide whether she was going to war or wanted to be a queen...

Here is the story I told: There were gods and there were two people.

There was also Felipe II, who was holy because he always prayed. There was also Elizabeth, who was holy but not wholly holy. because she considered herself sacred. But she had mortal blood in her.

But the gods were unjust, so they said, "Okay, all we have to do is help the righteous."

And they helped the right people.

And what they did was send in Walter Raleigh to physically separate her mortal self from her mental self.

And the mortal was a girl sent by Walter Raleigh, who gradually separated her so that she could be free to be a god.

Then the two godmen fought, and the gods sided with the god.

Of course, the British press were all outraged.

They said, "We have won the Armada."

But I said, "But the storm has defeated the Armada.

The gods sent a storm. ”

So what was I doing?

I was trying to find mythical reasons for making this movie.

Of course, when I asked Cate Blanchett, I said, "What is this movie about?"

She said, "This movie is about a woman who comes to terms with aging."

psychological.

The writer said, "This is about history, intrigue."

I said, "Mythology, the story of the gods."

So let me show you how I used a movie, a part of that movie, and a camera. This is the scene in my mind where she was in the depths of her mortality.

She had discovered what mortality really meant, and what really happened if she was at the bottom of mortality.

And she recognizes the perils of mortality and why she must get out of it.

Remember, in the movie she and her handmaiden are both part of the same body for me, one being my mortal self and the other my spiritual self.

So can I have the second one?

(music) Elizabeth: Beth?

Beth?

Beth Throckmorton?

Beth: Come on, miss.

Elizabeth: Tell me, is it true?

Are you traveling with children?

Are you traveling with children?

Beth: Yes, miss.

Elizabeth: You are a traitor.

Are you brave enough to tell me a secret?

Please ask my permission before you go into heat, before you breed.

My bitch is wearing my collar.

hear? hear?

Walsingham: Your Majesty. Please, have dignity. mercy.

Elizabeth: Now is not the time to give mercy, Walsingham.

You go to your traitorous brother and let me do the work.

is that his?

teach. Say it. Is the child his? is that his?

Beth: Yes.

Miss, it's my husband's child.

Elizabeth: Bitch! (shouting) Laurie: Your Majesty.

This is not the Queen I love and serve.

Elizabeth: This man seduced the Queen's ward and she married him without royal consent.

These crimes are punishable by law. arrest him

go.

I no longer have the protection of the Queen.

Beth: Take it easy, Your Majesty.

Elizabeth: Get out! Take it out! Take it out!

Take out.

(Music) Shekhar Kapoor: So what am I trying to do here?

Elizabeth is aware and confronts her own feelings of jealousy, and her own sense of mortality.

What are we doing in architecture?

Architecture tells a story.

This architecture tells the story of there being a much bigger woman in architecture, even though she was the most powerful woman in the world at the time.

The stone is bigger than her because the stone is organic.

that would survive her.

So for me, the stone is part of her destiny.

On the contrary, why is the camera pointing down?

The camera is looking down on her because she is in a well.

She fully understands what it feels like to be her own mortal being.

There she must escape from the depths of mortal life, enter, and free her mind.

And that is the moment in my mind that Elizabeth and Beth are one and the same person.

But that's the moment she's surgically removing herself from the condition.

So the movie works on different levels in the scene.

And how we tell stories visually, with music, with actors, and on each level it's a different feeling, sometimes contradicting each other.

So how do you get started with all this?

What is the storytelling process?

About ten years ago I heard this little thing from a politician who was not a very respected politician in India.

And people living in cities consume as much water at one time as you people in the countryside can't drink for your family in two days, he said.

It struck a chord with me and I said, "You're right."

I went to see a friend and he made me wait on the 20th floor of his apartment in Malabar Hill. It's a really, really posh area of ​​Mumbai.

And he was in the shower for 20 minutes.

I got bored and left, walking past the slums of Bombay as usual. And I saw a line of women and children with buckets in the hot midday sun waiting for tankers to come and give them water.

And then an idea began to emerge.

So how does it become a story?

I suddenly realized that we were headed for ruin.

So my next film is called 'Paani', which means water.

And now we are starting to create a world out of that myth.

What kind of world do you create and where do the ideas and designs come from?

In other words, I think that the construction of viaducts will start in the future.

Do you understand flyovers? yes?

They started building viaducts to get from point A to point B faster, but they were effectively moving from one relatively wealthy area to another relatively wealthy area.

And they built the city on the viaduct.

And the rich moved to the upper cities, the poor remained in the lower cities, and about 10-12 percent of the population moved to the upper cities.

Now, where do these upper and lower cities come from?

India has a myth about this. They say Say it in Hindi. [Hindi] Yes. what do you mean?

It is said that the rich always stand on the shoulders of the poor.

So from that myth came the Upper City and the Lower City.

Design tells a story.

And now what's happening is that the people in the upper cities are soaking up all the water.

Remember what I said, inhale.

They suck up all the water, keep only themselves, and feed the undercity with an IV.

And if there is a revolution, they will turn off the water.

And because democracy still exists, we have a democratic way of saying, "If you give us what you want, we'll give you water."

So time is up.

But I can continue to talk about how we evolve the stories, how the stories are who we are, and how they translate into the particular field of cinema that I'm working on.

But what is a story, after all? It's a contradiction.

Everything is inconsistent.

The universe is a contradiction.

And all of us are always looking for harmony.

When you wake up, day and night are inconsistent.

But I get up at 4:00 in the morning.

The first blue redness is where night and day are trying to find harmony with each other.

Harmony is the note Mozart didn't give you, but somehow the inconsistencies in his notes suggest it.

Every contradiction in his notes suggests harmony.

It is the effect of seeking harmony in the contradictions that exist in the mind of the poet, the contradictions that exist in the mind of the narrator.

In the narrator's head it is a moral contradiction.

In the mind of the poet it is the conflict of words, in the mind of the universe it is the conflict between day and night.

In the minds of men and women, we constantly look at the contradictions between men and women and seek harmony within each other.

The whole concept of contradiction, but embracing it is storytelling, not resolution.

A lot of storytelling issues in Hollywood and a lot of movies, and as [unintelligible] said in his mind, we're trying to resolve that contradiction.

Harmony is not the solution.

Harmony is the suggestion of something much larger than resolution.

Harmony represents the enveloping and universal, the eternity and the moment.

Resolution is much more limited.

it is finite. Harmony is infinite.

So the narrative, like all other contradictions in the universe, seeks harmony and infinity in moral resolution, solving one but letting go of another, letting go of another to create a question that really matters.

thank you very much.

(applause)

Today I would like to talk about the relationship between science and human values.

Now, the question of morality, the question of right and wrong or right and wrong, is commonly understood to be one on which science has no official opinion.

Science is supposed to help us get what we value, but it doesn't tell us what we should value.

As a result, most people, and probably most people here, believe that science will never be able to answer the most important questions in human life: questions like "What is life worth living for?"

"What is it worth dying for?"

"What is a good life?"

So I would like to argue that this is an illusion, that the separation of science and human values ​​is an illusion, and that it is actually very dangerous at this point in human history.

Now, it is often said that science cannot give us a foundation for morals and human values. Because science deals with facts, and facts and values ​​seem to belong in different realms.

It is often believed that there is no description of how the world should be that tells us what the world should be.

But I think this is plainly false.

Values ​​are certain facts.

These are facts about the well-being of conscious creatures.

Why don't we have an ethical obligation to stone?

Why don't we feel compassion for rocks?

Because they don't think rocks should suffer. And we worry more about our fellow primates than we do about insects, as we do, because we think they are subject to a wider range of potential well-being and suffering.

Now, the important point to note here is that this is a factual claim. This could be right or wrong for us. And if we misunderstand the relationship between biological complexity and experiential potential, we may also be wrong about the inner life of insects.

And there is no notion or version of human morality and human values ​​that I have come across that is not reducible to concerns about conscious experience and its possible changes at some point.

Even if you get your values ​​from religion, even if you think that good and evil are ultimately related to the situation after death: eternal happiness with God or eternal torment in hell, you are still concerned with consciousness and its changes.

And to say that such changes can persist after death is itself a factual claim, which, of course, may or may not be true.

Now, for man, we know that there is such a succession of facts when it comes to the conditions of happiness in this life.

We know that everything that goes wrong can go wrong, mothers can't feed their children, strangers can't find a basis to cooperate peacefully, people can be killed indiscriminately, they can live in broken states.

And we know that along this continuum it is possible to move towards something more pastoral, a place where such a conference could even be conceived.

And we know there are right and wrong answers to how we behave in this space.

Is it a good idea to add cholera to the water?

Probably not.

Is it a good idea for everyone to believe in the evil eye and blame their neighbors as soon as something bad happens to them? Probably not.

Whether we understand these truths or not, there are truths to know about how human communities thrive.

And morality is concerned with these truths.

So when we talk about values, we are talking about facts.

Now, of course, our situation in the world can be understood on many levels, from the level of the genome to the level of economic systems and political arrangements.

But if you try to talk about human well-being, you are necessarily talking about the human brain.

Because we know that the world and our own experiences in it, what happens after death, are realized in the brain.

Even if a suicide bomber gets 72 virgins in the afterlife, in this life his character--a rather unfortunate character--is a product of his brain.

That is the contribution of culture. If culture changes us, culture changes us by changing our brains, as it does.

So whatever cultural differences there are in how humans thrive, at least in principle, they can be understood in the context of mature mind sciences such as neuroscience and psychology.

So what I am arguing is that value is reduced to facts, facts about the conscious experiences of conscious beings.

Thus, we can visualize the space of possible changes in the experience of these beings.

And I see this as a kind of moral landscape with peaks and valleys corresponding to differences in the well-being of conscious creatures, both individual and collective.

And one thing to note is that there are probably states of human well-being that are rarely accessible to us, inaccessible to most people.

And these await our discovery.

Perhaps some of these states can be properly called mystical or psychic.

Perhaps there are other states that we cannot access due to the structure of our mind, but other minds may have access to them.

Now, let me clarify what I didn't say. I do not say that science is guaranteed to map this space, or that every conceivable moral question will have scientific answers.

For example, I don't think you'll one day use a supercomputer to know whether you should have a second child, whether you should bomb Iran's nuclear facilities, or whether the cost of TED is fully deductible.

(Laughter.) But if a question affects human well-being, it must have an answer, whether we can find it or not.

And just acknowledging this—that there are right and wrong answers to the question of how humans thrive—will change the way we talk about morality, and our expectations of future human cooperation.

For example, there are 21 states in our country where corporal punishment is legal in the classroom, where teachers are allowed to hit children hard with wooden boards, resulting in large bruises, blisters, and even skin tearing.

And, incidentally, hundreds of thousands of children are exposed to such harm every year.

I think these Enlightened District locations won't surprise you.

I'm not talking about Connecticut.

And the rationale for this behavior is clearly religious.

The Creator of the Universe Himself told us not to spoil our children, not to spare our wands. It's in Proverbs 13 and 20 and I think it's in 23.

But we can ask the obvious question. Generally speaking, is it a good idea to expose children to pain, violence, and public humiliation as a way to promote healthy emotional development and good behavior?

(Laughter) Do you doubt that there is an answer to this question and that it is important?

Now, many of you may be worried that the concept of happiness is so undefined that it seems forever open to reinterpretation.

How then can there be an objective concept of happiness?

Now, let's consider the concept of physical health by analogy.

The concept of physical health is undefined.

As we heard earlier from Michael Spector, that has changed over the years.

At the time this statue was carved, the average life expectancy was probably 30 years.

Currently, there are about 80 in developed countries.

It may be time to tamper with the genome so that not being able to run a marathon at age 200 is seen as a major disability.

People will send you donations when you are in such a state.

(Laughter) Note that the fact that the concept of health is open and truly modifiable does not make it hollow.

The distinction between the healthy and the dead is as clear and consequential as it is made in the field of science.

Another thing to note is that the moral situation may have many peaks. There may be equivalent ways to thrive. There may be similar ways of organizing human societies to maximize human prosperity.

Now, why shouldn't this undermine objective morality?

Consider how we talk about food. I would never claim that there is one right food to eat.

There is clearly a wide variety of ingredients that make up healthy food.

But still there is a clear distinction between food and poison.

There are many correct answers to the question, "What is food?"

I'm not tempted to say that there are no truths to know about human nutrition.

Many fear that universal morality will require moral precepts that do not allow exceptions.

So, for example, if lying is really wrong, it must always be wrong, and if we can find exceptions, there is no such thing as moral truth.

Why do we think this way?

By analogy, consider the game of chess.

Now, if you want to play good chess, it is very good to follow the principle of "don't lose your queen".

However, it clearly allows for some exceptions.

There are moments when losing a queen is great.

There are moments when it's the only good thing you can do.

Yet chess is the realm of complete objectivity.

The fact that there are exceptions here doesn't change that at all.

This leads to what kind of behavior people tend to take in the field of morality.

Consider the big question about the female body. What should be done about the female body?

Well, this is one thing you can do with them. It can hide them.

Now, generally speaking, it's the position of our intellectual community to think that this is "wrong," although Boston or Palo Alto may not like it. Who can say it is wrong for a proud inhabitant of an ancient culture to force his wife or daughter to live inside a cloth bag?

And if you deny yourself the privilege of being suffocated in this way, who can even say it's wrong to hit them with long steel cables or throw battery acid in their faces?

Well, who doesn't say this?

Who are we to pretend that we have to be uncritical about such acts because we know so little about human well-being?

I'm not talking about voluntarily wearing a veil. As far as I'm concerned, women should be able to wear whatever they want.

But what does voluntary mean in a community where when a girl is raped, the father's first impulse is to kill her out of shame?

Let this fact explode in your brain for a moment. Your daughter was raped and all you want to do is kill her.

What are the chances of representing the peak of human prosperity?

Now, this is not to say that we have a perfect solution in our society.

For example, almost anywhere in the civilized world, going to a newsstand looks like this.

Now, of course, for many men it may take a degree in philosophy to decide there is something wrong with these images.

(Laughter.) But if we're in the mood for introspection, we can ask, "Is this the perfect expression of psychological balance on variables like youth, beauty, and the female body?"

So, is this the perfect environment to raise children in?

Probably not. Well, perhaps there is a more balanced place between these two extremes.

(Applause.) There are probably many such places. Again, considering other changes in human culture, there may be many peaks in the moral landscape.

But it's worth noting that there are many other ways to not peak.

Now, the irony from my point of view is that only some form of religious agitator seems to generally agree with me, thinking there are right and wrong answers to moral questions.

And, of course, they think they have the right answers to moral questions. Not because he intelligently analyzed the causes and conditions of human and animal well-being, but because he got the answer from the voice in the whirlpool.

In fact, the tolerance of religion as the lens through which most people view moral issues has kept most moral narratives separated from the real issues of human and animal suffering.

This is why we spend our time talking about things like gay marriage, not about genocide, nuclear proliferation, poverty, and other serious issues.

But demagogues are right about one thing. That is, we need a universal conception of human worth.

Well, what prevents this?

Well, one thing to note is that when we talk about morality, especially secular, academic, and scientist types, we are doing something different.

When we talk about morality, we respect disagreements in ways we don't in other areas of life.

For example, His Holiness the Dalai Lama wakes up every morning to meditate on compassion and considers helping others to be an integral part of human well-being.

On the other hand, there are people like Ted Bundy. Ted Bundy loved kidnapping, raping, torturing, and murdering young women.

So we seem to have genuine disagreements about how to use our time profitably.

(Laughter) Most Western intellectuals look at this situation and say, ``There is nothing really wrong about the Dalai Lama being really right, really right, or Ted Bundy acknowledging real arguments that could fall within the realm of science.

He likes chocolate and he likes vanilla too.

There is nothing one says to the other to convince the other. ”

Note that science doesn't do this.

On the left is Edward Witten.

He's a string theorist.

If you ask the smartest physicist around, who is the smartest physicist, half of them, in my experience, will say Ed Witten.

The other half will say they don't like the question.

(Laughter) So what if I showed up at a physics conference and said, "Superstring theory is a hoax."

It doesn't resonate with me. That's not how I chose to see the universe on a small scale.

i am not a fan. ”

(Laughter) Well, I'm not a physicist, so nothing will happen. I don't understand string theory.

I'm Ted Bundy of string theory.

(Laughter) I don't want to be in a string theory club that would have me as a member.

But here's the point.

Whenever we talk about facts, we must exclude certain opinions.

That's what it means to have an area of ​​expertise.

That is what knowledge is all about.

How have we convinced ourselves that there is no such thing as moral expertise, moral talent, or even moral genius in the field of morality?

How have we convinced ourselves that all opinions matter?

How have we been convinced that every culture has perspectives on these subjects worth considering?

Do the Taliban have a perspective on physics worth considering? no.

(Laughter.) How could their ignorance be so obvious on the subject of human well-being?

(Applause.) So I think this is what the world needs right now.

It needs people like us to admit that there are right and wrong answers to the question of human prosperity, and that morality concerns the realm of facts.

Individuals, and even cultures as a whole, can care about the wrong things. That is, we can have beliefs and desires that are sure to bring us unnecessary human suffering.

Simply acknowledging this changes our discussion of morality.

We live in a world where borders between nations become increasingly irrelevant and eventually become irrelevant.

We live in a world full of disruptive technology, but this technology cannot help but be invented. It's much easier to break things than to fix them.

It therefore seems obvious to me that we cannot respect or tolerate great differences in ideas about human well-being any more than we can respect or tolerate great differences in how disease is spread, or about the safety standards of buildings and airplanes.

We just have to focus on the answers to the most important questions in human life.

To do that, we must admit that these questions have answers.

thank you very much.

(Applause) Chris Anderson: So there's some flammable material in there.

Whether in this audience or in other parts of the world, some of them may be screaming in anger at hearing this story as well.

Language seems to be very important here.

When you're talking about veils, you're talking about women with cloth bags.

I have lived in the Islamic world and have spoken with many Muslim women.

And some of them say otherwise. They would say, 'No, this celebrates and helps build on the specialness of women.

I mean, can you have a conversation with such a woman without coming across as a cultural imperialist?

Sam Harris: Well, I think I was trying to put this out in writing looking at the hands of the clock, but the question is what is voluntary when men have certain expectations and are guaranteed certain treatment if they don't veil themselves?

So if someone in this room wants to wear a veil or wear a really funny hat or have a tattoo on their face, I think we should be free to do whatever we want, but we have to be honest about the constraints these women are put into.

So I don't think we should always take their word for it, especially when it's 120 degrees outside and you're wearing a burqa.

CA: Many people want to believe in this concept of moral progress.

But can it be reconciled?

I understand your point that it can be reconciled with a non-unidimensional world where we all have to think alike.

As the clock ticks 50 or 100 years into the future, imagine how you would like to think about the world, balancing moral progress and abundance.

SH: Well, we have to admit that once we allow ourselves to move towards understanding our minds at the brain level down to the important details, we come to understand in greater detail all of our own positive and negative qualities.

Therefore, we intend to understand positive social emotions such as empathy and sympathy, and the factors that drive them. Whether it's genetic, whether it's the way people talk to each other, whether it's the economic system, and as long as we start shedding light on that, we're bound to converge on that fact space.

So not everything is fine.

In the context of men wanting women, veiling daughters from birth may not be as good as teaching them to be self-confident and well-educated.

I mean, I don't think you need an NSF grant to know that compulsory veil wearing is a bad idea, but at some point we'll be able to scan the brains of everyone involved and actually interrogate them.

Do people love their daughters the same way in a system like this?

And I think there's an obvious right answer to that.

CA: And if it actually does turn out to be so, are you ready to change your instinctive current judgments on some of these issues?

SH: Well, one obvious fact is that you can love someone within a truly delusional belief system.

You could say something like, "I cut off my head because I knew I was going to hell if my gay son found a boyfriend. And that was the most compassionate thing I could do."

If you have all these parts, I think you can probably feel the emotion of love.

But then again, we have to talk about happiness in the larger context.

It wasn't one man who felt ecstasy and blew himself up on the bus, all of us together.

CA: Sam, this is really a conversation I could go on for hours.

No, but another time. Thank you for coming to TED.

SH: I'm really honored. thank you.

(applause)

The illegal wildlife trade in Brazil is one of the major threats to our fauna, especially birds, and is primarily aimed at supplying the pet market with thousands of animals taken from the wild each month and transported far from their origins for sale, mainly in Rio de Janeiro and São Paulo.

In Brazil, it is estimated that about 38 million animals are pulled from the wild each year through illegal wildlife trade of all kinds, representing a business worth about $2 billion.

We seize thousands of animals each month as police intercept these massive shipments of live animals intended to supply the pet market, or seize them directly from people's homes.

And we'll follow Brad to figure out what's going on with them.

In the eyes of many people, after an animal is captured, they will say, "Well done, justice has been served."

The good people arrived and snatched the mistreated cute animals out of the hands of the evil traffickers, and everyone lived happily ever after. ”

But was it? Actually, no, this is where a lot of the problems start.

Because we have to think what to do with all these animals.

In Brazil, they are usually sent to government triage facilities first, but in most cases the conditions are as bad as those of traffickers.

In 2002, these centers received 45,000 animals, of which 37,000 were birds.

And the police estimate that we seized only 5 percent of what was trafficked.

Some of the lucky ones then end up in a full-fledged rehab center. Brad is among them.

And in these places they are taken care of.

They can be trained to fly, learn how to recognize food found in nature, and interact with other animals of the same species.

(Laughter.) But what then?

The Brazilian Ornithological Society (that is, we only talk about birds here) claims that we know too little about species in nature.

Release of these animals is therefore too dangerous for both the released population and the natural population.

They also claim that we are spending too many resources on their rehabilitation.

Following this debate, they propose that all birds captured from non-threatened species should be euthanized.

However, this translates to 26,267 birds killed in the state of São Paulo alone in 2006 alone.

However, some researchers, including myself (some NGOs and Brazilian government officials) believe there are alternatives.

We believe that technically responsible releases are possible, both for the well-being of the individual and for the conservation of the species and its ecosystem, provided that the animals meet certain standards regarding their health, behavior, probable origins, and what we know about their natural populations. Because we will be returning the genes of these populations. This can be important for animals facing environmental challenges, and can also bring back potential seed dispersers, predators, and prey.

These are all released by us.

Turtles are enjoying their freedom above.

(Laughs) In the middle, this guy nested weeks after release.

And in the bottom photo, my personal favorite, the little male there was with a wild female four hours after being released.

I mean, this is nothing new, people have been doing this all over the world.

But it's still a big problem in Brazil.

We believe we have done a responsible release.

Individuals that have been released into the wild and mated and gave birth to chicks are registered.

So these genes are actually making their way back into the population.

However, this is still the minority because knowledge is sorely lacking.

So I say, "Let's learn more, let's shed some light on this issue, let's do whatever we can."

I dedicate my career to it.

And I would like to encourage each of you here to do whatever you can. Talk to your neighbors, teach your kids, and make sure your pet is from a legal breeder.

We must act now before they are left alone.

thank you very much.

(applause)

So basically, we have public leaders, civil servants out of our control. They are creating bills that we don't understand, and perhaps 40,000 pages of regulations in these bills, which add overall complexity and have a dramatic and detrimental effect on our lives.

If you are a veteran returning from Iraq or Vietnam, you will face a lot of paperwork to receive your benefits. When you apply for a small business loan, you are faced with a huge amount of paperwork.

what are you going to do about it? I define simplicity as a means of achieving clarity, transparency, empathy, and embedding humanity into communication.

I've been simplifying things for 30 years.

I come from the advertising and design business.

My focus is on understanding you and understanding how you interact with governments to benefit, how you interact with businesses to determine who you do business with, and how you view brands.

So when President Obama said, "I don't understand why you can't have a one-page plain English consumer credit contract," it was right there.

So I locked myself in my room, thought about the content, organized the documents, and wrote them in plain English.

I had this examined by two of the country's top consumer credit attorneys.

This is real.

Now, I went one step further and said, "Why do we have to rely on cheap lawyers and just have paper documents? Let's go online."

And many may need help with calculations.

Working with Harvard Business School, we see the following example when talking about minimum payments. If you spent $62 on food, the longer it takes you to pay off that loan, the more you use the minimum payment, which is $99.17 over a period of time.

how about that? Do you think your bank is going to show it to people?

But it works. It is more effective than just a calculation aid.

So what about terms like "over the limit"?

Probably stealthy.

Define according to context. Tell people what it means.

In layman's terms, the system almost forces people to give way, to default, so that they do not endanger themselves.

Plain English is about changing content.

And one of the things I'm most proud of is this deal with IBM.

It's a grid, it's a calendar.

At any given time, IBM has a responsibility, and so do you.

It is also very popular with business travelers.

And today we have some good news.

1 in 10 taxpayers receive a notice from the IRS each year.

200 million letters are sent.

I looked up this typical letter they had in my Simplicity Lab and it's pretty confusing.

I don't understand all the red parts of the document.

We considered writing over 1,000 letters in plain English covering 70% of our transactions.

They are laboratory tested.

Running in the lab, this heat mapping shows that everything is understandable.

And the IRS introduced this program.

(Applause.) There are a few things going on right now that I would like to draw your attention to.

There is currently a lot of discussion about how to mandate simplicity for consumer financial protection agencies.

We understand all of this complexity.

I believe it is our duty and that of this organization to make clarity, transparency and empathy a national priority.

We shouldn't let the government the way it communicates.

There is no reason to do business with an unintelligible company with a stealth clause.

So how do we change the world?

Make clarity, transparency and simplicity a national priority.

thank you.

(applause)

I would like to talk about 4.6 billion years of history in 18 minutes.

That's 300 million years every minute.

Let's start with the first photos of Mars acquired by NASA.

This is a flyby, Mariner IV.

It was taken in 1965.

When the photo was published, the famous science magazine New York Times editorialized, "Mars is not fun.

It's a dead world. NASA should no longer spend time and effort on Mars research. ”

Fortunately, the leaders at NASA headquarters in Washington know better, and we have started a very extensive study of the Red Planet.

One of the key questions in all of science is, "Is there life outside of Earth?"

I believe Mars is the most likely target for extraterrestrial life.

In just a few minutes, we'll show you amazing measurements that suggest the possibility of life on Mars.

Let's start with Viking pictures.

This is a composite photo taken by Viking in 1976.

Viking was developed and maintained at NASA Langley Research Center.

We sent two orbiters and two landers in the summer of 1976.

There were four spacecraft, two around Mars and two on the surface. This was an amazing achievement.

This is the first photo taken from the planet's surface.

This is a photo of the surface of Mars taken by the Viking lander.

And yes, the red planet is red.

Mars is half the size of Earth, but two-thirds of the Earth is covered with water, so Mars' land area is comparable to Earth's.

So Mars is a pretty big place, even though it's half the size.

We have obtained topographical measurements of the surface of Mars. You can see the height difference.

We know a lot about Mars.

Mars has the largest volcano in the solar system, Mount Olympus.

Mars has the Grand Canyon of the Solar System, Valles Marineris.

It's a very, very interesting planet.

Mars has the largest impact crater in the solar system, Hellas Basin.

This is 2,000 miles in diameter.

If you happened to be on Mars at the time of this crash, it would have been a really bad day for Mars.

(laughs) It's Olympus Mons.

This is bigger than Arizona.

Volcanoes are important because they produce the atmosphere and they produce the oceans.

We see Valles Marineris, the largest canyon in the solar system, overlaid on a map of the United States 3,000 miles in diameter.

One of Mars' most intriguing features is one of the 10 major mysteries of the space age, and why certain regions of Mars are so highly magnetized, says the National Academy of Sciences.

This is called geomagnetism.

For some reason—we don't know why at this point—Mars has regions where its surface is very highly magnetized.

Is there water on Mars?

The answer is no. There is no liquid water on the surface of Mars today.

However, there is intriguing evidence to suggest that rivers and rapids may have existed in Mars' early history.

Mars is very dry today.

We believe there is water in the polar caps. There are polar caps of the North and South Poles.

Here are some recent images.

This is from Spirit and Opportunity.

These images show that there was once a very fast stream of water on the surface of Mars.

Why is water important? Water is important because if you want life, you need water.

Water is a key element in evolution and the origin of life on Earth.

Here is a photo of Antarctica and a photo of Mount Olympus. A very similar feature, a glacier.

So this is frozen water.

This is ice water on Mars.

This is my favorite photo. This was just taken a few weeks ago.

It is not seen publicly.

This is the European Space Agency's Mars Express image of a crater on Mars with liquid water and ice in the middle of the crater.

A very interesting picture.

We now believe that in the early history of Mars, 4.6 billion years ago, Mars was very similar to Earth.

Mars had rivers, Mars had lakes, but more importantly Mars had planetary-scale oceans.

The ocean is thought to have been in the northern hemisphere, and this blue region, marking a depression of about 4 miles, was an ancient oceanic region on the surface of Mars.

Where did the water equivalent of Mars' oceans go?

Well, we have an idea.

This is a measurement taken several years ago from a satellite orbiting Mars called Odyssey.

Groundwater on Mars frozen in the form of ice.

And this shows the percentage. A bluish color means 16 percent by weight.

Sixteen percent of the internal weight contains frozen water, or ice.

In other words, there is a lot of water under the surface of the earth.

Some of the most intriguing and puzzling Mars measurements I've gotten so far were published earlier this year in the journal Science.

And what we are paying attention to is the existence of methane gas CH4 in the atmosphere of Mars.

And we can see that methane has three distinct regions.

Why is methane important?

Because on Earth, nearly all of the methane, 99.9 percent, is produced by biological systems, tiny life forms below or above the surface, not by little green humans.

There is now evidence of the presence of methane in the atmosphere of Mars. Methane is a biogenic gas on Earth and is produced by living systems.

These are the three plumes, A, B1 and B2.

And this is the terrain in which it appears, and geological studies have shown that these regions are the oldest on Mars.

In fact, both Earth and Mars are 4.6 billion years old.

Only 3.6 billion rocks are the oldest rocks on Earth.

The reason our geological understanding is billions of years apart is because of plate tectonics, the Earth's crust being recycled.

There is no previous geological record for the first billion years.

That record exists on Mars.

And this terrain we're looking at dates back to 4.6 billion years ago, when Earth and Mars formed.

it was tuesday.

(Laughter) Here's a map of where we put spacecraft on the surface of Mars.

This is Viking I and Viking II.

This is your chance. This is the spirit.

This is Mars Pathfinder. This is Phoenix just installed two years ago.

Note that all probes and all landers have gone to the northern hemisphere.

That's because the northern hemisphere is a region of ancient ocean basins.

Not many craters.

And that's because water protected the basin from asteroid and meteorite impacts.

But look at the Southern Hemisphere.

There are impact craters and volcanic craters in the Southern Hemisphere.

This is the Hellas Basin, a geologically very different place.

Look where the methane is. Methane is found in areas of very rough terrain.

What's the best way to unlock the mysteries that exist on Mars?

We asked this question ten years ago.

We invited ten top Mars scientists to the Langley Research Center for two days.

We discussed the main questions that have yet to be answered at the board meeting.

And we spent two days deciding how best to answer this question.

And the result of our meeting was a robotic rocket-powered aircraft called ARES.

Aviation regional scale environmental investigator.

Here is the ARES model.

This is a 20 percent scale model.

This plane was designed at the Langley Research Center.

If there is anywhere in the world that can build a plane to fly to Mars, it is the Langley Research Center, the world's leading center for aviation for nearly 100 years.

We fly about a mile above the surface.

We travel hundreds of miles and fly at about 450 miles per hour.

We can do things that rovers and landers cannot. You can fly over mountains, volcanoes and impact craters. we fly over the valley We can fly over the surface magnetism, polar caps, and groundwater. And we can look for life on Mars.

But just as importantly, when we fly through the atmosphere of Mars, we transmit that journey, the first flight of a plane out of Earth, and we transmit those images back to Earth.

And our goal is to inspire the American people who pay for this mission through their tax dollars.

But more importantly, we inspire the next generation of scientists, engineers, engineers and mathematicians.

And it is a critical area of ​​national security and economic vitality to ensure the next generation of scientists, engineers, mathematicians and technicians.

This is what ARES looks like flying over Mars.

Program it in advance.

It flies where there is methane.

The plane will be equipped with an instrument that will sample the Martian atmosphere every three minutes.

We look for methane and other gases produced by living systems.

We pinpoint exactly where these gases are coming from. Because you can measure the gradient where the gas is generated. Then you can land your next mission in that area.

How do we get planes to Mars?

In two words, very discreet.

The problem is not to fly it to Mars, but put it on a spaceship and send it to Mars.

The problem is that the spacecraft has a maximum diameter of 9 feet. ARES has a wingspan of 21 feet and a length of 17 feet.

How do we get it to Mars?

Fold it up and carry it on a spaceship.

And we're putting that into something called an aeroshell.

This is how we do it.

I have a small video explaining the sequence.

Video: 7, 6. green board. 5, 4, 3, 2, 1.

Start the main engine and take off.

Joel Levin: This is a launch from the Kennedy Space Center in Florida.

This is a spacecraft that will take nine months to reach Mars.

Enter the atmosphere of Mars.

Mass heating, friction heating. Go at 18,000 miles per hour.

The parachute opens and slows you down.

Insulation tiles will come off.

The plane is exposed to the atmosphere for the first time.

We will expand.

Rocket engine starts.

We believe that in one hour of flight, we can rewrite textbooks on Mars by making high-resolution measurements of the atmosphere, looking for biogenic gases, looking for volcanic gases, studying the surface, studying surface magnetism that we don't understand, and about a dozen other areas.

Practice makes perfect.

How do we know we can do that?

Because we have been testing the ARES model, several models, for eight years in six wind tunnels at NASA Langley Research Center under Martian conditions.

And, just as importantly, testing ARES in the Earth's atmosphere at an altitude of 100,000 feet. This is comparable to the density and pressure of the atmosphere of Mars on which we fly.

Now, at 100,000 feet, a cross-country flight to Los Angeles is 37,000 feet.

We test at 100,000 feet.

I would like to show you one of our tests.

This is a half scale model.

High altitude helium balloon.

This is Tillamook, Oregon.

It took about 3 hours to put the folded plane into the balloon and go up there. Then, at 103,000 feet, I released the plane on command, deployed the plane, and everything worked perfectly.

To perfect this technology, we have conducted high and low altitude tests.

Preparations are complete.

Here is a scale model.

However, NASA Langley Research Center keeps a full-scale model.

Preparations are complete. All you need is a check from NASA headquarters (laughs). I can cover the cost.

I am ready to donate my honorarium for today's talk to this mission.

In fact, there is no gratuity to anyone for this matter.

This is the ARES team. We have about 150 scientists and engineers. We are working with Jet Propulsion Laboratory, Goddard Space Flight Center, Ames Research Center, and six major universities and companies on this development.

That's a lot of effort. All at NASA Langley Research Center.

Finally, I'd like to say that not far from here, just down the road in Kitty Hawk, North Carolina, history was made just over 100 years ago when the first powered airplane ever took off on Earth.

We are now on the cusp of the first flight of a plane beyond the Earth's atmosphere.

We are ready to fly this on Mars and rewrite the textbooks on Mars.

If you're interested in more information, visit our website to learn more about this exciting and interesting mission and why you want to do it.

thank you very much.

(applause)

One day, Los Angeles Times columnist Steve Lopez was walking down the streets of downtown Los Angeles when he heard beautiful music.

And the source was an African-American man, attractive, rugged, homeless, playing a violin with only two strings.

And I'm telling you a story that many people know. Because Steve's column was the basis for a book and a movie, with Robert Downey Jr. as Steve Lopez and Jamie Foxx as Nathaniel Anthony Ayers. Nathaniel Anthony Ayers is a Juilliard-trained double bass player whose promising career was cut short by the tragic affliction of paranoid schizophrenia.

Nathaniel dropped out of Juilliard School, was completely emaciated, and 30 years later found himself homeless on the streets of Skid Row in downtown Los Angeles.

I encourage everyone to read Steve's book or watch the movie to understand not only the beautiful bond that formed between these two, but how music helped form that bond and ultimately helped Nathaniel get off the streets.

I met Mr. Ayers two years ago in 2008 at the Walt Disney Concert Hall.

He had just heard Beethoven's 1st and 4th Symphonies played, and he came backstage to introduce himself.

He was very cheerful and sociable, talking about Yo-Yo Ma and Hillary Clinton, and about the Dodgers' absence from the World Series because of the dangerous first violin passage work in the final movement of Beethoven's Fourth Symphony.

Then we started talking about music, and a few days later Steve emailed me to say that Nathaniel was interested in taking violin lessons with me.

Now I would like to mention Nathaniel's refusal of treatment. Because when Nathaniel was treated, it was shock therapy, thorazine and handcuffs, and the scars will remain for life.

However, as a result, he is now prone to schizophrenia, and in the worst case, he explodes and disappears for days, wandering the streets of Skid Row, exposed to its terror, and can manifest itself in the form of unleashing the pain of his own heart.

And when we started our first lesson at the Walt Disney Concert Hall, Nathaniel was very upset. There was a kind of manic glint in his eyes, and he was lost.

And he was talking about invisible demons and smoke and someone poisoning him in his sleep.

And not for myself, I was afraid that I would lose him, that he would end up in one way or another, that if I started talking about scales, arpeggios, and other exciting violin teaching methods, it would ruin my relationship with him and the violin.

(Laughs) So I just started playing.

And I played the first movement of Beethoven's Violin Concerto.

And as I played, I noticed a significant change in Nathaniel's eyes.

It was as if he held some invisible agent, a chemical reaction, and my musical performance was the catalyst.

And Nathaniel's manic rage gave way to understanding, quiet curiosity, and grace.

And miraculously, he picked up his violin and began playing part of the Violin Concerto by ear, and then Mendelssohn, Tchaikovsky, Sibelius and others asked me to complete it.

And we started talking about all B music, from Bach to Beethoven, Brahms, Bruckner, Bartok to Esa-Pekka Salonen.

And I understood that he not only had an encyclopedic knowledge of music, but was involved in it on a personal level.

He spoke of this with the kind of passion and understanding that I share with my colleagues at the Los Angeles Philharmonic Orchestra.

And through playing music and talking about music, this man transformed from a paranoid, distraught man who had just walked the streets of downtown Los Angeles to a Juilliard-trained, charming, erudite, and intelligent musician.

Music is medicine. Music changes us.

And for Nathaniel, music is sanity.

Because music allows him to turn his thoughts and fantasies into reality through his imagination and creativity.

And it is an escape from his state of suffering.

And I understood that that is the essence of art.

This is why we make music, taking what exists in all of us as our fundamental core: emotions, and through our artistic lens, through our creativity, we are able to shape those emotions into reality.

And the reality of that expression reaches us all, moves us, inspires us, unites us.

And for Nathaniel, music brought him back into his circle of friends.

The saving power of music brought him back into a family of musicians who understood him, recognized his talents, and respected him.

And I always make music with Nathaniel, whether it's the Walt Disney Concert Hall or Skid Row. Because he reminds me why I became a musician.

thank you.

(Applause) Bruno Giussani: Thank you. thank you.

Robert Gupta.

(Applause.) Robert Gupta: I'm going to play what I shamelessly stole from a cellist.

So please forgive me.

(laughter) (music) (applause)

As you know, my interest in modern slavery began with a leaflet I picked up in London.

It was the early 90's and I was at a public event.

I saw this leaflet and it said, "There are millions of slaves in the world today."

And I thought, "No way, no way."

And I will admit to being arrogant.

Because, I confess, I was thinking, ``How could a popular young professor of human rights not know this?''

So it cannot be true. ”

If you teach, if you worship in the temple of learning, do not mock the gods. Because they take you, they fill you with curiosity and desire, they drive you. Be passionate about changing things.

I went out and thoroughly reviewed 3,000 articles on the keyword "slavery."

Only two turned out to be nearly modern.

All the rest was historical.

They were news stories, angry, speculative, anecdotal, and without any solid information.

So I started my own research project.

I have been to 5 countries around the world.

I saw a slave I met slave owners and did a very in-depth look at their business with slaves. Because this is an economic crime.

People don't enslave people to be mean.

They are doing it for profit.

And I must say that my discoveries in the world of four different continents were depressingly familiar.

This way: whipped and beaten African farm workers show us how they were beaten in the fields before escaping slavery and meeting with our film crew.

It was shocking.

And let me be clear.

I'm talking about real slavery.

This is not about a bad marriage or a boring job.

This is about people who can't leave, who are forced to work without pay, who work 24/7 under the threat of violence and who are not paid.

This is true slavery, in exactly the same way that slavery has been recognized throughout human history.

Well, where am I?

Well, colors like red and yellow on this map are where slavery is most concentrated.

But in fact, such bluish colors are countries where no cases of slavery can be found.

And you may have noticed that Iceland and Greenland are the only places in the world where no cases of enslavement have been found.

We are also particularly interested in places where slaves are used to carry out extreme environmental destruction, and we observe them very closely.

All over the world, slaves are being used to destroy the environment, including cutting down trees in the Amazon. Destroy the forestlands of West Africa. Mercury is mined in places such as Ghana and Congo and then diffused into the environment. It is destroying coastal ecosystems in South Asia.

This is a rather tragic link between what is happening to our environment and what is happening to our human rights.

So how did we end up with 27 million people in slavery in 2010?

This is twice as many out of Africa in the entire transatlantic slave trade.

Well, it's built by these factors.

They are not causal, but actually supporting factors.

The population explosion that everyone knows. Over the past 50 years, the world's population has grown from 2 billion to nearly 7 billion.

Just because there are a lot of people doesn't make you a slave.

In addition, vast numbers of people in developing countries are increasingly vulnerable caused by civil wars, ethnic conflicts, bandit politics, and disease.

we understand how it works. In some countries, like Sierra Leone a few years ago, all these things happen at once, crushing huge chunks... In fact, as we know, around a billion people worldwide live on the edge of the cliff, in conditions of no chance, and usually even in extreme poverty.

But that doesn't mean you're a slave.

Lack of the rule of law is what it takes to turn the poor and vulnerable into slaves.

A sound rule of law protects the poor and protects the vulnerable.

But even if corruption creeps in and people lose the chance to enjoy the protection of the rule of law, if they can use violence, if they can use violence with impunity, they can still reach out to the vulnerable and expropriate them into slavery.

Well, that's exactly what's happening all over the world.

But for many people, people who step into slavery today usually don't get kidnapped or beaten in the head.

They are in slavery because someone asked them this question.

Around the world, I have been told much the same story.

People say, ``Someone came to our village when I was at home, stood in the back of a truck, and said, 'I have a job, who needs a job?

They said, "The man looked unnatural. I was skeptical, but the children were hungry.

I needed medicine.

I thought I had to do whatever I could to make money to support the people I care about. ”

They get into the back of the truck. They date the person who recruited them.

After 10, 100, 1,000 miles, they find themselves in dirty, dangerous and humiliating jobs.

They accept it for a moment, but when they are about to leave, "Bang!" comes the hammer and they find themselves enslaved.

Now, this kind of slavery is, again, almost identical to the slavery that has existed throughout human history.

But there is one particular novelty about slavery today. That is, the human price has completely collapsed. It used to be expensive, but now it's very cheap.

Business programs are starting to take this up as well.

I would like to share a little clip.

Daphne: Okay. As always, lively discussions on macro topics and topics are guaranteed here.

We will continue with our guest in the studio, Michael O'Donoghue, Head of Commodities at Four Continents Capital Management.

Brent Lawson of Lawson Frisk Securities will also participate.

Brent Lawson: Nice to be here.

D: Nice to meet you, Brent.

So gentlemen... Brent, where is your money going this year?

BL: Well, Daphne, we've been short on gas and oil lately, so we're opening the net a little wider.

We really love human stories.

Looking at the long-term chart, we can see that global demand for forced labor is still very strong, even though prices are at historical lows.

So this is the scenario we think we should exploit.

D: Michael, what do you think about people's stories? Interested?

Michael O'Donoghue: Oh, sure. The greatest advantage of involuntary workers as assets is their unlimited supply.

We will not run out of people. This is not the case with other products.

BL: Daphne, there is one thing I would like you to note.

That is, private equity is sniffing around, indicating that this market is about to explode.

As usual, Africans, Indians, especially South Americans and Eastern Europeans are on the buying list.

D: Interesting. Michael, after all, what do you recommend?

MO: We recommend a buy-and-hold strategy to our clients.

No need to play in the market.

There are many people in vulnerable positions. It's very exciting.

D: It's really exciting. Thank you very much, gentlemen.

Kevin Bales: Okay, okay. it's a spoof.

But it was fun watching your jaw drop and drop and drop until you figured it out.

MTV Europe worked with us to create a parody of it and slipped it into the music video without any introduction. I think this is kind of fun.

This is reality.

The price of humanity over the last 4,000 years has averaged about $40,000 in today's money.

Capital purchase item.

You can see that the lines cross when the population explodes.

Today, the average human price is around $90 worldwide.

It is more expensive in regions such as North America.

In North America, slaves cost between $3,000 and $8,000, but in India and Nepal we can take you where you can get a human for $5 or $10.

The point here is that people are no longer subject to capital purchases, they are like Styrofoam cups.

Just buy it cheap, use it, crumple it up, and throw it away when you're done.

These boys are in Nepal.

These are basically quarry transportation systems run by slave owners.

There are no roads there, so they carry stones on their backs to carry their own weight up and down the Himalayas.

One of their mothers told us: "We can't live here, but it seems we can't die either."

It's a horrible situation.

And if there's one thing I find very positive about this, it's that in addition to these young people who are still enslaved, there are also former slaves who are now working to free others.

Or say Frederick Douglass is at home.

I don't know if you've ever fantasized, "Wow. What would it be like to meet Harriet Tubman?"

What would happen if you met Frederick Douglass? ”

One of the most exciting parts of my job is what I can achieve. I would like to introduce one of them.

His name is James Kofi Annan. He was the child of a fishing slave in Ghana, but after escaping and building a new life, he founded an organization that we work closely with to free people from slavery again.

This is not James, one of the kids he works with.

James Kofi Annan (video): He was hit in the head with a paddle. And this reminds me of my childhood when I used to work here.

KB: James and our country director for Ghana, Emmanuel Oto'o, are now receiving death threats on a regular basis. Because they were the first in Ghana to win convictions and imprisonment for three human traffickers for enslaving fishermen and children.

Well, I'll admit that everything I've been telling you has been pretty disappointing.

But this actually has a very positive side as well. It is this. The 27 million people currently in slavery are a lot, but they are also the smallest number of the world's population ever in slavery.

And likewise, the $40 billion they add to the global economy each year is the smallest share of the global economy ever made by slave labor.

Illegal slavery in every country has been relegated to the margins of our global society.

And in a way, without us even realizing it, it stands on its own on the cliff of extinction, waiting for us to knock it down with a heavy blow. and get rid of it.

And it can.

Now, if we did that and put our resources and focus there, how much would it really cost to free people from slavery?

First of all, we need to be absolutely clear before we discuss the costs.

We are not buying people out of slavery.

Buying a person out of slavery is like paying a robber to get your TV back. It encourages crime.

However, liberation comes at some cost.

Liberation, and more importantly, all the work that happens after liberation.

It's a process, not an event.

It is about helping people build lives of dignity, stability, economic independence and citizenship.

Amazingly, in a place like India where the costs are so low, the family, the three generations you see there, were placed in hereditary slavery—that is, the grandfather there was born into slavery as a baby—but the total cost of the two-year process of getting the family out of slavery and building a stable life with citizenship and education was about $150 amortized with the rest of the work.

Ghanaian boy rescued from fishing slavery, about $400.

In the US, North America, it is much more expensive. Litigation costs, medical expenses...

I understand it's expensive here. About $30,000.

But most of the people in slavery around the world live where the costs are lowest.

And in fact, the global average is about the same as Ghana.

Multiplying this, therefore, the estimated cost of not just freedom, but sustainable freedom for the entire 27 million enslaved people on Earth is around $10.8 billion. That's how much Americans spend on potato chips and pretzels and how much Seattle plans to spend on its light rail system. Normally, we spent $10.8 billion in the annual spending on blue jeans in this country, or during the last holiday period buying people Gameboys, iPods and other tech gifts.

Intel Q4 profit: 10.8 billion.

It's not a big amount when you look at the world level.

It's actually peanuts.

And the great thing about it is that it has a dividend of freedom, not money in a hole. When you free people from slavery and let them work for themselves, do they feel motivated?

They took their children out of work, built schools, and said, "We will have three squares, medicine when we are sick, clothes when we are cold, and things we never had before."

They become consumers and producers and the local economy begins to grow rapidly.

It's all about how we rebuild sustainable freedom. Because we never want to repeat what happened in this country in 1865.

Four million people were taken out of slavery and then abandoned.

Left without political participation, without a decent education, without any real opportunity for an economic life, condemned to generations of violence, prejudice and discrimination.

And America is still paying the price for the failure to emancipate the slaves of 1865.

We promised never to allow people to come out of slavery under our watch and eventually become second-class citizens.

it won't happen.

This is the true form of liberation.

Children rescued from enslavement in Ghana's fisheries are reunited with their parents, then brought back to their villages with their parents to rebuild their economic well-being, and become enslaved or never enslaved.

Well, this woman lived in a village in Nepal.

We worked there for about a month.

They were just beginning to emerge from hereditary slavery.

They were just starting to lighten up a little bit and open up a little bit.

But when we went to talk to her, when we took this photo, the slaveholders were still threatening us from the sidelines. They weren't really pushed back.

I was scared. we got scared

We said to her, "Are you worried? Are you upset?"

She said, "No, because we have hope.

"When people like you are here from the other side of the world to stand by us, why can't we succeed," she said.

Now we have to ask ourselves, are we willing to live in a world with slavery?

If we don't act, we leave the products we buy and the policies of our governments open to someone pulling the strings that bind us to slavery.

Still, I think if there is one thing that all of humanity can agree on, it is that slavery should be abolished.

And if there is one fundamental violation to human dignity that everyone says is terrifying, it is slavery.

And we must say, if all of our intellectual, political, and economic power cannot be put to use to end slavery, what good is this room in which we are serious about intellectual power?

I believe there is enough intellectual power in this room to end slavery.

And what do you know? If we can't, if we can't use our intellect to end slavery, then there's one final question: Are we really free?

Understood. Thank you very much.

(applause)

I humbly stand before you today to share with you my progress over the last six years in the field of service and education.

And I'm not a trained scholar.

I'm also not a seasoned social worker.

I have worked in the corporate world for 26 years and have worked to increase the profits of organizations.

And in 2003 I founded the Parikurma Humanity Foundation from my kitchen table.

The first thing we did was walk through the slums.

By the way, Bangalore has 2 million people living in 800 slums.

I couldn't go to every shantytown, but I tried to cover as many shantytowns as possible.

We roamed these slums and identified homes where children would never go to school.

We talked to the parents and tried to persuade them to send their children to school.

We played with our children and came home really tired and exhausted, but went to sleep with bright faces and images that made our eyes sparkle.

We were all excited to go to school, but then we were shocked by the numbers. 200 million children between the ages of 4 and 14 are not attending school when they should. 100 million children who go to school but cannot read. 125 million people cannot do basic math.

I also heard that INR 250 billion was spent on public school education.

Ninety percent of that was spent on teacher salaries and administrator salaries.

Nevertheless, India has nearly the highest rate of teacher absenteeism in the world, with one in four teachers not attending school at all for the entire school year.

These numbers are absolutely daunting and overwhelming, and we were constantly asked, "When are you starting? How many schools are you starting?"

How many children will be born?

How do you plan to scale?

how do you reproduce it? ”

It was very difficult not to be afraid, not to flinch.

But we desperately said, "We are not in a numbers game.

We want to ensure that one child at a time is in school, ready for college, and ready for a better life and a higher-value job. ”

So I started the Parikrama.

The first Paris Car School started in a slum where 70,000 people live below the poverty line.

Our first school was on the second floor roof of a building in the shantytown, the only two-story building in the shantytown.

And the roof had no ceiling, only half a tin plate.

That was our first school. One hundred sixty-five children.

The academic year in India starts in June.

So in June it rained and many times we all huddled under the tin roof waiting for the rain to stop.

my god! What a bonding exercise it was!

And all of us who were under that roof are still here today.

Then came the second school, third school, fourth school, and junior college.

In six years, four schools, one junior college, 28 shantytowns and four orphanages served 1,100 children.

(Applause.) Our dream is very simple. To prepare every child for an education so that they can live contentedly and peacefully in a chaotic, globalized world of constant conflict.

Well, when you speak globally, you have to speak English.

Therefore, our school is an all English intermediate school.

But they know the myth is that slum kids don't speak English well.

No one in their family speaks English.

No one in their generation spoke English.

But how wrong it was!

Girl: I like adventurous books, some of my favorites are Alfred Hitchcock, [unintelligible], The Hardy Boys.

They seem to be in different contexts, one magical and the other two investigative, but I like these books. Because there is something special about those books.

The vocabulary and style used in those books.

In other words, once you pick up a book, you can't let it go until you've read the whole book.

Even if it took me four and a half hours or three and a half hours to finish the book, I would finish it.

BOY: I did some research and got information about the fastest car in the world.

I like the Ducati ZZ143. Because it's the fastest, the fastest bike in the world. I also like the Pulsar 220 DTSI. Because it is India's fastest bike. (laughter) Shukla Bose: Well, that girl you saw her father selling flowers on the roadside.

And this little boy has been coming to school for five years.

But isn't it strange that little boys all over the world love fast bikes? (Laughter) Of course I've never seen one or ridden one, but I did a lot of Google searches.

As you know, when we started our English secondary school, we also decided to adopt the best possible curriculum, the ICSE curriculum.

Another person laughed at me and said, "Isn't it strange that these students should choose such a strict curriculum?"

they will never be able to cope. ”

Our children not only cope very well, they are excellent at it.

Come see how well our kids do.

It is also commonly believed that slum parents are not interested in their children attending school. They would rather have them work.

It's sheer trolling.

Parents all over the world want their children to have a better life than they did, but they need to believe that change is possible.

Video: (Hindi) SB: We have an 80 percent attendance rate at all parent-teacher meetings.

In some cases, 100 percent, well above many privileged schools.

Fathers have also started to participate.

Very interesting. When we started school, parents thumbprinted our attendance sheets.

Now they are starting to write their signatures.

The children taught me.

It's amazing how much children can teach.

A few months ago, actually late last year, some mothers came to us and said: "We want to learn to read and write.

Can you teach me? ” So we started an after school for parents and mothers.

Twenty-five mothers regularly came to study after school.

We hope to continue this program and extend it to all other schools.

98% of our fathers are alcoholics.

So you can imagine how traumatized and dysfunctional the homes our children grew up in.

We send fathers to de-addiction labs, and when they come back they are usually sober and have to find jobs so they don't fall behind.

We have three fathers who are trained to cook.

We have taught them nutrition and hygiene.

We helped them set up the kitchen and now feed all the children.

They are doing a very good job because their children eat their food, but most importantly this is their first time being respected and they feel they are doing something worthwhile.

Over 90 percent of our non-teacher staff are all parents and relatives.

We have started many programs just to make sure that children come to school.

A vocational skills program for older siblings to ensure that younger siblings are not prevented from attending school.

There is also a myth that slum children cannot fit into the mainstream.

Look at this girl The girl was one of 28 children from all privileged schools, the best schools in the country, who were selected for Duke University's Talent Discovery Program and sent to IIM Ahmedabad.

Video: Girls: Duke IIMA Camp. Every time I see IIMA, I am proud to have been to that camp.

Everyone was very friendly, especially I made a lot of friends.

And I felt that my English improved a lot by going there and chatting with my friends.

There they met children with different standards, different ways of thinking, a completely different society.

I interacted with almost everyone.

they were very friendly.

I had a very good friend there who was from Delhi and from Mumbai.

We still keep in touch through Facebook.

After this trip to Ahmedabad, I seem to relate to people and everyone else in a completely different way.

I feel like I've never felt like this before.

I don't mingle with anyone, and I don't start talking right away.

My English accent has improved a lot.

I also learned soccer, volleyball, frisbee and many other games.

And I don't want to go to Bangalore. let me stay here

It was a beautiful dish and I enjoyed it. It was so beautiful.

I enjoyed eating the kind of food that [unintelligible] would come and ask, "Yes ma'am, what do you want?" Great to hear!

(Laughter) (Applause) SB: This girl worked as a maid before she came to school.

And today she wants to become a neurologist.

Our children are doing great in sports.

they are really good.

Bangalore hosts an inter-school sports competition each year, attended by 5,000 children from 140 of the city's best schools.

Received best school award for 3 years in a row.

And our children come home with bags full of medals, with many admirers and friends.

Last year, several children from elite schools came to ask for admission to our school.

We also have our own dream team.

why did this happen? Why this confidence?

Is it exposure? Professors from MIT, Berkeley, Stanford and the Indian Institute of Science come to teach children many science formulas and experiments beyond the classroom.

Art and music are considered therapeutic and expressive mediums.

We also believe that content is more important.

It's not about the infrastructure, not the toilets, not the library, it's about what actually happens in this school.

Creating an environment of learning, inquiry and inquiry is true education.

When we started Parikrma, we had no idea what direction we were going.

We didn't hire McKinsey to come up with a business plan.

But we believe that what we want to do today is not to get hung up on numbers, but to take one child at a time and really see that child complete the wheel of life and reach their full potential.

We believe in quality, we don't believe in scale. Scale and numbers are generated automatically.

We have companies to help us and now we are able to open more schools.

But we started with the idea of ​​one child at a time.

Parshalam is 5 years old.

He was picked up from a bus stop some years ago and is now in an orphanage and has been in school for the last four and a half months.

He goes to kindergarten.

He learned how to speak English.

We have a model that children can speak and understand English within 3 months.

He tells stories in English about thirsty crows, crocodiles and giraffes.

And if you ask him what he likes to do, he will say, "I like to sleep.

i like to eat i like to play "

And if you ask him what he wants to do, he will say, "I want to race."

Well, "horsing" goes on horseback.

So Parsharam comes to my office every day.

He comes to get his tummy rubbed. Because I believe that good luck will come my way. (laughter) When I started Paris Car, I started with a very arrogant feeling that I wanted to change the world.

But today I have changed.

I have changed along with my children.

I learned a lot from them: love, compassion, imagination, and creativity.

Parsharam is a parishurma with an easy start but a long journey.

i promise. Parsharam will speak at the TED conference in a few years.

thank you.

(applause)

I would like to begin this song I wrote about endless longing and endless want with Sir Thomas Wyatt the Elder's famous Petrarca paradoxical poem. "I have not found peace, all my wars are over. I am terrified and hopeful, I burn and freeze like ice. I am flying on the wind, but I cannot rise. And I have nothing, all of the world that I grasp."

♫ I want what I don't have, I need what I don't want ♫ I want what I don't have, I want what I want ♫ I want what I don't have, I need what I want ♫ I want what I don't have, I want what I want Things ♫ ♫ I need what I don't have, what I don't want ♫ I have it, but I don't have it ♫ ♫ I feel like I'm just going to lose it because I'm lame ♫ ♫ I lost it on the last train, don't worry ♫ ♫ There's a ray of hope in every cloud ♫ ♫ A little rain, a little rain, a little rain ♫ I want what I can't have, I need what I don't want I need what I don't have ♫ ♫ I have but I don't ♫ ♫ My heart won't stop, my heart says go ♫ ♫ No one knows how to hold me ♫ ♫ My heart won't stop, my heart says ♫ ♫ "Good things happen to those who wait" ♫ ♫ And I can't stand in line... ♫ ♫ I can't stand in line forever ♫♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ I HAVE TO TAKE IT ONLY ♫ ♫ ♫ ♫ Good things must be here -- yes, they're here ♫ ♫ Here, here, here. No, I have to claim it ♫ ♫ I just have to grab ♫ Oh please, please, please ♫ ♫ I want what I can't have, I need what I don't want ♫ I have what I don't have, I need what I want Come on and my heart says go ♫ No one knows how to hold me, no ♫ ♫ My heart won't stop, my heart says go What I don't have, what I want ♫ ♫ I need what I don't have, what I don't want ♫ ♫ Take what I don't have, what I want ♫ ♫ I need what I don't have, what I don't want

We are drowning in news.

Reuters alone delivers 3.5 million news articles per year.

It's just a source of information.

My question is, how many of these stories will actually matter in the long run?

That's the idea behind The Long News.

This is a project by The Long Now Foundation, founded by TEDsters including Kevin Kelly and Stewart Brand.

And what we're looking for are news stories that will still matter 50, 100, or 10,000 years from now.

And when you look at the news through that filter, a lot of things fall by the wayside.

Take last year's Associated Press headlines, will this matter 10 years from now?

Or this?

Or this?

TRUE?

Will this matter 50 or 100 years from now?

Well, it was kind of cool.

(Laughter) But the headline story of the year was the economy. I am convinced that sooner or later this recession will become old news.

So what stories could change the future?

Now consider science.

One day, little robots will pass through our bloodstream to repair things.

If you're a mouse, that day has already come.

Recent article: Nano-bees attack tumors with real bee venom. They are sending genes into the brain. A robot that can crawl on a human body they made.

What about resources? How do we feed 9 billion people?

We struggle to feed six billion people today.

As we heard yesterday, over a billion people are suffering from hunger.

Britain would starve without GM crops.

Luckily, Bill Gates bet a billion on [agricultural] research.

What about world politics?

The world will be and may be very different when and if China sets its agenda.

It has overtaken the United States to become the world's largest car market, has overtaken Germany to become the largest exporter, and has begun DNA testing children for career choices.

We find all sorts of ways to push back the limits of what we know.

Recent Discovery: There is an Argentinean ant colony that now spans all continents except Antarctica. There is an autonomous robotics scientist who made a discovery. Eventually science may no longer need us, and life may no longer need us. Microbes wake up after 120,000 years.

With or without us, life seems to go on.

But my top long story of the year was water found on the Moon.

It makes setting up a colony much easier.

And if NASA doesn't do it, China or someone in this room might write a big check.

My point is that some news stories matter more than others in the long run.

(applause)

Guys, at TED we talk a lot about leadership and how to start a movement.

So let's look at the movement from start to finish in less than three minutes and analyze some lessons from it.

First, of course, as you know, a leader must have the courage to be publicly ridiculed.

What he does is very easy to understand.

This is his first follower with an important role. He's going to teach you how to obey everyone else.

Notice here that the leader accepts the leader as an equal.

Now it's no longer about leaders. It's about them, plural.

Now he is calling his friends there.

Now imagine that the existence of the first follower is actually an underrated form of leadership.

It takes courage to stand out like that.

The first follower is what turns a lonely nut into a leader.

(Laughter) (Applause) And here comes the second follower.

Now it's not one nut, not two nuts - three are the crowd and the crowd is the news.

Therefore the movement must be public.

It is important to show not only the leader, but also the follower. Because we know that new followers emulate followers, not leaders.

Well, here came two more, followed shortly after by three more.

This gave me momentum. This is the tipping point.

(Laughter) So, notice that the more people participate, the less risk there is.

So those who used to sit on the fence have no reason not to.

They don't stand out, they don't get ridiculed, but if you hurry they become part of the crowd.

(Laughter) So in the next minute, all the people who like to stick with the crowd will show up because eventually they'll be ridiculed for not participating.

And that's how it works.

But let's summarize some lessons learned here.

First, if you're more of a guy who dances standing alone shirtless, remind yourself of the importance of nurturing your first few followers on an equal footing. In doing so, it's clearly the exercise that counts, not you.

(Laughter) Okay, but maybe I missed the real lesson here.

The biggest lesson, did you notice? Did you understand? --Leadership is overly glorified.

Yes, it will be the shirtless guy who acts first and he will get all the credit. But in fact, it was the first follower who turned the lone madman into a leader.

That's why we're all told that we should all be leaders, and that's not really effective.

If you really want to start exercising, be brave and show others how to follow suit.

And if you see a lone madman doing something great, be the first to have the courage to stand up and join in.

TED is the perfect place to do that.

thank you.

(applause)

Okay, let me start with a question, when was the last time you were called "childish"?

For a child like me, being called childish is common.

We are called childish whenever we make unreasonable demands, exhibit irresponsible behavior, or show other signs of being normal Americans.

It really bothers me.

After all, look at events like imperialism and colonization, world wars, and George W. Bush.

Ask yourself who is responsible. adult.

What did the children do?

Anne Frank touched millions with her powerful account of the Holocaust.

Ruby Bridges helped end racism in the United States.

And recently, Charlie Simpson raised £120,000 for Haiti on a tiny bicycle.

As you can see from examples like this, age doesn't matter at all.

Because the traits referred to by the term “childish” are common in adults, the ageist term should be repealed when criticizing behavior associated with irresponsible or irrational thinking.

(Applause.) Thank you.

Again, who says a certain kind of irrational thinking isn't exactly what the world needs?

Maybe you've made grand plans and stopped thinking, 'I can't,' 'It's too expensive,' or 'It's not profitable for me.'

For better or worse, we kids aren't so hindered from thinking of reasons not to do things.

Sometimes children are full of inspiring aspirations and hopeful thoughts, like my wish that no one should starve, that everything should be free, that it would be a kind of utopia.

How many people have such a dream and believe in the possibility?

Knowledge of history and past failures of utopian ideals can sometimes be a burden. Because we know that if everything were free, food stocks would dry up and run out, leading to chaos.

On the other hand, we children still dream of perfection.

That's good. Because in order to make something real, you first have to dream it.

Our daring to imagine helps us push the boundaries of what is possible in many ways.

For example, the Glass Museum in my hometown of Tacoma, Washington -- Hey Washington!

(Applause) has a program called Kids Design Glass, where children draw their own glass art.

Resident artists said they got some of their best ideas from the program. Because kids don't think about the limits of how hard it is to blow glass into a certain shape, they just come up with good ideas.

Now, when you think of glass, you might think of colorful Chihuly designs or Italian vases, but you'll find that kids have visions of the flesh, venturing into the realm of broken-hearted snakes and bacon boys to glass artists beyond that.

(Laughter) Now, our inherent wisdom doesn't have to be insider knowledge.

Children have already learned a lot from adults, and we have a lot to share.

I think adults should learn from children too.

Today I speak mostly to educators, teachers and students, and I love this analogy. Teachers should not lead the class telling students to do this, do that.

Students should teach teachers.

Learning between adults and children should be reciprocal.

Unfortunately, the reality is a little different and has a lot to do with the lack of trust.

Now, when you can't trust someone, you impose limits on them, right?

If I have any doubts about my sister's ability to repay the 10 percent interest I placed on her last loan, I will withhold any further money from me until she repays.

(laughs) By the way, it's a true story.

Restrictive attitudes by adults toward children now seem to be prevalent, from "Don't do that, don't do this" in school brochures to restricting Internet use in schools.

As history points out, regimes become repressive when they fear maintaining control.

And while adults may not have reached the level of totalitarian regimes, children have little or no say in setting the rules, even though attitudes should actually be reciprocal. In other words, adults should learn and consider the needs of younger generations.

Now, what's even worse than limitations is that adults often underestimate children's abilities.

We love challenges, but when expectations are low, believe us, we sink into them.

My own parents never expected anything from me and my sister.

So they didn't tell us to be doctors or lawyers or anything like that, but when so many other kids were listening to "The Wheels of the Bus Turn", my dad read me a book about Aristotle and the pioneers who fought germs.

Well, I heard that too, but the "Pioneer Bacteria Fighters" are in complete control.

(Laughter) I've been writing since I was four years old, and my mom bought me my own laptop with Microsoft Word when I was six.

Thank you, Bill Gates, and thank you, Mom.

I wanted to write and publish over 300 short stories on that little laptop.

Instead of just ridiculing this myth that a child wants to be published and telling them to wait until they're older, my parents have been really supportive.

Many publishers were less favorable.

One major children's book publisher quipped that they don't work with children.

Are children's publishers not involved with children?

I don't know, but I feel like they're alienating big customers.

(laughter) One of the publishers, Action Publishing, was happy to take that step, trust me, and listen to me.

They published my first book "Flying Fingers", here it is.

Since then, I've spoken in hundreds of schools, keynotes to thousands of educators, and I'm here to speak to you today.

Thank you for your attention today. You have listened to me to show that you really care.

But there's a problem with this rosy image that children are so much better than adults.

Children grow up and become adults just like you.

(laughter) Or is it the same as you? TRUE?

The goal is not to make your children adults like you, but rather to make them better adults than you are, but considering your male qualifications, that might be a little difficult.

(Laughter) But progress will come as new generations and new times grow and develop and become better than the previous ones.

That is why we are no longer in the Dark Ages.

Regardless of your position or place in life, it is imperative that you create opportunities for your children so that we can grow to surprise you.

(Laughter) Adults and TED stars, listen and learn from your kids, trust us and expect more.

Please listen today. Because we are the leaders of tomorrow. This means that we will take care of you when you grow old and senile.

(Laughter) No, really, we are the next generation and we are going to move this world forward.

And if you don't think this really makes sense to you, just remember that cloning is possible. It will require you to relive your childhood, and in that case, like my generation, you will want to be heard.

The world needs new leaders and opportunities for new ideas.

Children need opportunities to take initiative and succeed.

Are you ready to enter the game?

Because the problems of the world should not be the heirlooms of mankind.

thank you.

(Applause.) Thank you. thank you.

"People do stupid things.

That's what spreads HIV. ”

This was a headline in the British newspaper The Guardian some time ago.

Interested, hands up, does anyone agree with this?

Well, one or two brave souls.

This is actually a direct quote from an epidemiologist who has worked in the HIV field for 15 years and has worked on four continents.

And I will now argue that this is only half true.

People do get HIV for doing stupid things, but most of them do stupid things for perfectly reasonable reasons.

Right now, “rational” is the dominant paradigm in public health, and if you put on the glasses of a public health geek, you will find that if you give people the information they need about what is good or bad for them, give them the services they can use to act on that information, and give them a little motivation, they will make rational decisions and live healthier and longer lives.

wonderful.

I work in the HIV field, so this is a bit of a problem. We all know HIV is about poverty and gender inequality, but if you were at TED '07 it's about the price of coffee...

In fact, HIV is about sex and drugs, and if there are two things that make humans a little irrational, they are erections and addiction.

(Laughter) So let's start with what makes sense for an addict.

Now I remember talking to my Indonesian friend Frankie.

We were having lunch and he told me about a time he was in a prison in Bali for an injection.

It was someone's birthday and they were very kind enough to smuggle heroin into the prison, which he was very generously sharing with all his colleagues.

So they all lined up and the line of smackheads and the guy whose birthday was that day filled their bellies and went downstairs and started injecting people.

So he injects the first patient, wipes the needle from his shirt, and injects the next patient.

And Frankie said, "I'm number 22 in line and I can see needles coming down on me and there's blood all over the place.

It's getting slower and slower.

And while a small part of my brain is thinking, 'That's so bad and really dangerous,' most of my brain is thinking, 'Let there be some tugs left by the time it gets to me.

Leave it alone.'" And while telling me this story, Frankie said, "See... God, drugs really make people stupid."

And you know, you can't blame him for his accuracy.

However, Frankie was actually in prison for heroin addiction at the time.

So his choice was either to accept that dirty needle or not to get high.

And if there's one place where you really want to get high, it's in prison.

But I'm a scientist and I don't like making data out of anecdotes, so let's look at some data.

We interviewed 600 drug addicts in three cities in Indonesia and asked, "Do you know how you get HIV?"

"Oh yes, by sharing needles."

So almost 100 percent. Yes, by sharing the needle.

And, "Do you know where I can get a clean needle for a price that avoids that?"

"Oh yeah."100.

“We are so smart that we know where to get clean needles.”

"So you have a needle?"

We're actually interviewing people on the street, where they're hanging out or taking drugs.

"Do you carry clean needles with you?"

Up to 1 in 4.

So it's no surprise that only 1 in 10 actually used a clean needle every time they injected in the last week, while 9 out of 10 shared it.

So you have this big discrepancy. We all know that sharing will give you HIV, but we share anyway.

So what is it? Do you feel like you get high when you share something?

When I asked Junkie about it, he said, "Are you crazy?"

I hate sharing needles as much as I love sharing toothbrushes, even with the people I sleep with.

There's a certain nasty element to it.

"No, no. I don't want to go to jail, so I'm sharing needles."

So in those days in Indonesia, if you had a needle and the police rounded you up, you could end up in jail.

That changes the formula a little.

Because your choice is either I use my needles now, or I share my needles now and get a disease that might kill me in ten years, or I use my needles now and go to jail tomorrow.

And while drug addicts think exposing themselves to HIV is a really bad idea, they think it's a far worse idea to spend the next year in jail, where they'll probably end up in Frankie's situation and expose themselves to HIV anyway.

So suddenly it makes perfect sense to share needles.

Now let's look at it from a policy maker's point of view.

This is a really simple problem.

Your incentives are now in place.

We have what makes sense for public health.

You want people to use clean needles. And drug addicts want to use clean needles.

Therefore, simply making clean needles widely available and removing the fear of arrest will solve the problem.

Now, the first person to discover the problem and take some action on a national scale was the famous bloody liberal Margaret Thatcher.

She introduced the world's first national needle exchange program, followed by Australia, the Netherlands and several other countries.

And in all these countries, less than 4% of those who inject have ever been infected with HIV.

Now, in places that haven't done this, like New York City, Moscow, and Jakarta, they say 1 in 2 injecters contracted the deadly disease at its peak.

Now, Margaret Thatcher didn't do this because she had a deep love for drug addicts.

She did so because she ran a country with a national health service.

So if she didn't invest in effective prevention, she would end up paying for treatment later, and obviously that would be much more expensive.

So she was making politically rational decisions.

Now, when you pull out your public health geek glasses and look at these data, it sounds like a no-brainer, doesn't it?

But in this country, where the government apparently doesn't feel obligated to provide health care to its citizens (laughs), we took a completely different approach.

So what we've been doing in the United States is reviewing data—reviewing data endlessly.

So these are reviews of hundreds of studies by high-ranking figures in the US scientific community, and these are the studies that have shown that acupuncture programs work, and quite a few of them have.

Well, here's an indication that the needle program is ineffective. I think this is one of those annoying dynamic slides. Pressing the dongle shows the rest, but it doesn't. This is the entire slide.

(Laughter) There's nothing on the other side.

Quite absurd, you would think.

Other than that, wait a minute, politicians are rational too, and they respond to what voters want.

So what we're seeing is that voters respond very well to things like this, but not very well to things like this.

(Laughter) So it becomes very reasonable to deny service to the injectors.

Now let's talk about sex.

Are we more rational than ever about sex?

Well, I'm not even going to refer to the apparently irrational position of people like the Catholic Church. They somehow think that if they hand out condoms, everyone will have sex.

I don't know if Pope Benedict is watching TEDTalks online, but if he is, Benedict has news. I always carry a condom, but I have never had sex.

(Laughter) (Applause) It's not that easy!

You might get lucky here.

(Applause) Now, seriously, HIV is actually not that easy to transmit sexually.

That is, it depends on how much virus is present in the blood or body fluids.

And what we're getting is very high levels of the virus at the beginning of the first infection, then antibodies start to build, and then for a long period of time, say 10 or 12 years, it stays at pretty low levels and then spikes when you get another STD.

But basically, nothing much happens until you start getting symptomatic AIDS, at which point you don't look or feel good, and you don't have much sex.

Sexual transmission of HIV therefore basically depends on how many partners you have in a very short time frame during peak viremia.

Now this is going to piss people off. Because it means that some groups have more sexual partners than others in a short period of time, which is considered stigmatizing.

I've always had a little interest in that. Because I think prejudice is bad and lots of sex is very good, but I'll leave it at that.

The truth is, 20 years of very good research shows that there are groups that are more likely to leave a large number of partners in a short period of time.

And those groups, globally, are those who sell sex and its more general partners.

They are gay men in the party scene and have on average three times more partners than straight men in the party scene.

And they are heterosexuals from countries with polygamous traditions and relatively high levels of female autonomy, most of which are in East or Southern Africa.

And that is reflected in today's plague.

We can see these frightening figures from Africa.

All of these countries are located in southern Africa, where between 1 in 7 and 1 in 3 adults are living with HIV.

Now, in the rest of the world, basically nothing is happening to the general population, but there are very low levels of people living with HIV. But others at greatest risk, including drug injecters, sex workers and gay men, have unusually high levels of HIV infection.

And you'll notice that this is local data for Los Angeles. The prevalence in homosexual men is 25 percent.

Of course, unprotected sex isn't the only way to get HIV.

You can only get HIV if you have unprotected sex with someone who tests positive.

In most parts of the world, commercial sex is actually doing very well these days, despite some of these preventive failures. Condom use rates in commercial sex range from 80 to 100 percent in most countries.

And, again, it's due to the alignment of incentives.

What makes sense for public health also makes sense for individual sex workers. Because re-emerging STDs is very bad for business.

no one wants

And in fact, clients don't want to go home on IVs either.

So, in essence, commercial sex can achieve significantly higher rates of condom use.

But in "intimate" relationships it is much more difficult. Because between your wife, your boyfriend, or someone you aspire to be one of them, there is an illusion of romance, trust, and intimacy, and nothing is less romantic than "my condom or yours?" question.

So, let's face it, you need a pretty strong motivation to use condoms.

For example, this gentleman is called Joseph.

He is from Haiti and has AIDS.

And while he probably doesn't have much sex now, it's a reminder to the public why condoms should be used.

This one is also in Haiti and probably reminds you why you might want to have sex.

Now, interestingly enough, this is Joseph again after six months of antiretroviral therapy.

No wonder we call it the Lazarus effect.

But the equation of what is rational in sexual decision-making is changing.

And so the conclusion we've come to is, some people say, "Oh, it doesn't really matter because the treatment lowers the viral load and makes HIV transmission more difficult, so it's actually an effective prevention."

So, looking again at viremia, what happens when you start treatment when you're sick? Your viral load goes down.

But compared to what? What if I am not receiving treatment?

Well, you die, so your viral load goes to zero.

And all this green stuff here, including spikes, because you couldn't go to the pharmacy, you ran out of meds, you went to a party for three days and forgot to take your meds, or you started to develop resistance, but they're all viruses that aren't there except for a cure.

Now, am I saying, "Oh, that's a great preventive strategy"?

Stop treating people. ”

Of course not, of course not.

Antiretroviral therapy should be expanded as much as possible.

But what I am doing is questioning those who claim that further treatment is the only preventive measure needed.

That's not necessarily true. I think we can learn a lot from the experiences of gay men in wealthy countries where treatment has been widely available for the past 15 years.

And what we saw was that condom use was actually very high -- the gay community could be said to have responded very quickly to HIV with little help from public health geeks -- condom use actually dropped dramatically after treatment for two reasons. One is, "Well, if he's infected, he's probably on meds, and his viral load is low, so I'll be pretty safe."

And the other is that people aren't as afraid of HIV as they are of AIDS, and that's no surprise.

AIDS is a ugly, deadly disease, and HIV is an invisible virus that must be taken daily.

It's boring, but is it as boring as having to use a condom every time you have sex, no matter how drunk or how many poppers you drink?

Looking at the data, we can see that the answer to that question is "hmm."

So these are Scottish data.

We're seeing a peak in drug syringes before the nationwide needle replacement program kicks in.

Then it went down quite a bit.

And for both heterosexuals (mainly commercial sex) and drug users, nothing really happens after treatment begins. That's because of the incentive adjustments we talked about earlier.

However, homosexual men see a fairly dramatic increase three to four years after treatment becomes widely available.

This is due to a new infection.

what do you mean?

This means that the combined effects of less anxiety and more virus in the population – more people living longer, healthier and more likely to be infected with HIV – outweigh the effects of lower viral load, which is very worrying.

what do you mean?

This means that the more treatment there is, the more prevention needs to be done.

Is that happening?

No, I call it the "compassion conundrum."

We've been talking a lot about compassion in the last few days, but what's really happening is that people aren't willing to use good sexual and reproductive services for sex workers, and they can't even give needles to drug addicts.

But after they go from offenders to AIDS victims doing things we don't want to tolerate, we'll come with all the mercy and buy them incredibly expensive drugs for the rest of their lives.

It makes no sense from a public health point of view.

I would like to say almost the last words to Ines.

Inez is a transgender prostitute on the streets of Jakarta. She's a chick with a penis.

why is she doing that job?

Well, of course, she had no choice but to do it, and so on.

And if we can teach her to sew and get her a good job in the factory, all will be well.

This is the hourly income of Indonesian factory workers, averaging 20 cents.

It varies somewhat by prefecture.

I'm talking to sex workers for this slide, and 15,000 of them say they make money in one hour of sex workers.

So it's not a great job, but it's a very reasonable choice for many people.

Well, Ines.

We have the tools, the knowledge, the money, and we are also working on HIV prevention.

Innes: So why is the prevalence still rising?

It's all politics.

It makes no sense when it comes to politics.

Elizabeth Pisani: "When you enter politics, nothing makes sense."

So from a sex worker's point of view, politicians don't make sense.

From a public health nerd's point of view, junkies are doing stupid things.

The truth is that everyone has a different rationale.

There are as many ways to become rational as there are humans on earth, and that is one of the glories of human existence.

But these ways of being rational are not independent of each other, so it is reasonable for drug injectors to share needles because of stupid decisions made by politicians, and it is reasonable for politicians to make that stupid decisions because they are responding to what they think voters want.

But the point here is that we are voters.

We're not all of us, of course, but TED is a community of thought leaders.

And I think everyone in this room, and everyone watching this on the web, has an obligation to demand that politicians base their policies on scientific evidence and common sense.

It's going to be very difficult to individually influence every Frankie and every Inez that makes sense, but at least you can use your vote to stop the stupid politicians who spread HIV.

thank you.

(applause)

It's not the technology, it's the people and the stories.

Here's a high quality video "60 Minutes" that recently aired on TV. Many of you may have seen it.

And it was the man himself — who had lost an arm in Vietnam 39 years ago — who was put in charge of an entire regime of veterans, who was adamantly opposed to such a non-functioning crazy device.

And with the 60 Minutes cameras rolling in the background, it turns out he had his hook and his arm after he pretty much made his stand on the matter. It turned out that he was able to pour himself a drink in this arm for less than two hours and was very emotional at the fact that he felt, quoted, in his words, the first time he had an arm in 39 years.

But that would be too much of a story, so I'm not going to show you the polished video.

Instead, I'll show you an early crude video in a minute or two. Because I think it's a better way to tell a story.

A few years ago I was visited by the person who runs DARPA. DARPA is the one funding any advanced technology that companies and universities wouldn't risk.

They are especially interested in what helps our soldiers.

I get these unsolicited visits, but sitting in my conference room is a senior military surgeon who runs DARPA.

They told me basically the following story. We are now using advanced technology like this to make it available in the most remote places to deploy soldiers, such as the hills of Afghanistan and Iraq.

They were very proud of the fact that if there was a wounded soldier they would collect him or her and bring him back before the dust cleared, they would have world-class triage emergency care before you, and I would have it if we were injured in a car accident in a major US city.

That's good news.

The bad news is that if they retrieve this person and they're missing an arm, leg, or part of his face, it probably won't come back.

So they started giving me statistics on how many children had lost their arms.

Then the surgeon pointed out with rage, "Why? At the end of the Civil War, they were shooting each other with muskets. If someone lost an arm, we gave them a wooden stick with a hook.

Now we have F18 and F22, and if someone loses an arm, give them a plastic stick with a hook. ”

And they basically said, 'This is unacceptable,' and then they said, 'Dean, we're here because you're making medical stuff.

you will lend us your arm ”

And I was waiting for 500 pages of bureaucracy, paperwork, and the Pentagon.

No, the man said, "We're going to take a man into this boardroom and put on the arm you're going to give us, and he or she's going to pick up some raisins or grapes from this table.

If it's grapes, they won't break it. ”

Great, he needs centrifugal, centripetal and tactile sensors.

"I won't drop raisins."

So he wants fine motor control, including wrist flexion, elbow flexion, and shoulder abduction and flexion.

Either way, they were going to eat it.

"Oh, by the way Dean. This fits the 50th percentile female skeleton, 32 inches from the long fingers, and weighs less than 9 pounds."

50th percentile female frame.

"And it will be completely self-contained, including all the power."

So they finished it. And as you can see, I'm a shy guy.

I told them they were out of their minds.

(Laughter) They watch too much Terminator.

(Laughter.) And the surgeon said to me, "Dean, you should know that more than 20 of these children have come back bilateral."

Now, I can't imagine -- sorry, you guys may have more imagination than I do -- I can't imagine losing an arm at 22.

But 2 losses compared to that?

It seems to cause trouble.

Anyway, I went home for the night. i thought about it.

I literally lost sleep thinking, "How am I going to toss and turn without using my shoulders?"

So I decided that I had to do this.

Believe me, I have a day job and I have many.

Most of my day job is busy funding my fantasies like FIRST, water, power...

And I have a lot of work to do during the day.

But I thought I had to do this.

I did a little research, went to Washington and told them that they still think they're crazy, but we're going to do it.

And I said I would make them arms.

I told them it would probably take 5 years to get through the FDA and maybe 10 years to be fully functional.

Let's see what it takes to build something like an iPod.

"Great," he said, "two more years."

(Laughter) I said, "I'll tell you, I'm going to build you a 9-pound arm with this capability in a year."

The remaining nine are necessary to make it functional and useful. ”

It was like we agreed not to agree.

I went back and started building a team with the best guys who were passionate about doing this.

At the end of exactly one year, we had a 14-degree-of-freedom device with all sensors, all microprocessors, and everything else.

You can wear cosmetics that are too real and creepy, but then you lose sight of this cool thing.

Then I thought it would take years to build something really, really useful.

As you can see by Amy's ability and demeanor, I've found that people who are willing to do something are very good and nature is very adaptable.

Anyway, less than 10 hours of use and 2 guys, 1 of which is bilateral.

He literally has one shoulder missing and the other shoulder high over his humerus.

And that's it, 10 hours later Chuck and Randy were hanging out in our office together.

And we shot some pretty vulgar home movies.

At the end of what I'm about to show you, in just a few seconds, Chuck still does things that I envy, but I can't do.

He picks up a spoon, picks it up, scoops out the shredded wheat and milk, keeps the spoon horizontal, all joints at the same time, and moves it toward his mouth. And he didn't drop a single drop of milk.

(Laughter) You can't do that.

(laughter) His wife was standing behind me.

Then she was standing behind me and said, 'Dean, Chuck hasn't eaten in 19 years.

So you have a choice: either we leave the arm or you leave the chuck. ”

(Laughter) (Applause) So, do you understand?

A chuck that demonstrates simultaneous control of all joints.

He's punching our air traffic controller. Behind him is our technician/surgeon, a nice guy to have around.

There's Randy, they're passing rubber little pucks between them.

And just like the spirit of FIRST - courteous professionalism - they are very proud of this and decided to share a drink.

By the way, this is not easy.

Imagine doing one of those things with a wooden stick and a hook on the end.

Now Chuck is doing something very extraordinary, at least for my limited physical abilities.

And now he's going to do what DARPA asked me to do.

He picked up the grapes and didn't drop them or break them. And I'm going to eat it

So at the end of about 15 months we were there.

(Applause.) But as I learned from Richard, it's not the technology, the processor, the sensor, the motor.

I had never tackled this kind of problem, or, frankly, this whole area of ​​the medical community.

Here are some of the amazing things that happened when I started doing this.

After you're pretty sure you've got a good design, you have to make all the standard engineering trade-offs you always make. You can always achieve 3 out of 4 of what you want. Weight, size, cost, functionality—I put a bunch of guys on the plane and said,

It doesn't matter if the Pentagon likes this weapon. ”

When I told them they were completely reluctant, "It doesn't matter what their opinion is.

There is only one opinion that matters: either the children use it or they don't. ”

I said to some engineers, "If you go to Walter Reed now, you will see people, many people, who have lost major parts of their bodies.

They will probably get angry, depressed, or frustrated.

Perhaps we need to give them support and encouragement.

But we need to elicit enough information from them to make sure we are doing the right thing. ”

We walked into Walter Reed's store and couldn't have been more wrong.

We saw large numbers of people, many of whom had lost many parts of their bodies and had their remaining parts burned. Half of his face was gone, and his ears were burned off.

they were sitting at the table. they were collected for us.

And we started asking them all sorts of questions.

"Look, we're still far from nature.

I can give you fine motor control or let you do 40-pound curls. I don't think you can do both.

These gears can provide quick control at low reduction ratios or they can provide power. I can't give you both.

And we tried to make sure they all knew what to give.

Not only were they enthusiastic, they kept thinking they were there to help us.

"Well, if you don't mind..."

"Men and women, you've had enough.

we are here to help you. I need data. we need to know what you need. ”

After maybe 30 minutes, there was one man at the end of the table who didn't say much.

I found him missing an arm.

He was leaning on his other arm.

I made the call to the end, 'Hey, you haven't said much.

If you need this and that, what do you want? ”

And he said, "At this table I am the lucky man.

I lost my right arm but am left handed. ”

(Laughter.) So he didn't say much.

He had a great mind, just like everyone else had a great mind.

And he made some comments.

And the meeting ended. We said goodbye to all these guys.

And the man pushed his body back off the table...

he has no legs

So we left.

And I was thinking, 'We didn't give them support and encouragement, they gave us.

They haven't finished donating yet. ”

It was amazing.

So we went back.

And I worked harder and faster.

Then we went to Brooke Army Medical Center.

And we have seen many children like this.

And it was amazing how positive they were.

So we've been back and working even harder.

We have clinical trials, 5 of which have been applied to humans.

we cry together

Then I get a phone call and go back to Washington.

Going back to Walter Reed, he literally had a child 20 days before he was blown up.

And they transported him to Germany, and 24 hours later from Germany to Walter Reed.

And he was there and they said we needed to come.

And when I went down they pushed him into the room.

he has no legs

he has no arms

He has a small stump on one side.

Half of his face is gone, but his eyesight is returning.

He had one good eye.

His name is Brandon Marco.

And he said, "I need your arms, but I need two."

"You will get it."

This kid was from Staten Island.

And he said, "I had a truck before I went there, and it had a stick on it.

do you think i can drive ”

"of course."

And I turned around and thought, "How am I going to do that?"

(Laughter) Anyway, he was like everyone else.

he doesn't want too much.

he wants to help He told me he wanted to come back to help his fellows.

So I was on my way out of here.

I was asked to stop by Texas.

The U.S. Department of Veterans Affairs, 3,500 people attended this massive event and wanted me to speak to help the families of all the children who died and others like Brandon.

I said, 'What are you going to say?

This is not a happy thing. See, if this happens to you, I can give you... this is still not as good as the original gear. ”

"Please come."

So I went.

And, as you can see, there were a lot of people there who were recovering.

Some are even more advanced than others.

But in general, the attitudes of people who have been through situations like this are amazing, and just the fact that people care about them makes a big difference to them.

Except for one message or concern, I will remain silent.

I don't think anyone would do that on purpose, but there were people literally discussing, "And how much are you going to get?"

As you know, this country is involved in this great medical controversy as we all hear.

"Who has what rights?

Who is entitled to how much?

who pays for that? ”

That's a tough question.

There is no answer to that. Being born here doesn't mean everyone gets it all.

Impossible. That's nice, but let's be realistic.

It was a difficult question. There are polarized groups.

I don't know the answer.

I have another difficult question.

"Should we be there?

How can I get out?

what do i need to do? ’ The answer to this question is also very polarizing and I don’t have an answer for it.

It's a political issue, an economic issue, a strategic issue.

No answer. But then let me make a simple concern or statement.

That's the easy answer.

I know what these children should receive medically.

I was talking to one of them and he really liked this arm - much, much better than a plastic stick with hooks - but no one in this room would rather have one than the one you bought.

But I said to him, "You know, the first plane flew 100 feet in 1903.

Wilbur and Orville.

But do you know? The old pigeon would not have been jealous.

But now we have the Eagle, the F15 and even that bald eagle.

I have never seen a bird fly around at Mach 2.

I think we can finally make these special. ”

And I said to the kid, "If your friends are jealous of what your Luke arms can do and how you do it, I stop.

and we keep working. And I'm not going to stop working until I can do that. ”

And I think this country should continue the big debate while whining and complaining, "I have rights." "You are the victim."

And whine and complain about what our foreign policy should be.

But while we have the luxury of whining and complaining about who is paying and getting what, those who give us the wonderful privilege of whining and complaining know what they deserve. That's all humans are capable of.

And we should give it to them.

(applause)

Almost exactly a year ago, a little over a year ago, I had a visit from a very senior person at the Department of Defense.

Come see me and say, "1,600 of the kids we sent out came back with at least one arm missing.

whole arm. Shoulder disarticulation.

And we are more or less doing what we have been doing since the Civil War with the whip and hook.

And they deserve more than that. ”

And literally this guy sat in my office in New Hampshire and said, “Give me something I can wear on children picking up raisins and grapes off the table, and put both in their mouths without breaking them, and I can tell the difference without looking.”

You know, there were efferent, afferent, and tactile responses.

He finished the explanation and I was waiting for a big paper proposal for £300. "That's what I want from you."

I said, "Look, you're crazy. That technology isn't available right now.

And it can't be done.

It's not within the bounds of a human arm, which has 21 degrees of freedom from shoulder to fingertips. ”

"About 24 of the 1,600 children have returned in both directions," he said.

Do you think losing one arm is a bad thing?

It's inconvenient compared to the two disappearing."

I have a day job and my nights and weekends are already filled with trying to water the world, powering the world and educating all the children, Chris, I won't talk about that. No need for another mission.

I keep thinking about children without arms.

He told me, "We've done some work all over the country.

We have very nice neurologists and other specialists. ”

I said, "I'm going on a field trip to see what I've got."

Over the next month, I visited many places. Some of them were where I found the best here and around the country.

I went to Washington I looked at them and said, "I did what you asked me to do. I checked what was there.

I still think you're crazy. But it wasn't as crazy as I thought. ”

I formed a team a little over thirteen months ago and amassed a maximum of around 20 members.

We said we were going to build a device that would do what he wanted.

There are 14 degrees of freedom out of 21 degrees of freedom. You don't need the last two fingers.

I put this together.

We brought this up with Walter Reed a few weeks ago, but unfortunately it's been in the news lately.

We showed it to a lot of people.

One man said he was lucky because he lost his left arm and is right-handed.

He sat at a table with seven or eight other people.

He said he was lucky because he was good, and pushed himself off the table. he had no legs.

These kids have an incredible attitude.

Now, let me show you a 30 second piece without the skin. That's all.

But understand what you are seeing. We made it large enough to fit a 50th percentile woman so that any of these people could wear it.

It goes inside what we use in their good arm CAT scans and MRIs, makes silicone rubber, coats it and paints it in 3D. An exact mirror image of their other limb.

So you won't see all the really cool features that this series' elastic set of 14 actuators has. Each actuator has its own ability to sense temperature and pressure.

It also comes with a pneumatically fixed cuff, so the more the load is applied, the more the fit increases.

It will lighten your load and make you compliant again.

Here's someone doing some simple work with it, which we demoed in Washington. can i see this?

Observe how your fingers grip. Thumbs up. wrist.

This one weighs 6.9 pounds.

I scratch my nose.

There are 14 active degrees of freedom.

Now he is trying to pick up the pen with his opposite thumb and forefinger.

He then puts it down, picks up the paper, rotates all the degrees of freedom of his hand and wrist, and reads it.

(applause)

The first robot to be described there is called STiDER.

It stands for Self-excited Tripedal Dynamic Experimental Robot.

A three-legged robot inspired by nature.

But have you ever seen a three-legged animal in nature?

Probably not. So why call this a biologically inspired robot?

How does it work?

You know the H.G. Wells novel and the movie War of the Worlds.

What we're looking at here is a very popular video game, in which fictional three-legged alien creatures and robots are terrorizing the Earth.

This is a real dynamic simulation animation.

Describe how the robot works.

Flip your body 180 degrees and swing your legs between your legs to catch the fall.

So walk like that.

But when we look at us humans, when we're bipedal, we don't actually use our muscles to lift our legs and walk like robots.

What you're doing is swinging your leg to catch a fall, then standing up again and swinging your leg to catch a fall.

You are using your built-in dynamics, the physics of your body, just like a pendulum.

We call it the concept of passive dynamic movement.

What you are doing is converting potential energy to kinetic energy and potential energy to kinetic energy when you stand up.

It's always a falling process.

So in nature there is nothing like this, but in fact we take inspiration from biology and apply the principle of walking to this robot.

Here is what we want to do next.

I want to fold up my legs and travel long distances.

And since the legs are unfolded, it's like "Star Wars", and when it lands, it absorbs the shock and starts walking.

What you see here, this yellow thing, this is not a death ray.

(Laughter) This just goes to show that with cameras and different types of sensors, you can see over bushes and other obstacles because you're 1.8 meters tall.

So we have two prototypes.

The first version at the back is STiDER I.

The small one in front is STRiDER II.

The problem with the STiDER I is that it is too heavy.

There were a lot of motors that adjusted joints and such.

So I decided to get rid of all the motors and synthesize a mechanical mechanism so that a single motor could coordinate all the movements.

This is a mechanical solution to the problem rather than using mechatronics.

The top of the body is now lit up. walking around our lab.

This was the first successful step.

It's not finished yet and the coffee is falling, so there's still a lot of work to do.

The second robot I want to discuss is IMPASS.

Abbreviation for Intelligent Mobility Platform with Actuated Spoke System.

It is a hybrid robot with wheels and legs.

So think of a rimless or spoked wheel. However, the spokes move in and out of the hub individually. That is, a hybrid of wheels and legs.

We are literally reinventing the wheel here.

Let me explain how it works.

Therefore, this video uses an approach called the reactive approach.

Using the tactile sensors in my feet, I'm trying to walk over changing terrain, soft terrain that changes as it's pushed down.

And it navigates this kind of terrain just fine with tactile information.

However, when it encounters very extreme terrain (where obstacles are more than three times the height of the robot), it switches to intentional mode and uses a laser rangefinder and camera system to identify obstacles and sizes.

And the movement of the spokes is carefully planned and coordinated to enable this very impressive mobility.

You've probably never seen anything like this before.

This is the highly mobile robot “IMPASS” developed by our company.

Oh, isn't that cool?

When driving a car, when steering a car, we use a method called Ackermann steering.

The front wheels rotate like this.

Many small-wheeled robots use a method called differential steering, in which the left and right wheels rotate in opposite directions.

IMPASS allows you to do so many different types of motion.

For example, in this case the left and right wheels are connected to a single axle that rotates at the same speed angle, but by simply changing the length of the spokes, you can influence the diameter and rotate left or right.

These are just a few examples of the amazing things you can do with IMPASS.

This robot is called CLIMBeR (Cable-Suspended Limbed Intelligent Matching Behavior Robot).

I've talked to a lot of scientists at NASA JPL, most famous for the Mars rover at JPL. Scientists and geologists have always said that the really interesting science, the place rich in science, is always on the cliffs.

But current rovers can't get there.

So, inspired by that, we wanted to build a robot that can climb structured cliff environments.

This is CLIMBeR.

I have three legs.

It may be hard to see, but there is a winch and cable at the top.

Try to find the best place to put your feet.

Then, once that is known, it calculates in real time the force distribution, how much force must be applied to the surface to keep it from tilting or slipping.

Once it stabilizes, you can raise your legs and use a winch to climb a cliff like this.

Also for search and rescue applications.

Five summers ago, I was actually working as a faculty fellow at NASA JPL.

And they already had a six-legged robot called LEMUR.

So this is really based on that.

This robot is called MARS (Multi-Appendage Robotic System).

We developed an adaptive gait planner.

In fact, there is a very interesting payload there.

Students love to have fun.

Here you find yourself walking on unstructured terrain.

(Motor sound) I'm trying to walk on sandy terrain along the coast, but the soil subsidence model of the foot changes depending on the water content and grain size of the sand, so I'm trying to change the way I walk so that I can overcome such things.

They do interesting things too.

As you can imagine, our lab gets a lot of visitors.

So when a visitor comes, MARS will approach the computer and start typing "Hello, my name is MARS."

Welcome to RoMeLa, the robotics lab at Virginia Tech. ”

(laughs) This robot is an amoeba robot.

I don't have enough time to explain the technical details. I just want to show you some of the experiments.

These are some of the early feasibility experiments.

Store potential energy in elastic skin to move the skin, or use active tension cords to move the skin back and forth.

We have also worked with several scientists and engineers at UPenn to develop a chemically-actuated version of this amoeba robot.

When we do something to something, it works, as if by magic.

This robot is a very recent project.

It's called RAPHaEL: an air-powered robotic hand with elastic ligaments.

There are many very good, very good robotic hands on the market.

Therefore, it is probably not very practical for prosthetic applications because it is not affordable.

Instead of using electric motors or electromechanical actuators, it uses compressed air.

We are compliant because we have developed these new actuators for our joints.

You can actually change the force just by changing the air pressure.

And you can actually crush an empty soda can.

It can pick up very delicate objects, such as a raw egg or, in this case, a light bulb.

Best of all, it only cost us $200 to build the first prototype.

This robot is actually a family of snake robots called HyDRAS (Hyper Degree of Freedom Robot Articulated Serpentine).

This is a robot that can climb structures.

This is the HyDRAS arm.

A robot arm with 12 degrees of freedom.

But the nice part is the user interface.

That cable over there is fiber optic.

This student is probably using it for the first time, but he can say it in many different ways.

For example, in Iraq, which is a war zone, there are roadside bombs.

Now you're sending armed remote-controlled vehicles.

Training operators to operate this complex arm is very time consuming and expensive.

In this case it's very intuitive. This student is probably new to this and is doing a very complex manipulation task, picking up objects and manipulating them.

Well, this robot is our current star robot.

We actually have a robot fan club called DARwIn: Dynamic Anthropomorphic Robot with Intelligence.

As you know, we are very interested in human walking, so we decided to build a small humanoid robot.

This was in 2004. At the time, this was really, really revolutionary.

This is more of a feasibility study, what kind of motor should we use? Is it possible?

What kind of control should I have?

It has no sensors, so it is an open-loop control.

For those of you who probably know, you know what happens when there is no sensor and it fails.

(Laughter) Based on that success, the next year we did a proper mechanical design, starting with kinematics.

Thus in 2005 DARwIn I was born.

Standing up, walking, very impressive.

But still, as you can see, the umbilical cord is attached.

So we still use external power supply and external computation.

2006 is a really good time.

Give it some intelligence.

It offers all the computing power you need, including a 1.5 gigahertz Pentium M chip, two FireWire cameras, a rate gyro, an accelerometer, four forced sensors in your feet, and a lithium polymer battery. And now DARwIn II is fully autonomous.

Not remote control. No string.

It looks around, looks for the ball... looks around, looks for the ball, and tries to play a soccer game autonomously, artificial intelligence.

Let's see what happens.

(Video) Crowd: Goal!

Dennis Hong: Actually, there is a competition called RoboCup.

I don't know how many people have heard of RoboCup.

An international competition for autonomous robot soccer.

And the actual goal of RoboCup is for a full-sized autonomous humanoid robot to play soccer against a human World Cup champion and win by 2050.

(Laughter) That's really, a real goal.

This is a very ambitious goal, but we truly believe it can be achieved.

This was last year in China.

We were the first US team to qualify for the Humanoid RoboCup competition.

You can see that the action is 3 on 3 and completely autonomous.

(video) (crowd moaning) DH: Come on. yes!

Robots track and team play with each other.

Very impressive.

This is actually a research event, packaged into a more exciting competitive event.

Here is a beautiful Louis Vuitton Cup trophy.

This is for best humanoids.

I hope to bring this to the US for the first time next year, so good luck.

(Applause.) Thank you.

(Applause.) DARwIn has many other talents.

In fact, last year he conducted the Roanoke Symphony Orchestra at a holiday concert.

This is DARwIn IV, the next generation of smarter, faster and more powerful robots.

And he tries to show off his abilities by saying, "I'm macho, I'm strong."

(laughs) "I can do Jackie Chan motions and martial arts moves."

(Laughter) And it goes away. This is DARwIn IV.

Also available in the lobby.

We truly believe this will be America's first humanoid robot on the move.

stay tuned.

So what is the secret of our success?

Where do these ideas come from?

How do ideas like this evolve?

We have fully self-driving cars that can drive into urban environments.

We won $500,000 in the DARPA Urban Challenge.

It also has the world's first vehicle that can be driven by visually impaired people.

We call it the "Blind Driver Challenge" and it's very exciting.

I would love to talk to you about many other robotics projects.

These are just some of the awards we received at robotics competitions in the fall of 2007 and elsewhere.

Actually, we have 5 secrets.

The first is where do you get your inspiration from?

Where does this spark of imagination come from?

When I go to bed at night, at 3 or 4 in the morning, when I lie down and close my eyes, I see these lines and circles and shapes floating around.

And together they form this kind of mechanism.

And I think, "Oh, this is cool."

So I don't want to wake my wife up with the light on, so I keep my notebook and diary right next to my bed with a special pen with an LED light.

So I look at this, write everything down, draw something, and go to bed.

Every morning before I have my first cup of coffee and before I brush my teeth, I open my notebook.

Often it is empty. Sometimes I have something there

Even if something is there, it can be junk.

4 in the morning -- what are you waiting for?

So you have to decipher what I wrote.

But sometimes, seeing this original idea out there, I have this wonderful moment.

I go straight to my home office, sit in front of my computer, type ideas, sketch, and keep a database of ideas.

So when I solicit these suggestions, I try to find ones that match my potential ideas and problems.

If there is a match, we write a research proposal, get research funding, and that's how the research program starts.

How do ideas like this evolve?

Our lab RoMeLa, the Robotics and Mechanics Lab, hosts such great brainstorming sessions.

There we get together to discuss and discuss problems and solutions.

But before we start, let's set this golden rule.

The rule is that no one criticizes anyone's ideas.

No one criticizes any opinion.

This is important because students often fear or feel uncomfortable about how their opinions and ideas will be perceived by others.

Once you do this, your students will be surprisingly open-minded.

They're quirky, they're cool, they're crazy, they have great ideas, and the whole room throbs with creative energy.

And this is how we develop our ideas.

Well, we're out of time.

Another thing I want to say is that ideas and sparks of development are not enough.

I had a great TED moment -- I think it was Sir Ken Robinson.

He lectured on how education and schools rob creativity.

Actually, there are two sides to this story.

Therefore, there is only so much you can do with original ideas, creativity, and good engineering intuition.

More than just a mod, more than a hobby in robotics, if you want to really tackle the grand challenges of robotics through rigorous research, you need more than that.

Batman fights bad guys and has utility belts, grappling hooks and all sorts of gadgets.

For us roboticists, engineers, and scientists, these tools are the courses and classes we take in class.

Mathematics, differential equations.

I'm studying linear algebra, science, physics, and most recently chemistry and biology.

These are all necessary tools.

So for Batman, the more tools he has, the more effective he is at fighting bad guys, and for us, the more tools we have to combat this kind of big problem.

Therefore, education is very important.

And that's not all.

You have to work really, really hard too.

That's why I always tell my students, "Work smart, then work hard."

If you come to our lab at 3:00 or 4:00 am, I assure you that the students will be working there. Not because I told them to do it, but because we have too much fun.

Which brings us to the final topic. Don't forget to have fun.

It really is the key to our success and we enjoy it a lot.

I truly believe that we are most productive when we are having fun, and that is what we do.

So that's it.

Thank you very much.

thank you. We have two missions here today.

The first is to talk about pollen and convince them that pollen isn't just something that gets in your nose.

And second, to convince every home that there really should be a scanning electron microscope.

(Laughter) Pollen is a way for flowers to produce more flowers.

It carries male cells from one flower to another.

This gives us genetic diversity, or at least plants.

And in fact, it is better not to mingle with yourself.

That probably applies mostly to humans as well.

Pollen is produced from the anthers of flowers.

It is very prolific as each anther can carry up to 100,000 grains of pollen.

And it's not just bright flowers that have pollen. It can also be trees and grass.

And don't forget that all our grains are also grasses.

This is a scanning electron micrograph of a grain of pollen.

The small hole in the middle, which will be explained later, is for the pollen tube to come out later. It's a very small tube.

That is, there are pollen grains with a diameter of 20 micrometers.

That's about 1/50th of a millimeter.

But not all pollen looks so simple.

Molina. This is a plant I always found rather boring, named after Morin, an enterprising French gardener who published the first seed catalog in 1621.

Anyway, look at that pollen.

I think this is amazing.

That little hole in the middle is for the pollen tube, and what happens when pollen finds a spot in another Molina flower, a special female of exactly the right species?

As I said earlier, pollen carries male reproductive cells.

Plants are rampant, promiscuous, and really have very interesting and curious sexual behaviors, if you weren't actually aware that they have sex. TRUE.

(Laughter) There are many.

My story isn't really about plant reproduction, it's about pollen itself.

The question is heard: "So what properties does pollen have?"

First, pollen is small. Yes I know that.

As people with hay fever know, it is biologically very active.

Currently, pollen from wind-blown plants (such as trees and grasses) is most likely to cause hay fever.

The reason for this is that a large amount of pollen must be removed in order to increase the chances of it reaching another plant of the same species.

Here are some examples of tree pollen that should be carried by the wind. If you look closely, it's very smooth.

Again--this time the plane trees--they were scattered by the wind.

So trees are very boring flowers, not trying to attract insects.

Still cool pollen.

I especially like this one.

This is a Monterey pine, which has tiny air sacs to carry pollen further afield.

Remember, its diameter is only about 30 micrometers.

Now, it would be much more efficient if we could let the insects do the commands.

This is a bee's leg with pollen from a mallow plant.

And this is a ridiculously beautiful flower of a mangrove palm.

It is very showy and attracts many insects to obey its orders.

If you look closely, the pollen has tiny thorns.

Now, these little thorns obviously stick to insects a lot, but there's more to this photo. That is, if it were the Earth, you might see a fracture line that crosses this equator.

So this pollen is actually fossilized.

And I'm rather proud that this was found so close to London, and that 55 million years ago London was full of mangroves.

Isn't that cool?

(Laughter) So this is another species that evolved to be dispersed by insects.

You can tell by the little spines there.

All of these pictures were actually taken with a scanning electron microscope in the Kew Labs lab.

It's no coincidence that these were shot by the artist, Rob Kesseler. I think someone with a design and artistic eye like his has managed to bring out the best in pollen.

(Laughter) Now, this diversity means that you can look at a pollen grain and tell which species it came from. This is actually very useful if you have a sample and want to know where it came from.

Therefore, different types of plants grow in different places, and some pollen is carried farther than others.

So if you have a sample of pollen, in principle you should be able to tell where it came from.

This is where forensics gets interesting.

Pollen is very small. It sticks to things and sticks to them.

So not only does each pollen type look different, but each habitat has a different combination of plants.

Another pollen signature, or another pollen fingerprint, if desired.

By looking at the proportions and combinations of different types of pollen in a sample, you can tell very precisely where it came from.

It's pollen on a cotton shirt like the one I'm wearing right now.

Well, even after repeated washing, much of the pollen still remains.

Where were you?

Although the four disparate habitats may appear similar, their pollen characteristics are vastly different.

Actually this is especially easy, all these pictures were taken in different countries.

But pollen forensics can be very nuanced.

It is now used to track where counterfeit drugs are made, to trace the provenance of banknotes, and to trace the provenance of antiques to verify that they really came from where the seller said they were.

And indeed in the UK, murder suspects are tracked by clothing, within an area small enough to send tracking dogs to find the murder victim.

Therefore, within about a kilometer of the clothing, we can determine where the clothing has been recently and send the dog.

And finally, in a rather grizzly way, Bosnian war crimes. Some of the people brought to trial have been brought to court because of evidence from pollen showing that the bodies had been buried, exhumed, and then reburied elsewhere.

I hope you'll forgive the visual puns (lol), but I hope you've opened your eyes to some of pollen's secrets.

This is horse chestnut.

There is unseen beauty all around us, and each grain has a story to tell...

In fact, each of us has a story to tell from the pollen fingerprints that rain down on us.

We thank our colleagues at Q and hay fever specialists around the world.

(applause)

(music) ♫ I'm three hundred years old ♫ ♫ And I'm 72 years old ♫ ♫ I'm so sorry ♫ ♫ How I used to pick you up and chew you greedily ♫ ♫ The lovely boys I met ♫ ♫ I ate them raw in my holiday suits ♫ ♫ I ate them with curry rice ♫ ♫ I baked them in my jackets and boots ♫ ♫ And they were so delicious is. ♫ ♫ But now my jaw is too weak to eat like that, ♫ ♫ I find it all the more disrespectful ♫ ♫ To do such things when I am fully aware ♫ ♫ Little boys don't like being bitten. ♫ ♫ Little boys hate being bitten. ♫ (music) ♫ So now I'm eating eels and living contentedly. ♫ (Applause) I think I owe you an explanation.

For the past six years I have been working on a project to turn children's poetry into music.

This is a poem by Charles Edward Carrill. He was a stockbroker in New York City for 45 years, and at night he wrote nonsense poems to children.

And this book has been one of America's most famous books for about 35 years.

The song I just sang, "The Sleepy Giant," is one of his poems.

Here are some other poems. Here's a preview of some of the poets.

This is Rachel Field, Robert Graves, very young Robert Graves, Christina Rossetti.

A ghost, right?

You don't have to tell us anything. It's outdated and gone, but it's not.

What I really enjoyed about this project was bringing these people's words back to life.

Remove them from dead flat pages.

Bring them to life and shine a light on them.

So what we're going to do next is a poem written by Natalia Crane.

Natalia Crane was a little girl from Brooklyn.

In 1927, at the age of ten, she published her first collection of poetry, The Janitor's Boy.

she came

And here is her poem.

(music) ♫ Oh, I'm in love with the janitor boy ♫ ♫ And the janitor boy is in love with me. ♫ ♫ Oh, I'm in love with the janitor boy, ♫ ♫ And the janitor boy is in love with me. ♫ ♫ He's going to find a desert island ♫ ♫ in our geography. ♫ ♫ A desert island with spicy trees ♫ ♫ Somewhere in Sheepshead Bay. ♫ ♫ Just the right place for two ♫ ♫ A place where you can always live. ♫ ♫ Oh, I'm in love with the janitor boy ♫ ♫ And the janitor boy, ♫ He's as busy as he can be. ♫ ♫ In the basement he is building a raft ♫ ♫ Building a raft out of an old couch. ♫ ♫ He will take me away, I know he will, ♫ ♫ because his hair is so red. ♫ ♫ And the only thing that comes to my mind ♫ ♫ is dutifully shivering in bed. ♫ ♫ And on the day of sailing, I leave a small note ♫ ♫ I hate to bother my parents: ♫ ♫ "I flew to an island in the bay ♫ ♫ With the red-haired janitor boy." I went to ♫ ♫ with the red-haired boy who was the manager. ♫ ♫ On the old couch ♫ ♫ The red-haired boy and I ♫ ♫ The red-haired janitor. ♫ ♫ Janitor's Red-Haired Boy ♫ ♫ Janitor's Red-Haired Boy ♫ ♫ Janitor's Red-Haired Boy ♫ ♫ Janitor's Red-Haired Boy ♫ (Applause) The next poem is "Maggie and Milly and Molly and May" by E.E. Cummings.

(Music) ♫ Maggie and Millie, Molly and May ♫ ♫ One day they went to the beach ♫ ♫ And Maggie found a singing shell ♫ ♫ So sweetly she couldn't remember her troubles ♫ ♫ Maggie and Millie, Molly and May ♫ ♫ Maggie and Millie, Molly and May Five languid fingers ♫ (music) ♫ Maggie and Millie, Molly and May ♫ ♫ Maggie and Millie, Molly and May ♫ (music) ♫ Molly was chased by something horrible ♫ ♫ It ran sideways ♫ ♫ Blows ♫ ♫ Blows ♫ ♫ May came home with a smooth round stone ♫ ♫ The world is small but as big as one person ♫ (music) ♫ Like you and me And for what we've lost ♫ ♫ Usual selves found at sea ♫ (Applause) Thank you.

(Applause.) The next verse is "If no one will marry me."

Written by Lawrence Alma-Tadema.

She was the daughter of a very famous Dutch painter who achieved fame in England.

He took his two young children there after he lost his wife to smallpox.

One was his daughter, Lawrence.

She wrote this poem in 1888, when she was eighteen. I think of this poem as a very sweet feminist manifesto with a little bit of rebellion and a little bit of resignation and regret.

(music) ♫ Well, if no one ever marries me ♫ ♫ And I don't know why they have to ♫ ♫ Nurses say I'm not pretty ♫ ♫ And you know I'm seldom good and seldom good ♫ ♫ Well, if no one ever marries me ♫ ♫ I don't really care. ♫ ♫ Buy a squirrel in a cage ♫ ♫ And a little rabbit hutch. ♫ ♫ If no one will marry me ♫ ♫ If no one will marry me ♫ ♫ If no one will marry me ♫ ♫ If no one will marry me ♫ ♫ If no one will marry me ♫ ♫ I'll build a villa near the woods ♫ ♫ And my own pony ♫ ♫ A very pretty and gentle lamb ♫ ♫ I can take you to town. ♫ ♫ And when I'm really old -- ♫ ♫ And when I'm 28 or 9 -- ♫ ♫ Buy yourself an orphan girl ♫ ♫ And raise her as mine. ♫ ♫ If nobody marry me ♫ ♫ If nobody marry me ♫ ♫ If nobody marry me ♫ ♫ If nobody marry me ♫ ♫ Yes, if nobody marry me ♫ ♫ Marry me ♫ ♫ If nobody marry me ♫ ♫ If nobody marry me ♫ ♫ If nobody marry me ♫ Thank you.

(Applause.) Thank you.

I was so intrigued by the poets I had spent six years with, that I began researching their lives and decided to write a book about them.

And the real question about Alma-Tadema was, "Is she married?"

And the answer was no. I found it in the London Times archives.

She died alone in 1940 surrounded by books and dear friends.

Gerald Manley Hopkins, a saintly man.

He became a Jesuit.

He converted from the Anglican faith.

He was inspired by the Tractarian Movement, aka the Oxford Movement, and became a Jesuit priest.

He burned all his poetry at the age of 24 and did not write for at least seven years. Because the life of a monk could not correct the life of a poet.

He died of typhoid fever at the age of 44, I think 43 or 44.

At the time he was teaching classics at Trinity College, Dublin.

A few years before he died, after he resumed writing poetry, he secretly confessed to a friend in a letter I found during my research.

It's meant to explain death to a child, and plain song music is appropriate. ”

And my blood froze when I read it. For 130 years after he wrote the letter, I wrote the music for this plain song.

And the poem is called "Spring and Autumn".

♫ Margaret, are you sad? ♫ ♫ Beyond the Golden Globes, will you eventually be set free? ♫ ♫ Leaves are just like human ones, can you ♫ ♫ take care of them with your fresh thinking? ♫ ♫ But as the heart grows older, ♫ ♫ It will be colder to see such sights ♫ ♫ In time, sighs will be spared ♫ ♫ Though the world of Onewood leaf powder lies. ♫ ♫ You will still cry, and you will know why. ♫ ♫ Regardless of the child, the name is: ♫ ♫ The Fountains of Sorrow are all the same ♫ ♫ They are all the same. ♫ ♫ It was neither in the mouth nor in the heart ♫ ♫ What the heart heard, the ghost guessed: ♫ ♫ It's the injury that man was born with ♫ ♫ It's Margaret that you grieve ♫ Thank you.

(Applause) (music) Scientists, philosophers, architects, inventors, biologists, botanists, artists, I want to thank you all...

To all of you who have surprised me this week.

thank you.

(Applause) ♫ Oh, lilalalalala ♫ ♫ Lalilalalalilalalalala ♫ (Applause) ♫ Lalilalalala ♫ ♫ Lilalalalala ♫ ♫ Lalilalalalalalala ♫ ♫ Lalalalilalalala ♫ ♫ You were so kind and generous ♫ ♫ I don't know how you keep giving. ♫ ♫ I am indebted to you for your kindness. ♫ ♫ And I admire your selflessness. ♫ ♫ And for all that you've done, I know I'm bound. ♫ ♫ I should be grateful for that ♫ ♫ lalilalilalala ♫ ♫ lalilalalilalalalala ♫ (applause) ♫ lalilalalilalilalala ♫ (applause) ♫ lalilalala ♫ ♫ lalilalalalala ♫ ♫ lalilalalalala ♫ ♫ lalilalalilalalala ♫ ♫ And you ♫ ♫ Now you're so kind... ♫ Suppress your excitement just a little bit.

Please turn it down a little. (laughs) Now it's my turn.

You still have two minutes.

(laughter) Okay, let's start that verse again.

♫ Well... ♫ Isn't that revolutionary?

Calm the audience. I'm sure I'm pissing you off, but I said, "Enough. Shhh." (Laughter) I have a lot of respect for him.

♫ Well, you were very kind and generous. ♫ ♫ I don't know how you keep giving. ♫ ♫ And I am indebted to you for your kindness. ♫ ♫ And I couldn't have gotten this far without you. ♫ ♫ So you know I'm bound for all that you've done for me ♫ ♫ I owe it to you to thank me ♫ (Applause) ♫ ♫ I want to thank you for your generosity ♫ ♫ You gave me love and sincerity ♫ ♫ I want to show my gratitude ♫ My love and respect for you ♫ ♫ Thank you, thank you ♫ ♫ Thank you, thank you ♫ ♫ Thank you, thank you ♫ ♫ Thank you, thank you ♫ ♫ Thank you, thank you Thank you ♫ ♫ Thank you, thank you ♫ Do you know?

I will show you how to clap along to this song. (Laughter) (Applause) ♫ Thank you, thank you ♫ ♫ Thank you, thank you ♫ ♫ Thank you, thank you ♫ ♫ Thank you, thank you ♫ ♫ Thank you, thank you ♫ Thank you, thank you ♫ That's more effective, right?

♫ Thank you, thank you ♫ ♫ Thank you ♫ ♫ oh oh oh oh oh oh oh oh oh oh oh oh oh oh oh oh oh oh oh oh oh oh oh oh oh oh oh oh oh oh oh oh oh oh oh oh oh oh oh oh oh oh

Decreasing.

Gradually, lower, lower.

♫ Thank you, thank you ♫ I can't stop snapping my fingers.

Thank you very much.

(applause)

Let's say we have a machine here.

A big machine, a cool TED-ish machine, and it's a time machine.

And everyone in this room must enter there.

And you can go backwards or forwards. You cannot stay where you are.

I've been asking my friends this question a lot lately, and they all want to go back.

don't know. They want to go back to before cars, Twitter and "American Idol" existed.

don't know.

I believe that nostalgia and wishful thinking have a certain appeal.

And I understand that.

I have to say that I am not part of that group.

I don't want to go back, and it's not because I'm adventurous.

Because the possibilities on this planet are irreversible, forward.

So I want to get in the machine and move forward.

It's the best time on the planet, by whatever criteria you choose: health, wealth, mobility, opportunity, declining morbidity.

There has never been a time like this.

All my great grandparents died before they turned 60.

My grandparents pushed that number up to 70.

My parents are approaching 80.

Therefore, it would be better if my death number had a leading 9.

But it's not about people like us, because this is a bigger problem than that.

A child born in New Delhi today can expect to live as long as the richest man in the world 100 years ago.

Think about it, it's an amazing fact.

And why is it true?

smallpox. Smallpox has killed billions of people on earth.

It has reshaped the demographics of the world in ways no war has ever experienced before.

It's gone. It's gone.

we beat it. puff.

In an affluent world, diseases that threatened millions of people just a generation ago no longer exist.

Diphtheria, rubella, polio...

Anyone know what those are?

Vaccines, modern medicine, our ability to feed billions of people, these are triumphs of the scientific method.

And in my opinion, the scientific method—trying things out, seeing if they work, and changing them if they don't—is one of humanity's greatest achievements.

That's good news.

Unfortunately, there are some other issues, which have been mentioned many times, so that's all the good news.

One is that despite all the progress we've made so far, 1 billion people in this world go to bed hungry every day.

Their numbers are growing, really fast, which is a shame.

Not only that, we have used our imaginations to destroy this planet to the ground.

Drinking water, arable land, rainforests, oil and gas. They are disappearing and will soon disappear. Unless we innovate our way out of this mess, we too will perish.

So the question is, can it be done? And I think it can be done.

I think it is clear that we can produce food to feed billions of people without raping the land they live on.

I believe we can empower this world with energies that do not destroy this world.

I really believe so, and no, it's not wishful thinking.

But this is what keeps me up at night. One of the things that keeps me up at night is that I've never needed more scientific advances than I do now. I never have.

And we've never been in a position to properly deploy it the way we do today.

We stand on the brink of astonishing and astonishing events in many areas, but the fact is that I think we must go back several hundred, three hundred years before the Enlightenment to find a time when we fought progress, when we fought these things more vigorously and on more fronts than we do now.

People have wrapped themselves up in their beliefs and they are so tightly packed that they cannot be released.

Not even the truth can set them free.

And listen, everyone is entitled to their opinion. They even have the right to ask for their opinion on progress.

But do you know what you are not entitled to?

You have no right to know your own facts. Sorry, but it's not.

And it took me a while to figure this out.

About ten years ago, I wrote an article on vaccines for The New Yorker. A little story.

And I was surprised to find the opposite. After all, it is against the most effective public health measures in human history.

I didn't know what to do, so I just did what I had to do. I wrote the story and moved on.

And shortly after that, I wrote an article about genetically modified foods.

Same thing, just bigger.

People went crazy.

So I wrote a story about it too, but I didn't understand why people thought this was "Frankenfoods" and why they thought moving molecules in a certain way rather than haphazardly violated the natural ground.

But you know, I do what I gotta do. I wrote the story and moved on.

In other words, I am a journalist.

We type, we write files, we go to dinner. fine.

(Laughter) But these stories haunted me, and I didn't understand why, but I eventually did.

Because the fanatics who were driving me crazy weren't really fanatics at all.

They were thoughtful people, educated people, decent people.

They were exactly like the people in this room.

And it made me feel very uneasy.

But I thought, let's be honest.

We are at a stage in the world where we are no longer able to relate to progress in the same way as before.

We speak vaguely about it.

We talk about it ironically with the little quote "progress."

Well, there's a reason for that, and I think I know what the reason is.

We have lost faith in institutions, authority, and sometimes science itself, and there is no reason why we shouldn't.

Just say a few names and people will understand.

Chernobyl, Bhopal, Challenger, Viox, WMD, The Hanged Chad.

You can choose the list yourself.

Be skeptical because people we always believed to be right have their doubts and problems.

Ask questions, demand evidence, demand evidence.

Don't take anything for granted.

But the problem is, once we have the evidence, we have to accept it, and we're not very good at that.

And the reason I say that is because we are now in an epidemic of terror that we have never seen before and never want to see again.

About 12 years ago, a horrifying article was published that linked the autism epidemic to measles, mumps, and rubella vaccinations.

I am very scared.

Many studies have been done to confirm whether this is true.

A lot of research should have been done. That's a serious problem.

Data is back.

Data were returned from the US, UK, Sweden, and Canada, all identical and completely uncorrelated and unrelated.

it doesn't matter. It doesn't matter because we believe in anecdotes, because we believe in what we see, what we think we see, what makes us feel real.

We do not trust the mass of documents that government officials supply us with data for. I understand that, and I think everyone does.

But do you know?

The results were disastrous.

It's tragic because here are the facts. The United States is one of the only countries in the world with declining measles vaccination coverage.

It's a shame and we should be ashamed of ourselves.

It's terrible.

What happened to make it possible?

Okay, okay. I understand that.

I mean, does anyone here have measles?

Has anyone in this audience ever seen someone die from measles?

It doesn't happen often.

It has never happened in this country, but last year it happened 160,000 times around the world.

Measles kills as many as 20 people an hour.

But that didn't happen here, so we can get it out of our heads and people like Jenny McCarthy can go around preaching messages of fear and illiteracy from platforms like "Oprah" and "Larry King Live."

And it is possible because you are not tying causation and correlation.

They don't understand that although they look similar, they are rarely the same.

And that's something we need to learn, really quickly.

This man was a hero, Jonas Salk.

He has rid us of one of the worst plagues of mankind.

No fear, no pain. Polio is gone.

The man in the middle, not so much.

His name is Paul Offitt.

He has just developed a rotavirus vaccine in collaboration with many others.

This saves the lives of 400-500,000 children in developing countries each year.

Pretty good, right?

Well, that's good, except that Paul goes around talking about vaccines and saying people should stop whining about how valuable vaccines are.

And he actually says so.

So Paul is a terrorist.

When Paul speaks at the hearing, he cannot testify without an armed security guard.

He is called home because people like to tell him that he remembers where his children went to school.

why? Because Paul made the vaccine.

Needless to say, vaccines are essential.

If you remove them, the disease will return, a terrible disease. And it's happening.

There is currently an epidemic of measles in this country.

And things are going from bad to worse, and soon children will die again, because it's just playing with numbers.

And they don't just die from measles.

What about polio? Let's have it. why not?

A college classmate of mine wrote me a few weeks ago and said she thought I was being a little picky.

No one has ever said that before.

She had no intention of vaccinating her children against polio.

are you OK.

why? Because we don't have polio. And what do you know?

Yesterday there was no polio in this country.

I don't know today, but I think maybe a guy got on a plane in Lagos this morning, heading to Los Angeles International Airport, and he's in the skies over Ohio right now.

And he'll land in a few hours, pick up a rental car, and be in Long Beach to attend a great TED dinner tonight.

And he doesn't know he's infected with a paralytic disease, and neither do we because that's how the world works.

That's the planet we live on. Don't pretend it's not.

Well, we love to wrap ourselves up in lies. we love to do it

Are you taking your vitamins this morning?

Echinacea, an invigorating little antioxidant.

I know you do because half of Americans do it every day.

They take medications, they take alternative medications, and it doesn't matter how often they prove to be useless.

The data always speaks for itself.

Urine turns black. They rarely do more than that.

(Laughter) Okay, you want to pay $28 billion for black urine?

I totally agree with you.

(laughs) Dark urine. dark.

Why would you do that? Why would you do that?

Well, I think we understand that we hate big pharma.

We hate big government. We don't trust the man.

And we shouldn't: Our healthcare system sucks.

It's cruel to millions of people.

For those of us who can afford it, it's downright amazingly chilling and soul-breaking.

So we run away from there, and where?

We dive into the arms of the big placebo.

(Laughter) That's great. I love big placebos.

(Applause.) But as you know, this is a really serious problem. Because this is crap and we spend billions of dollars on it.

And there are all sorts of little props here.

None... ginkgo, fraud. Echinacea, deception. Acai -- I don't even know what it is, but we spend billions on it -- it's a scam.

And what do you know? When I say things like this, people yell at me and say, "What do you care about? Let people do what they want."

It gives them a good mood. ”

And what do you know? you are wrong

Because I don't care if it's the Secretary of Health and Human Services saying, "Well, I'm not going to take expert evidence on mammography," or the cancer pseudo-cancer who wants to treat his patients with coffee enemas.

When belief and magic begin to take the place of evidence and science, you end up in places you don't want to go.

You arrive in Thabo Mbeki, South Africa.

He claimed that beets, garlic and lemon oil were far more effective than antiretroviral drugs known to be able to slow the progression of AIDS, killing 400,000 of his people.

Hundreds of thousands of needless deaths occur in countries that have been hit harder by the disease than others.

Please don't say these things have no effect.

There is There is always

Well, the most senseless epidemic we have right now is this absurd battle between proponents of genetically engineered foods and the organic elite.

That's a stupid argument. it has to stop.

It's a discussion of words and metaphors.

It's ideology, not science.

Everything we eat, every grain of rice, every sprig of parsley, every sprout has been altered by humans.

As you know, there were no tangerines in the Garden of Eden.

There was no cantaloupe. (laughs) There was no Christmas tree. we've done it all.

We've been doing it for 11,000 years.

And some of it worked, some of it didn't.

I removed the ones that weren't.

Now we can do it in a more precise way. There are risks, of course, but you can put things like vitamin A into your rice, and that will help millions of people live longer.

Don't you want to do that?

I have to say I don't understand.

We oppose genetically modified food.

Why would you do that?

Yes, what I hear all the time is, 'Too many chemicals, pesticides, hormones, monocultures, we don't want a huge field of the same thing, it's wrong'.

We are not a company that patents life.

We don't want corporations to own the seeds.

And do you see my reaction to all of them?

yes you are right Let's fix that.

Sure, we have big food problems, but this is not science.

This has nothing to do with science.

It's legal, it's moral, it's about patents.

You know that science is not a company.

it's not a country.

It's not even an idea. it's a process.

It's a process, and it may or may not work, but the idea that we shouldn't let science do its job because it's scary is actually pretty deadly, and it's keeping millions of people from thriving.

As you know, in the next 50 years we will have to produce 70 percent more food than we do now, 70 percent.

Investing in Africa over the last 30 years.

Shameful. Shameful.

They need it, but we don't give it to them.

why? genetically modified food.

We don't want to encourage people to eat rotten things like cassava.

Cassava is what half a billion people eat.

It looks kind of like a potato.

It's just a bunch of calories. It's the worst.

It contains no nutrients, no protein, and scientists are now incorporating them all.

Then people would be able to eat it and not go blind.

They won't starve to death, and you know?

That's nice. Not Chez Panisse, but good.

All I can say about this is "why are we fighting this?"

So let's ask ourselves, why are we fighting it?

Is it because you don't want to move the gene?

This is about moving genes. It's not about chemicals.

It's not about our ludicrous passion for hormones or our obsession with eating bigger, better, and idiosyncratic foods.

This is not a Rice Krispies issue. This is a matter of keeping people alive. It's time to start understanding what that means.

'Cause you know something, right?

Otherwise, if I continue to act as I am now, I will be guilty of something I don't want to be guilty of: high-tech colonialism.

There's no other way to explain what's going on here.

It's selfish, it's ugly, it's what's under us and we really have to stop it.

So after this amazingly fun conversation (laughs), you might be tempted to say, "So you still want to get in this silly time machine and move on?"

absolutely. I absolutely agree.

We're stuck right now, but there's a great opportunity.

You can set the time machine to whatever you like.

I can go where I want to go, and I intend to go where I want to go.

We have to have these conversations, we have to think about them, but when we get on the time machine and move on, we will be happy to do so.

I know it can be done, and as far as I'm concerned, that's what the world needs right now.

(Applause.) Thank you.

thank you.

thank you. thank you.

In my industry, we believe images can change the world.

Well, we are naive, with big eyes and bushy tails.

In fact, we know that images themselves don't change the world, but we also know that since the beginning of photography, images have triggered reactions, and those reactions have triggered change.

Let's start with a group of images.

I would be very surprised if you didn't recognize many or most of them.

These are best described as symbolic. It's so iconic that it's probably become a cliché.

In fact, they are so well known that they are sometimes perceived slightly or somewhat differently.

(Laughter) But I think we're looking for more than that.

Looking for something more.

We want images that shine an uncompromising light on important issues, images that transcend borders and religions, images that inspire us to step out and do something – to act.

Well, you've all seen this image before.

It changed the way we see the physical world.

We have never seen the Earth from this perspective before.

Many believe that much of the birth of the environmental movement was due to our first sighting of a planet like this, its smallness and fragility.

Forty years later, this group is more aware than most of the destructive power our species can wield over the environment.

And finally, it looks like we're doing something about it.

This destructive power takes many forms.

For example, these images taken by Brent Sturton in Congo.

Some said these gorillas were murdered and crucified, which unsurprisingly sparked international outrage.

The recent earthquake in Haiti has tragically reminded us of the destructive power of nature itself.

Well, I think what's worse is the destructive power humans have over humans.

Auschwitz survivor Samuel Pissar said: I quote him. “The Holocaust teaches us that nature, even in its most cruel moments, is gentler than man, who has lost his moral compass and reason.”

There is also another kind of crucifixion.

The terrifying images of Abu Ghraib and those of Guantanamo had a great impact.

The release of those images, not the images themselves, caused a change in government policy.

Some would argue that these images did more to fuel the uprising in Iraq than virtually any other single act.

Moreover, those images permanently removed the so-called moral high ground of the occupying forces.

Let's go back for a moment.

In the 1960s and 1970s, the Vietnam War was televised in American tea rooms basically every day.

News photos have brought the public's eye to the victims of war, including a girl who was napalmed and a student killed by the National Guard at Kent State University in Ohio during a protest.

In fact, the images themselves became the voice of protest.

Now, images have the power to shed light on doubt and ignorance, especially - we've talked about this a lot, but I'll just give you one image - on our understanding of the problem of HIV/AIDS.

In the 1980s, stigma against people with the disease was a major barrier to even discussing or even addressing the disease.

In 1987, the simple act of touching an HIV/AIDS-infected baby by the world's most famous woman, the Princess of Wales, went a long way toward stopping it, especially in Europe.

She knew the power of images better than anyone.

So when faced with powerful images, we all have a choice. Either look away or deal with the image.

Thankfully, when these photos were published in The Guardian in 1998, the Sudan hunger relief effort received a lot of attention, attention, and ultimately a lot of money.

Did images change the world?

No, but it made a big impact.

Images often make us question our core beliefs and our responsibilities to each other.

We all saw those images after Katrina, and I think they had a very strong impact on millions of people.

And I think it's very unlikely they were far off the American public's mind when they went to the polls in November of 2008.

Unfortunately, some very important images are too graphic or disturbing for us to see.

I'll show you one picture here. This is a photo by Iraq war veteran Eugene Richards from the wonderful never-published book War Is Personal.

But images don't have to be graphic to remind us of the tragedy of war.

John Moore installed this photo in Arlington Cemetery.

Even after going through tense moments of conflict in every conflict zone around the world, there is one photograph taken in a quiet place that sticks with me more than any other.

Ansel Adams said this, and I disagree with him. "I don't take pictures, I make them."

In my opinion, you are the one taking the pictures, not the photographer.

We bring our own values ​​and belief systems to each image, so that the image resonates with us.

My company has 70 million images.

I have one image in my office.

here it is.

Hopefully the next time you see an image that inspires something in you, you'll have a better idea why. And I know you will definitely do something about it by speaking to this audience.

And thank you to all the photographers.

(applause)

First of all, I'm a geek.

I eat organic food, minimize my carbon footprint, and am a robotic surgery geek.

And while I really want to build things that are eco-friendly, I highly question all of these well-intentioned articles where people longing for moral authority and lacking in data tell me how to do things like this.

So you have to figure this out yourself.

Example: Is this a bad thing?

I accidentally dropped a chunk of happy self-actualized local cow organic yogurt on the counter and wanted to grab a paper towel to wipe it down.

But can I use paper towels? (Laughter) The answer to this is found in the embodied energy.

This is the amount of energy put into a paper towel or embodied water, and every time you use a paper towel you are using this much virtual energy and water.

Wipe it up and throw it away.

Now, when I compare this to a cotton towel that can be used a thousand times, I don't have much embodied energy until I wash that yogurt towel.

This is the working energy.

So when you throw a towel in the washing machine, you're returning energy and water to the towel...

Unless you're using a high-efficiency drum washer (laughter), then it looks a little better.

But what about these little half-sheets of recycled paper towels?

Well, paper towels look better now.

Screw in a paper towel. Let's go sponge.

After wiping it with a sponge and exposing it to running water, the energy was significantly reduced and the water was significantly increased.

Except if you're like me, when you turn it on and leave the handle in a hot position, it starts consuming more energy.

Worse, you keep driving until it's warm to wash off your towels.

And now all bets are void.

(Laughter) What this means is that sometimes the least anticipated thing, where you put your steering wheel, has more impact than anything else you're trying to optimize.

Now imagine someone as perverse as I am trying to build a house.

(Laughter) That's what my husband and I are doing now.

So we wanted to know how far we can be eco-friendly.

And there are thousands of articles explaining how to make all these green tradeoffs.

And they're just as suspicious telling us to optimize the little things around the edges and miss the elephant in the living room.

The average home currently stores about 300 megawatt hours of energy. This is the energy required to make millions of paper towels.

We wanted to know how much we could improve.

Like many people, we start by building a house on the site. I'll show you the typical construction on top and what we do on the bottom.

So, let's dismantle it first.

It takes some energy, but if you break it down, break it all down, and use bits, you can get back some of that energy.

We then dug a large hole for a rainwater catchment tank to keep the garden water independent.

And we have laid a great foundation for passive solar.

Currently, using high fly ash concrete can reduce embodied energy by approximately 25%.

Next, we will add the frame.

It is a frame of wood, composites, etc., from which the embodied energy is difficult to extract, but with FSC-certified wood it has the potential to become a sustainable resource.

Now on to the very first thing that surprised me.

If you put aluminum windows in this house, you'll double the energy usage there.

PVC is a little better, but still not as good as our wood of choice.

Next, install plumbing, electrical and air conditioning equipment, and insulate.

Well, spray foam is a great insulator and will fill in all the cracks, but it has a pretty high energy inside, and sprayed cellulose and blue jeans are much lower energy alternatives.

I also used straw bale filling for the library, which has zero embodied energy.

When seat rocking, EcoRock uses about a quarter of the energy of a standard seat rock.

And then we get to the finish, which is the subject of our "going green" article, but on the scale of the house there is little difference.

Nevertheless, the media are all paying attention to it.

Except for flooring.

If you put carpet in your house, its energy will be about 1/10th of the volumetric energy of the whole house, unless you use concrete or wood to get a lower embodied energy.

So, adding the final construction energy and adding it all together, we were able to build a house with less than half the typical materializing energy to build a house like this.

But before we beat ourselves up too much, we put 151 megawatt hours of energy into building this house when it was here before.

So the question is, how can we get it back?

Therefore, promoting a new energy efficient home will pay off in about 6 years compared to an older, less energy efficient home.

Now you probably upgraded your old home to something more energy efficient, but it would take about 20 more years to break even.

Now, if I hadn't paid attention to the energy embodied, it would have taken me over 50 years to break even compared to an upgraded home.

So what does this mean?

Converted to my home usage, this is the equivalent of driving in a year, about five times as much as going full vegetarian.

But the elephant in the living room flies.

Obviously I have to walk home from TED.

But all the embodied energy calculations are on the blog.

And remember, sometimes the biggest change is what you didn't expect.

thank you. (applause)

My journey away from violent extremism began 22 years ago. That's when I denounced racism and walked away from the white supremacist skinhead movement in America that I helped launch.

(Cheers and applause) I was only 22 at the time, but for eight years already, since I was 14, I have been one of the earliest, youngest members and eventual leaders of America's most violent hate movement.

But I was not born with hatred. In fact it was quite the opposite.

I had a relatively normal childhood.

My parents were Italian immigrants who came to America in the mid-1960s and settled on Chicago's South Side, where they met and opened a small beauty shop.

Right after I was born, things got a little more difficult.

They struggled to make ends meet raising young families and starting new businesses, often working 14-hour days, seven days a week, holding second and third jobs just to make ends meet.

And I rarely spent quality time with my parents.

Growing up, I felt abandoned, even though I knew they loved me very much.

I was lonely and started to withdraw, and I resented my parents and became very angry.

And as I grew through my teenage years, I turned to acting to try and get my parents' attention.

And then one day, when I was 14, I was standing in an alley smoking a joint. Then a man twice my age, with a shaved head and tall black boots, came up to me and snatched the joint from my lips.

Then he put his hand on my shoulder, looked me in the eye and said, "That's what the communists and Jews want to keep you docile."

I was 14 years old, trading baseball cards, watching Happy Days, and had no idea what a Jew was.

(laughs) It's true.

And the only communist I knew was the bad Russian from my favorite Rocky movie.

(Laughter.) And I'm bareing my soul to you guys here, so I can make it clear that I didn't even know what the word "obedience" meant.

(Laughter) I'm totally serious.

But it was as if this man in this alley gave me a lifeline.

For 14 years I felt alienated and bullied.

I had low self-esteem.

And frankly, I didn't know who I was, where I belonged, or what my purpose was.

I got lost.

And overnight, this guy pulled me in, and I went from being "Joanie Loves Chachi" to a full-blown Nazi because I held onto that lifeline with all my might.

One night.

I heard the rhetoric and began to believe it.

I have come to watch closely as the leaders of this organization target vulnerable young people who feel marginalized from society, and bring them in with broken promises of paradise.

And I started adopting myself.

I started it by making white power music.

And soon I was the leader of an infamous organization led by that man in that alley who recruited me that day. He was America's first neo-Nazi skinhead and the one who radicalized me.

For the next eight years, I continued to believe the lies I was told.

And although I saw no evidence of that at all, I did not hesitate to blame all the Jews of the world for what I thought was the genocide of European whites facilitated by them through their policies of multiculturalism.

I blamed people of color for the crime, violence, and drugs in the city, completely ignoring the fact that I was a regular perpetrator of violence, and that, in many cases, it was white supremacists who pumped drugs into the inner city.

And blaming immigrants for taking jobs from white Americans, completely ignoring the fact that my parents were hardworking immigrants who survived with no help from anyone.

In the eight years since, I have watched friends die and others thrown into prison, inflicting immeasurable pain on the lives of countless victims and their families.

I have heard horror stories from young women who have participated in the movement. They were brutally raped by the very men they were conditioned to trust. I myself have committed acts of violence against people just because of the color of my skin, the people I love, and the God I prayed to.

I was stockpiling weapons for the coming race war.

I went to 6 high schools. I was kicked out twice by 1 out of 4 people.

And 25 years ago, I wrote and performed racist music that decades later found its way onto the internet, partly influencing young white supremacists to break into a sacred church in Charleston, South Carolina, and senselessly slaughter nine innocent people.

But then my life changed.

At 19, I met and fell in love with a girl who wasn't in the movement, who didn't have a racist element in her body.

At the age of 19, I got married and had a son.

And when I held my son in my arms that day in the delivery room, not only did I regain some of the innocence I had lost at age 14, but I also began to challenge the very important things that drew me to this movement in the first place: identity, community, purpose—things I struggled with early on.

And now I again struggled with the notion of who I was.

Was I a neo-Nazi hate-monger, or a caring father and husband?

Is my community something I built around me to boost my own ego because I felt self-loathing about myself and wanted to project it onto others, or is it something I physically gave life to?

Was my purpose to burn the earth, or to make it a better place for my family?

And suddenly, like a bunch of bricks hitting me, I was so confused about who I had been for the last eight years.

And perhaps the tragedy could have been avoided if I had had the courage to walk away in that moment, and understood what the conflict was going on within me.

Instead, I compromised.

I got off the streets for my family. I was worried that I might go to prison, die, and my family would have to live on their own.

So I stepped down as leader and instead opened a record store to sell white music. Because, of course, they were importing music from Europe.

But I knew the community wouldn't allow me to be there if I was just a racist shop selling racist music.

So I decided to stock the shelves with other music like punk rock, heavy metal and hip hop.

And while the White Power music I was selling made up 75 percent of my total revenue, as people drove from all over the country to buy that music to the only store that sold it, so did customers to buy other music.

And finally they started talking to me.

One day a young black teen came in and was clearly upset.

And I decided to ask him what the problem was.

and told me that his mother had been diagnosed with breast cancer.

And suddenly I was able to connect with this young black teenager who had never had a meaningful conversation or interaction before. Because my own mother was diagnosed with breast cancer and I could feel his pain.

On another occasion, a gay couple came with their son, and there was no denying that they loved him as much as I loved him.

And suddenly I couldn't justify or justify the prejudices I had in my head.

I was embarrassed to sell it in front of my new friends, so I decided to take the White Power music out of my inventory.

And of course, the store became unviable and had to close.

At the same time, I lost almost everything in my life.

I used this as an opportunity to step away from the movement I had been a part of for eight years, the only identity, community and purpose I had known for most of my life.

So nobody was there.

I couldn't make a living because the shop was closed.

I couldn't have a good relationship with my parents, even if they tried.

And my wife and children left me because I didn't leave the exercise and didn't leave early enough.

And suddenly I didn't know who I was again, where I fit in, what my purpose was.

I was miserable on the inside, and often woke up in the morning and thought, "I wish I hadn't done this."

After about five years, one of my few friends came to me concerned about my health and said: "I don't want to see you die, so you have to do something."

Then she suggested I apply for a job at the company she worked for, IBM.

I thought she was crazy too.

(laughter) Here was a Nazi in hiding covered in hate tattoos.

I didn't go to college.

I have been expelled from multiple high schools many times.

I didn't even have a computer.

But I got in and somehow miraculously got the job.

I was so excited.

And I was horrified to learn that they were actually going to take me back to my old high school where I was expelled from twice to install a computer.

This was the high school where I committed violent acts against students and faculty. There I protested in front of schools for equal rights for whites and even sat in cafeterias to demand the formation of a white student union.

And of course, due to karma, it was Mr. Johnny Holmes who walked right by me within the first few hours. He was a tough black security guard who got into a fistfight with me for which I was kicked out for the second time and handcuffed out of school.

He didn't recognize me, but I looked at him and I didn't know what to do.

I froze. Years after exercising, I was a grown man by now, sweating and shivering.

But I decided something had to be done.

And I decided I needed to bear the weight of my past. Because for five years I was trying to get over the past.

There were times when I tried to make new friends and cover up my tattoos with long sleeves, but I didn't admit it because I was afraid of being judged the same way I was judging other people.

Well, I decided to drive Mr. Holmes out to the parking lot. Probably not the wisest decision I made.

(Laughter.) But when I found him, he was in the car and I tapped him on the shoulder.

And when he turned and saw me, I took a step back in fear.

And I didn't know what to say.

The only words that finally came out of my mouth were "I'm sorry".

And he hugged me and forgave me.

And he encouraged me to forgive myself.

He realized that this wasn't the story of a wounded, going nowhere kid who just joined a gang and ended up in jail.

He knew this was the story of every vulnerable young person who, in search of identity, community and purpose, hits a wall, can't find it, and takes a dark path.

And he made me promise one thing, that he would tell my story to anyone who would listen.

That was 18 years ago and I've been doing it ever since.

(Applause.) You may be asking yourself this right now. How did the good boy of a hard-working immigrant family end up on such a dark road?

In a word, "pothole".

That is correct. pothole.

There were many holes when I was a child.

We have all had such experiences. Life's bumps will always throw us off course, and when they are left unresolved, untreated, or unaddressed, they can sometimes lead us down a rather dark corridor in a dangerous direction.

Potholes can be things like trauma, abuse, unemployment, neglect, untreated mental health conditions, and even privilege.

And sometimes even good people do bad things when we hit holes in our journey through life and don't have the resources or help to avoid them or get out.

Darrell is one such pothole.

Darrell is from upstate New York.

He was reading my memoir and was very upset with the ending.

You see, I got out of the exercise and he was still in it.

And he emailed me and said, "I didn't really like the results."

And I said, "Well, I'm sorry."

(Laughter) "But if you want to talk about it, we can certainly do it."

And after a few weeks of dealing with Darrell, I learned that he was a wounded 31-year-old veteran who was genuinely angry that he couldn't go to Afghanistan to kill Muslims.

And then one day he told me on the phone that he saw a Muslim man praying in a park and he just wanted to kick him in the face.

The next day, I flew to Buffalo, sat down with Darrell, and asked, "Have you ever met a Muslim?"

And he said, "No!

Why on earth would you want to do that?

they are evil I don't want anything to do with them. ”

I said ok. "

So I excused myself, went into the bathroom, took out my phone in the bathroom, googled the local mosque, called very quietly from the bathroom and said, 'Excuse me, Imam, I have a favor to ask of you.

I have a Christian man who wants to know more about your religion. ”

(Laughter) “May I stop by for a minute?”

Well, it took a bit of persuasion for Darrell to go, but when he finally arrived and knocked on the door, the Imam said he was preparing for prayer and we only had 15 minutes left.

I said, "I'll take it."

We walked into the house and came out two and a half hours later hugging each other and crying, and for some very odd reason, we bonded over Chuck Norris.

(Laughter.) I don't know what it was, but it happened.

And Darrell and Imam are often seen having lunch together at the local falafel stand.

(Applause) You see, it's our disconnect from each other.

Hate is born out of ignorance.

Fear is its father, isolation is its mother.

When we don't understand something, we tend to fear it, and when we move away from it, that fear grows and even turns into hatred.

Since leaving the movement, I have helped more than 100 people leave extremist movements, from white supremacist groups (applause) to jihadist groups.

And the way I do that is not by arguing with them or arguing or even telling them they are wrong.

I don't do that.

Instead, I don't let them go.

I bring them closer, listen carefully to their holes, and then start filling them.

I strive to help people become more resilient, more confident, and have the skills to compete in the marketplace so they don't have to blame others they've never met.

Before I leave, I have one last thing to say.

Of all the people I've worked with, they all say the same thing.

First, they became extremists not because of ideology or dogma, but because they wanted to belong.

And secondly, what drew them out was receiving mercy from the least deserving, when they least deserved it.

(Applause.) So I would like to leave you with a challenge. Today, tomorrow, preferably every day, go out and find people who you think don't deserve your compassion and give them compassion. Because, I assure you, they are the ones who need it most.

thank you very much.

(applause)

I've always wondered what "mind-boggling" means.

After spending two days here, I am baffled yet very impressed and feel that you are one of the great hopes not only of America's achievements in science and technology, but of the whole world.

But I have come with a special mission to represent 10 to the 18th power in the electorate, a million trillion insects and other little creatures, to plead on their behalf.

If we exterminated only insects, just that group of insects on this planet, and we are trying very hard to do so, then the rest of life, and with it most of the human race, would be wiped off the face of the earth.

and within a few months.

Now how did I come to defend this particular position?

Throughout my childhood and teenage years, I became increasingly fascinated by the diversity of life.

I have had an age of butterflies, an age of snakes, an age of birds, an age of fishes, an age of caves and finally, and crucially, an age of ants.

By college, I had become an avid ant ecologist, an expert in ant biology, but my attention and research continued to travel across the wide variety of life on Earth. These include what it means to us as a species, how little we understand it, and how our activities pose an immediate danger to ants.

Out of that extensive research came the concerns and ambitions embodied in the wishes I am about to convey to you.

My selection is the culmination of a lifelong commitment that began with growing up on the Gulf Coast of Alabama on the Florida Peninsula.

Ever since I can remember, I have been fascinated by the natural beauty of the area and the vibrancy of its tropical-like flora and fauna.

One day when I was just 7 years old, I pulled a "pinfish" (as it is called), which has sharp spines, too hard and too fast while fishing, and I lost my sight in one eye.

Later I realized that I was probably congenital high-frequency deaf.

So when I was planning to become a professional naturalist, I never thought of anything else in my life, but I realized that I'm not very good at birdwatching, nor can I track frog calls.

So I turned to the many little creatures that can be pinched between my thumb and forefinger, the little creatures that make up the foundation of our ecosystem, the little creatures that, as I like to say, make the world go round.

In doing so, I reached a strange and rich biological frontier that seemed to exist on another planet.

In fact, we live on a mostly unexplored planet.

Most of life on Earth remains scientifically unknown.

Over the past 30 years, thanks to exploration and technological advances in the world's remotest regions, biologists have added, for example, a third of the known frogs and other amphibians, bringing the current total to 5,400 species, with more frogs continuing to pour in.

Two new whale species have been discovered, as well as two antelope species, dozens of monkey species, a new elephant species and even a different species of gorilla.

At the other end of the size scale, a marine bacterium, Prochlorococcus (subject to final testing), discovered in 1988, is now recognized as perhaps the most abundant organism on earth, and is believed to be responsible for much of the photosynthesis that occurs in the ocean.

Since these bacteria are among the smallest of all life forms on Earth, they were not immediately discovered. They are so minute that they cannot be seen with conventional optical microscopes.

However, life in the sea may depend on these tiny creatures.

These examples are just the first glimpse of our ignorance of life on Earth.

Think fungi, including mushrooms, rusts, molds, and many disease-causing organisms.

60,000 species are known to science, but over 1.5 million are estimated to exist.

Consider the nematode roundworm, the most abundant of all animals.

Four out of five animals on earth are nematodes. Even if all solid matter is removed except nematodes, nematodes still have most of their ghostly outlines visible.

About 16,000 species of nematodes have been discovered and diagnosed by scientists. There could be hundreds of thousands, or even millions, of those still unknown.

This vast area of ​​hidden biodiversity is further augmented by the dark matter of the bacterial biological world. Only about 6,000 species of bacteria worldwide were known to exist in this dark matter in just the last few years.

But that number of bacterial species translates to 10 billion bacteria in 1 gram of soil, or a handful of soil.

One tonne of soil, or fertile soil, is estimated to contain about four million species of bacteria, all of which are unknown.

So the question is, what are they doing?

As a matter of fact, we don't know.

We carry out a variety of activities on earth, taking into account the circumstances in which we live, only by faith and speculation.

Our lives depend on these creatures.

To give a familiar example, there are currently over 500 known types of bacteria, and good bacteria live symbiotically in the mouth and throat and are probably necessary for good health to thwart disease-causing germs.

At this point, I think we've got a little impressionist film made especially for the occasion.

And I would like to show it.

Billie Holiday helped with this.

(Video) And it may just be the beginning!

Viruses, pseudo-organisms among which include prophages, gene weavers that facilitate continued evolution in bacterial life, are virtually uncharted frontiers of modern biology, worlds in their own right.

What constitutes virus species is still open, but they are clearly of great importance to us.

What we can say, however, is that the genetic diversity contained in viruses on Earth exceeds, or likely exceeds, that of all the rest of life combined.

A scientist working on microbial biodiversity today is like an explorer on a rowing boat out into the Pacific Ocean.

But that is rapidly changing with the help of new genomic technologies.

Already, it is possible to decipher the entire genetic code of a bacterium in less than four hours.

Soon we will be out in the field with our sequencers on our backs looking for bacteria in tiny cracks on the surfaces of their habitats, much like watching birds through binoculars.

What will you find when you finally get serious and map the living world?

Do we move past relatively large mammals, birds, frogs, and plants, into the more elusive insects and other small invertebrates, and further into humanity, into the myriad creatures of a living, invisible world of life?

What was already thought to be bacteria for generations has instead been found to constitute two large domains of microbes. True bacteria and archaea, single-celled organisms that are more closely related to the eukaryotes to which we belong than other bacteria.

Some serious biologists, myself included, are beginning to think that perhaps we might find aliens among the vast and unknown microbial diversity.

Exactly an alien, a stock that came from outer space.

They spent billions of years doing that, especially in the early days of biological evolution on this planet.

We know that some bacterial species of terrestrial origin can withstand harsh changes in the environment, such as unimaginably extreme temperatures and hard radiation strong enough and sustained long enough to crack the Pyrex containers around which the bacteria thrive.

There may be a temptation to treat the biosphere as a whole, and to treat the species that compose it as a large stream of beings with little merit of distinguishing them from one another.

But any of these species, even the tiniest Prochlorococcus, is an evolutionary masterpiece.

Each has existed for thousands to millions of years.

Each is exquisitely adapted to the environment they live in, intertwined with other species to form ecosystems, and our own lives depend on them in ways we haven't even begun to imagine.

We will risk our existence to destroy these ecosystems and the species that make them up. And unfortunately, we destroy them with ingenuity and relentless energy.

My own epiphany as a conservationist came in 1953, when I was a graduate student at Harvard University. A rare ant found in the forests of Cuba, an ant that glows in the sun, metallic green or metallic blue depending on the species, and metallic gold found in one species.

I found the magic ants, but only after a grueling climb up a mountain that was and is still being cut down, the last remaining primeval forest in Cuba.

It was then that I realized that those species that had taken millions of years to evolve, and most of the other unique and wonderful flora and fauna of the island, that had taken millions of years to evolve—and this is true of virtually every region of the world—are disappearing forever.

And it's everywhere you look.

This giant human is permanently encroaching upon Earth's ancient biosphere through a combination of various forces that can be summed up by the animal hippopotamus acronym "HIPPO".

H means habitat destruction, including climate change forced by greenhouse gases.

I support alien species such as fire ants, zebra mussels, broom grasses, and pathogenic bacteria and viruses that are exponentially invading every country. That's the "I".

The first P in "HIPPO" means pollution.

The second is population continuation, or population expansion.

And the final letter is O, which stands for overharvesting, which means driving a species to extinction through overhunting or fishing.

The gigantic HIPPO we have created is doomed to extinction or critically endangered by the end of this century, according to the best estimates of ongoing biodiversity research, if the momentum continues.

Human-induced climate change alone could wipe out a quarter of the surviving species in the next 50 years if it is not stopped.

What will we and all future generations lose if so much of our living conditions deteriorate in this way?

Vast sources of potential scientific information that have not yet been collected, environmental stability, new classes of medicines, and many new products of unimaginable strength and value have all been discarded.

This loss will continue to come at a much greater cost to wealth, security and, yes, spirituality. Because the previous catastrophes of this kind, the last catastrophe that ended the age of the dinosaurs, typically took 5 to 10 million years to repair.

Sadly, our knowledge of biodiversity is so incomplete that much is in danger of being lost before it is discovered.

For example, even in the United States, we know that the currently known 200,000 species are only partially covered in practice. Little known in basic biology.

Only about 15 percent of the known species have been sufficiently studied to assess their status.

Of the 15% assessed, 20% are classified as "endangered", i.e. endangered.

It's the United States.

In short, we are flying blindly into the future of the environment.

This needs to change urgently.

To enable us to understand and properly manage the biosphere, it must be properly investigated.

We need to calm down before we destroy the earth.

And we need that knowledge.

This would be a major science project on par with the Human Genome Project.

Think of it as a biological moonshot with a timeline.

So this brings me to my wishes to the TEDsters and others around the world who hear this talk.

We hope that we can work together to create the critical tools needed to help protect the planet's biodiversity.

Let's call it "Encyclopedia of Life".

What is the "Encyclopedia of Life"? Is it a concept that has already taken hold, is gaining ground, and is beginning to be taken seriously?

It is an encyclopedia that exists on the Internet and is contributed by thousands of scientists around the world.

Even an amateur can do it.

There are infinitely expandable pages for each type.

This will give anyone, anywhere in the world, on-demand access to all the important information about life on Earth.

I've written about this idea before, but I also know that someone in this room has put a lot of effort into this idea in the past.

But what excites me is that the science has advanced since I first proposed this particular idea in its form.

Technology has advanced.

Today, creating such an encyclopedia is practically within reach, regardless of the amount of information it contains.

In fact, last year a group of influential scientific institutions began to come together to make this dream a reality.

I wish you could help them.

Together, we can make this happen.

The encyclopedia pays off quickly in practical application.

It addresses transcendental qualities in human consciousness and the human sense of need.

It will transform the science of biology in ways that are clearly beneficial to mankind.

And above all, this will inspire a new generation of biologists to continue the quest that began for me personally 60 years ago: the search for life, the understanding of life, and above all, the preservation of life.

That is my wish. thank you.

I became interested in octopuses at an early age.

I grew up in Mobile, Alabama. There must be someone from Mobile, right? -- And Mobile sits at the confluence of five rivers, forming this beautiful delta.

And in the delta there are alligators wading in and out of fish-filled rivers, cypress trees dripping with snakes and birds of all kinds.

This is truly the perfect place to live in a magical wonderland. Children who are interested in animals would love to grow up there.

This delta water then flows into Mobile Bay and eventually into the Gulf of Mexico.

And I remember my first real contact with an octopus when I was probably 5 or 6 years old.

I was in the bay and when I was swimming I saw a small octopus on the bottom.

And I reached out and picked him up and was immediately fascinated and impressed by his speed, strength and agility.

It had pried my fingers apart and moved to the back of my hand.

All I could do was hold on to this wonderful creature.

Then it settled down a bit in my palm and the colors started flashing and just pulsing with all these colors.

And as I looked at it, it felt like I was pushing my arm under it, and it rose into a ball, turned chocolate brown, and had two white stripes in it.

I think, "Oh my God!" Never seen anything like this in my life!

I was taken aback for a moment, but decided it was time to let him go, so I put him down.

The octopus left my hand and then acted the worst. It fell to the bottom of the rubble, and—Shhh! -- Disappeared in front of my eyes.

And 6 year old me knew it was the animal I wanted to know more about. So I did.

I went to college and earned a degree in marine zoology, then moved to Hawaii and enrolled in graduate school at the University of Hawaii.

When I was a student in Hawaii, I worked at the Waikiki Aquarium.

The aquarium had many large tanks, but not many invertebrate exhibits. Since I have no spine, I decided to go out into the field and collect the wonderful animals that I learned about when I was a student.

Well, the fish in the tank, although gorgeous to look at, didn't interact much with humans.

But the octopus did.

Especially if you approach an octopus tank early in the morning before anyone arrives, the octopus will get up and stare at you and think, "Is that guy really looking at me? He's looking at me!"

Then walk to the front of the tank. And then you realize that these animals all have different personalities. Some hold their ground, others sneak behind tanks and disappear into the rocks, and one in particular is this amazing animal...

When I went to the front of the tank, he just stared at me and had little horns growing over his eyes.

So I went to the front of the tank--3 or 4 inches from the front glass--and the octopus was sitting on a perch, a small rock, and he got off the rock, and he came down on the front of the glass too.

So I was staring at this animal from about six or seven inches away, and then I could really focus so close. Now, when I look at my hairy fingers, I realize those days are long gone.

Anyway, we were there, staring at each other, and he reached out and grabbed an armful of gravel, released it from the filtration system into the jet of water entering the tank, and -- tingling tingling tingling! -- This gravel hits the front of the glass and falls.

He reaches out, picks up another handful of gravel, and lets it go—chuck-chuck-chuck-chuck! - Same.

Then he raises another arm and I raise my arm.

Then he raises another arm and I raise another.

And I realized that the octopus won the arms race. Because I withdrew and he had 6 left. (Laughter.) But the only way I can explain what I was seeing that day is that this octopus was playing, which is pretty sophisticated behavior for just an invertebrate.

So, about three years after completing my degree, on my way to the office, a funny thing happened that really changed the course of my life.

A man entered the aquarium. It's a long story, but in short, he sent me and a few friends to the South Pacific to collect animals, and when we left, he gave me two 16mm movie cameras.

He said, "Please make a movie about this expedition."

``Okay, two biologists are going to make a movie. And then we made the movie. It was supposed to be the worst movie in the history of filmmaking, but it was the best. it was really fun.

And I remember thinking, "Wait a minute."

Maybe we can do this all the time.

Yes, I will become a film director. ”

So I literally came back from that job, quit school, hung my filmmaking roof, and told no one I didn't know what I was doing.

It was a comfortable ride.

And what I learned at school really helped me.

If you're a wildlife filmmaker who's going to be out in the field and shooting animals, especially behavior, knowing a little bit about who these animals are, how they work, and how they behave can give you some basic background.

But what I really learned about octopuses was on the set of making a movie with them as a filmmaker. There you can spend a lot of time with the animals and see the octopus being an octopus in its sea dwelling.

I remember traveling to Australia and going to an island called One Tree Island.

And apparently, between the time they named it and the time I arrived, One Tree evolved pretty quickly. Because I'm pretty sure there were at least 3 trees on that island when we were there.

Anyway, there is a single tree standing right next to a beautiful coral reef.

In fact, there is a rising channel where the tide comes and goes quite rapidly twice a day.

And there are beautiful reefs, very intricate reefs and lots of animals including lots of octopuses.

And, nothing special, sure, Australian octopuses are masters of camouflage.

As a matter of fact, there is one.

So our first challenge was finding these things, and it certainly was a challenge.

But we wanted to stay there for a month and get the animals used to us so we could see their behavior without disturbing them.

For the first week, I spent most of my time trying to get as close as possible, getting closer and closer each day.

And I knew what the limits were. They start jerking and you back off and come back a few hours later.

And after the first week they ignored us.

I was like, "I don't know what that is, but he's not a threat to me."

So they continued their work and we watched mating, courtship and fighting from a foot away and it's just an incredible experience.

And one of the nicest exhibits I remember, or at least visually remember, was the foraging behavior.

And they had a lot of different techniques they used to forage, but this technique was visual.

And when they saw a coral head maybe 10 feet away, they started moving towards it.

And I don't know if they actually saw a crab in it or imagined there might be a crab, but either way, they jumped off the bottom, through the water, landed right on top of this coral head, and then the web between their arms completely swallowed the coral head, caught the crab and swam away.

And it went out as soon as the crab touched my arm.

And I always wondered what was going on under that nest.

So we developed a way to look at it. (Laughter) And for the first time, I got to see that famous beak in action.

It was great.

If you plan to make a lot of movies about a specific animal group, you'd be better off picking a fairly common animal.

And octopuses live in every ocean.

They also live deeply.

And I can't say it's because of the octopus that I have such a strong interest in diving deep into submarines, but in any case, I like it.

It's like nothing you've ever done before.

If you want to get away from it all and see what you've never seen, and if you have a good chance of seeing something no one has seen, take a submarine.

They will throw you overboard as you board, seal the hatch, and switch on the scrubbers that provide a small amount of oxygen and remove carbon dioxide from the air you breathe.

go down. No connection to the ground except for some pretty funky radio.

And as you go down, the ground washer settles down.

and quiet down.

And it really starts to get better.

And as you go deeper, that beautiful blue water you washed up on is replaced by more and more dark blues.

And finally, it's rich lavender and ink-black as you go thousands of feet.

And now you've entered the realm of the middle-water community.

We could talk about the creatures that live in the middle waters entirely.

As far as I'm concerned, though, suffice it to say that the most bizarre designs and outrageous behaviors are, without a doubt, those that live in middle-class communities.

But we pass through this very region, which contains about 95 percent of the Earth's inhabited space, and then onto the Mid-Ocean Ridge, which I think is even more extraordinary.

Mid-ocean ridges are huge mountain ranges 40,000 miles long that meander across the globe.

And they are huge mountains, thousands and even tens of thousands of feet high, that break through the earth's surface to form islands like Hawaii.

And the crests of this mountain range are splitting to form a rift valley.

And when you dive into that rift valley, that's where the action takes place. Because literally thousands of active volcanoes are erupting at any given moment in this 40,000-mile range.

And as these crustal plates separate and magma, lava rises and fills in the gaps between them, we see land, new land, being created before our very eyes.

And there are 3,000 to 4,000 meters of water on top of them, creating enormous pressure, pushing water down through fissures towards the center of the Earth, eventually hitting magma chambers where they become superheated and supersaturated with minerals, begin to reverse the flow and jet to the surface, and are ejected out of the Earth like geysers in Yellowstone.

In fact, the whole area is like Yellowstone National Park with all the decorations.

And the temperature of this vent fluid is about 600 or 700 degrees.

The surrounding water is just a few degrees below freezing.

Therefore, it cools down quickly and can no longer hold all the dissolved material in suspension, causing it to precipitate and form black smoke.

And that forms these towers, chimneys ten, twenty, thirty feet high.

And the whole side of these chimneys shimmers with heat and is full of life.

Black smokers roam the streets, chimneys with tubeworms 8-10 feet long.

And from the top of this tube worm, there are beautiful red wings.

And living within the tangle of tubeworms is a whole animal community — shrimp, fish, lobsters, crabs, clams, and schools of arthropods — playing a perilous game here between scorching heat and freezing cold.

And this entire ecosystem was unknown until 33 years ago.

And it completely subverted science.

It has caused scientists to rethink where life on Earth really began.

And before the discovery of these vents, the sun and photosynthesis were believed to be the key to all life on Earth, life on Earth.

But there is no sun and no photosynthesis. It's powered by an underground chemosynthetic environment, and it's all very fleeting.

We may be able to photograph this incredible hydrothermal vent that we thought must be on another planet at the time.

It's amazing to think that this is actually on Earth. It looks like an alien in an alien environment.

But if you go back to the same vent eight years later, it might be dead dead.

There is no hot water.

The animals are all gone and dead, but the chimneys are still there, creating a really nice ghost town, a spooky spooky ghost town, but of course basically no animals.

But 10 miles down the ridge...

Push! Another volcano is coming.

And a whole new hydrothermal vent community is forming.

And the life and death of these hydrothermal vent communities repeats along the ridge every 30 to 40 years.

And the ephemeral nature of hydrothermal vent communities isn't all that different from some of the places I've seen in my 35 years of traveling and making movies.

A place where you can shoot some really great sequences on the bay.

And then you come back and I'm at home thinking, 'Okay, what shall I shoot...'.

ah! I know where I can shoot.

This beautiful bay has lots of soft corals and protopods. ”

And when you show up, it's dead.

No coral, no algae, and pea soup in the water.

"So what happened?" you think?

And I turn around and there's a hillside behind me, neighbors coming in, bulldozers pushing a mound of dirt back and forth.

And then there's the golf course.

And it's tropical here.

It's raining like crazy here.

So this rainwater runs down the hillsides, carrying dirt from construction sites, suffocating and killing corals.

And fertilizers and pesticides are running into the bay from the golf course. The pesticide kills all the larvae and small animals, and the fertilizer makes this beautiful plankton bloom. And then there is pea soup.

But reassuringly, I've seen the opposite.

I've been to a place that used to be a pretty trashy bay.

And I looked at it and just said 'yeah' and went to work on the other side of the island.

Five years later, when I returned again, the same bay was beautiful. beautiful.

There's live coral, fish everywhere, crystal clear water and you think, 'How did that happen?

Well, here's how it happened: the local community was revitalized.

They recognized what was happening on the hillside and stopped it. We passed legislation, made the necessary permits for responsible construction and golf course maintenance, stopped sediment runoff into the bay, stopped chemical runoff into the bay, and restored the bay.

The ocean has amazing resilience even when left alone.

I think Margaret Mead said it best.

She said a small group of thoughtful people can change the world.

Indeed, this is the only one that has ever existed.

And a small group of thoughtful people changed that bay.

I am a big fan of grassroots organizations.

I've attended many lectures, and one of the first questions that always comes up after a lecture is, "But, but what can I do?"

I am an individual I am alone too.

And these problems are so big, so global, so overwhelming. ”

Fair enough question.

My answer is to turn a blind eye to the world's big, overwhelming problems.

Look at your own backyard.

In fact, look inside your own heart.

What really bothers you that doesn't apply where you live?

and fix it.

Create a healing zone in your neighborhood and encourage others to do the same.

And perhaps these healing zones could scatter little dots on the map.

And indeed, the way we can communicate today is that Alaska could instantly know what was going on in China, Kiwi did this, and in England they tried...

And everyone is talking to other people. It's no longer an isolated dot on a map, it's the network we've created.

And perhaps these healing zones will begin to grow, possibly overlapping, and good things can happen.

So I will answer that question this way.

Look at your own backyard. Look in the mirror, actually.

What could be more responsible than what you are doing now?

Then do it and spread the word.

The animals in the fumarole region can't really do much about the life and death that's happening where they live, but here we can.

In theory, we think we are rational human beings.

And just as those people changed the health of that bay, we can change the behavior that affects and affects the environment.

Now, Sylvia's wish for the TED Award was to do whatever we could to beg us not to prick ourselves with needles but to set aside a vast ocean for preservation, a place we call "a place of hope."

And I applaud it. I applaud it loudly.

And it is my hope that some of these "places of hope" are in deep waters that have been seriously neglected historically, if not abused.

The term “deep 6” comes to mind. "If it's too big or too toxic to landfill, let it be Deep 6!"

Therefore, we also want to leave this "place of hope" in the deep sea.

I can't grant my wish now, but I can say with certainty that I will do whatever I can to support Sylvia Earle's wish.

And so am I.

thank you very much. (applause)

Genius playwright Adrian Kennedy wrote a book called People Led by My Play.

And if I were to write a book, it would be called 'The Artist Who Led My Exhibition'. Because my work has come about by following artists and finding out what they mean, what they do, and who they are, in understanding art and understanding culture.

J.J.'s songs from "Good Times" (applause) are important to many, of course, thanks to "Die No Might," but perhaps even more so as the first truly black artist to appear on primetime television.

Jean-Michel Basquiat is an important person to me. Because I was the first black artist who gave me real-time insight into who I was going to be and what I was going to do.

My whole project is about art, specifically black artists, and very generally how art can change the way we think about culture and ourselves.

I'm interested in artists who understand and rewrite history, think of themselves in the larger world story of art, yet create new places for us to see and understand.

Here are two artists, Glenn Lygon and Kara Walker. Two of the many artists really embodied the essential questions I wanted to ask the world as a curator.

I was interested in the idea of ​​how and why we can create new stories, new stories in art history, and new stories in the world.

To do that, I knew I had to look at the way artists work, understand the artist's studio as a laboratory, reinvent the museum as a think tank, and see the exhibition as the ultimate white paper, providing a space to imagine, ask questions, see and think about answers.

In 1994, when I was a curator at the Whitney Museum of American Art, I had an exhibition called "Black Male."

It focused on the intersection of race and gender in contemporary American art.

It sought to express how art can provide a space for dialogue, a complex dialogue, a dialogue with so many entrances, and how a museum can be a space for this contest of ideas.

The exhibition featured more than 20 artists of all ages and races, all looking at black masculinity from a very particular perspective.

What was important about this exhibition was how I got involved in my role as curator, as a catalyst for this dialogue.

One of the things that clearly happened in the course of this exhibition was that I was confronted with the idea of ​​how powerful images can be in helping people understand themselves and each other.

I will introduce two works by Leon Golub on the right and Robert Colscott on the left.

And during the exhibition it was controversial, controversial and ultimately life-changing for me about what art is. A woman approached me on the gallery floor and expressed concern about how powerful the images were and how we understood each other.

She then pointed to the work on the left and told me how problematic this image was as it relates to her idea of ​​how black people have been represented.

And she pointed to me the image on the right as an example of the kind of dignity that needs to be portrayed to counter these images in the media.

She then assigned a racial identity to these pieces, basically saying that the piece on the right was clearly made by a black artist and the piece on the left was clearly made by a white artist, but in reality it was the other way around. Bob Colescott, African-American artist. Leon Golub is a white artist.

The point for me was that in that space, in that moment, I really, above all, wanted to understand how images work, how images work, and how artists offer a larger space to process these images than we can imagine in our everyday lives.

Fast forward and you'll arrive in Harlem. Home to many blacks in America, it is truly the spiritual center of the black experience and where the Harlem Renaissance truly existed.

Harlem now is like describing and thinking about yourself, looking both past and future at this time of the century...

I always say that Harlem is an interesting community. Because, unlike many other places, Harlem thinks of past, present and future all at once. No one is talking about it so far.

It has always been in the past, and may always be in the future.

And when I think about it, my second project, the second question I ask, is can museums be catalysts for communities?

Can museums house artists and enable them to be agents of change as communities rethink themselves?

This is, in fact, Harlem on January 20th, and it thinks about itself in a very nice way.

So now I'm working at The Studio Museum in Harlem, thinking about exhibitions there and what it means to discover the possibilities of art.

Now what does this mean for you?

In some cases, I know many of you are involved in cross-cultural dialogue and ideas of creativity and innovation.

Think about the role an artist can play in that. That's the kind of nurturing and advocacy that I work with young Black artists.

Artists may be better at that than content providers, but still think of them as true catalysts.

The Studio Museum was founded in the late 60's.

I bring this up because it is important to place this practice in history.

To reflect on 1968 in its incredible historic moment, to think about the arc that has taken place since then, to consider the possibility of all of us standing in this position today and imagining this museum born out of a moment of mass protest, a museum focused on investigating the history and legacy of important African-American artists in our country's art history, including Jacob Lawrence, Norman Lewis, and Romea Bearden.

And, of course, to this day.

In 1975, Muhammad Ali lectured at Harvard University.

After his lecture, a student stood up and said to him, "Give me a poem."

And Muhammad Ali said, "I, we."

Deep statements about individuals and communities.

A space in my discovery project to think about artists and try to define what the 21st century black arts and culture movement is.

What that means for the cultural movement of this moment, “I, we” seems incredibly prescient and hugely important.

To this end, the tangible project that made this possible for me is a series of exhibitions, all with an 'F' (Freestyle, Frequency, Flow) in the title, aimed at discovering and defining young black artists who I feel strongly are working in this moment and will continue to do for years to come.

This series of exhibitions was specially put together to question the idea of ​​what it means to see art as a catalyst at this point in history. What it means now, at this point in history, when we define and redefine culture in general, especially black culture in my case.

I named this group of artists because I called the ideas I put out there "Post-Black," but really meant to define them as artists who are going back in time, historically starting at this moment, coming here and starting to work.

It is precisely in the sense of this discovery that I have new questions.

This new set of questions is, "What does it mean to be African American in America right now?"

What can a work of art say about this?

Where can a museum exist as a place where we all have this conversation?

Really, what excites me the most about this is thinking about the energy and excitement that young artists bring.

Their work, to me, has always been not just about the aesthetic innovations that they conceive in their heads, their visions generate and send out to the world, but perhaps more importantly, through the excitement of the community they create as the critical voices that enable us to make sense of what is happening now and in the future.

It always amazes me how the subject of race is brought up in places we would never have imagined.

It always amazes me how artists are willing to do that with their work.

That's why I turn to art.